

PROJECT MANUAL

FOR

**SHELBY COUNTY
WATER SERVICES
BUILDING PROJECT**

APRIL 17, 2023

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PROJECT MANUAL TABLE OF CONTENTS**

SECTION 00-0010 – Page 1 of 4

DIVISION 00 - PROCUREMENT AND CONTRACTING REQUIREMENTS

00 0010	Project Manual Table of Contents
00 0020	Index of Bid Documents
00 0030	Legal Advertisement
00 0040	General Conditions
00 0050	Supplementary Conditions
00 0200	Invitation to Bid
00 0201	Instructions to Bidders
00 0202	Bid Requirements
00 0300	Proposal Form and Bid Bond
00 1010	Project Summary
00 1020	Project Notes
00 1025	Cost Reporting and Payments
00 1026	Measurement and Payment
00 1028	Change Order Procedures
00 1200	Project Meetings
00 1310	Construction Schedules
00 1340	Shop Drawings, Product Data, Samples
00 1620	Storage and Protection
00 1700	Contract Closeout
00 1720	Project Record Documents
00 1740	Warranties and Bonds

Contract Documents and Forms

00 2000	Public Works Contract
00 2010	Debarment, Suspension and Other Responsibility Matters Certificate
00 2015	Performance and Materials Bond
00 2020	Certificate of Non-Segregated Facilities
00 2030	Notice of Award
00 2040	Notice to Proceed
00 2050	Change Order Form
00 2070	Advertisement of Completion
00 2080	C-23 Affidavit for Payment of Debts Incurred on Construction Projects
00 2090	Alabama Department of Revenue Sales Tax Notice

DIVISION 01 - GENERAL REQUIREMENTS

01 1100	Summary of Work
01 1150	Construction Documents
01 2500	Substitution Procedures
01 2519	Substitution Request Form
01 3216	Construction Progress Schedules
01 3233	Photographic Documentation
01 3300	Submittal Procedures
01 4000	Quality Requirements
01 4100	Structural Tests and Special Inspections
01 5000	Temporary Facilities and Controls
01 6000	Product Requirements
01 7123	Field Engineering

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PROJECT MANUAL TABLE OF CONTENTS**

SECTION 00-0010 – Page 2 of 4

01 7419	Construction Waste Management
01 7700	Closeout Procedures

DIVISION 02 – SITEWORK

02 010	Erosion and Sediment Control
02 230	Site Clearing
02 300	Earthwork
02 419	Selective Structure Demolition
02 444	Decorative Metal Fences and Gates
02 485	Vegetation Establishment
02 513	Asphalt Concrete Paving
02 520	Portland Cement Concrete Paving
02 525	Traffic Stripe

DIVISION 03 - CONCRETE

03 3000	Cast-in-Place Concrete
---------	------------------------

DIVISION 04 - MASONRY

04 0513	Masonry Mortaring
04 2000	Unit Masonry

DIVISION 05 - METALS

05 4000	Cold-Formed Metal Framing
05 5000	Metal Fabrications

DIVISION 06 - WOOD, PLASTICS AND COMPOSITES

06 1643	Gypsum Sheathing
06 4100	Architectural Wood Casework
06 4600	Wood Trim
06 6116	Solid Surfacing Fabrications

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 2115	Batt Insulation
07 2800	Moisture Barriers
07 4113	Metal Roof Panels
07 4213	Metal Wall Panels
07 6200	Sheet Metal Flashing and Trim
07 9200	Joint Sealers

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PROJECT MANUAL TABLE OF CONTENTS**

SECTION 00-0010 – Page 3 of 4

DIVISION 08 - OPENINGS

08 1113	Hollow Metal Doors and Frames
08 1416	Flush Wood Doors
08 3323	Overhead Coiling Doors
08 4113	Aluminum-Framed Entrances and Storefronts
08 7100	Door Hardware
08 8000	Glazing
08 9100	Louvers

DIVISION 09 - FINISHES

09 2200	Metal Support Assemblies
09 2900	Gypsum Board
09 3000	Tiling
09 5100	Acoustical Ceilings
09 6513	Resilient Base
09 6519	Resilient Tile Flooring
09 6813	Tile Carpeting
09 7200	Wall Coverings
09 9100	Painting

DIVISION 10 – SPECIALTIES

10 1423	Interior Panel Signs
10 1429	Dimensional Letters
10 2600	Wall and Door Protection
10 2813	Toilet Accessories
10 4413	Fire Extinguishers and Cabinets
10 5300	Sunshades / Solar Louvers

DIVISION 11 - EQUIPMENT

11 3100	Appliances and Equipment
---------	--------------------------

DIVISION 13 - SPECIAL CONSTRUCTION

13 3419	Metal Building Systems
---------	------------------------

DIVISION 22 – PLUMBING

22 0500	General Provisions
22 1000	Materials and Methods
22 1500	Thermal and Acoustical Insulation
22 2000	Plumbing Fixtures and Equipment

DIVISION 23 – HVAC

23 0500	General Provisions
---------	--------------------

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PROJECT MANUAL TABLE OF CONTENTS**

SECTION 00-0010 – Page 4 of 4

23 1000	Materials and Methods
23 1500	Thermal and Acoustical Insulation
23 5000	Heating and Air Conditioning Equipment and Specialties
23 6000	Air Distribution
23 7000	HVAC Testing and Balancing
23 8100	Building Automation System (BAS)

DIVISION 26 – ELECTRICAL

26 0500	Basic Electrical Materials and Methods
26 0519	Power Conductors and Cables
26 0526	Grounding
26 0533	Raceways
26 0534	Outlet Boxes, Junction Boxes, Wireways
26 0553	Electrical Identification
26 0573	Power Distribution System Electrical Studies
26 0944	Distributed Digital Lighting Management System
26 2416	Power Panelboards – Circuit Breaker Type
26 2417	Lighting Panelboards
26 2726	Wiring Devices
26 2816	Safety Switches and Fuses
26 4300	Surge Protective Devices
26 5000	Lighting Materials and Methods
27 0500	Auxiliary System Cables, 0-50V
27 1000	Structured Cabling Systems

END OF TABLE OF CONTENTS

SECTION 00-0020 – Page 1 of 1

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**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
LEGAL ADVERTISEMENT**

SECTION 00-0102 – Page 1 of 1

STATE OF ALABAMA

COUNTY OF SHELBY

LEGAL NOTICE

NOTICE TO CONTRACTORS

Sealed bids will be received at the Shelby County Manager's Office at 200 West College St. Room 123, Columbiana, AL 35051 for the Shelby County Water Services Building Project until Thursday, May 11, 2023 at 2:00 p.m. and at that time publicly opened.

Plans and specifications will be available at the Shelby County Facilities & General Services Office, 280 McDow Road Columbiana, AL 35051 after 12:00 noon on Monday, April 17, 2023.

Fee is \$100.00 which includes the cost of plans and specifications when picked up at the above office. No refunds will be made. Electronic copies of bid documents may be obtained by email at no charge. To obtain electronic copies, send request to rlcroy@shelbyal.com.

A mandatory pre-bid conference will be held at 10:00 a.m. on April 27th, 2023 at the Shelby County Administration Building, 200 West College Street, Columbiana, AL 35051.

Attendance at the Pre-Bid Conference IS REQUIRED for all General Contractor Bidders intending to submit a Proposal, and is highly recommended for Subcontractors. Bids from General Contractors not attending the Pre-Bid Conference will be rejected.

Please contact the Project Manager, Trey Gauntt, PE at trey@shelbyal.com with any questions regarding this project.

April 9, 2023
April 16, 2023
April 23, 2023

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 1 of 49

GENERAL CONDITIONS of the CONTRACT

CONTENTS

1. Definitions
2. Intent and Interpretation of the Contract Documents
3. Contractor's Representation
4. Supervision, Superintendent, & Employees
5. Review of Contract Documents and Field Conditions by Contractor
6. Submittals
7. Documents and Samples at the Site
8. "As-built" Documents
9. Progress Schedule
10. Equipment, Materials, & Substitutions
11. Safety & Protection of Persons & Property
12. Hazardous Materials
13. Inspection of the Work
14. Correction of Defective Work
15. Deductions for Uncorrected Work
16. Changes in the Work
17. Claims for Extra Cost or Extra Work
18. Differing Site Conditions
19. Claims for Damages
20. Delays
21. Owner's Right to Correct Defective Work
22. Progress Payments
23. Certification & Approvals for Payments
24. Payments Withheld
25. Substantial Completion
26. Occupancy or Use Prior to Completion
27. Final Payment
28. Contractor's Warranty
29. Insurance
30. Performance and Payment Bonds
31. Assignment
32. Construction by Owner or Separate Contracts
33. Subcontracts
34. Architect's Status
35. Cash Allowances
36. Permits, Laws and Regulations
37. Royalties, Patents and Copyrights
38. Use of the Site
39. Cutting and Patching
40. In-progress and Final Cleanup
41. Liquidated Damages

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 2 of 49

**ARTICLE 1
DEFINITIONS**

Whenever the following terms, or pronouns in place of them, are used in the Contract Documents, the intent and meaning shall be interpreted as follows:

ARCHITECT: The Architect is the person or entity lawfully licensed to practice architecture in the State of Alabama, who is under contract with the Owner as the primary design professional for the Project and identified as the Architect in the Construction Contract. The term “Architect” means the Architect or the Architect’s authorized representative. If the employment of the Architect is terminated, the Owner shall employ a new Architect whose status under the Contract Documents shall be that of the former Architect

CONTRACT: The Contract is the embodiment of the Contract Documents. The Contract represents the entire and integrated agreement between the Owner and Contractor and supersedes any prior written or oral negotiations, representations or agreements that are not incorporated into the Contract Documents. The Contract may be amended only by a Contract Change Order or a Modification to the Construction Contract. The contractual relationship which the Contract creates between the Owner and the Contractor extends to no other persons or entities.

DEFECTIVE WORK: The term “Defective Work” shall apply to: **(1)** any product, material, system, equipment, or service, or its installation or performance, which does not conform to the requirements of the Contract Documents, **(2)** in-progress or completed Work the workmanship of which does not conform to the quality specified or, if not specified, to the quality produced by skilled workers performing work of a similar nature on similar projects in the state, **(3)** substitutions and deviations not properly submitted and approved or otherwise authorized, **(4)** temporary supports, structures, or construction which will not produce the results required by the Contract Documents, and **(5)** materials or equipment rendered unsuitable for incorporation into the Work due to improper storage or protection.

DRAWINGS: The Drawings are the portions of the Contract Documents showing graphically the design, location, layout, and dimensions of the Work, in the form of plans, elevations, sections, details, schedules, and diagrams.

NOTICE TO PROCEED: A proceed order issued by the Owner or Director, as applicable, fixing the date on which the Contractor shall begin the prosecution of the Work, which is also the date on which the Contract Time shall begin.

OWNER: The Owner is the entity or entities identified as such in the Construction Contract and is referred to throughout the Contract Documents as if singular in number. The term “Owner” means the Owner or the Owner’s authorized representative. The term “Owner” as used herein shall be synonymous with the term “Awarding Authority” as defined and used in Title 39 - Public Works, Code of Alabama, 1975, as amended.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 3 of 49

THE PROJECT: The Project is the total construction of which the Work required by these Contract Documents may be the entirety or only a part with other portions to be constructed by the Owner or separate contractors.

PROJECT MANUAL: The Project Manual is the volume usually assembled for the Work which may include the Advertisement for Bids, Instructions to Bidders, sample forms, General Conditions of the Contract, Supplementary Conditions, and Specifications of the Work.

SPECIFICATIONS: The Specifications are that portion of the Contract Documents which set forth in writing the standards of quality and performance of products, equipment, materials, systems, and services and workmanship required for acceptable performance of the Work.

SUBCONTRACTOR: A Subcontractor is a person or entity who is undertaking the performance of any part of the Work by virtue of a contract with the Contractor. The term “Subcontractor” means a Subcontractor or its authorized representatives.

THE WORK: The Work is the construction and services required by the Contract Documents and includes all labor, materials, supplies, equipment, and other items and services as are necessary to produce the required construction and to fulfill the Contractor’s obligations under the Contract. The Work may constitute the entire Project or only a portion of it.

ARTICLE 2

INTENT and INTERPRETATION of the CONTRACT DOCUMENTS

INTENT

It is the intent of the Contract Documents that the Contractor shall properly execute and complete the Work described by the Contract Documents, and unless otherwise provided in the Contract, the Contractor shall provide all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work, in full accordance with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

COMPLEMENTARY DOCUMENTS

The Contract Documents are complementary. If Work is required by one Contract Document, the Contractor shall perform the Work as if it were required by all of the Contract Documents. However, the Contractor shall be required to perform Work only to the extent that is consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

ORDER of PRECEDENCE

Should any discrepancy arise between the various elements of the Contract Documents, Precedence shall be given to them in the following order unless to do so would contravene the apparent Intent of the Contract Documents stated in preceding Paragraph Titled INTENT:

(1) The Construction Contract.

(2) Addenda, with those of later date having precedence over those of earlier date.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 4 of 49

- (3)** Supplementary Conditions (or other Conditions which modify the General Conditions of the Contract).
- (4)** General Conditions of the Contract.
- (5)** The Specifications.
- (6)** Details appearing on the Drawings; large scale details shall take precedence over smaller scale details.
- (7)** The Drawings; large scale drawings shall take precedence over smaller scale drawings.

INTERPRETATION

- (1)** The Contract Documents shall be interpreted collectively, each part complementing the others and consistent with the Intent of the Contract Documents stated in preceding Paragraph Titled INTENT. Unless an item shown or described in the Contract Documents is specifically identified to be furnished or installed by the Owner or others or is identified as “Not In Contract” (“N.I.C.”), the Contractor’s obligation relative to that item shall be interpreted to include furnishing, assembling, installing, finishing, and/or connecting the item at the Contractor’s expense to produce a product or system that is complete, appropriately tested, and in operative condition ready for use or subsequent construction or operation of the Owner or separate contractors. The omission of words or phrases for brevity of the Contract Documents, the inadvertent omission of words or phrases, or obvious typographical or written errors shall not defeat such interpretation as long as it is reasonably inferable from the Contract Documents as a whole.
- (2)** Words or phrases used in the Contract Documents which have well-known technical or construction industry meanings are to be interpreted consistent with such recognized meanings unless otherwise indicated.
- (3)** Except as noted otherwise, references to standard specifications or publications of associations, bureaus, or organizations shall mean the latest edition of the referenced standard specification or publication as of the date of the Advertisement for Bids.
- (4)** In the case of inconsistency between Drawings and Specifications or within either document not clarified by addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect’s interpretation.
- (5)** Generally, portions of the Contract Documents written in longhand take precedence over typed portions, and typed portions take precedence over printed portions.
- (6)** Any doubt as to the meaning of the Contract Documents or any obscurity as to the wording of them, shall be promptly submitted in writing to the Architect for written interpretation, explanation, or clarification.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 5 of 49

SEVERABILITY

The partial or complete invalidity of any one or more provision of this Contract shall not affect the validity or continuing force and effect of any other provision.

**ARTICLE 3
CONTRACTOR'S REPRESENTATIONS**

By executing the Construction Contract the Contractor represents to the Owner:

- A.** The Contractor has visited the site of the Work to become familiar with local conditions under which the Work is to be performed and to evaluate reasonably observable conditions as compared with requirements of the Contract Documents.
- B.** The Contractor shall use its best skill and attention to perform the Work in an expeditious manner consistent with the Contract Documents.
- C.** The Contractor is an independent contractor and in performance of the Contract remains and shall act as an independent contractor having no authority to represent or obligate the Owner in any manner unless authorized by the Owner in writing.

**ARTICLE 4
SUPERVISION, SUPERINTENDENT, and EMPLOYEES**

A.SUPERVISION and CONSTRUCTION METHODS

- (1)** The term "Construction Methods" means the construction means, methods, techniques, sequences, and procedures utilized by the Contractor in performing the Work. The Contractor is solely responsible for supervising and coordinating the performance of the Work, including the selection of Construction Methods, unless the Contract Documents give other specific instructions concerning these matters.
- (2)** The Contractor is solely and completely responsible for job site safety, including the protection of persons and property.
- (3)** The Contractor shall be responsible to the Owner for acts and omissions of not only the Contractor and its agents and employees, but all persons and entities, and their agents and employees, who are performing portions of the Work for or on behalf of the Contractor or any of its Subcontractors.
- (4)** The Contractor shall be responsible to inspect the in-progress and completed Work to verify its compliance with the Contract Documents and to insure that any element or portion of the Work upon which subsequent Work is to be applied or performed is in proper condition to receive the subsequent Work.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 6 of 49

B. SUPERINTENDENT

(1) The Contractor shall employ and maintain a competent level of supervision for the performance of the Work at the Project site, including a superintendent who shall: (a) have full authority to receive instructions from the Architect or Owner and to act on those instructions and (b) be present at the Project site at all times during which Work is being performed.

(2) Before beginning performance of the Work, the Contractor shall notify the Architect in writing of the name and qualifications of its proposed superintendent so that the Owner may review the individual's qualifications. If, for reasonable cause, the Owner refuses to approve the individual, or withdraws its approval after once giving it, the Contractor shall name a different superintendent for the Owner's review and approval. Any disapproved superintendent will not perform in that capacity thereafter at the Project site.

C. EMPLOYEES

The Contractor shall permit only fit and skilled persons to perform the Work. The Contractor shall enforce safety procedures, strict discipline, and good order among persons performing the Work. The Contractor will remove from its employment on the Project any person who deliberately or persistently produces non-conforming Work or who fails or refuses to conform to reasonable rules of personal conduct contained in the Contract Documents or implemented by the Owner and delivered to the Contractor in writing during the course of the Work.

ARTICLE 5

REVIEW of CONTRACT DOCUMENTS and FIELD CONDITIONS by CONTRACTOR

A. In order to facilitate assembly and installation of the Work in accordance with the Contract Documents, before starting each portion of the Work, the Contractor shall examine and compare the relevant Contract Documents, and compare them to relevant field measurements made by the Contractor and any conditions at the site affecting that portion of the Work.

B. If the Contractor discovers any errors, omissions, or inconsistencies in the Contract Documents, the Contractor shall promptly report them to the Architect as a written request for information that includes a detailed statement identifying the specific Drawings or Specifications that are in need of clarification and the error, omission, or inconsistency discovered in them.

(1) The Contractor shall not be expected to act as a licensed design professional and ascertain whether the Contract Documents comply with applicable laws, statutes, ordinances, building codes, and rules and regulations, but the Contractor shall be obligated to promptly notify the Architect of any such noncompliance discovered by or made known to the Contractor. If the Contractor performs Work without fulfilling this notification obligation, the Contractor shall pay the resulting costs and damages that would have been avoided by such notification.

(2) The Contractor shall not be liable to the Owner for errors, omissions, or inconsistencies that may exist in the Contract Documents, or between the Contract Documents

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 7 of 49

and conditions at the site, unless the Contractor knowingly fails to report a discovered error, omission, or inconsistency to the Architect, in which case the Contractor shall pay the resulting costs and damages that would have been avoided by such notification.

C. If the Contractor considers the Architect's response to a request for information to constitute a change to the Contract Documents involving additional costs and/or time, the Contractor shall follow the procedures prescribed herein.

D. If, with undue frequency, the Contractor requests information that is obtainable through reasonable examination and comparison of the Contract Documents, site conditions, and previous correspondence, interpretations, or clarifications, the Contractor shall be liable to the Owner for reasonable charges from the Architect for the additional services required to review, research, and respond to such requests for information.

**ARTICLE 6
SUBMITTALS**

A. Where required by the Contract Documents, the Contractor shall submit shop drawings, product data, samples and other information (hereinafter referred to as Submittals) to the Architect for the purpose of demonstrating the way by which the Contractor proposes to conform to the requirements of the Contract Documents. Submittals which are not required by the Contract Documents may be returned by the Architect without action.

B. The Contractor shall be responsible to the Owner for the accuracy of its Submittals and the conformity of its submitted information to the requirements of the Contract Documents. Each Submittal shall bear the Contractor's approval, evidencing that the Contractor has reviewed and found the information to be in compliance with the requirements of the Contract Documents. Submittals which are not marked as reviewed and approved by the Contractor may be returned by the Architect without action.

C. The Contractor shall prepare and deliver its submittals to the Architect sufficiently in advance of construction requirements and in a sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. In coordinating the Submittal process with its construction schedule, the Contractor shall allow sufficient time to permit adequate review by the Architect.

D. By approving a Submittal the Contractor represents not only that the element of Work presented in the Submittal complies with the requirements of the Contract Documents, but also that the Contractor has:

- (1) found the layout and/or dimensions in the Submittal to be comparable with those in the Contract Documents and other relevant Submittals and has made field measurements as necessary to verify their accuracy, and

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 8 of 49

determined that products, materials, systems, equipment and/or procedures presented in the Submittal are compatible with those presented, or being presented, in other relevant Submittals and with the Contractor's intended Construction Methods.

E. The Contractor shall not fabricate or perform any portion of the Work for which the Contract Documents require Submittals until the respective Submittals have been approved by the Architect.

F. In the case of a resubmission, the Contractor shall direct specific attention to all revisions in a Submittal. The Architect's approval of a resubmission shall not apply to any revisions that were not brought to the Architect's attention.

G. If the Contract Documents specify that a Submittal is to be prepared and sealed by a registered architect or licensed engineer retained by the Contractor, all drawings, calculations, specifications, and certifications of the Submittal shall bear the Alabama seal of registration and signature of the registered/licensed design professional who prepared them or under whose supervision they were prepared. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of such a Submittal, provided that all performance and design criteria that such Submittal must satisfy are sufficiently specified in the Contract Documents. The Architect will review, approve or take other appropriate action on such a Submittal only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance or design criteria specified in the Contract Documents.

H. DEVIATIONS

(1) The Architect is authorized by the Owner to approve "minor" deviations from the requirements of the Contract Documents. "Minor" deviations are defined as those which are in the interest of the Owner, do not materially alter the quality or performance of the finished Work, and do not affect the cost or time of performance of the Work. Deviations which are not "minor" may be authorized only by the Owner through the Change Order procedures.

(2) Any deviation from the requirements of the Contract Documents contained in a Submittal shall be clearly identified as a "Deviation from Contract Requirements" (or by similar language) within the Submittal and, in a letter transmitting the Submittal to the Architect, the Contractor shall direct the Architect's attention to, and request specific approval of, the deviation. Otherwise, the Architect's approval of a Submittal does not constitute approval of deviations from the requirements of the Contract Documents contained in the Submittal.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 9 of 49

(3) The Contractor shall bear all costs and expenses of any changes to the Work, changes to work performed by the Owner or separate contractors, or additional services by the Architect required to accommodate an approved deviation unless the Contractor has specifically informed the Architect in writing of the required changes and a Change Order has been issued authorizing the deviation and accounting for such resulting changes and costs.

I. ARCHITECT’S REVIEW and APPROVAL

(1) The Architect will review the Contractor’s Submittals for conformance with requirements of, and the design concept expressed in, the Contract Documents and will approve or take other appropriate action upon them. This review is not intended to verify the accuracy and completeness of details such as dimensions and quantities nor to substantiate installation instructions or performance of equipment or systems, all of which remain the responsibility of the Contractor. However, the Architect shall advise the Contractor of any errors or omissions which the Architect may detect during this review. The Architect’s approval of a specific item shall not indicate approval of an assembly of which the item is a component.

(2) The Architect will review and respond to all Submittals with reasonable promptness to avoid delay in the Work or in the activities of the Owner, Contractor or separate contractors, while allowing sufficient time to permit adequate review.

(3) No corrections or changes to Submittals indicated by the Architect will be considered as authorizations to perform Extra Work. If the Contractor considers such correction or change of a Submittal to require Work which differs from the requirements of the Contract Documents, the Contractor shall promptly notify the Architect in writing in accordance with Article, Claims for Extra Cost or Extra Work.

J. CONFORMANCE with SUBMITTALS

The Work shall be constructed in accordance with approved Submittals.

**ARTICLE 7
DOCUMENTS and SAMPLES at the SITE**

A. “AS ISSUED” SET

The Contractor shall maintain at the Project site, in good order, at least one copy of all Addenda, Change Orders, supplemental drawings, written directives and clarifications, and approved Submittals intact as issued, and an updated construction schedule.

B. “POSTED” SET

The Contractor shall maintain at the Project site, in good order, at least one set of the Drawings and Project Manual into which the Contractor has “posted”(incorporated) all Addenda, Change Orders, supplemental drawings, clarifications, and other information pertinent to the proper

performance of the Work. The Contractor shall assure that all sets of the Drawings and Project Manuals being used by the Contractor, Subcontractors, and suppliers are “posted” with the current information to insure that updated Contract Documents are used for performance of the Work.

C. RECORD SET

One set of the Drawings and Project Manual described in Paragraph B shall be the Contractor’s record set in which the Contractor shall record all field changes, corrections, selections, final locations, and other information as will be duplicated on the “As-built” documents. The Contractor shall record such “as-built” information in its record set as it becomes available through progress of the Work. The Contractor’s performance of this requirement shall be subject to confirmation by the Architect at any time as a prerequisite to approval of Progress Payments.

D. The documents and samples required by this Article to be maintained at the Project site shall be readily available to the Architect, Owner, and their representatives.

**ARTICLE 8
“AS-BUILT” DOCUMENTS**

A. Unless otherwise provided in the Contract Documents, the Contractor shall deliver two (2) sets of “As-built” documents, as described herein, to the Architect for submission to the Owner upon completion of the Work. Each set of “As-built” documents shall consist of a copy of the Drawings and Project Manual, in like-new condition, into which the Contractor has neatly incorporated all Addenda, Change Orders, supplemental drawings, clarifications, field changes, corrections, selections, actual locations of underground utilities, and other information as required herein or specified elsewhere in the Contract Documents.

B. The Contractor shall use the following methods for incorporating information into the “As-built” documents:

1. Drawings

(a) To the greatest extent practicable, information shall be carefully drawn and lettered, in ink, on the Drawings in the form of sketches, details, plans, notes, and dimensions as required to provide a fully dimensioned record of the Work. When required for clarity, sketches, details, or partial plans shall be drawn on supplemental sheets and bound into the Drawings and referenced on the drawing being revised.

(b) Where a revised drawing has been furnished by the Architect, the drawing of latest date shall be bound into the Drawings in the place of the superseded drawing.

(c) Where a supplemental drawing has been furnished by the Architect, the supplemental drawing shall be bound into the Drawings in an appropriate location and referred to by note added to the drawing being supplemented.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 11 of 49

(d) Where the Architect has furnished details, partial plans, or lengthy notes of which it would be impractical for the Contractor to redraw or letter on a drawing, such information may be affixed to the appropriate drawing with transparent tape if space is available on the drawing.

(e) Any entry of information made in the Drawings that is the result of an Addendum or Change Order, shall identify the Addendum or Change Order from which it originated.

2. Project Manual

(a) A copy of all Addenda and Change Orders, excluding drawings thereof, shall be bound in the front of the Project Manual.

(b) Where a document, form, or entire specification section is revised, the latest issue shall be bound into the Project Manual in the place of the superseded issue.

(c) Where information within a specification section is revised, the deleted or revised information shall be drawn through in ink and an adjacent note added identifying the Addendum or Change Order containing the revised information.

C. Within ten days after the Date of Substantial Completion of the Work, or the last completed portion of the Work, the Contractor shall submit the “As-built” documents to the Architect for approval. If the Architect requires that any corrections be made, the documents will be returned in a reasonable time for correction and resubmission.

**ARTICLE 9
PROGRESS SCHEDULE**

A. The Contractor shall within fifteen days after the date of commencement stated in the Notice to Proceed, or such other time as may be provided in the Contract Documents, prepare and submit to the Architect for review and approval a practicable construction schedule informing the Architect and Owner of the order in which the Contractor plans to carry on the Work within the Contract Time. The Architect’s review and approval of the Contractor’s construction schedule shall be only for compliance with the specified format, Contract Time, and suitability for monitoring progress of the Work and shall not be construed as a representation that the Architect has analyzed the schedule to form opinions of sequences or durations of time represented in the schedule.

B. At the end of each month the Contractor shall enter the actual percentage of completion on the construction schedule submit two copies to the Architect, and attach one copy to each copy of the monthly Application for Payment. The construction schedule shall be revised to reflect any agreed extensions of the Contract Time or as required by conditions of the Work.

C. The Contractor’s construction schedule shall be used by the Contractor, Architect, and Owner to determine the adequacy of the Contractor’s progress. The Contractor shall be responsible for maintaining progress in accordance with the currently approved construction schedule and shall increase the number of shifts, and/or overtime operations, days of work,

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 12 of 49

and/or the amount of construction plant and equipment as may be necessary to do so. If the Contractor's progress falls materially behind the currently approved construction schedule and, in the opinion of the Architect or Owner, the Contractor is not taking sufficient steps to regain schedule, the Architect may, with the Owner's concurrence, issue a Contractor a Notice to Cure. In such a Notice to Cure the Architect may require the Contractor to submit such supplementary or revised construction schedules as may be deemed necessary to demonstrate the manner in which schedule will be regained.

**ARTICLE 10
EQUIPMENT, MATERIALS, and SUBSTITUTIONS**

A. Every part of the Work shall be executed in a workmanlike manner in accordance with the Contract Documents and approved Submittals. All materials used in the Work shall be furnished in sufficient quantities to facilitate the proper and expeditious execution of the Work and shall be new except such materials as may be expressly provided or allowed in the Contract Documents to be otherwise.

B. Whenever a product, material, system, item of equipment, or service is identified in the Contract Documents by reference to a trade name, manufacturer's name, model number, etc.(hereinafter referred to as "source"), and only one or two sources are listed, or three or more sources are listed and followed by "or approved equal" or similar wording, it is intended to establish a required standard of performance, design, and quality, and the Contractor may submit, for the Architect's approval, products, materials, systems, equipment, or services of other sources which the Contractor can prove to the Architect's satisfaction are equal to, or exceed, the standard of performance, design and quality specified, unless the provisions of Paragraph D below apply. Such proposed substitutions are not to be purchased or installed without the Architect's written approval of the substitution.

C. If the Contract Documents identify three or more sources for a product, material, system, item of equipment or service to be used and the list of sources is not followed by "or approved equal" or similar wording, the Contractor may make substitution only after evaluation by the Architect and execution of an appropriate Contract Change Order.

D. If the Contract Documents identify only one source and expressly provide that it is an approved sole source for the product, material, system, item of equipment, or service, the Contractor must furnish the identified sole source.

**ARTICLE 11
SAFETY and PROTECTION of PERSONS and PROPERTY**

A. The Contractor shall be solely and completely responsible for conditions at the Project site, including safety of all persons (including employees) and property. The Contractor shall create, maintain, and supervise conditions and programs to facilitate and promote safe execution of the Work, and shall supervise the Work with the attention and skill required to assure its safe performance. Safety provisions shall conform to OSHA requirements and all other federal, state,

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 13 of 49

county, and local laws, ordinances, codes, and regulations. Where any of these are in conflict, the more stringent requirement shall be followed. Nothing contained in this Contract shall be construed to mean that the Owner has employed the Architect nor has the Architect employed its consultants to administer, supervise, inspect, or take action regarding safety programs or conditions at the Project site.

B. The Contractor shall employ Construction Methods, safety precautions, and protective measures that will reasonably prevent damage, injury or loss to:

(1) workers and other persons on the Project site and in adjacent and other areas that may be affected by the Contractor's operations;

(2) the Work and materials and equipment to be incorporated into the Work and stored by the Contractor on or off the Project site; and

(3) other property on, or adjacent to, the Project site, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and other improvements not designated in the Contract Documents to be removed, relocated, or replaced.

C. The Contractor shall be responsible for the prompt remedy of damage and loss to property, including the filing of appropriate insurance claims, caused in whole or in part by the fault or negligence of the Contractor, a Subcontractor, or anyone for whose acts they may be liable.

D. The Contractor shall comply with and give notices required by applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety and protection of persons or property, including without limitation notices to adjoining property owners of excavation or other construction activities that potentially could cause damage or injury to adjoining property or persons thereon.

E. The Contractor shall erect and maintain barriers, danger signs, and any other reasonable safeguards and warnings against hazards as may be required for safety and protection during performance of the Contract and shall notify owners and users of adjacent sites and utilities of conditions that may exist or arise which may jeopardize their safety.

F. If use or storage of explosives or other hazardous materials or equipment or unusual Construction Methods are necessary for execution of the Work, the Contractor shall exercise commensurate care and employ supervisors and workers properly qualified to perform such activity.

G. The Contractor shall furnish a qualified safety representative at the Project site whose duties shall include the prevention of accidents. The safety representative shall be the Contractor's superintendent, unless the Contractor assigns this duty to another responsible member of its on-site staff and notifies the Owner and Architect in writing of such assignment.

H. The Contractor shall not permit a load to be applied, or forces introduced, to any part of the construction or site that may cause damage to the construction or site or endanger safety of the construction, site, or persons on or near the site.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 14 of 49

I. The Contractor shall have the right to act as it deems appropriate in emergency situations jeopardizing life or property. The Contractor shall be entitled to equitable adjustment of the Contract Sum or Contract Time for its efforts expended for the sole benefit of the Owner in an Emergency.

J. The duty of the Architect and the Architect's consultants to visit the Project site to conduct periodic inspections of the Work or for other purposes shall not give rise to a duty to review or approve the adequacy of the Contractor's safety program, safety supervisor, or any safety measure which Contractor takes or fails to take in, on, or near the Project site.

**ARTICLE 12
HAZARDOUS MATERIALS**

A. A Hazardous Material is any substance or material identified as hazardous under any federal, state, or local law or regulation, or any other substance or material which may be considered hazardous or otherwise subject to statutory or regulatory requirements governing its handling, disposal, and/or clean-up. Existing Hazardous Materials are Hazardous Materials discovered at the Project site and not introduced to the Project site by the Contractor, a Subcontractor, or anyone for whose acts they may be liable.

B. If, during the performance of the Work, the Contractor encounters a suspected Existing Hazardous Material, the Contractor shall immediately stop work in the affected area, take measures appropriate to the condition to keep people away from the suspected Existing Hazardous Material, and immediately notify the Architect and Owner of the condition in writing.

C. The Owner shall obtain the services of an independent laboratory or professional consultant, appropriately licensed and qualified, to determine whether the suspected material is a Hazardous Material requiring abatement and, if so, to certify after its abatement that it has been rendered harmless. Any abatement of Existing Hazardous Materials will be the responsibility of the Owner. The Owner will advise the Contractor in writing of the persons or entities who will determine the nature of the suspected material and those who will, if necessary, perform the abatement. The Owner will not employ persons or entities to perform these services to whom the Contractor or Architect has reasonable objection.

D. After certification by the Owner's independent laboratory or professional consultant that the material is harmless or has been rendered harmless, work in the affected area shall resume upon written agreement between the Owner and Contractor. If the material is found to be an Existing Hazardous Material and the Contractor incurs additional cost or delay due to the presence and abatement of the material, the Contract Sum and/or Contract Time shall be appropriately adjusted by a Contract Change Order.

E. The Owner shall not be responsible for Hazardous Materials introduced to the Project site by the Contractor, a Subcontractor, or anyone for whose acts they may be liable unless such Hazardous Materials were required by the Contract Documents.

**ARTICLE 13
INSPECTION of the WORK**

A. GENERAL

(1) The Contractor is solely responsible for the Work's compliance with the Contract Documents; therefore, the Contractor shall be responsible to inspect in-progress and completed Work, and shall verify its compliance with the Contract Documents and that any element or portion of the Work upon which subsequent Work is to be applied or performed is in proper condition to receive the subsequent Work. Neither the presence nor absence of inspections by the Architect, Owner, any public authority having jurisdiction, or their representatives shall relieve the Contractor of responsibility to inspect the Work, for responsibility for Construction Methods and safety precautions and programs in connection with the Work, or from any other requirement of the Contract Documents.

(2) The Architect, Owner, Director, any public authority having jurisdiction, and their representatives shall have access at all times to the Work for inspection whenever it is in preparation or progress, and the Contractor shall provide proper facilities for such access and inspection. All materials, workmanship, processes of manufacture, and methods of construction, if not otherwise stipulated in the Contract Documents, shall be subject to inspection, examination, and test at any and all places where such manufacture and/or construction are being carried on. Such inspections will not unreasonably interfere with the Contractor's operations.

(3) The Architect will inspect the Work as a representative of the Owner.

(4) The Contractor may be charged by the Owner for any extra cost of inspection incurred by the Owner or Architect on account of material and workmanship not being ready at the time of inspection set by the Contractor.

B. TYPES of INSPECTIONS

(1) **SCHEDULED INSPECTIONS and CONFERENCES.** Scheduled Inspections and Conferences are conducted by the Architect, scheduled by the Architect in coordination with the Contractor and are attended by the Contractor and applicable Subcontractors, suppliers and manufacturers. Scheduled Inspections and Conferences of this Contract include:

(a) **Pre-construction Conference.**

(b) **Pre-roofing Conference** (not applicable if the Contract involves no roofing work)

(c) **Above Ceiling Inspection(s):** An above ceiling inspection of all spaces in the building is required before the ceiling material is installed. Above ceiling inspections are to be conducted at a time when all above ceiling systems are complete and tested to the greatest extent reasonable pending installation of the ceiling material. System identifications and

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 16 of 49

markings are to be complete. All fire-rated construction including fire-stopping of penetrations and specified identification above the ceiling shall be complete. Ceiling framing and suspension systems shall be complete with lights, grilles and diffusers, access panels, fire protection drops for sprinkler heads, etc., installed in their final locations to the greatest extent reasonable. Above ceiling framing to support ceiling mounted equipment shall be complete. The above ceiling construction shall be complete to the extent that after the inspection the ceiling material can be installed without disturbance.

(d) Final Inspection(s): A Final Inspection shall establish that the Work, or a designated portion of the Work, is Substantially Complete and is accepted by the Architect, and Owner, as being ready for the Owner's occupancy or use. At the conclusion of this inspection, items requiring correction or completion ("punch list" items) shall be minimal and require only a short period of time for accomplishment to establish Final Acceptance of the Work. If the Work, or designated portion of the Work, includes the installation, or modification, of a fire alarm system or other life safety systems essential to occupancy, such systems shall have been tested and appropriately certified before the Final Inspection.

(e) Year-end Inspection(s): An inspection of the Work, or each separately completed portion thereof, is required near the end of the Contractor's one year warranty period(s). The subsequent delivery of the Architect's report of this inspection will serve as confirmation that the Contractor was notified of Defective Work found within the warranty period.

(2) PERIODIC INSPECTIONS. Periodic Inspections are conducted throughout the course of the Work by the Architect, the Architect's consultants, and their representatives, jointly or independently, with or without advance notice to the Contractor.

(3) SPECIFIED INSPECTIONS and TESTS. Specified Inspections and Tests include inspections, tests, demonstrations, and approvals that are either specified in the Contract Documents or required by laws, ordinances, rules, regulations, or orders of public authorities having jurisdiction, to be performed by the Contractor, one of its Subcontractors, or an independent testing laboratory or firm (whether paid for by the Contractor or Owner).

C. INSPECTIONS by the ARCHITECT

(1) The Architect is not authorized to revoke, alter, relax, or waive any requirements of the Contract Documents (other than "minor" deviations and "minor" changes) to finally approve or accept any portion of the Work or to issue instructions contrary to the Contract Documents without concurrence of the Owner.

(2) The Architect will visit the site at intervals appropriate to the stage of the Contractor's operations and as otherwise necessary to:

(a) become generally familiar with the in-progress and completed Work and the quality of the Work,

(b) determine whether the Work is progressing in general accordance with the Contractor's schedule and is likely to be completed within the Contract Time,

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 17 of 49

(c) visually compare readily accessible elements of the Work to the requirements of the Contract Documents to determine, in general, if the Contractor's performance of the Work indicates that the Work will conform to the requirements of the Contract Documents when completed,

(d) endeavor to guard the Owner against Defective Work,

(e) review and address with the Contractor any problems in implementing the requirements of the Contract Documents that the Contractor may have encountered, and

(f) keep the Owner fully informed about the Project.

(3) The Architect shall have the authority to reject Defective Work or require its correction, but shall not be required to make exhaustive investigations or examinations of the in-progress or completed portions of the Work to expose the presence of Defective Work. However, it shall be an obligation of the Architect to report in writing, to the Owner, and Contractor any Defective Work recognized by the Architect.

(4) The Architect shall have the authority to require the Contractor to stop work only when, in the Architect's reasonable opinion, such stoppage is necessary to avoid Defective Work. The Architect shall not be liable to the Contractor or Owner for the consequences of any decisions made by the Architect in good faith either to exercise or not to exercise this authority.

(5) "Inspections by the Architect" includes appropriate inspections by the Architect's consultants as dictated by their respective disciplines of design and the stage of the Contractor's operations.

D. UNCOVERING WORK

(1) If the Contractor covers a portion of the Work before it is examined by the Architect and this is contrary to the Architect's request or specific requirements in the Contract Documents, then, upon written request of the Architect, the Work must be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

(2) Without a prior request or specific requirement that Work be examined by the Architect before it is covered, the Architect may request that Work be uncovered for examination and the Contractor shall uncover it. If the Work is in accordance with the Contract Documents, the Contract Sum shall be equitably adjusted to compensate the Contractor for the costs of uncovering and replacement. If the Work is not in accordance with the Contract Documents, uncovering, correction, and replacement shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

E. SPECIFIED INSPECTIONS and TESTS

(1) The Contractor shall schedule and coordinate Specified Inspections and Tests to be made at appropriate times so as not to delay the progress of the Work or the work of the Owner or separate contractors. If the Contract Documents require that a Specified Inspection or Test be witnessed or attended by the Architect or Architect's consultant, the Contractor shall give the

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 18 of 49

Architect timely notice of the time and place of the Specified Inspection or Test. If a Specified Inspection or Test reveals that Work is not in compliance with requirements of the Contract Documents, the Contractor shall bear the costs of correction, repeating the Specified Inspection or Test, and any related costs incurred by the Owner, including reasonable charges, if any, by the Architect for additional services. Through appropriate Contract Change Order the Owner shall bear costs of tests, inspections or approvals which become Contract requirements subsequent to the receipt of bids.

(2) If the Architect, Owner, or public authority having jurisdiction determines that inspections, tests, demonstrations, or approvals in addition to Specified Inspections and Tests are required, the Contractor shall, upon written instruction from the Architect, arrange for their performance by an entity acceptable to the Owner, giving timely notice to the architect of the time and place of their performance. Related costs shall be borne by the Owner unless the procedures reveal that Work is not in compliance with requirements of the Contract Documents, in which case the Contractor shall bear the costs of correction, repeating the procedures, and any related costs incurred by the Owner, including reasonable charges, if any, by the Architect for additional services.

(3) Unless otherwise required by the Contract Documents, required certificates of Specified Inspections and Tests shall be secured by the Contractor and promptly delivered to the Architect.

(4) Failure of any materials to pass Specified Inspections and Tests will be sufficient cause for refusal to consider any further samples of the same brand or make of that material for use in the Work.

**ARTICLE 14
CORRECTION of DEFECTIVE WORK**

A. The Contractor shall, at the Contractor's expense, promptly correct Defective Work rejected by the Architect or which otherwise becomes known to the Contractor, removing the rejected or nonconforming materials and construction from the project site.

B. Correction of Defective Work shall be performed in such a timely manner as will avoid delay of completion, use, or occupancy of the Work and the work of the Owner and separate contractors.

C. The Contractor shall bear all expenses related to the correction of Defective Work, including but not limited to: **(1)** additional testing and inspections, including repeating Specified Inspections and Tests, **(2)** reasonable services and expenses of the Architect, and **(3)** the expense of making good all work of the Contractor, Owner, or separate contractors destroyed or damaged by the correction of Defective Work.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 19 of 49

**ARTICLE 15
DEDUCTIONS for UNCORRECTED WORK**

If the Owner deems it advisable and in the Owner's interest to accept Defective Work, the Owner may allow part or all of such Work to remain in place, provided an equitable deduction from the Contract Sum, acceptable to the Owner, is offered by the Contractor.

**ARTICLE 16
CHANGES in the WORK**

A. GENERAL

(1) The Owner may at any time direct the Contractor to make changes in the Work which are within the general scope of the Contract, including changes in the Drawings, Specifications, or other portions of the Contract Documents to add, delete, or otherwise revise portions of the Work. The Architect is authorized by the Owner to direct "minor" changes in the Work by written order to the Contractor. "Minor" changes in the Work are defined as those which are in the interest of the Owner, do not materially alter the quality or performance of the finished Work, and do not affect the cost or time of performance of the Work. Changes in the Work which are not "minor" may be authorized only by the Owner.

(2) If the Owner directs a change in the Work, the change shall be incorporated into the Contract by a Contract Change Order prepared by the Architect and signed by the Contractor, Owner, and other signatories to the Construction Contract, stating their agreement upon the change or changes in the Work and the adjustments, if any, in the Contract Sum and the Contract Time.

(3) Subject to compliance with Alabama's Public Works Law, the Owner may, upon agreement by the Contractor, incorporate previously unawarded bid alternates into the Contract.

(4) In the event of a claim or dispute as to the appropriate adjustment to the Contract Sum or Contract Time due to a directive to make changes in the Work, the Work shall proceed as provided in this article subject to subsequent agreement of the parties or final resolution of the dispute.

(5) Consent of surety will be obtained for all Contract Change Orders involving an increase in the Contract Sum.

(6) Changes in the Work shall be performed under applicable provisions of the Contract Documents and the Contractor shall proceed promptly to perform changes in the Work, unless otherwise directed by the Owner through the Architect.

B. DETERMINATION of ADJUSTMENT of the CONTRACT SUM

The adjustment of the Contract Sum resulting from a change in the Work shall be determined by one of the following methods, or a combination thereof, as selected by the Owner:

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 20 of 49

(1) Lump Sum. By mutual agreement to a lump sum based on or negotiated from an itemized cost proposal from the Contractor. Additions to the Contract Sum shall include the Contractor's direct costs plus a maximum 15% markup for overhead and profit. Where subcontract work is involved the total mark-up for the Contractor and a Subcontractor shall not exceed 25%. No allowance for overhead and profit shall be figured on a change which involves a net credit to the Owner. For the purposes of this method of determining an adjustment of the Contract Sum, "overhead" shall cover the Contractor's indirect costs of the change, such as the cost of bonds, superintendent and other job office personnel, watchman, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

(2) Unit Price. By application of Unit Prices included in the Contract or subsequently agreed to by the parties. However, if the character or quantity originally contemplated is materially changed so that application of such unit price to quantities of Work proposed will cause substantial inequity to either party, the applicable unit price shall be equitably adjusted.

(3) Force Account. By directing the Contractor to proceed with the change in the Work on a "force account" basis under which the Contractor shall be reimbursed for reasonable expenditures incurred by the Contractor and its Subcontractors in performing added Work and the Owner shall receive reasonable credit for any deleted Work. The Contractor shall keep and present, in such form as the Owner may prescribe, an itemized accounting of the cost of the change together with sufficient supporting data. Unless otherwise stated in the directive, the adjustment of the Contract Sum shall be limited to the following:

- (a)** costs of labor and supervision, including employee benefits, social security, retirement, unemployment and workers' compensation insurance required by law, agreement, or under Contractor's or Subcontractor's standard personnel policy;
- (b)** cost of materials, supplies and equipment, including cost of delivery, whether incorporated or consumed;
- (c)** rental cost of machinery and equipment, not to exceed prevailing local rates if contractor owned;
- (d)** costs of premiums for insurance required by the Contract Documents, permit fees, and sales, use or similar taxes related to the change in the Work;
- (e)** reasonable credits to the Owner for the value of deleted Work, without Contractor or Subcontractor mark-ups; and
- (f)** for additions to the Contract Sum, mark-up of the Contractor's direct costs for overhead and profit not exceeding 15% on Contractor's work nor exceeding 25% for Contractor and Subcontractor on a Subcontractor's work. No allowance for overhead and profit shall be figured on a change which involves a net credit to the Owner. For the purposes of this method of determining an adjustment of the Contract Sum,

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 21 of 49

“overhead” shall cover the Contractor’s indirect costs of the change, such as the cost of insurance other than mentioned above, bonds, superintendent and other job office personnel, watchman, use and rental of small tools, job office, job office supplies and expenses, temporary facilities and utilities, and home office expenses.

C. ADJUSTMENT of the CONTRACT TIME due to CHANGES

(1) Unless otherwise provided in the Contract Documents, the Contract Time shall be equitably adjusted for the performance of a change provided that the Contractor notifies the Architect in writing that the change will increase the time required to complete the Work. Such notice shall be provided no later than:

(a) with the Contractor’s cost proposal stating the number of days of extension requested, or

(b) within ten days after the Contractor receives a directive to proceed with a change in advance of submitting a cost proposal, in which case the notice should provide an estimated number of days of extension to be requested, which may be subject to adjustment in the cost proposal.

(2) The Contract Time shall be extended only to the extent that the change affects the time required to complete the entire Work of the Contract, taking into account the concurrent performance of the changed and unchanged Work.

D. CHANGE ORDER PROCEDURES

(1) If the Owner proposes to make a change in the Work, the Architect will request that the Contractor provide a cost proposal for making the change to the Work. The request shall be in writing and shall adequately describe the proposed change using drawings, specifications, narrative, or a combination thereof. Within 21 days after receiving such a request, or such other time as may be stated in the request, the Contractor shall prepare and submit to the Architect a written proposal, properly itemized and supported by sufficient substantiating data to facilitate evaluation. The stated time within which the Contractor must submit a proposal may be extended if, within that time, the Contractor makes a written request with reasonable justification thereof.

(2) The Contractor may voluntarily offer a change proposal which, in the Contractor’s opinion, will reduce the cost of construction, maintenance, or operation or will improve the cost-effective performance of an element of the Project, in which case the Owner, through the Architect, will accept, reject, or respond otherwise within 21 days after receipt of the proposal, or such other reasonable time as the Contractor may state in the proposal.

(3) If the Contractor’s proposal is acceptable to the Owner, or is negotiated to the mutual agreement of the Contractor and Owner, the Architect will prepare an appropriate Contract

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 22 of 49

Change Order for execution. Upon receipt of the fully executed Contract Change Order, the Contractor shall proceed with the change.

(4) In advance of delivery of a fully executed Contract Change Order, the Architect may furnish to the Contractor a written authorization to proceed with an agreed change. However, such an authorization shall be effective only if it:

- (a)** identifies the Contractor's accepted or negotiated proposal for the change,
- (b)** states the agreed adjustments, if any, in Contract Sum and Contract Time,
- (c)** states that funds are available to pay for the change, and
- (d)** is signed by the Owner.

(5) If the Contractor and Owner cannot agree on the amount of the adjustment in the Contract Sum for a change, the Owner, through the Architect, may order the Contractor to proceed with the change on a Force Account basis, but the net cost to the Owner shall not exceed the amount quoted in the Contractor's proposal. Such order shall state that funds are available to pay for the change.

(6) If the Contractor does not promptly respond to a request for a proposal, or the Owner determines that the change is essential to the final product of the Work and that the change must be effected immediately to avoid delay of the Project, the Owner may:

- (a)** determine with the Contractor a sufficient maximum amount to be authorized for the change and
- (b)** direct the Contractor to proceed with the change on a Force Account basis pending delivery of the Contractor's proposal, stating the maximum increase in the Contract Sum that is authorized for the change.

(7) Pending agreement of the parties or final resolution of any dispute of the total amount due the Contractor for a change in the Work, amounts not in dispute for such changes in the Work may be included in Applications for Payment accompanied by an interim Change Order indicating the parties' agreement with part of all of such costs or time extension. Once a dispute is resolved, it shall be implemented by preparation and execution of an appropriate Change Order.

**ARTICLE 17
CLAIMS for EXTRA COST or EXTRA WORK**

A. If the Contractor considers any instructions by the Architect, Owner, or public authority having jurisdiction to be contrary to the requirements of the Contract Documents and will involve extra work and/or cost under the Contract, the Contractor shall give the Architect written notice thereof within ten days after receipt of such instructions, and in any event before proceeding to execute such work. As used in this Article, "instructions" shall include written or oral clarifications, directions, instructions, interpretations, or determinations.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 23 of 49

B. The Contractor's notification pursuant to Paragraph 17A shall state: (1) the date, circumstances, and source of the instructions, (2) that the Contractor considers the instructions to constitute a change to the Contract Documents and why, and (3) an estimate of extra cost and time that may be involved to the extent an estimate may be reasonably made at that time.

C. Except for claims relating to an emergency endangering life or property, no claim for extra cost or extra work shall be considered in the absence of prior notice required under Paragraph 17.A.

D. Within ten days of receipt of a notice pursuant to Paragraph 17.A, the Architect will respond in writing to the Contractor, stating one of the following:

- (1) The cited instruction is rescinded.
- (2) The cited instruction is a change in the Work and in which manner the Contractor is To proceed with procedures for Changes in the Work.
- (3) The cited instruction is reconfirmed, is not considered by the Architect to be a change in the Contract Documents, and the Contractor is to proceed with Work as instructed.

E. If the Architect's response to the Contractor is as in Paragraph 17.D(3), the Contractor shall proceed with the Work as instructed. If the Contractor continues to consider the instructions to constitute a change in the Contract Documents, the Contractor shall, within ten days after receiving the Architect's response, notify the Architect in writing that the Contractor intends to submit a claim pursuant to, Resolution of Claims and Disputes

**ARTICLE 18
DIFFERING SITE CONDITIONS**

A. DEFINITION

“Differing Site Conditions” are:

- (1) subsurface or otherwise concealed physical conditions at the Project site which differ materially from those indicated in the Contract Documents, or
- (2) unknown physical conditions at the Project site which are of an unusual nature, differing materially from conditions ordinarily encountered and generally recognized as inherent in construction activities of the character required by the Contract Documents.

B. PROCEDURES

If Differing Site Conditions are encountered, then the party discovering the condition shall promptly notify the other party before the condition is disturbed and in no event later than ten days after discovering the condition. Upon such notice and verification that a Differing Site Condition exists, the Architect will, with reasonable promptness and with the Owner's concurrence, make changes in the Drawings and/or Specifications as are deemed necessary to conform to the Differing Site Condition. Any increase or decrease in the Contract Sum or Contract Time that is warranted by the changes will be made as provided under Changes in the

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 24 of 49

Work. If the Architect determines a Differing Site Condition has not been encountered, the Architect shall notify the Owner and Contractor in writing, stating the reason for that determination.

**ARTICLE 19
CLAIMS for DAMAGES**

If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time after the discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

**ARTICLE 20
DELAYS**

A. A delay beyond the Contractor's control at any time in the commencement or progress of Work by an act or omission of the Owner, Architect, or any separate contractor or by labor disputes, unusual delay in deliveries, unavoidable casualties, fires, abnormal floods, tornadoes, or other cataclysmic events of nature, may entitle the Contractor to an extension of the Contract Time provided, however, that the Contractor shall, within ten days after the delay first occurs, give written notice to the Architect of the cause of the delay and its probable effect on progress of the entire Work.

B. Adverse weather conditions that are more severe than anticipated for the locality of the Work during any given month may entitle the Contractor to an extension of Contract Time provided, however;

(1) the weather conditions had an adverse effect on construction scheduled to be performed during the period in which the adverse weather occurred, which in reasonable sequence would have an effect on completion of the entire Work,

(2) the Contractor shall, within twenty-one days after the end of the month in which the delay occurs, give the Architect written notice of the delay that occurred during that month and its probable effect on progress of the Work, and

(3) within a reasonable time after giving notice of the delay, the Contractor provides the Architect with sufficient data to document that the weather conditions experienced were unusually severe for the locality of the Work during the month in question. Unless otherwise provided in the Contract Documents, data documenting unusually severe weather conditions shall compare actual weather conditions to the average weather conditions for the month in question during the previous five years as recorded by the National Oceanic and Atmospheric Administration (NOAA) or similar record-keeping entities.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 25 of 49

C. Adjustments, if any, of the Contract Time pursuant to this Article shall be incorporated into the Contract by a Contract Change Order prepared by the Architect and signed by the Contractor, Owner, and other signatories to the Construction Contract or, at closeout of the Contract, by mutual written agreement between the Contractor and Owner. The adjustment of the Contract Time shall not exceed the extent to which the delay extends the time required to complete the entire Work of the Contract.

D. The Contractor shall not be entitled to any adjustment of the Contract Sum for damage due to delays claimed pursuant to this Article.

ARTICLE 21

OWNER'S RIGHT to CORRECT DEFECTIVE WORK

If the Contractor fails or refuses to correct Defective Work in a timely manner that will avoid delay of completion, use, or occupancy of the Work or work by the Owner or separate contractors, the Architect may give the Contractor written Notice to Cure the Defective Work within a reasonable, stated time. If within ten days after receipt of the Notice to Cure the Contractor has not proceeded and satisfactorily continued to cure the Defective Work or provided the Architect with written verification that satisfactory positive action is in process to cure the Defective Work, the Owner may, without prejudice to any other remedy available to the Owner, correct the Defective Work and deduct the actual cost of the correction from payment then or thereafter due to the Contractor.

ARTICLE 22

PROGRESS PAYMENTS

A. FREQUENCY of PROGRESS PAYMENTS

Unless otherwise provided in the Contract Documents, the Owner will make payments to the Contractor as the Work progresses based on monthly estimates prepared and certified by the Contractor, approved and certified by the Architect, and approved by the Owner and other authorities whose approval is required.

B. SCHEDULE of VALUES

Within ten days after receiving the Notice to Proceed the Contractor shall submit to the Architect a Schedule of Values, which is a breakdown of the Contract Sum showing the value of the various parts of the Work for billing purposes. The Schedule of Values shall be prepared on 8 1/2" x 11"

paper in a format that is acceptable to the Architect and Owner and shall divide the Contract Sum

into as many parts ("line items") as the Architect and Owner determine necessary to permit evaluation and to show amounts attributable to Subcontractors. The Contractor's overhead and profit are to be proportionately distributed throughout the line items of the Schedule of Values. Upon approval, the Schedule of Values shall be used as a basis for monthly Applications for

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 26 of 49

Payment, unless it is later found to be in error. Approved change order amounts shall be added to or incorporated into the Schedule of Values as mutually agreed by the Contractor and Architect.

A. APPLICATIONS for PAYMENTS

(1) Based on the approved Schedule of Values, each monthly Application for Payment shall show the Contractor's estimate of the value of Work performed in each line item as of the end of the billing period. The Contractor's cost of materials and equipment not yet incorporated into the Work, but delivered and suitably stored on the site, may be considered in monthly Applications for Payment.

(2) The Contractor's estimate of the value of Work performed and stored materials must represent such reasonableness as to warrant certification by the Architect to the Owner in accordance with Article 23. Each monthly Application for Payment shall be supported by such data as will substantiate the Contractor's right to payment, including without limitation copies of requisitions from subcontractors and material suppliers.

(3) If no other date is stated in the Contract Documents or agreed upon by the parties, each monthly Application for Payment shall be submitted to the Architect on or about the first day of each month and payment shall be issued to the Contractor within thirty days after an Application for Payment is Certified pursuant to Article 23 and delivered to the Owner.

D. MATERIALS STORED OFF SITE

Unless otherwise provided in the Contract Documents, the Contractor's cost of materials and equipment to be incorporated into the Work, which are stored off the site, may also be considered in monthly Applications for Payment under the following conditions:

(1) the contractor has received written approval from the Architect and Owner to store the materials or equipment off site in advance of delivering the materials to the off site location;

(2) a Certificate of Insurance is furnished to the Architect evidencing that a special insurance policy, or rider to an existing policy, has been obtained by the Contractor providing all-risk property insurance coverage, specifically naming the materials or equipment stored, and naming the Owner as an additionally insured party;

(3) the Architect is provided with a detailed inventory of the stored materials or equipment and the materials or equipment are clearly marked in correlation to the inventory to facilitate inspection and verification of the presence of the materials or equipment by the Architect or Owner;

(4) the materials or equipment are properly and safely stored in a bonded warehouse, or a facility otherwise approved in advance by the Architect and Owner; and

(5) compliance by the Contractor with procedures satisfactory to the Owner to establish

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 27 of 49

the Owner's title to such materials and equipment or otherwise protect the Owner's interest.

C. RETAINAGE

(1) "Retainage" is defined as the money earned and, therefore, belonging to the Contractor (subject to final settlement of the Contract) which has been retained by the Owner conditioned on final completion and acceptance of all Work required by the Contract Documents. Retainage shall not be relied upon by Contractor (or Surety) to cover or off-set unearned monies attributable to uncompleted or uncorrected Work.

(2) In making progress payments the Owner shall retain five percent of the estimated value of Work performed and the value of the materials stored for the Work; but after retainage has been held upon fifty percent of the Contract Sum, no additional retainage will be withheld.

D. CONTRACTOR'S CERTIFICATION

(1) Each Application for Payment shall bear the Contractor's notarized certification that, to the best of the Contractor's knowledge, information, and belief, the Work covered by the Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payments were issued and payments received from the Owner and that the current payment shown in the Application for Payment has not yet been received.

(2) By making this certification the Contractor represents to the Architect and Owner that, upon receipt of previous progress payments from the Owner, the Contractor has promptly paid each Subcontractor, in accordance with the terms of its agreement with the Subcontractor, the amount due the Subcontractor from the amount included in the progress payment on account of the Subcontractor's Work and stored materials. The Architect and Owner may advise Subcontractors and suppliers regarding percentages of completion or amounts requested and/or approved in an Application for Payment on account of the Subcontractor's Work and stored materials.

E. PAYMENT ESTABLISHES OWNERSHIP

All material and Work covered by progress payments shall become the sole property of the Owner, but the Contractor shall not be relieved from the sole responsibility for the care and protection of material and Work upon which payments have been made and for the restoration of any damaged material and Work.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 28 of 49

**ARTICLE 23
CERTIFICATION and APPROVALS for PAYMENT**

A. The Architect's review, approval, and certification of Applications for Payment shall be based on the Architect's general knowledge of the Work obtained through site visits and the information provided by the Contractor with the Application. The Architect shall not be required to perform exhaustive examinations, evaluations, or estimates of the cost of completed or uncompleted Work or stored materials to verify the accuracy of amounts requested by the Contractor, but the Architect shall have the authority to adjust the Contractor's estimate when, in the Architect's reasonable opinion, such estimates are overstated or understated.

B. Within seven days after receiving the Contractor's monthly Application for Payment, or such other time as may be stated in the Contract Documents, the Architect will take one of the following actions:

(1) The Architect will approve and certify the Application as submitted and forward it as a Certification for Payment for approval by the Owner (and other approving authorities, if any) and payment.

(2) If the Architect takes exception to any amounts claimed by the Contractor and the Contractor and Architect cannot agree on revised amounts, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to certify to the Owner, transmitting a copy of same to the Contractor.

(3) To the extent the Architect determines may be necessary to protect the Owner from loss on account of any of the causes stated in Article 24, the Architect may subtract from the Contractor's estimates and will issue a Certificate for Payment to the Owner, with a copy to the Contractor, for such amount as the Architect determines is properly due and notify the Contractor and Owner in writing of the Architect's reasons for withholding payment in whole or in part.

C. Neither the Architect's issuance of a Certificate for Payment nor the Owner's resulting progress payment shall be a representation to the Contractor that the Work in progress or completed at that time is accepted or deemed to be in conformance with the Contract Documents.

D. The Architect shall not be required to determine that the Contractor has promptly or fully paid Subcontractors and suppliers or how or for what purpose the Contractor has used monies paid under the Construction Contract. However, the Architect may, upon request and if practical, inform any Subcontractor or supplier of the amount, or percentage of completion, approved or paid to the Contractor on account of the materials supplied or the Work performed by the Subcontractor.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 29 of 49

**ARTICLE 24
PAYMENTS WITHHELD**

A. The Architect may nullify or revise a previously issued Certificate for Payment prior to Owner's payment thereunder to the extent as may be necessary in the Architect's opinion to protect the Owner from loss on account of any of the following causes not discovered or fully accounted for at the time of the certification or approval of the Application for Payment:

- (1)** Defective Work;
- (2)** filed, or reasonable evidence indicating probable filing of, claims arising out of the Contract by other parties against the Contractor;
- (3)** the Contractor's failure to pay for labor, materials or equipment or to pay Subcontractors;
- (4)** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- (5)** damage suffered by the Owner or another contractor caused by the Contractor, a Subcontractor, or anyone for whose acts they may be liable;
- (6)** reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance is insufficient to cover applicable liquidated damages; or
- (7)** the Contractor's persistent failure to conform to the requirements of the Contract Documents.

B. If the Owner deems it necessary to withhold payment pursuant to preceding Paragraph A, the Owner will notify the Contractor and Architect in writing of the amount to be withheld and the reason for same.

C. The Architect shall not be required to withhold payment for completed or partially completed Work for which compliance with the Contract Documents remains to be determined by Specified Inspections or Final Inspections to be performed in their proper sequence. However, if Work for which payment has been approved, certified, or made under an Application for Payment is subsequently determined to be Defective Work, the Architect shall determine an appropriate amount that will protect the Owner's interest against the Defective Work.

(1) If payment has not been made against the Application for Payment first including the Defective Work, the Architect will notify the Owner and Contractor of the amount to be withheld from the payment until the Defective Work is brought into compliance with the Contract Documents.

(2) If payment has been made against the Application for Payment first including the Defective Work, the Architect will withhold the appropriate amount from the next Application for

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 30 of 49

Payment submitted after the determination of noncompliance, such amount to then be withheld until the Defective Work is brought into compliance with the Contract Documents.

D. The amount withheld will be paid with the next Application for Payment certified and approved after the condition for which the Owner has withheld payment is removed or otherwise resolved to the Owner's satisfaction.

E. The Owner shall have the right to withhold from payments due the Contractor under this Contract an amount equal to any amount which the Contractor owes the Owner under another contract.

**ARTICLE 25
SUBSTANTIAL COMPLETION**

A. Substantial Completion is the stage in the progress of the Work when the Work or designated portion of the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use without disruption or interference by the Contractor in completing or correcting any remaining unfinished Work ("punch list" items). Substantial Completion of the Work, or a designated portion of the Work, is not achieved until so agreed in a Certificate of Substantial Completion signed by the Contractor, Architect, and Owner.

B. The Contractor shall notify the Architect in writing when it considers the Work, or a portion of the Work which the Owner has agreed to accept separately, to be substantially complete and ready for a Final Inspection. In this notification the Contractor shall identify any items remaining to be completed or corrected for Final Acceptance prior to final payment.

C. Substantial Completion is achieved and a Final Inspection is appropriate only when a minimal number of punch list items exists and only a short period of time will be required to correct or complete them. Upon receipt of the Contractor's notice for a Final Inspection, the Architect will advise the Contractor in writing of any conditions of the Work which the Architect or Owner is aware do not constitute Substantial Completion, otherwise, a Final Inspection will proceed within a reasonable time after the Contractor's notice is given. However, the Architect will not be required to prepare lengthy listings of punch list items; therefore, if the Final Inspection discloses that Substantial Completion has not been achieved, the Architect may discontinue or suspend the inspection until the Contractor does achieve Substantial Completion.

D. CERTIFICATE of SUBSTANTIAL COMPLETION

(1) When the Work or a designated portion of the Work is substantially complete, the Architect will prepare and sign a Certificate of Substantial Completion to be signed in order by the Contractor, and Owner.

(2) When signed by all parties, the Certificate of Substantial Completion shall establish the Date of Substantial Completion which is the date upon which:

(a) the Work, or designated portion of the Work, is accepted by the Architect, and Owner as being ready for occupancy,

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 31 of 49

- (b) the Contractor's one-year and special warranties for the Work covered by the Certificate commence, unless stated otherwise in the Certificate (the one-year warranty for punch list items completed or corrected after the period allowed in the Certificate shall commence on the date of their Final Acceptance) , and
- (c) Owner becomes responsible for building security, maintenance, utility services, and insurance, unless stated otherwise in the Certificate.
- (3) The Certificate of Substantial Completion shall set the time within which the Contractor shall finish all items on the "punch list" accompanying the Certificate. The completion of punch list items shall be a condition precedent to Final Payment.
- (4) If the Work or designated portion covered by a Certificate of Substantial Completion includes roofing work, the General Contractor's (5-year) Roofing Guarantee, ABC Form C-9, must be executed by the Contractor and attached to the Certificate of Substantial Completion. If the Contract Documents specify any other roofing warranties to be provided by the roofing manufacturer, Subcontractor, or Contractor, they must also be attached to the Certificate of Substantial Completion.

E. The Date of Substantial Completion of the Work, as set in the Certificate of Substantial Completion of the Work or of the last completed portion of the Work, establishes the extent to which the Contractor is liable for Liquidated Damages, if any; however, should the Contractor fail to complete all punch list items within thirty days, or such other time as may be stated in the respective Certificate of Substantial Completion, the Contractor shall bear any expenses, including additional Architectural services and expenses, incurred by the Owner as a result of such failure to complete punch list items in a timely manner.

**ARTICLE 26
OCCUPANCY or USE PRIOR to COMPLETION**

A. UPON SUBSTANTIAL COMPLETION

Prior to completion of the entire Work, the Owner may occupy or begin utilizing any designated portion of the Work on the agreed Date of Substantial Completion of that portion of the Work.

B. BEFORE SUBSTANTIAL COMPLETION

- (1) The Owner shall not occupy or utilize any portion of the Work before Substantial Completion of that portion has been achieved.
- (2) The Owner may deliver furniture and equipment and store, or install it in place ready for occupancy and use, in any designated portion of the Work before it is substantially completed under the following conditions:
 - (a) The Owner's storage or installation of furniture and equipment will not unreasonably disrupt or interfere with the Contractor's completion of the designated portion of the Work.
 - (b) The Contractor consents to the Owner's planned action (such consent shall not be unreasonably withheld).
 - (c) The Owner shall be responsible for insurance coverage of the Owner's furniture and equipment, and the Contractor's liability shall not be increased.
 - (d) The Contractor, Architect, and Owner will jointly inspect and record the condition of

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 32 of 49

the Work in the area before the Owner delivers and stores or installs furniture and equipment; the Owner will equitably compensate the Contractor for making any repairs to the Work that may subsequently be required due to the Owner's delivery and storage or installation of furniture and equipment.

- (e) The Owner's delivery and storage or installation of furniture and equipment shall not be deemed an acceptance of any Work not completed in accordance with the requirements of the Contract Documents.

ARTICLE 27

FINAL PAYMENT

A. PREREQUISITES to FINAL PAYMENT

The following conditions are prerequisites to Final Payment becoming due the Contractor:

(1) Full execution of a Certificate of Substantial Completion for the Work, or each designated portion of the Work

(2) Final Acceptance of the Work.

(3) The Contractor's completion, to the satisfaction of the Architect and Owner, of all documentary requirements of the Contract Documents; such as delivery of "as-built" documents, operating and maintenance manuals, warranties, etc.

(4) Delivery to the Owner of a final Application for Payment, prepared by the Contractor and approved and certified by the Architect.

(5) Completion of an Advertisement for Completion pursuant to Paragraph C below.

(6) Delivery by the Contractor to the Owner through the Architect of a Release of Claims and such other documents as may be required by Owner, satisfactory in form to the Owner pursuant to Paragraph D below.

(7) Consent of Surety, if any, to Final Payment to Contractor.

(8) Delivery by the Contractor to the Architect and Owner of other documents, if any, required by the Contract Documents as prerequisites to Final Payment.

B. FINAL ACCEPTANCE of the WORK

"Final Acceptance of the Work" shall be achieved when all "punch list" items recorded with the Certificate(s) of Substantial Completion are accounted for by their completion or correction by the Contractor and acceptance by the Architect, and Owner

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 33 of 49

C. ADVERTISEMENT for COMPLETION

(1) If the Contract Sum is less than \$50,000: The Owner, immediately after being notified by the Architect that all other requirements of the Contract have been completed, shall give public notice of completion of the Contract by having an Advertisement for Completion published one time in a newspaper of general circulation, published in the county in which the Owner is located and shall post notice of completion of the Contract on the Owner's bulletin board for one week, and shall require the Contractor to certify under oath that all bills have been paid in full. Final payment may be made at any time after the notice has been posted for one entire week.

(2) If the Contract Sum is more than \$50,000: The Contractor, immediately after being notified by the Architect that all other requirements of the Contract have been completed, shall give public notice of completion of the Contract by having an Advertisement for Completion, similar to the sample contained in the Project Manual, published for a period of four successive weeks in some newspaper of general circulation published within the city or county where the Work was performed. Proof of publication of the Advertisement for Completion, in duplicate, shall be made by the Contractor to the Architect by affidavit of the publisher and a printed copy of the Advertisement for Completion published, in duplicate. If no newspaper is published in the county where the work was done, the notice may be given by posting at the Court House for thirty days and proof of same made by Probate Judge or Sheriff and the Contractor. Final payment shall not be due until thirty days after this public notice is completed.

D. RELEASE of CLAIMS

The Release of Claims and other documents referenced in Paragraph A(6) above are as follows:

(1) A release executed by Contractor of all claims and claims of lien against the Owner arising under and by virtue of the Contract, other than such claims of the Contractor, if any, as may have been previously made in writing and as may be specifically excepted by the Contractor from the operation of the release in stated amounts to be set forth therein

(2) An affidavit under oath, if required, stating that so far as the Contractor has knowledge or information, there are no claims or claims of lien which have been or will be filed by any Subcontractor, Supplier or other party for labor or material for which a claim or claim of lien could be filed.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 34 of 49

(3) A release, if required, of all claims and claims of lien made by any Subcontractor, Supplier or other party against the Owner or unpaid Contract funds held by the Owner arising under or related to the Work on the Project; provided, however, that if any Subcontractor, Supplier or others refuse to furnish a release of such claims or claims of lien, the Contractor may furnish a bond executed by Contractor and its Surety to the Owner to provide an unconditional obligation to defend, indemnify and hold harmless the Owner against any loss, cost or expense, including attorney's fees, arising out of or as a result of such claims, or claims of lien, in which event Owner may make Final Payment notwithstanding such claims or claims of lien. If Contractor and Surety fail to fulfill their obligations to Owner under the bond, the Owner shall be entitled to recover damages as a result of such failure, including all costs and reasonable attorney's fees incurred to recover such damages.

D. EFFECT of FINAL PAYMENT

(1) The making of Final Payment shall constitute a waiver of Claims by the Owner except those arising from:

- (a)** liens, claims, security interests or encumbrances arising out of the Contract and unsettled;
- (b)** failure of the Work to comply with the requirements of the Contract Documents;
- (c)** terms of warranties or indemnities required by the Contract Documents, or
- (d)** latent defects.

(2) Acceptance of Final Payment by the Contractor shall constitute a waiver of claims by Contractor except those previously made in writing, identified by Contractor as unsettled at the time of final Application for Payment, and specifically excepted from the release provided for in Paragraph D(1), above.

**ARTICLE 28
CONTRACTOR'S WARRANTY**

A. GENERAL WARRANTY

The Contractor warrants to the Owner and Architect that all materials and equipment furnished under the Contract will be of good quality and new, except such materials as may be expressly provided or allowed in the Contract Documents to be otherwise, and that none of the Work will be Defective Work.

B. ONE-YEAR WARRANTY

(1) If, within one year after the date of Substantial Completion of the Work or each

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 35 of 49

designated portion of the Work (or otherwise as agreed upon in a mutually-executed Certificate of Substantial Completion), any of the Work is found to be Defective Work, the Contractor shall promptly upon receipt of written notice from the Owner or Architect, and without expense to either, replace or correct the Defective Work to conform to the requirements of the Contract Documents, and repair all damage to the site, the building and its contents which is the result of Defective Work or its replacement or correction.

(2) The one-year warranty for punch list items shall begin on the Date of Substantial Completion if they are completed or corrected within the time period allowed in the Certificate of Substantial Completion in which they are recorded. The one-year warranty for punch list items that are not completed or corrected within the time period allowed in the Certificate of Substantial Completion, and other Work performed after Substantial Completion, shall begin on the date of Final Acceptance of the Work. The Contractor's correction of Work pursuant to this warranty does not extend the period of the warranty. The Contractor's one-year warranty does not apply to defects or damages due to improper or insufficient maintenance, improper operation, or wear and tear during normal usage.

(3) Upon recognizing a condition of Defective Work, the Owner shall promptly notify the Contractor of the condition. If the condition is causing damage to the building, its contents, equipment, or site, the Owner shall take reasonable actions to mitigate the damage or its continuation, if practical. If the Contractor fails to proceed promptly to comply with the terms of the warranty, or to provide the Owner with satisfactory written verification that positive action is in process, the Owner may have the Defective Work replaced or corrected and the Contractor and the Contractor's Surety shall be liable for all expense incurred.

(4) Year-end Inspection(s): An inspection of the Work, or each separately completed portion thereof, is required near the end of the Contractor's one-year warranty period(s). The subsequent delivery of the Architect's report of a Year-end Inspection will serve as confirmation that the Contractor was notified of Defective Work found within the warranty period.

(5) The Contractor's warranty of one year is in addition to, and not a limitation of, any other remedy stated herein or available to the Owner under applicable law.

C. GENERAL CONTRACTOR'S ROOFING GUARANTEE

(1) In addition to any other roof related warranties or guarantees that may be specified in the Contract Documents, the roof and associated work shall be guaranteed by the General Contractor against leaks and defects of materials and workmanship for a period of five (5) years, starting on the Date of Substantial Completion of the Project as stated in the Certificate of Substantial Completion. This guarantee for punch list items shall begin on the Date of Substantial Completion if they are completed or corrected within the time period allowed in the Certificate of Substantial Completion in which they are

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 36 of 49

recorded. The guarantee for punch list items that are not completed or corrected within the time period allowed in the Certificate of Substantial Completion shall begin on the date of Final Acceptance of the Work.

(2) The “General Contractor’s Roofing Guarantee” (ABC Form C-9), included in the Project Manual, shall be executed in triplicate, signed by the appropriate party and submitted to the Architect for submission with the Certificate of Substantial Completion to the Owner.

(3) This guarantee does not include costs which might be incurred by the General Contractor in making visits to the site requested by the Owner regarding roof problems that are due to lack of proper maintenance (keeping roof drains and/or gutters clear of debris that cause a stoppage of drainage which results in water ponding, overflowing of flashing, etc.), or damages caused by vandalism or misuse of roof areas. Should the contractor be required to return to the job to correct problems of this nature that are determined not to be related to faulty workmanship and materials in the installation of the roof, payment for actions taken by the Contractor in response to such request will be the responsibility of the Owner. A detailed written report shall be made by the General Contractor on each of these ‘Service Calls’ with copies to the Architect, and Owner

D. SPECIAL WARRANTIES

(1) The Contractor shall deliver to the Owner through the Architect all special or extended warranties required by the Contract Documents from the Contractor, Subcontractors, and suppliers.

(2) The Contractor and the Contractor’s Surety shall be liable to the Owner for such special warranties during the Contractor’s one-year warranty; thereafter, the Contractor’s obligations relative to such special warranties shall be to provide reasonable assistance to the Owner in their enforcement.

E. ASSUMPTION of GUARANTEES of OTHERS

If the Contractor disturbs, alters, or damages any work guaranteed under a separate contract, thereby voiding the guarantee of that work, the Contractor shall restore the work to a condition satisfactory to the Owner and shall also guarantee it to the same extent that it was guaranteed under the separate contract.

ARTICLE 29

CONTRACTOR’S and SUBCONTRACTORS’ INSURANCE

A. GENERAL

(1) RESPONSIBILITY. The Contractor shall be responsible to the Owner from the time of the signing of the Construction Contract or from the beginning of the first work,

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 37 of 49

whichever shall be earlier, for all injury or damage of any kind resulting from any negligent act or omission or breach, failure or other default regarding the work by the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of who may be the owner of the property.

(2) INSURANCE PROVIDERS. Each of the insurance coverages required below shall be issued by an insurer licensed by the Insurance Commissioner to transact the business of insurance in the State of Alabama for the applicable line of insurance, and such insurer (or, for qualified selfinsureds or group self-insureds, a specific excess insurer providing statutory limits) must have a Best Policyholders Rating of "A-" or better and a financial size rating of Class V or larger.

(3) NOTIFICATION ENDORSEMENT. Each policy shall be endorsed to provide that the insurance company agrees that the policy shall not be canceled, changed, allowed to lapse or allowed to expire for any reason until thirty days after the Owner has received written notice by certified mail as evidenced by return receipt or until such time as other insurance coverage providing protection equal to protection called for in the Contract Documents shall have been received, accepted and acknowledged by the Owner. Such notice shall be valid only as to the Project as shall have been designated by Project Name and Number in said notice.

(4) INSURANCE CERTIFICATES. The Contractor shall procure the insurance coverages identified below, or as otherwise required in the Contract Documents, at the Contractor's own expense, and to evidence that such insurance coverages are in effect, the Contractor shall furnish the Owner an insurance certificate(s) acceptable to the Owner and listing the Owner as the certificate holder. The insurance certificate(s) must be delivered to the Owner with the Construction Contract and Bonds for final approval and execution of the Construction Contract.

The insurance certificate must provide the following:

- (a)** Name and address of authorized agent of the insurance company
- (b)** Name and address of insured
- (c)** Name of insurance company or companies
- (d)** Description of policies
- (e)** Policy Number(s)
- (f)** Policy Period(s)
- (g)** Limits of liability
- (h)** Name and address of Owner as certificate holder
- (i)** Project Name and Number, if any
- (j)** Signature of authorized agent of the insurance company
- (k)** Telephone number of authorized agent of the insurance company
- (l)** Mandatory thirty day notice of cancellation / non-renewal / change

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 38 of 49

B. INSURANCE COVERAGES

Unless otherwise provided in the Contract Documents, the Contractor shall purchase the types of insurance coverages with liability limits not less than as follows:

(1) WORKERS' COMPENSATION and EMPLOYER'S LIABILITY INSURANCE

(a) Workers' Compensation coverage shall be provided in accordance with the statutory coverage required in Alabama. A group insurer must submit a certificate of authority from the Alabama Department of Industrial Relations approving the group insurance plan. A selfinsurer must submit a certificate from the Alabama Department of Industrial Relations stating the Contractor qualifies to pay its own workers' compensation claims.

(b) Employer's Liability Insurance limits shall be at least:

(1) Bodily Injury by Accident - \$1,000,000 each accident

(2) Bodily Injury by Disease - \$1,000,000 each employee

(2) COMMERCIAL GENERAL LIABILITY INSURANCE

(a) Commercial General Liability Insurance, written on an ISO Occurrence Form (current edition as of the date of Advertisement for Bids) or equivalent, shall include, but need not be limited to, coverage for bodily injury and property damage arising from premises and operations liability, products and completed operations liability, blasting and explosion, collapse of structures, underground damage, personal injury liability and contractual liability. The Commercial General Liability Insurance shall provide at minimum the following limits:

Coverage	Limit
(1) General Aggregate	\$ 2,000,000.00 per Project
(2) Products, Completed Operations Aggregate	\$ 2,000,000.00 per Project
(3) Personal and Advertising Injury	\$ 1,000,000.00 per Occurrence
(4) Each Occurrence	\$ 1,000,000.00

(b) Additional Requirements for Commercial General Liability Insurance:

(1) The policy shall name the Owner, Architect, and their agents, consultants and employees as additional insureds, state that this coverage shall be primary insurance for the additional insureds; and contain no exclusions of the additional insureds relative to job accidents.

(2) The policy must include separate per project aggregate limits.

(3) COMMERCIAL BUSINESS AUTOMOBILE LIABILITY INSURANCE

(a) Commercial Business Automobile Liability Insurance which shall include coverage for bodily injury and property damage arising from the operation of any owned, non-owned or hired automobile. The Commercial Business Automobile Liability Insurance Policy shall provide not less than \$1,000,000 Combined Single Limits for each occurrence.

(b) The policy shall name the Owner, Architect, and their agents, consultants, and employees as additional insureds.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 39 of 49

(4) COMMERCIAL UMBRELLA LIABILITY INSURANCE

(a) Commercial Umbrella Liability Insurance to provide excess coverage above the Commercial General Liability, Commercial Business Automobile Liability and the Workers' Compensation and Employer's Liability to satisfy the minimum limits set forth herein.

(b) Minimum Combined Primary Commercial General Liability and Commercial/Excess

Umbrella Limits of:

(1) \$ 5,000,000 per Occurrence

(2) \$ 5,000,000 Aggregate

(c) Additional Requirements for Commercial Umbrella Liability Insurance:

(1) The policy shall name the Owner, Architect, and their agents, consultants, and employees as additional insureds.

(2) The policy must be on an "occurrence" basis.

(5) BUILDER'S RISK INSURANCE

(a) The Builder's Risk Policy shall be made payable to the Owner and Contractor, as their interests may appear. The policy amount shall be equal to 100% of the Contract Sum, written on a Causes of Loss - Special Form (current edition as of the date of Advertisement for Bids), or its equivalent. All deductibles shall be the sole responsibility of the Contractor.

(b) The policy shall be endorsed as follows:

"The following may occur without diminishing, changing, altering or otherwise affecting the coverage and protection afforded the insured under this policy:

(i) Furniture and equipment may be delivered to the insured premises and installed in place ready for use; or

(ii) Partial or complete occupancy by Owner; or

(iii) Performance of work in connection with construction operations insured by the Owner, by agents or lessees or other contractors of the Owner, or by contractors of the lessee of the Owner."

C. SUBCONTRACTORS' INSURANCE

(1) **WORKERS' COMPENSATION and EMPLOYER'S LIABILITY INSURANCE.** The Contractor shall require each Subcontractor to obtain and maintain Workers' Compensation and Employer's Liability Insurance coverages as described in preceding Paragraph B, or to be covered by the Contractor's Workers' Compensation and Employer's Liability Insurance while performing Work under the Contract.

(2) **LIABILITY INSURANCE.** The Contractor shall require each Subcontractor to

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 40 of 49

obtain and maintain adequate General Liability, Automobile Liability, and Umbrella Liability Insurance coverages similar to those described in preceding Paragraph B. Such coverage shall be in effect at all times that a Subcontractor is performing Work under the Contract.

(3) ENFORCEMENT RESPONSIBILITY. The Contractor shall have responsibility to enforce its Subcontractors' compliance with these or similar insurance requirements; however, the Contractor shall, upon request, provide the Architect or Owner acceptable evidence of insurance for any Subcontractor.

D. TERMINATION of OBLIGATION to INSURE

Unless otherwise expressly provided in the Contract Documents, the obligation to insure as provided herein shall continue as follows:

(1) BUILDER'S RISK INSURANCE. The obligation to insure under Subparagraph B(5) shall remain in effect until the Date of Substantial Completion as shall be established in the Certificate of Substantial Completion. In the event that multiple Certificates of Substantial Completion covering designated portions of the Work are issued, Builder's Risk coverage shall remain in effect until the Date of Substantial Completion as shall be established in the last issued Certificate of Substantial Completion.

(2) PRODUCTS and COMPLETED OPERATIONS. The obligation to carry Products and Completed Operations coverage specified under Subparagraph B(2) shall remain in effect for two years after the Date(s) of Substantial Completion.

(3) ALL OTHER INSURANCE. The obligation to carry other insurance coverages specified under Subparagraphs B(1) through B(4) and Paragraph C shall remain in effect after the Date(s) of Substantial Completion until such time as all Work required by the Contract Documents is completed. Equal or similar insurance coverages shall remain in effect if, after completion of the Work, the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, returns to the Project to perform warranty or maintenance work pursuant to the terms of the Contract Documents.

E. WAIVERS of SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors performing construction or operations related to the Project, if any, and any of their subcontractors, sub-subcontractors, agents and

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 41 of 49

employees, for damages caused by fire or other causes of loss to the extent covered by builder's risk insurance or other property insurance applicable to the Work or to other property located within or adjacent to the Project, except such rights as they may have to proceeds of such insurance held by the Owner or Contractor as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors, if any, and the subcontractor, sub-subcontractors, suppliers, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The Policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to the person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged. The waivers provided for in this paragraph shall survive final acceptance and continue to apply to insured losses to the Work or other property on or adjacent to the Project.

**ARTICLE 30
PERFORMANCE and PAYMENT BONDS**

A. GENERAL

Upon signing and returning the Construction Contract to the Owner for final approval and execution, the Contractor shall, at the Contractor's expense, furnish to the Owner a Performance Bond and a Payment Bond, each in a penal sum equal to 100% of the Contract Sum. Each bond shall be on the form contained in the Project Manual, shall be executed by a surety company (Surety) acceptable to the Owner and duly authorized and qualified to make such bonds in the State of Alabama in the required amounts, shall be countersigned by an authorized, Alabama resident agent of the Surety who is qualified to execute such instruments, and shall have attached thereto a power of attorney of the signing official. The provisions of this Article are not applicable to this Contract if the Contract Sum is less than \$50,000, unless bonds are required for this Contract in the Supplemental General Conditions.

B. PERFORMANCE BOND

Through the Performance Bond, the Surety's obligation to the Owner shall be to assure the prompt and faithful performance of the Contract and Contract Change Orders. The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. In case of default on the part of the Contractor, the Surety shall take charge of and complete the Work in accordance with the terms of the Performance Bond. Any reasonable expenses incurred by the Owner as a result of default on the part of the Contractor, including architectural, engineering, administrative, and legal services, shall be recoverable under the Performance Bond.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 42 of 49

C. PAYMENT BOND

Through the Payment Bond the Surety's obligation to the Owner shall be to guarantee that the contractor and its Subcontractors shall promptly make payment to all persons supplying labor, materials, or supplies for, or in, the prosecution of the Work, including the payment of reasonable attorneys' fees incurred by successful claimants or plaintiffs in civil actions on the Bond. Any person or entity indicating that they have a claim of nonpayment under the Bond shall, upon written request, be promptly furnished a certified copy of the Bond and Construction Contract by the Contractor, Architect, Owner or whomever is recipient of the request.

D. CHANGE ORDERS

The Penal Sum shall remain equal to the Contract Sum as the Contract Sum is adjusted by Contract Change Orders. All Contract Change Orders involving an increase in the Contract Sum will require consent of Surety by endorsement of the Contract Change Order form. The Surety waives notification of any Contract Change Orders involving only extension of the Contract Time.

E. EXPIRATION

The obligations of the Contractor's performance bond surety shall be coextensive with the contractor's performance obligations under the Contract Documents; provided.

**ARTICLE 31
ASSIGNMENT**

The Contractor shall not assign the Contract or sublet it as a whole nor assign any moneys due or to become due to the Contractor thereunder without the previous written consent of the Owner (and of the Surety, in the case of a bonded Construction Contract). As prescribed by the Public Works Law, the Contract shall in no event be assigned to an unsuccessful bidder for the Contract whose bid was rejected because the bidder was not a responsible or responsive bidder.

**ARTICLE 32
CONSTRUCTION by OWNER or SEPARATE CONTRACTORS**

A. OWNER'S RESERVATION of RIGHT

(1) The Owner reserves the right to self-perform, or to award separate contracts for, other portions of the Project and other Project related construction and operations on the site. The contractual conditions of such separate contracts shall be substantially similar to those of this Contract, including insurance requirements and the provisions of this Article

(2) When separate contracts are awarded, the term "Contractor" in the separate Contract Documents shall mean the Contractor who executes the respective Construction Contract.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 43 of 49

B. COORDINATION

Unless otherwise provided in the Contract Documents, the Owner shall be responsible for coordinating the activities of the Owner's forces and separate contractors with the Work of the Contractor. The Contractor shall cooperate with the Owner and separate contractors, shall participate in reviewing and comparing their construction schedules relative to that of the Contractor when directed to do so, and shall make and adhere to any revisions to the construction schedule resulting from a joint review and mutual agreement.

C. CONDITIONS APPLICABLE to WORK PERFORMED by OWNER

Unless otherwise provided in the Contract Documents, when the Owner self-performs construction or operations related to the Project, the Owner shall be subject to the same obligations to Contractor as Contractor would have to a separate contractor under the provision of this Article 32.

D. MUTUAL RESPONSIBILITY

(1) The Contractor shall reasonably accommodate the required introduction and storage of materials and equipment and performance of activities by the Owner and separate contractors and shall connect and coordinate the Contractor's Work with theirs as required by the Contract Documents.

(2) By proceeding with an element or portion of the Work that is applied to or performed on construction by the Owner or a separate contractor, or which relies upon their operations, the Contractor accepts the condition of such construction or operations as being suitable for the Contractor's Work, except for conditions that are not reasonably discoverable by the Contractor. If the Contractor discovers any condition in such construction or operations that is not suitable for the proper performance of the Work, the Contractor shall not proceed, but shall instead promptly notify the Architect in writing of the condition discovered.

(3) The Contractor shall reimburse the Owner for any costs incurred by a separate contractor and payable by the Owner because of acts or omissions of the Contractor. Likewise, the Owner shall be responsible to the Contractor for any costs incurred by the Contractor because of the acts or omissions of a separate contractor.

(4) The Contractor shall not cut or otherwise alter construction by the Owner or a separate contractor without the written consent of the Owner and separate contractor; such consent shall not be unreasonably withheld. Likewise, the Contractor shall not unreasonably withhold its consent allowing the Owner or a separate contractor to cut or otherwise alter the Work.

(5) The Contractor shall promptly remedy any damage caused by the Contractor to the construction or property of the Owner or separate contractors.

**ARTICLE 33
SUBCONTRACTS**

A. AWARD of SUBCONTRACTS and OTHER CONTRACTS for PORTIONS of the WORK

(1) Unless otherwise provided in the Contract Documents, when delivering the executed Construction Contract, bonds, and evidence of insurance to

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 44 of 49

the Architect, the Contractor shall also submit a listing of Subcontractors proposed for each principal portion of the Work and fabricators or suppliers proposed for furnishing materials or equipment fabricated to the design of the Contract Documents. This listing shall be in addition to any naming of Subcontractors, fabricators, or suppliers that may have been required in the bid process. The Architect will promptly reply to the Contractor in writing stating whether or not the Owner, after due investigation, has reasonable objection to any Subcontractor, fabricator, or supplier proposed by the Contractor. The issuance of the Notice to Proceed in the absence of such objection by the Owner shall constitute notice that no reasonable objection to them is made.

(2) The Contractor shall not contract with a proposed Subcontractor, fabricator, or supplier to whom the Owner has made reasonable and timely objection. Except in accordance with prequalification procedures as may be contained in the Contract Documents, through specified qualifications, or on the grounds of reasonable objection, the Owner may not restrict the Contractor's selection of Subcontractors, fabricators, or suppliers.

(3) Upon the Owner's reasonable objection to a proposed Subcontractor, fabricator, or supplier, the Contractor shall promptly propose another to whom the Owner has no reasonable objection. If the proposed Subcontractor, fabricator, or supplier to whom the Owner made reasonable objection was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be equitably adjusted by Contract Change Order for any resulting difference if the Contractor has acted promptly and responsively in this procedure.

(4) The Contractor shall not change previously selected Subcontractors, fabricators, or suppliers without notifying the Architect and Owner in writing of proposed substitute Subcontractors, fabricators, or suppliers. If the Owner does not make a reasonable objection to a proposed substitute within three working days, the substitute shall be deemed approved.

B. SUBCONTRACTUAL RELATIONS

(1) The Contractor agrees to bind every Subcontractor and material supplier (and require every Subcontractor to so bind its subcontractors and material suppliers) to all the provisions of the Contract Documents as they apply to the Subcontractor's and material supplier's portion of the Work.

(2) Nothing contained in the Contract Documents shall be construed as creating any contractual relationship between any Subcontractor and the Owner, nor to create a duty of the Architect, or Owner, to resolve disputes between or among the Contractor or its Subcontractors and suppliers or any other duty to such Subcontractors or suppliers.

**ARTICLE 34
ARCHITECT'S STATUS**

A. The Architect is an independent contractor performing, with respect to this Contract, pursuant to an agreement executed between the Owner and the Architect. The Architect has prepared the Drawings and Specifications and assembled the Contract Document and is, therefore, charged with their interpretation and clarification as described in the Contract Documents. As a representative of the Owner, the Architect will endeavor to guard the Owner against variances from the requirements of the Contract Documents by the Contractor. On behalf of the Owner, the Architect will administer the Contract as described in the Contract Documents during construction and the Contractor's one-year warranty.

B. So as to maintain continuity in administration of the Contract and performance of the Work, and to facilitate complete documentation of the project record, all communications between the Contractor and Owner regarding matters of or related to the Contract shall be directed through the Architect, unless direct communication is otherwise required to provide a legal notification. Unless otherwise authorized by the Architect, communications by and with the Architect's consultants shall be through the Architect. Unless otherwise authorized by the Contractor, communications by and with Subcontractors and material suppliers shall be through the Contractor.

C. ARCHITECT'S AUTHORITY

Subject to other provisions of the Contract Documents, the following summarizes some of the authority vested in the Architect by the Owner with respect to the Construction Contract and as further described or conditioned in other Articles of these General Conditions of the Contract.

(1) The Architect is authorized to:

- (a)** approve "minor" deviations as defined in Article 9, Submittals,
- (b)** make "minor" changes in the Work as defined in Article 19, Changes in the Work,
- (c)** reject or require the correction of Defective Work,
- (d)** require the Contractor to stop the performance of Defective Work,
- (e)** adjust an Application for Payment by the Contractor pursuant to Article 30, Certification and Approval of payments, and
- (f)** issue Notices to Cure.

(2) The Architect is not authorized to:

- (a)** revoke, alter, relax, or waive any requirements of the Contract Documents (other than "minor" deviations and changes) without concurrence of the Owner,
- (b)** finally approve or accept any portion of the Work without concurrence of the Owner,
- (c)** issue instructions contrary to the Contract Documents,
- (d)** issue Notice of Termination or otherwise terminate the Contract, or
- (e)** require the Contractor to stop the Work except only to avoid the performance of Defective Work.

D. LIMITATIONS of RESPONSIBILITIES

- (1)** The Architect shall not be responsible to Contractors or to others for supervising or coordinating the performance of the Work or for the Construction Methods or safety of the Work, unless the Contract Documents give other specific instructions concerning

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 46 of 49

these matters.

(2) The Architect will not be responsible to the Contractor (nor the Owner) for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents or for acts or omissions of the Contractor, a Subcontractor, or anyone for whose acts they may be liable. However, the Architect will report to the Owner and Contractor any Defective Work recognized by the Architect.

(3) The Architect will endeavor to secure faithful performance by Owner and Contractor, and the Architect will not show partiality to either or be liable to either for results of interpretations or decisions rendered in good faith.

E. ARCHITECT'S DECISIONS

Decisions by the Architect shall be in writing. The Architect's decisions on matters relating to aesthetic effect will be final and binding if consistent with the intent expressed in the Contract Documents. The Architect's decisions regarding disputes arising between the Contractor and Owner shall be advisory.

**ARTICLE 35
CASH ALLOWANCES**

A. All allowances stated in the Contract Documents shall be included in the Contract Sum. Items covered by allowances shall be supplied by the Contractor as directed by the Architect or Owner and the Contractor shall afford the Owner the economy of obtaining competitive pricing from responsible bidders for allowance items unless other purchasing procedures are specified in the Contract Documents.

B. Unless otherwise provided in the Contract Documents:

(1) allowances shall cover the cost to the Contractor of materials and equipment delivered to the Project site and all applicable taxes, less applicable trade discounts;

(2) the Contractor's costs for unloading, storing, protecting, and handling at the site, labor, installation, overhead, profit and other expenses related to materials or equipment covered by an allowance shall be included in the Contract Sum but not in the allowances;

(3) if required, the Contract Sum shall be adjusted by Change Order to reflect the actual costs of an allowance.

C. Any selections of materials or equipment required of the Architect or Owner under an allowance shall be made in sufficient time to avoid delay of the Work.

**ARTICLE 36
PERMITS, LAWS, and REGULATIONS**

A. PERMITS, FEES AND NOTICES

(1) Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses, and inspections necessary for proper execution and completion of the Work which are customarily secured after award of the

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 47 of 49

Construction Contract and which are in effect on the date of receipt of bids.

(2) The Contractor shall comply with and give notices required by all laws, ordinances, rules, regulations, and lawful orders of public authorities applicable to performance of the Work.

B. TAXES

Unless stated otherwise in the Contract Documents, materials incorporated into the Work are exempt from sales and use tax pursuant to Section 40-9-33, Code of Alabama, 1975 as amended. The Contractor and its subcontractors shall be responsible for complying with rules and regulations of the Sales, Use, & Business Tax Division of the Alabama Department of Revenue regarding certificates and other qualifications necessary to claim such exemption when making qualifying purchases from vendors. The Contractor shall pay all applicable taxes that are not covered by the exemption of Section 40-9-33 and which are imposed as of the date of receipt of bids, including those imposed as of the date of receipt of bids but scheduled to go into effect after that date.

C. COMPENSATION for INCREASES

The Contractor shall be compensated for additional costs incurred because of increases in tax rates imposed after the date of receipt of bids.

ARTICLE 37

ROYALTIES, PATENTS, and COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend, indemnify and hold harmless the Owner, Architect, Architect's consultants and their agents, employees, and consultants from and against all claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of, related to, or resulting from all suits or claims for infringement of any patent rights or copyrights arising out of the inclusion of any patented or copyrighted materials, methods, or systems selected by the Contractor and used during the execution of or incorporated into the Work. This indemnification does not apply to any suits or claims of infringement of any patent rights or copyrights arising out of any patented or copyrighted materials, methods, or systems specified in the Contract Documents. However, if the Contractor has information that a specified material, method, or system is or may constitute an infringement of a patent or copyright, the Contractor shall be responsible for any resulting loss unless such information is promptly furnished to the Architect.

ARTICLE 38

USE of the SITE

- A.** The Contractor shall confine its operations at the Project site to areas permitted by the Owner and by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with materials, equipment, employees' vehicles, or debris. The Contractor's operations at the site shall be restricted to the sole purpose of

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 48 of 49

constructing the Work, use of the site as a staging, assembly, or storage area for other business which the Contractor may undertake shall not be permitted.

- B.** Unless otherwise provided in the Contract Documents, temporary facilities, such as storage sheds, shops, and offices may be erected on the Project site with the approval of the Architect and Owner. Such temporary buildings and/or utilities shall remain the property of the Contractor, and be removed at the Contractor's expense upon completion of the Work, unless the Owner authorizes their abandonment without removal.

ARTICLE 39

CUTTING and PATCHING

- A.** The Contractor shall be responsible for all cutting, fitting, or patching that may be required to execute the Work to the results indicated in the Contract Documents or to make its parts fit together properly.
- B.** Any cutting, patching, or excavation by the Contractor shall be supervised and performed in a manner that will not endanger persons nor damage or endanger the Work or any fully or partially completed construction of the Owner or separate contractors.

ARTICLE 40

IN-PROGRESS and FINAL CLEANUP

A. IN-PROGRESS CLEAN-UP

(1) The Contractor shall at all times during the progress of the Work keep the premises and surrounding area free from rubbish, scrap materials and debris resulting from the Work. Trash and combustible materials shall not be allowed to accumulate inside buildings or elsewhere on the premises. At no time shall any rubbish be thrown from window openings. Burning of trash and debris on site is not permitted.

(2) The Contractor shall make provisions to minimize and confine dust and debris resulting from construction activities.

B. FINAL CLEAN-UP

(1) Before Substantial Completion or Final Acceptance is achieved, the Contractor shall have removed from the Owner's property all construction equipment, tools, and machinery; temporary structures and/or utilities including the foundations thereof (except such as the Owner permits in writing to remain); rubbish, debris, and waste materials; and all surplus materials, leaving the site clean and true to line and grade, and the Work in a safe and clean condition, ready for use and operation.

(2) In addition to the above, and unless otherwise provided in the Contract Documents, the Contractor shall be responsible for the following special cleaning for all trades as the Work is completed:

(a) Cleaning of all painted, enameled, stained, or baked enamel work: Removal of all marks, stains, finger prints and splatters from such surfaces.

(b) Cleaning of all glass: Cleaning and removing of all stickers, labels, stains, and paint

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL CONDITIONS**

SECTION 00-0040 – Page 49 of 49

from all glass, and the washing and polishing of same on interior and exterior.

(c) Cleaning or polishing of all hardware: Cleaning and polishing of all hardware.

(d) Cleaning all tile, floor finish of all kinds: Removal of all splatters, stains, paint, dirt, and dust, the washing and polishing of all floors as recommended by the manufacturer or required by the Architect.

(e) Cleaning of all manufactured articles, materials, fixtures, appliances, and equipment: Removal of all stickers, rust stains, labels, and temporary covers, and cleaning and conditioning of all manufactured articles, material, fixtures, appliances, and electrical, heating, and air conditioning equipment as recommended or directed by the manufacturers, unless otherwise required by the Architect; blowing out or flushing out of all foreign matter from all equipment, piping, tanks, pumps, fans, motors, devices, switches, panels, fixtures, boilers, sanitizing potable water systems; and freeing identification plates on all equipment of excess paint and the polishing thereof.

C. OWNER'S RIGHT to CLEAN-UP

If the Contractor fails to comply with these clean-up requirements and then fails to comply with a written directive by the Architect to clean-up the premises within a specified time, the Architect or Owner may implement appropriate clean-up measures and the cost thereof shall be deducted from any amounts due or to become due the Contractor

**ARTICLE 41
LIQUIDATED DAMAGES**

- A.** Time is the essence of the Contract. Any delay in the completion of the Work required by the Contract Documents may cause inconvenience to the public and loss and damage to the Owner including but not limited to interest and additional administrative, architectural, inspection and supervision charges. By executing the Construction Contract, the Contractor agrees that the Contract Time is sufficient for the achievement of Substantial Completion.
- B.** The Contract Documents may provide in the Construction Contract or elsewhere for a certain dollar amount for which the Contractor and its Surety (if any) will be liable to the Owner as liquidated damages for each calendar day after expiration of the Contract Time that the Contractor fails to achieve Substantial Completion of the Work. If such daily liquidated damages are provided for, Owner and Contractor, and its Surety, agree that such amount is reasonable and agree to be bound thereby.
- C.** The amount of liquidated damages due under either paragraph B or C, above, may be deducted by the Owner from the moneys otherwise due the Contractor in the Final Payment, not as a penalty, but as liquidated damages sustained, or the amount may be recovered from Contractor or its Surety. If part of the Work is substantially completed within the Contract Time and part is not, the stated charge for liquidated damages shall be equitably prorated to that portion of the Work that the Contractor fails to substantially complete within the Contract Time. It is mutually understood and agreed between the parties hereto that such amount is reasonable as liquidated damages.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SUPPLEMENTARY CONDITIONS**

SECTION 00-0050 – Page 1 of 2

1.1 SUMMARY

- A. Related Documents:
 - 1. Document 00 7200 - General Conditions.
 - 2. Division 01 - General Requirements.

1.2 GENERAL

- A. The following supplements modify, delete from, or add to the General Conditions referenced above.
- B. Where provisions of the General Conditions are modified, unaltered provisions remain in effect.

1.3 SUPPLEMENTS

1.4 ADDITIONAL REQUIREMENTS

A. Preliminary Drawings and Specifications – Prior to beginning construction, Contractor shall mark all preliminary drawings as VOID and insure no preliminary drawings will be used during construction. Contractor shall further direct his subcontractors, vendors, and trades to do likewise. At execution of the construction contract, the Contractor and his subcontractors shall certify that all contracts reflect the provisions of the current and official drawing revision that will be used to obtain permits and licenses from the Authorities Having Jurisdiction (AHJ)

B. Drawings and Specifications for Permitting – Contractor will be furnished computer .pdf files for bidding, building permits, and construction transmitted by email. These drawings and specifications will be labeled *Drawings and Project Manual For Construction* and will contain the Architect's Alabama registration seal. The Contractor is authorized to make sufficient copies as is required by the AHJ for submittals and procuring all required permits. The Project Manual may also be referred to as "Project Specifications"

C. Revised Drawings and Specifications - In the event that drawings are revised due to subsequent changes by the Owner or comments by the AHJ, the Contractor will be furnished amended documents by emailed .pdf files, either by individual sheet, or groups of sheets, or full set. Contractor is responsible for distribution and receipt of amended sheets to all subcontractors, vendors, and trades.

D. Drawings and Specifications for Construction– Contractor will maintain the official printed permit set of drawings and specifications for use as the master construction set. These drawings will be labeled *Drawings and Project Manual For Construction* and will contain the Architect's Alabama registration seal, and the AHJ certification stamp. The Contractor alone is authorized to make an unlimited number of copies for his and his sub-contractors' use, at the

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SUPPLEMENTARY CONDITIONS**

SECTION 00-0050 – Page 2 of 2

Contractor's expense. Such authorization shall expire at the completion of construction, and all drawings that can be accounted for, except final record sets, shall be destroyed or returned to Architect.

E. Additional Insured Provisions – Contractor's General, Automobile, and Umbrella Liability Insurance Policies shall name the Owner, the Architect, and their agents, consultants, and employees as Additional Insureds, stating that this coverage shall be the primary insurance for the Additional Insureds, and contain no exclusions of the Additional Insureds relative to job accidents. Architect must be furnished Certificates of Insurance listing Architect and consultants as Additional Insured. This requirement is in accord with General Conditions of the Contract 00 0040, Article 29.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
INVITATION TO BID**

SECTION 00-0200 – Page 1 of 2

INVITATION TO BID

Project: Shelby County Water Services Building Project

Owner: Shelby County Commission

Sealed bids for the **SHELBY COUNTY WATER SERVICES BUILDING PROJECT located at 10927 US Highway 280 Sterrett, AL 35147** will be received by the Shelby County Commission in the County Manager's Office located at 200 West College Street, Room 123, Columbiana, AL 35051 until 2:00 p.m. on May 11, 2023 and at the time will be opened, and publicly read.

The owner requires the Project to be complete within **270** calendar days from date indicated on the notice to proceed. (See detail on construction time periods in Section 00-1020.)

All interested bidders may obtain copies of the Construction Documents upon receipt of a \$100.00 non-refundable payment. Checks should be made payable to the Shelby County Commission. Interested bidders may obtain Bid Documents from the Shelby County Department of Facilities & General Services office located at 280 McDow Road, Columbiana, Alabama 35051. Electronic copies of bid documents may be obtained at no cost by sending a request to rlecroy@shelbyal.com. Contact Trey Gauntt at 205-670-6461 or at trey@shelbyal.com regarding any questions.

A mandatory pre-bid conference will be held at 10:00 a.m. on April 27th, 2023 at the Shelby County Administration Building, 200 West College Street, Columbiana, AL 35051.

Attendance at the Pre-Bid Conference IS REQUIRED for all General Contractor Bidders intending to submit a Proposal, and is highly recommended for Subcontractors. Bids from General Contractors not attending the Pre-Bid Conference will be rejected. Shelby County reserves the right to waive this requirement if it is determined to be in the best interest of the County.

Bidders will be required to provide Bid security in the form of a Bid Bond or cashier's check in the amount of a sum no less than five (5) percent of the Bid Price.

Refer to other bidding requirements described in Document 00201 – Instructions to Bidders

Submit your Bid on the Bid Form provided.

Your Bid will be required to be submitted under a condition of irrevocability for a period of sixty (60) days after submission.

The attention of bidders is called to the provisions of State Law Governing General Contractors, as set forth in Sections 34-8-1 to 34-8-24, inclusive, Code of Alabama of 1975, as amended; and the provisions of said law shall govern bidders insofar as it is applicable.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
INVITATION TO BID**

SECTION 00-0200 – Page 2 of 2

The above-mentioned provisions of the Code make it illegal for the Owner to consider a bid from anyone who is not properly licensed under such code provisions. The Owner, therefore will not consider any bid unless the bidder produces evidence that he is licensed. Neither will the Owner enter into a Contract with a foreign corporation which is not qualified under State Law to do business in the State of Alabama.

The attention of non-resident bidders is called to the provisions of Alabama Law, Section 39-3-5, Code of Alabama 1975, as amended, relating to preference to be given to resident contractors in Alabama over non-resident contractors in the award of contracts in the same manner and to the same extent as provided by the laws of the state of domicile of the non-resident contractor, and to the requirements that the bid documents tendered by any non-resident contractor must be accompanied by "a written opinion of an attorney-at-law licensed to practice law in such non-resident contractor's state of domicile as to the preference, if any or none, granted by the law of the state to its own business entities whose principal places of business are in that state in the letting of any or all public contracts."

REQUIREMENTS FOR BIDDERS

Bidding contractor will be required to provide evidence of E-Verify documentation and Section 84 business license.

IMMIGRATION LAW

By signing this contract, the contracting parties affirm, for the duration of the agreement, that they will not violate federal immigration law or knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama. Furthermore, a contracting party found to be in violation of this provision shall be deemed in breach of the agreement and shall be responsible for all damages resulting therefrom.

OPEN TRADE

By signing this contract, vendor agrees that it is not currently engaged in, nor will it engage in, any boycott of a person or entity based in or doing business with a jurisdiction with which the State of Alabama can enjoy open trade.

Please provide your bid response in triplicate, one original and two copies.

The Owner reserves the right to accept or reject any or all Bids.

Chad Scroggins
County Manager

SHELBY COUNTY WATER SERVICES BUILDING PROJECT INSTRUCTIONS TO BIDDERS

SECTION 00-0201 – Page 1 of 6

1.1 SECURITY DOCUMENTS

Bidders may obtain Bid Documents from the Shelby County Facilities & General Services office located at 280 McDow Road, AL 35051 (telephone 205/670-6461). Electronic copies of bid documents may be obtained at no cost by sending a request to rlcroy@shelbyal.com.

1.2 BID FORM

- A. In order to receive consideration, make all bids in strict accordance with the following:
 - 1. Make bids upon the forms provided therefore, properly executed and with all items filled out.
 - 2. Do not change the wording of the Bid Form, and do not alter the Bid Form.
 - 3. Unauthorized conditions, limitations, or provisions attached to the proposal shall be cause for rejection of the proposal.
 - 4. Telegraphic bid or telegraphic modification of bid will not be considered.
 - 5. Bids received after the time specified for receiving them will not be considered.
 - 6. Late bids will be returned to the sender unopened.
 - 7. Each bid shall be addressed to the Owner, and shall be delivered to the Owner at the address given in the Invitation to Bid on or before the day and hour set for receiving bids.
 - 8. Each bid shall be enclosed in a sealed envelope bearing the title of the Work, the name of the Bidder and address, Bidder's license number, classification of license, limits of classification, expiration date, and the date and hour of the bid opening.
 - 9. It is the sole responsibility of the bidder to see that his bid is received on time.

Bidders are cautioned that, in order to be considered responsive, a complete bid for the project, including unit prices and any specified allowances, must be submitted. A bid for less or with exceptions or clarifications will not be considered responsive.

1.3 BONDS

- A. BID BONDS
 - 1. A Certified Check or Bid Bond for the lesser of five percent (5%) of the proposed Contract Amount or \$10,000 made payable to Shelby County Commission must accompany each bid as evidence of good faith.
 - 2. All Bid Bonds shall be on the standard form provided.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
INSTRUCTIONS TO BIDDERS**

SECTION 00-0201 – Page 2 of 6

3. The Successful Bidder's bond will be retained until he has signed the Contract and furnished the required Labor and Materials Payment and Performance Bond.
4. The Owner reserves the right to retain the bond of the two next lowest Bidders until the lowest Bidder enters into contract or until 60 days after the Bid Opening, whichever is shorter.
5. All other Bid Bonds will be returned as soon as practicable, and in accordance with Alabama State Law.
6. If any bidder refuses to enter into a Contract, the Owner will retain his Bid Bond as liquidated damages, but not as a penalty.

B. OTHER BONDS

1. Prior to signing the Contract, the Owner will require the successful bidder to secure and post a Performance Bond in the amount of 100 percent of the Contract Sum, Labor and Materials Payment Bond in the amount of 50 percent of the Contract Sum.
2. All such bonds shall be issued by Surety acceptable to the Owner. Include the costs of all such bonds in the proposed Contract Sum.

1.4 PRIOR TO BID

A. Examination of Drawings, Project Manual and Site of Work:

1. **Before submitting a Bid, each Bidder shall carefully examine the Drawings, read the Bid Documents, and visit the site of the Work. Bidders will need to coordinate with Owner to get access to the site.**
2. Each Bidder shall fully inform himself prior to bidding as to all existing conditions and limitations under which the Work is to be performed, and he shall include in his Bid a sum to cover all costs of all items necessary to perform the Work as set forth in the proposed Bid Documents.
3. Allowance will not be made to any Bidder because of lack of such examination or knowledge of the existing conditions.
4. The submission of a Bid will be construed as conclusive evidence that the Bidder has made such examination.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
INSTRUCTIONS TO BIDDERS**

SECTION 00-0201 – Page 3 of 6

B. Interpretation of Bid Documents Prior to Bidding

1. If any person contemplating submitting a Bid for construction of the Work is in doubt as to the true meaning of any part of the proposed Bid Documents, or finds discrepancies in or omissions from any part of the proposed Bid Documents, he may submit to the Owner a written request by email to trey@shelbyal.com for interpretation thereof not later than three days before Bids are specified to be received.
 - a. The person submitting the request shall be responsible for its prompt delivery.
 - b. Interpretation or correction of proposed Bid Documents will be made only by Addendum and will be mailed, faxed, or delivered to each bidder of record. Each Addendum will have a location for acknowledgement of receipt and understanding of its contents. **Bids will not be considered complete if a signature of an officer of the bidding party does not appear thereon.**
 - c. The Owner will not be responsible for any other explanations or interpretations of the proposed Bid Documents.

1.5 BIDS

A. Withdrawal of Bids

1. Any Bidder may withdraw his Bid, either personally or by written request, if received by the Owner at any time prior to scheduled time for opening bids.
2. Bidder cannot withdraw his Bid for a period of 60 days after the date set for receiving thereof.
3. Each Bid shall be subject to acceptance by the Owner during this period.

B. Award or Rejection of Bids

1. **The Contract, if awarded will be awarded to the responsive low Bidder who proposes the lowest Contract Sum on the basis of the Base Bid plus any approved alternates,** subject to the Owner's right to reject any or all Bids and waive informality and irregularity in the Bids and in the bidding.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
INSTRUCTIONS TO BIDDERS**

SECTION 00-0201 – Page 4 of 6

C. Proof of Competency of Bidder

1. At the time of bid, bidder must furnish a list of previous projects successfully completed. The list provided must include specific contacts and telephone numbers for each project. All projects must meet the requirements listed in Section 00 00200.
2. Any Bidder may be required to furnish additional evidence satisfactory to the Owner that he and his proposed Subcontractors have sufficient experience in the types of work called for to assure completion of the Contract in a satisfactory manner and that their current project workload will not limit their capability.

1.6 EXECUTION OF AGREEMENT

- A. Public Works Contract.
- B. The Bidder to whom the Contract is awarded by the Owner shall, within 10 days after Notice of Award and receipt of Agreement forms from the Owner, sign and deliver to the Owner all required copies of the Contract.
- C. The Bidder to whom the Contract is awarded by the Owner shall receive five (5) sets of Construction documents. Any sets needed beyond the initial five sets may be purchased from the Owner.
- D. At or prior to the delivery of the signed Agreement, the Contractor shall deliver to the Owner the Labor and Materials Payment Bond, the Performance Bond, and the policies of insurance or Insurance Certificates as required by the Bid Documents.
- E. All bonds and policies of insurance must be approved by the Owner before the successful Bidder can proceed with the Work.
- F. Failure or refusal to furnish bonds or insurance policies or certificates in a form satisfactory to the Owner and in a timely manner, shall subject the Bidder to loss of time from the allowable construction period equal to the time of delay in furnishing the required material.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
INSTRUCTIONS TO BIDDERS**

SECTION 00-0201 – Page 5 of 6

CONTRACT TIMES

- G. Contractor agrees that the work will be substantially complete within **270** calendar days from the date indicated on the Notice to Proceed.
- H. If the Contractor is delayed, hindered or impeded at any time in the progress of the Work for any reason or by any alleged act or neglect of the Owner, or the Architect, or by any employee of any of them or by a separate Contractor employed by the Owner, or by changes ordered in the scope of the Work, or by other causes beyond the Contractor's control, then the Contract Time may be extended by Change Order for such reasonable time as is agreed to by the Owner. However, to the fullest extent permitted by law, and notwithstanding any other provisions in the Contract Documents, and whether contemplated or not, and whether or not arising by active interference by the Owner and his agents and employees shall not be liable for any damages for delay whether for direct or indirect costs, extended home office overhead, idle or inefficient labor or equipment, cost escalations, or monetary claims of any nature arising from or attributable to delay by any cause whatsoever. The Contractor's sole and exclusive right and remedy for delay by any cause whatsoever is an extension of the Contract Time but no increase in the Contract Sum.
- I. No delay, interference, hindrance or disruption, from whatever source or cause, in the progress of the Contractor's Work shall be a basis for an extension of time unless the delay, interference, hindrance or disruption is (1) without the fault and not the responsibility of the Contractor, its subcontractors and suppliers and (2) directly affects the overall completion of the Work as reflected on the critical path of the updated Construction Schedule.
- J. The Contractor expressly agrees that the Owner shall have the benefit of any float in the construction schedule and delay to construction activities which do not affect the overall completion of the Work does not entitle the Contractor to any extension in the Contract Time.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
INSTRUCTIONS TO BIDDERS**

SECTION 00-0201 – Page 6 of 6

K. Time Extension for Unusually Severe Weather:

This provision specifies the procedure for determination of time extensions for unusually severe weather. In order for the Owner to award a time extension under this clause, the following conditions must be satisfied.

1. The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.
2. The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the contractor.

1.7 LIQUIDATED DAMAGES

Should the Contractor fail to substantially complete the work within the specified time, an assessment of \$1300 per day shall be applied as damages and not as a penalty.

1.8 COORDINATION

It is the responsibility of the Contractor to schedule and coordinate any required testing and inspections.

End of Section

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
BID REQUIREMENTS**

SECTION 00-0202 – Page 1 of 2

BID REQUIREMENTS

INSURANCE REQUIREMENTS:

The Contractor shall provide certification of required coverage to the Owner. Certification shall provide Owner with **10 days Notice of Cancellation**. Required insurance shall not be written for less than the following limits, or greater if required by law. Additional named insured shall be the Shelby County Commission, its officers, agents, and employees, successors or assigns.

Contractor's Liability Insurance:

1. Worker's Compensation
 - a. State.....Statutory
 - b. Applicable Federal.....Statutory
 - c. Employer's Liability\$500,000
 - d. Benefits required by Union laboras applicable
 - e. Voluntary Compensation.....\$100,000
 - f. Broad Form all States Endorsement

2. Comprehensive General Liability (including Premises - Operations; Independent Contractor's Protective; Products and Completed Operations; Broad Form Property Damage; Contractual Liability; Personal Injury; all as combined single limits):
 - a. Bodily Injury/Property Damage, each occurrence.....\$1,000,000
 - b. Products/Completed Operations annual aggregate.....\$1,000,000

Products and Completed Operations Insurance shall be maintained for 3 years after the work has been completed; Property Damage liability insurance will provide X, C, or U coverage as applicable; Fellow employee Suits to be included.

3. Comprehensive Automobile Liability (owner, non-owned, hired): Combined single limits for bodily injury and property damage:
 - a. Bodily Injury/Property Damage, each occurrence.....\$1,000,000

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
BID REQUIREMENTS**

SECTION 00-0202 – Page 2 of 2

Indemnity:

The Contractor shall assume all liability for and shall indemnify and save harmless the Shelby County Commission, its officers, agents, and employees, and their successors and assigns, and their consultants and employees from all damages and liability for injury to any person or persons, and injury to or destruction of property, including the loss of use thereof, by reason of an accident or occurrence arising from operations under the Contract, whether such operations be by himself or by any Subcontractor or by anyone directly or indirectly employed by either of them, occurring on or about the premises or the ways and means immediately adjacent, during the term of the Contract, or any extension thereof, and shall also assume the liability for injury and/or damages to adjacent or neighboring property by reason of work done under this Contract.

The insurance shall extend to and include all of the Contractor's operations, regardless of whether they may be in connection with work that is temporary, permanent, or classified as "extra work".

ADVERTISEMENT OF COMPLETION:

Immediately after completion of the Contract, the Contractor shall publish an Advertisement of Completion (see sample form within this document) The Shelby County Reporter, once a week for four consecutive weeks. Proof of publication of said notice shall be submitted by the Contractor to the Shelby County Commission by affidavit of the publisher and a printed copy of the notice. In no instance shall a final settlement be made upon the Contract until the expiration of thirty (30) days from the completion of the Contract.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PROPOSAL FORM AND SAMPLE BID BOND**

SECTION 00-0300 – Page 1 of 3

Bids shall be submitted in triplicate.

DATE: _____

TO: Mr. Chad Scroggins
Shelby County Commission
200 West College Street
Columbiana, AL 35051

Bidding Contractor

1. Pursuant to and in compliance with the Invitation to Bid and the proposed Contract Documents relating to the construction of:

Shelby County Water Services Building Project
Shelby County

Including Addenda _____

The undersigned, having become thoroughly familiar with the terms and conditions of the proposed Contract Documents and with local conditions affecting the performance and costs of the Work at the place where the Work is to be completed, and having fully inspected the site in all particulars, hereby proposes and agrees to fully perform the Work within the time stated and in strict accordance with the proposed Contract Documents, including furnishing any and all labor and materials, and to do all work required to construct and complete said Work in accordance with the Contract Documents, for the following sum of money:

Total Base Bid Amount - _____

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PROPOSAL FORM AND SAMPLE BID BOND**

SECTION 00-0300 – Page 2 of 3

2. I understand that Shelby County reserves the right to reject this Bid, but that this Bid shall remain open and not be withdrawn for a period of sixty (60) days from the date prescribed for its receiving.
3. There will not be a pre-bid meeting for this project. Any questions or clarifications regarding the bid should be submitted in writing and answers will be provided.
4. The Bidder, if awarded the contract, hereby agrees to commence work under this contract on or before a date to be specified in a written Notice to Proceed from the Owner and to fully complete work as specified in the required timeframe.
5. If written notice of the acceptance of this Bid is mailed or delivered to the undersigned within sixty (60) days after the date set for the receiving of this Bid, or at any other time thereafter before it is withdrawn, the undersigned shall execute and deliver the Contract Documents to the Owner in accordance with this Bid as accepted, and will also furnish and deliver to the Owner the proof of insurance coverage, within ten (10) days after personal delivery or any deposit in the mails of the notification of acceptance of this Bid.
6. Notice of Acceptance or request for additional information may be addressed to the undersigned at the address set forth in Item 7 below.
7. The names of all persons interested in foregoing Bid as principals are:

IMPORTANT NOTICE: If Bidder or other interested person is a corporation, give legal name of corporation, state where incorporated, and names of president and secretary; if a partnership, give name of firm and names of all individual co-partners composing the firm; if Bidder or interested person is an individual, give first and last names in full.)

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PROPOSAL FORM AND SAMPLE BID BOND**

SECTION 00-0300 – Page 3 of 3

NOTE: If Bidder is a corporation, set forth the legal name of the corporation together with the signature of the officer or officers authorized to sign contracts on behalf of the corporation. If Bidder is a partnership, set forth the name of the firm together with the signature of the partner or partners authorized to sign contracts on behalf of the partnership.

The Bidder acknowledges by his signature that he agrees to requirements contained in the Invitation to Bid and the Instructions to Bidders, and that should he fail to execute a Contract with the Owner, should the Owner award said Contract to him, that the Owner may rightfully collect the sum of the Bid Bond. The required Bid Bond is attached to this Bid.

NAME OF FIRM: _____

ADDRESS: _____

ALABAMA GENERAL CONTRACTOR'S LICENSE #: _____

SIGNED: _____

PRINT NAME: _____

TITLE: _____

Note: If a corporation, Bid must be signed by person authorized by corporation by-laws to bind it to a contract.

The entirety of this project shall be bid as a **“LUMP SUM BID”**. The Bidder agrees to perform all necessary work described in the **CONTRACT DOCUMENTS** for the project, constituted by the **LUMP SUM BID**.

FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS:

That the contractor, as Principal, and _____
(Name of Surety)

_____, as Surety, are held and firmly bound
unto _____
(Address)

the **SHELBY COUNTY COMMISSION** as Obligee in the full and just sum of five percent (5%) of amount bid (Maximum amount - \$10,000.00), lawful money of the United States, for the payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said Principal is herewith submitting its proposal for

PROJECT NAME: _____

The condition of this obligation is such that:

If the aforesaid Principal shall be awarded the contract and said Principal will, within the time required, enter into a formal contract and give a good and sufficient bond to secure the performance of the terms and conditions of the contract, then this obligation will be void; otherwise, the Principal and the Surety will pay unto the Obligee the difference in money between the amount of the contract as awarded and the amount of the proposal of the next lowest acceptable bidder, but not to exceed the total amount of the proposal guaranty. If no other bids are received, the full amount of the proposal guaranty shall be retained and/or recovered as liquidated damages for such default.

Witness our hands and seals this _____ day of _____,
20____.

SIGNATURE OF INDIVIDUAL BIDDER: (USE ONLY WHERE BIDDER IS AN INDIVIDUAL)

_____, Doing Business As, _____
(Name of Individual) (Business Name)

Business Mailing Address: _____

NAME OF PARTNERSHIP, JOINT VENTURE OR CORPORATION:

(Name of Partnership, Joint Venture or Corporation*) – (If Two Corporations**)

Business Mailing
Address: _____ BY: _____ (L.S.)
(Signature and Position or Title of
Officer Authorized to Sign Bids and
Contracts for the Firm)

Business Mailing
Address: _____ BY: _____ (L.S.)
(Signature and Position or Title of
Officer Authorized to Sign Bids and
Contracts for the Firm)

Business Mailing
Address: _____ BY: _____ (L.S.)
(Signature and Position or Title of
Officer Authorized to Sign Bids and
Contracts for the Firm)

* (Corporate Seal) Name of State under the laws of which the
Attest: Corporation was chartered:

(Secretary)

** (Corporate Seal) Name of State under the laws of which the
Attest: Corporation was chartered:

(Secretary)

(Name of Surety)

BY: _____
(Attorney-in-Fact)

**PROPOSAL WILL NOT BE ACCEPTED UNLESS THIS FORM FOR BID BOND IS USED,
AND BIDS WILL NOT BE CONSIDERED UNLESS THIS FORM IS SIGNED BY PRINCIPAL
AND SURETY OR A CERTIFIED CHECK IN THE PROPER AMOUNT IS FURNISHED.
CASHIER'S CHECK IS NOT ACCEPTABLE.**

PLEASE LEAVE ATTACHED IN YOUR BIDDING FORM

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PROJECT SUMMARY**

SECTION 00-1010 – Page 1 of 1

Part 1 – General

Project Description:

Contractor shall provide materials and construction services for the project at Water Services building, as shown on the project drawings and specifications. The work shall comply with the following specifications; see attached exhibits.

Requirements for Contractor:

Contractor and contractors on site staff shall have experience in the construction of similar projects. Contractor shall provide documentation satisfactory to Owner of compliance with these experience requirements and that contractor's operator is competent to construct the proposed project.

Construction Timeframe:

Project to be complete within **270** calendar days from date of indicated on the notice to proceed.

Construction Scope and Site Conditions:

Operator(s) to construct the project per the project specifications and layout.

Contractor is expected to execute a Public Works Contract, Bonds and provide other required documents as required by the contract and Local and State laws. (Sample Attached)

Building permit and other permits required are the responsibility of the Contractor.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PROJECT NOTES**

SECTION 00-1020 – Page 1 of 2

1. The successful bidder, upon notification by the Owner, shall have ten (10) days to execute a contract pertaining to the scope of work as identified within this bid proposal package. Failure to do so shall result in forfeiture of the bidder's bond subject to stipulations as provided herein.
2. After the contract is signed and executed by both parties, the Owner shall issue a "Notice to Proceed" to the successful bidder.
3. Upon failure of the Contractor to complete the contract work within the specified time in Section 00-1010, the Contractor shall be assessed liquidated damages of the amount specified in Section 00-0201. Construction can begin on site any time after the date on the Notice to Proceed and must be substantially complete no later than time indicated on construction documents.
4. The contractor shall locate all utilities prior to commencing construction. Prior to the start of construction, the contractor shall field verify the locations of all pipes, power lines, and utilities to check for conflicts with the construction project. The Contractor shall notify the Owner immediately if a conflict is found prior to commencement of construction. It shall be the responsibility of the Contractor to determine the exact location of all existing utilities, whether shown on the plans or not. In the event of a conflict it shall be the responsibility of the contractor to cooperate with the applicable utility company.
5. It is the responsibility of the contractor to verify all quantities and site conditions prior to bidding. The Contractor shall notify the Owner prior to bidding of any discrepancies in the plans.
6. The Contractor shall be responsible for obtaining all construction permits, (building permit and NPDES permit if required).
7. If required, any erosion control devices required will be the responsibility of the contractor and shall be installed and maintained by the contractor per the project plans and per ADEM BMP specifications.
8. The existing access drive will remain open during construction.
9. The Contractor will be responsible for any and all aspects of job safety. The Owner will not supervise or inspect any safety feature.
10. It shall be the duty and the responsibility of the Contractor to give notification to the Owner 24 hours prior to commencement of any construction activity. Failure to notify as required may be grounds for non-acceptance.
11. Proof of Competency of Bidder – At the time of bid, bidder must furnish a list of previous similar projects successfully completed. The list provided must include specific contacts and telephone numbers for each project. Upon request prior to award of bid the Owner may request any bidder to furnish additional evidence satisfactory to the Owner that he and his proposed Subcontractors have sufficient experience in the types of work called for to assure completion of the Contract in a satisfactory manner and that their current project workload will not limit their capability. Successful Bidder shall submit a list of subcontractors to be employed on the project.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PROJECT NOTES**

SECTION 00-1020 – Page 2 of 2

12. Prior to installation or request for associated field inspections, shop drawings shall be submitted for review and approval, designed in accordance with the project plans and specifications.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
COST REPORTING AND PAYMENTS**

SECTION 00-1025 – Page 1 of 2

Part 1 – General

1.1 SECTION INCLUDES

- A. Procedural requirements for processing the following:
 - 1. Schedule of Values
 - 2. Cash flow projections for the project
 - 3. Lump Sum and Unit prices (if any)
 - 4. Payment applications
 - 5. Payments at substantial completion
 - 6. Payment at final completion
 - 7. Identification of substitutions and alternatives in payment requests
 - 8. Accounting of Change Order amounts and allowances, and similar cost and pay-out related requirements

1.2 LUMP SUM PRICE SCHEDULE

- A. General:
 - a. It is recognized that this project is a lump sum bid as listed in the Bid Form, and that the Owner - Contractor Agreement records acceptance or rejection of the bid price, either as bid or as otherwise agreed upon by the date of the Agreement.
 - b. It is recognized that the utilization of the lump sum price contain total costs as defined therein, and include each entity's total cost to include margins for overhead and profit.

1.3 PAYMENT REQUESTS

- A. General:
 - a. Except as otherwise indicated in the Contract Documents, comply with the procedures and requirements of the General Conditions, including the submittal of supporting documentation and waivers or releases of lien.
 - b. Refer to the Supplementary Conditions for requirements concerning "retainage" by Owner on payment.
 - c. Except as otherwise indicated, sequence of progress payments shall be made on a regular basis, and each must be consistent with previous applications and payments.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
COST REPORTING AND PAYMENTS**

SECTION 00-1025 – Page 2 of 2

B. Payment Application Times:

The period of construction work covered by each payment request is the period indicated in the General Conditions.

C. Final Payment Application:

- a. The administrative actions and submittals which must precede or coincide with submittal of the final payment application can be summarized as follows but not necessarily limited to these:
 - i. Completion of project closeout requirements
 - ii. Completion of items specified for payment application at time of substantial completion (regardless of whether such application was made).
 - iii. Written assurance, satisfactory to Owner, that unsettled claims will be settled and that work not actually completed and accepted will be completed without undue delay.
 - iv. Transmittal of required project construction records to Owner.
 - v. Proof, satisfactory to Owner, that taxes, fees and similar obligations of the Contractor have been paid.
 - vi. Removal of temporary facilities, services, surplus materials, rubbish and similar provisions.
 - vii. Final payment for the work to be performed under this project shall be in accordance with the advertisement of completion requirements as set forth in the State of Alabama Public Works Bid Law.

Part 2 – Products

Not Used

Part 3 –Execution

Not Used

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
MEASUREMENT AND PAYMENT**

SECTION 00-1026 – Page 1 of 1

Part 1 – General

1.1 SECTION INCLUDES

- A. The entirety of the Project shall be bid lump sum price. The Bidder agrees to perform all necessary work described in the Contract Documents. Alterations to the Construction Contract will be based on the lump sum price established in the Base Bid Schedule, and the Bidder will receive no additional compensation for items covered under this scope. All materials and services provided for construction on this project shall meet or exceed the requirement of the project specifications outlined herein.
- B. Even though an item of work is included in the technical specifications, if it is not both covered herein and specifically itemized in the Bid Form, payment for it shall not be separately made. Such work shall be considered a necessary part of or incidental to its related work and shall be subsidiary obligation to the items of work being performed.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CHANGE ORDER PROCEDURES**

SECTION 00-1028 – Page 1 of 3

Part 1 – General

1.1 SECTION INCLUDES

- A. Procedural requirements for considering and processing Change Orders.
- B. Related Requirements:
 - a) Agreement: The amounts of established unit prices
 - b) Conditions of the Contract:
 - 1. Methods of determining cost or credit to Owner resulting from changes in Work made on a time and material basis.
 - 2. Contractor's claims for additional costs
 - c) Section 01025: Cost Reporting and Payments

1.2 PRELIMINARY PROCEDURES

- A. Owner or Engineer may initiate a potential change by submitting a Proposal Request to Contractor. Request will include the following:
 - a) Detailed description of the change, products, and location of the change in the Project.
 - b) Supplementary or revised drawings and specifications.
 - c) The Projected time span for making the change, and a specific statement as to whether overtime work is, or is not, authorized.
 - d) A specific period of time during which the requested price will be considered valid.
 - e) Such request is for information only, and is not an instruction to execute the changes, nor is it a mandate to stop work in progress.
- B. Provide full written data required to evaluate changes.
 - a) Maintain detailed records of work performed on a time-and-material/force account basis.
 - b) Provide full documentation to Owner upon request.
- C. Designate in writing the member of Contractor's organization:
 - a) Who is authorized to accept changes in the work
 - b) Who is responsible for informing others in the Contractor's organization of the authorization of changes in the work.
- D. Owner will designate in writing the person who is authorized to execute Change Orders.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CHANGE ORDER PROCEDURES**

SECTION 00-1028 – Page 2 of 3

1.3 CONSTRUCTION CHANGE DIRECTIVES

- A. In absence of total agreement on the terms of a Change Order, the Owner may prepare and issue a Construction Change Directive directing a change in the work, for subsequent inclusion in a Change order.
 - a) Construction Change Directive will describe changes in the Work, and describe the method of determining any change in the Contract Sum or Contract Time, or both
 - b) The Owner will sign construction Change Directive
- B. Upon receipt of a Construction Change Directive, Contractor shall do the following:
 - a) Promptly proceed with the change in the work involved
 - b) Promptly advise the Owner of the Contractor's agreement or disagreement with the method, if any provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.
- C. A Construction Change Directive signed by the Contractor indicates the agreement of the Contractor therewith, including adjustment in Contract Sum and Contract Time or the method for determining them.
 - a) Such agreement shall be effective immediately and shall be recorded as a Change Order
 - b) If Contractor does not respond promptly or if he disagrees with the Construction Change Directive, he shall comply with General Conditions.
- D. A Construction Change Directive shall be processed in compliance with requirements of the General Conditions.

1.4 DOCUMENTATION OF PROPOSALS AND CLAIMS

- A. Support each quotation for a lump-sum proposal, and for each unit price that has not previously been established, with sufficient substantiating data to allow Owner to evaluate the quotation.
- B. On request provide additional data to support time and cost computations:
 - a. Labor required
 - b. Equipment required:
 - i. Recommended source of purchase and unit cost
 - ii. Quantities required
 - c. Taxes, insurance and bonds
 - d. Credit for work deleted from Contract, similarly documented
 - e. Overhead and profit, for subcontractor and General Contractor separately
 - f. Justification for any change in Contract Time

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CHANGE ORDER PROCEDURES**

SECTION 00-1028 – Page 3 of 3

- C. Support each claim for additional costs, and for work done on a time-and – material/force account basis, with documentation as required for a lump sum proposal, plus the following additional information:
 - a. Name of the Owner's authorized agent who ordered the Work, and date of the order
 - b. Dates and hours work was performed, and by whom
 - c. Time record, summary of hours worked, and hourly rates paid
 - d. Receipts and invoices for:
 - e. Equipment used, listing dates and times of use
 - f. Products used, listing of quantities
 - g. Subcontracts
 - h. Overhead and Profit, taxes, insurance
- D. Document requests for substitutions for Products as specified elsewhere in Division One

1.5 PREPARATION OF CHANGE ORDERS

- A. Contractor will prepare each Change Order.
- B. Change Order will describe change in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.
- C. Change Order will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.

1.6 CORRELATION WITH CONTRACTOR'S SUBMITTALS

- A. Periodically revise Schedule of Values and Request for Payment forms to record each change as a separate item of Work, and to record the adjusted Contract Sum.
- B. Periodically revise the Construction Schedule to reflect each change in Contract Time. Revise sub-schedules to show changes for other items of Work affected by the changes.
- C. Upon completion of Work under a Change Order, enter pertinent changes in Record Documents.

PART 2 -- PRODUCTS
Not Used

PART 3 – EXECUTION
Not Used

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PROJECT MEETINGS**

SECTION 00-1200 – Page 1 of 2

Part 1 – General

1.1 PRE-CONSTRUCTION MEETING

- A. Schedule meeting within the early stages of Construction as determined by the owner.
- B. Suggested Agenda: Contractor shall prepare written material, distribute lists, and discuss the following:
 - a. Identification of major Subcontractors and Suppliers
 - b. Projected construction schedule (To be supplied in bar chart format by the Contractor prior to beginning work)
 - c. Critical work sequencing
 - d. Major Equipment deliveries and priorities
 - e. Project coordination, including designation of responsible persons
 - f. Procedures for, and processing of:
 - i. Field decisions
 - ii. Proposal requests
 - iii. Submittals
 - iv. Change orders
 - v. Applications for payments
 - g. Adequacy of distribution of Contract Documents
 - h. Procedures for maintaining Record Documents
 - i. Use of premises
 - i. Work and storage areas
 - ii. Owner's requirements
 - j. Construction facilities, construction aids, and controls
 - k. Temporary utilities
 - l. Safety and first aid procedures
 - m. Security procedures
 - n. Housekeeping procedures
 - o. Working days/hours
 - p. Erosion control and stormwater management

1.2 PROGRESS MEETINGS

- A. Schedule progress meetings as determined by the owner when they are necessary.
- B. Suggested Agenda:
 - a. Review and approval of minutes of previous meeting
 - b. Review of work progress since previous meeting
 - c. Field observations, problems, conflicts.
 - d. Problems which impede construction schedule

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PROJECT MEETINGS**

SECTION 00-1200 – Page 2 of 2

- e. Corrective measures and procedures required to regain projected schedule
- f. Revisions to construction schedule
- g. Plan progress and schedule for succeeding work period
- h. Coordination of schedules
- i. Review submittal schedules; expedite as required
- j. Review proposed changes for:
 - i. Effect on construction schedule and on completion date
 - ii. Effect on other contracts of the Project
- k. Other Business

Part 2 – Products

Not Used

Part 3 – Execution

Not Used

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CONSTRUCTION SCHEDULES**

SECTION 00-1310 – Page 1 of 2

Part 1 – General

1.1 SECTION INCLUDES

Procedures for preparation, submission and review of “Horizontal Bar Type” Progress or Construction Schedules for the entire project, and bi-weekly updating.

1.2 FORM OF SCHEDULES

Prepare Construction Schedules in the form of a horizontal bar chart prior to commencing the work. Work shall not commence until the Contractor submits the project schedule for review.

1.3 CONTENT OF SCHEDULES

- A. Construction Schedules shall include the following:
 - a. Complete sequence of construction by activity.

1.4 SUBMITTALS

- A. Submit Design and Construction Schedule within five (5) calendar days after date of a contract award
 - a. Owner will review design and schedule and return a copy marked approved or with comments.
 - b. If required, resubmit for final review.

1.5 DISTRIBUTION

- A. Distribute copies of approved Design and Construction Schedule to job file and other concerned parties.
- B. Instruct all recipients to report any inability to comply and provide detailed explanation with suggested remedies.

1.6 DURATION AND MILESTONES

- A. The Contract Time shall commence to run on the date of issuance of the Notice to Proceed. The project shall be substantially completed within 270 calendar days after the Contract Time commences to Run. Upon reaching substantial completion, the successful contractor will be issued a letter stating the project has reached substantial completion, the work will be inspected, and a punch list will be generated and forwarded.
- B. The Contractor shall prosecute the work diligently and will avoid interfering with or delaying any progress of any other Contractors or the Owner’s own forces on other project related work.
- C. The Contractor shall be allowed 30 calendar days from the date of award to

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CONSTRUCTION SCHEDULES**

SECTION 00-1310 – Page 2 of 2

procure all required materials after such period, contract time charges shall commence. Contract time specified in Section 00-201 will be allowed.

Part 2 - Products

Not used

Part 3 - Execution

Not used

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SHOP DRAWINGS, PRODUCT DATA, SAMPLES**

SECTION 00-1340 – Page 1 of 1

Part 1 – General

1.01 SECTION INCLUDES

Procedures for processing Shop Drawings, Product Data, Office Samples, and Certificate of Compliance

1.02 GENERAL PROCEDURES

- A. The approval of submittals does not constitute a Change Order.
- B. All items shall be submitted under Contractor's transmittal letter. The Contractor shall stamp each submittal with his submittal stamp, and shall include the following information:
 - 1. Project by title and Owner's project number
 - 2. Work and products by Specifications Section and Article number
 - 3. Contractor shall submit one copy of every submittal or sample to Owner for review.
- C. Resubmittals: When Owner requires that a submittal be "resubmitted," comply with the requirements of this Section and identify changes made since the previous submittal.
- D. Notify Owner in writing at time of submittal of any deviations from the requirements of Contract Documents.
- E. Make all submittals far enough in advance of scheduled dates for installation to provide sufficient time for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing deliver.
 - 1. Review Time: In scheduling work activities, allow at least seven (7) working days from Owner's receipt for his review. The seventh day shall be defined as the first day of return to the Contractor.
 - 2. Delays caused by the tardiness of the Contractor in preparing and in forwarding of submittals will not be an acceptable basis for extension of the Contract completion date nor for consideration of alternate products that do not meet the specified requirements of this Project Manual.
- F. Starting work which requires submittals to be approved by Owner before Owner approves and returns the submittals to Contractor shall be at Contractor's risk.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
STORAGE AND PROTECTION**

SECTION 00-1620 – Page 1 of 2

Part 1 – General

1.01 GENERAL STORAGE

- A. Store products immediately on delivery in accordance with the manufacturer's printed instructions, with seals and labels intact and legible, and protect until installed in the work.
- B. Arrange storage in a manner to provide easy access for inspection.
- C. Provide protection and restrict access to project site, in-place work, and stored materials from vandalism.

1.02 EXTERIOR STORAGE

- A. Provide substantial platforms, blocking or skids to support fabricated products above the ground to prevent soiling or staining.
- B. Cover products that are subject to discoloration, deterioration, or oxidation from exposure to the elements with impervious sheet coverings or sheds constructed of lumber. Provide adequate ventilation to avoid condensation.
- C. Any mechanical or electrical equipment that is to be stored at the Project site shall be protected and periodically maintained in accordance with these Specifications (all applicable sections) and the manufacturer's recommendations. If warehousing of any products to be used in the work is required as a result of inclement weather conditions or other special product needs, all costs shall be borne by the Contractor.
- D. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
- E. Provide surface drainage to prevent flow or ponding of rainwater.
- F. Prevent mixing of refuse or chemically injurious materials or liquids.
- G. Maintain a periodic system of inspections of stored products on a scheduled basis to assure that:
 - a. Condition of storage facilities is adequate to provide required conditions.
 - b. Required environmental conditions are maintained on a continuing basis

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
STORAGE AND PROTECTION**

SECTION 00-1620 – Page 2 of 2

- c. Surfaces of products exposed to elements are not adversely affected. NOTE: any weathering of products, coatings and finishes is not acceptable under requirements of the Contract Documents.

1.03 PROTECTION AFTER INSTALLATION

- A. Provide substantial coverings to protect installed products from damage from subsequent operations and vandalism. Remove when no longer needed, prior to completion of work.
- B. Control traffic to prevent damage to equipment and surfaces.
- C. Provide coverings to protect finished surfaces from damage.
- D. In other areas subject to foot traffic, secure heavy paper, sheet goods or other materials in place.
- E. For movement of heavy products, lay planking or similar materials in place.
- F. Prohibit traffic of any kind across grassed, seeded, or landscaped areas.

Part 2 – Products

Not Used

Part 3 – Execution

Not Used

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CONTRACT CLOSEOUT**

SECTION 00-1700 – Page 1 of 3

Part 1 – General

1.01 SUBSTANTIAL COMPLETION

- A. When the project is considered to be substantially complete, submit written notice to the Owner that the project or designated portion is substantially complete. Include a list of items to be completed.
- B. Within a reasonable time, Owner will inspect to determine status of completion, and compile a punch list of items to be completed and corrected. If Owner determines that Work is not substantially complete, he will immediately notify Contractor in writing. The Owner will generally point out his reasons; he will not be obligated to give an exhaustive list of discrepancies.
- C. Contractor's Duties are to remedy the deficiencies and send the Owner another written Notice of Substantial Completion.
- D. Owners Actions will be to re-inspect the work and issue a Certificate of Substantial Completion when he considers it to be warranted.

1.02 OWNER OCCUPANCY

- A. Owner's Action: Occupy the Project, or designated portion of the Project, in accordance with provisions of the Certificate of Substantial Completion.
- B. Contractor's Duties:
 - a. Obtain Certificate of Occupancy if required by local building codes authority.
 - b. Obtain consent of insurance company or companies to keep insurance in force during partial occupancy by the Owner.
 - c. Make corrections listed on punch list attached to Certificate of Substantial Completion.
 - d. Perform final clean up.

1.03 FINAL COMPLETION

- A. When this Project is considered to be complete, Contractor shall submit certification indicating the following:
 - a. Contact Documents have been reviewed and Work has been inspected for compliance with those Documents.
 - b. Work has been completed in accordance with Contract Documents.
 - c. All punch list items have been corrected
 - d. Work is complete and ready for final inspection.
 - e. Appropriate notifications have been filed with Governmental Agencies (attach copies.)

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CONTRACT CLOSEOUT**

SECTION 00-1700 – Page 2 of 3

B. Owner's actions during final inspection:

- a. Inspect to verify the status of completion with reasonable promptness
- b. Notify Contractor in writing about any Work considered to be incomplete or defective.

C. Contractor's Duties: take immediate action to correct deficiencies, and send certification to Owner that Work is complete.

D. Owner's duties: determine when Work is acceptable then request Contractor to make closeout submittals.

1.04 RE-INSPECTION FEES

Should status of completion of work require re-inspection by Engineer due to failure of work to comply with Contractor's claims on initial inspection, Owner will deduct the amount of Engineer's compensation for re-inspection services from final payment to Contractor.

1.05 CONTRACTOR'S CLOSEOUT SUBMITTALS REQUIRED

- A. Documents required by State Licensure inspectors and other authorities having jurisdiction.
- B. Project Record Documents: Comply with Section 01720
- C. Operation and Maintenance Data: Comply with Section 01730
- D. Warranties and Bonds: Comply with Section 01740
- E. Evidence of Payment and Release of Liens: Comply with requirements and Conditions of the Contract
- F. Consent of Surety to Final Payment
- G. Certificates of Insurance for Products and Completed Operations: Comply with Supplementary Conditions
- H. Test Results: Complete, dated test results of various systems signed by persons authorized to sign for the qualified testing agencies that conducted tests.
- I. Closeout documents shall require written acceptance by the governing agency.

1.06 STATEMENT OF ADJUSTMENT OF ACCOUNTS

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CONTRACT CLOSEOUT**

SECTION 00-1700 – Page 3 of 3

- A. Submit a final statement to Owner indicating all adjustments to the Contract Sum.
Include the following:
- a. Original Contract Sum
 - b. Previous change orders
 - c. Changes under allowances
 - d. Changes under unit prices.
 - e. Deductions for uncorrected work
 - f. Penalties and bonuses
 - g. Deductions for liquidated damages.
 - h. Deductions for re-inspection fees
 - i. Other adjustments to Contract Sum
 - j. Total Contract Sum, as adjusted.
 - k. Previous payments.
 - l. Sum remaining due
- B. If required, a final Change Order will be prepared reflecting approved adjustments to Contract Sum that were not previously made on Change Orders.

1.07 FINAL APPLICATION FOR PAYMENT

Submit final Application for Payment in accordance with procedures and requirements of the Conditions of the Contract and Alabama State Law.

1.08 FINAL PAYMENT

Owner will make final payment.

1.09 POST-CONSTRUCTION INSPECTION

Prior to expiration of one year from the Date of Substantial Completion, the Owner will make a visual inspection of the Project to determine whether correction of Work is required, in accordance with the Conditions of the Contract.

The Owner will promptly notify the Contractor, in writing, of any observed deficiencies. Contractor shall then correct deficiencies promptly.

Part 2 – Products

Not Used

Part 3 – Execution

Not Used

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PROJECT RECORD DOCUMENTS**

SECTION 00-1720 – Page 1 of 2

Part 1 – General

1.01 SECTION INCLUDES

- A. Procedural requirements for maintaining documents and samples at the site as required in the General Conditions.
- B. The General Conditions require the Contractor to maintain a record copy of the following for Owner's review:
 - a. Drawings
 - b. Specifications and Schedules (Project Manual)
 - c. Addenda
 - d. Change Orders and other documents which modify original document
 - e. Approved shop drawings, product data and samples
 - f. Records of all changes made during construction
- C. In addition to the above, the Contractor shall maintain at the site a record copy of the following where applicable:
 - a. Field test records
 - b. Manufacturer's certificates
 - c. Inspection certificates

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Maintain Record Documents on site, apart from the documents used for construction.
- B. Label and file Record Documents in sequence with section number listings in Table of Contents of this Project Manual. Label each document "Project Record" in the lower right hand corner in neat, large printed letters.
- C. Maintain Record Documents in clean, dry, legible condition. Do not use Record Documents for construction purposes.
- D. Keep Record Document and samples available for inspection by Owner.

1.03 RECORDING

- A. Record information concurrently with construction progress. DO NOT conceal work until required information has been recorded.
- B. Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction, including the following:
 - a. Depth of footings in relation to finish first floor level.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PROJECT RECORD DOCUMENTS**

SECTION 00-1720 – Page 2 of 2

- b. Measured horizontal and vertical locations of underground utilities, valves, etc. referenced to the original survey line. Show direction of flow of pipe and depth of piping underground.
 - c. Field changes of dimensions and details
 - d. Changes made by Contract Modifications
 - e. Details not on original Contract Drawings
- C. Project Manual: Legibly mark to record actual construction , including the following:
 - a. On appropriate pages, record changes made by Addenda, Change Orders and other modifications
 - b. On appropriate pages, enter trade name, manufacturer, catalog number, and name of supplier of each product and item actually installed, if different from that specified
 - c. Other items installed but not originally specified

1.04 RECORD DRAWINGS

- A. Record Drawings that are required for Owner's records, shall be recorded on blueprints (other than the construction drawings) kept on the job by the Contractor. Do not use Record Drawings for construction purposes.
- B. The Contractor shall transfer all changes recorded on construction drawings to the Record Drawings. All information shall be recorded neatly and legibly.

1.05 SUBMITTALS

- A. At Contract Closeout, deliver Record Documents and samples, including Record Drawings, to Owner.
- B. Submit Record Documents under cover of a transmittal letter containing:
 - a. Date
 - b. Project title and number
 - c. Contractor's and subcontractor's names and addresses
 - d. Title and number of each Record Document
 - e. Certification that each document submitted is complete and accurate
 - f. Signature of Contractor or his authorized representative

Part 2 – Products

Not Used

END OF SECTION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT WARRANTIES AND BONDS

SECTION 00-1740 – Page 1 of 2

Part 1 – General

1.01 SECTION INCLUDES

Provide warranties and bonds required for specific products: **All materials that will become a permanent part of this project shall require a written manufacturer's warranty.**

1.02 FORM OF SUBMITTALS

- A. Submit by electronic copy.
- B. Label cover of each binder with typed or printed title "WARRANTIES AND BONDS" with title of Project; name, address, and telephone number of contractor; and name of responsible principal.
- C. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section that detailed the name of the product or work item.
- D. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing.
 - a. Provide full information using separate typed sheets as necessary
 - b. List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

1.03 PREPARATION OF SUBMITTALS

- A. Obtain warranties and bonds, executed in duplicate by responsible subcontractors, suppliers, and manufacturers, after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial Completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

1.04 TIME OF SUBMITTALS

- A. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents to Owner after acceptance.
- B. Make other submittals to Owner after date of Substantial Completion, prior to final Application for Payment.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
WARRANTIES AND BONDS**

SECTION 00-1740 – Page 2 of 2

- C. For items of work when acceptance is delayed beyond date of Substantial Completion, submit documents to owner after acceptance, listing the date of acceptance as the beginning of the warranty period.

1.05 WARRANTY PERIOD

- A. The warranty period shall continue for a period of one (1) year from final acceptance of the work. All materials of construction, installation, and workmanship shall be covered under this warranty.
- B. Roof warranty shall be as specified in roofing section.
- C. Provide General Contractors 5 year Roofing Guarantee.

Part 2 – Products

Not Used

Part 3 –Execution

Not Used

END OF SECTION



SHELBY COUNTY, ALABAMA
PUBLIC WORKS CONTRACT
For Projects Over \$50,000
Act 97-225

SHELBY COUNTY AND _____

THIS AGREEMENT, entered into as of this _____ day of _____ by and between SHELBY COUNTY, ALABAMA, a political subdivision of the State of Alabama (hereinafter called the COUNTY) and _____ (hereinafter called the CONTRACTOR). This agreement concerns: _____ as described in the noted attached plans index, specifications index, project issued addenda, and the contractor's bid (herein called the PROJECT).

WITNESSETH THAT:

WHEREAS, the COUNTY is currently involved in the planned construction of the PROJECT as specified in design and bid specifications dated _____, which said design and bid specifications are incorporated into this Contract by reference and made part and parcel hereof as fully as if set out herein. (See also attached bid by CONTRACTOR on the _____) and

WHEREAS, CONTRACTOR submitted the lowest responsive and responsible bid for the construction of the PROJECT; and

WHEREAS, the COUNTY desires to engage and contract with the CONTRACTOR to provide technical, professional, and construction services and to construct and complete the PROJECT herein described; and

WHEREAS, the CONTRACTOR desires to contract to provide technical, professional, and construction services and to complete the construction of the PROJECT herein described:

NOW, THEREFORE, in consideration of the mutual covenants and agreements contained herein, the COUNTY and the CONTRACTOR do hereby mutually agree, covenant, and contract as follows:

Section 1. CONTRACTOR

The COUNTY agrees to engage the CONTRACTOR, and the CONTRACTOR hereby agrees, to perform the construction services hereinabove and hereinafter set forth, and to construct the PROJECT described within this Contract in accord with the accompanying plans and specifications in a good, competent, and workmanlike manner as requested and determined by the COUNTY and in strict compliance with the design and bid specifications for such PROJECT as referenced in other portions of this Contract.

The CONTRACTOR will supply to the COUNTY prior to the commencing of work the following documents, together with any other documents as are required by Alabama law:

- A) Certificate of Insurance (with unconditional cancellation clause), said insurance in the amounts as specified in the contract documents and as approved by the COUNTY.
- B) Section 84 Business License, Applicable City Business License and all other licenses required by law to complete this project
- C) The CONTRACTOR will furnish to the COUNTY a performance bond equaling the total bid amount of the PROJECT payable to the COUNTY, which said bond shall be in form and substance as approved by the COUNTY. The CONTRACTOR shall also execute and furnish to the COUNTY a payment bond securing the CONTRACTOR'S obligation to pay for all labor, materials, or supplies for work done pursuant to this contract, which said payment bond shall be in an amount equal to fifty percent (50%) of the total contract price and shall be in form and substance as approved by the COUNTY. Said payment bond shall also provide bonded coverage to cover and to compensate for reasonable attorney fees incurred by a successful party in civil actions brought on the bond and ordered to be paid by a court of competent jurisdiction.
- D) The CONTRACTOR shall comply with all applicable laws, ordinances, and codes of the U. S. Government, the State of Alabama, any relevant municipality, and the COUNTY, and, specifically and without limitation, shall comply with all provisions of the Beason-Hammond Alabama Taxpayer and Citizen Protection Act, commonly referred to as the Immigration Act, and amendments thereto adopted from time to time during the performance of this Contract, and shall document CONTRACTOR'S compliance with said law and submit to the COUNTY or at the direction of COUNTY any and all affidavits and proof as are from time to time required by law or required by COUNTY.

The CONTRACTOR, by the execution of this Contract, certifies and confirms that it is, at the time of the signing of this document, in full compliance with the aforesaid Beason-Hammond Alabama Taxpayer and Citizen Protection Act, and further agrees that upon request from the COUNTY it will execute and file and take such action as is deemed by the COUNTY to be necessary to verify the CONTRACTOR's continuing compliance therewith.

Section 2. Scope of Services

The CONTRACTOR shall provide all construction services, work and labor, and other professional and technical services to complete the PROJECT herein described, which shall include, but not necessarily be limited to, the activities, plans, and specifications described in the construction drawings, specifications, bid and related documents.

Section 3. Time of Performance

The CONTRACTOR shall begin work on the PROJECT upon the execution of this contract and will continue, uninterrupted, for a period of time not to exceed _____ (____) calendar days beginning after receiving Notice to Proceed from the COUNTY. Said work to be completed in a good and workmanlike manner by the CONTRACTOR within the period of time specified.

Section 4. General Provisions

- (a) *Personnel.* The CONTRACTOR warrants that it has the expertise, professional personnel, and adequate work force capable of performing this Contract, as called for herein, in a satisfactory and proper manner, in accord with highest industry standards, or will secure the services of such personnel as may be required to perform such services, construct said PROJECT, and perform its obligations pursuant to this Contract.
- (b) *Office Space.* The CONTRACTOR agrees to provide and maintain the office space and facilities required to perform all services as called for under this Contract, at no expense to the COUNTY.
- (c) *Subcontracts.* None of the work or services covered by this contract shall be subcontracted without the prior approval of the COUNTY. Any work or services subcontracted hereunder shall be specified by written contract or agreement and shall be subject to each provision of this contract.
- (d) *Access to Materials.* The COUNTY agrees to make available to the CONTRACTOR, upon request, any maps, documents, and planning materials or any other information in its possession or otherwise readily available, which has a direct bearing on the PROJECT, at no expense to the CONTRACTOR.

(e) *Communications.* The representatives of the COUNTY and the CONTRACTOR to whom communications regarding the PROJECT which is the subject of this contract should be directed are as follows:

(1) COUNTY: Trey Gauntt, PE, Manager,
 Shelby County Department of Facilities and General Services
 280 McDow Road
 Columbiana, Alabama 35051
 (205) 670-6461
 Email: trey@shelbyal.com

(2) CONTRACTOR: _____

(f) The CONTRACTOR shall perform the work and complete the PROJECT in accord with all laws of the State of Alabama, all laws of the United States of America, relevant municipal laws, and to the satisfaction of the COUNTY. Work will be performed by the CONTRACTOR under the direct supervision of the representative of the COUNTY, who will have sole authority of deciding if work conditions, such as weather, temperature, roadway conditions, and other details of construction are complied with by the CONTRACTOR. At the discretion of the COUNTY, work may be stopped or delayed at any time until conditions are appropriate, in the opinion of the COUNTY, in order that optimum results and work quality may be obtained from the PROJECT in the best interest of the COUNTY. The decision of the COUNTY upon any questions connected with the performance of this Contract or any failure or delay in the prosecution of the work by the CONTRACTOR shall be final and conclusive.

(g) Attachment A - Supplemental Conditions is hereby incorporated as part of this contract.

Section 5. Compensation and Method of Payment

(a) For services satisfactorily rendered under this Contract and approved by COUNTY, the COUNTY agrees to pay the CONTRACTOR for fulfillment of the terms and conditions of this Contract as specified in the specifications and bid documents. The total amount to be paid under this section for services shall not exceed _____ (\$_____). Such payment shall, if due, be made monthly at the end of each calendar month, but in no case later than forty-five (45) days after the acceptance by COUNTY that the estimate and terms of the contract providing for partial payment have been fulfilled. In preparing estimates, the material delivered on the site, materials suitably store, and insured off-site, and preparatory work done may be taken into consideration by COUNTY. If the amount due by COUNTY is not in dispute and the amount payable is not paid within the forty-five (45) day period, the CONTRACTOR shall be entitled to interest from COUNTY at the rate assessed for underpayment of taxes under Section 40-1-44(a), Code of Alabama 1975, on the unpaid balance due. Interest payments shall not be due on payments made after the forty-five (45) day period

because of administrative or processing delays at the close of the fiscal year. In making the partial payments, there shall be retained not more than five percent (5%) of the estimated amount of work done and the value of materials stored on the site or suitably stored and insured off-site, and after fifty percent (50%) completion has been accomplished and approved by COUNTY, no further retainage shall be withheld. The retainage as set out herein shall be held until final completion and acceptance of all work covered by the contract. Retainage shall be held until all work has been completed to COUNTY's satisfaction. The CONTRACTOR, upon completion and acceptance by COUNTY of the work, shall give notice of completion of PROJECT by advertising in the Shelby County Reporter. The advertisement must run four consecutive weeks. After receiving the affidavit from the newspaper publisher and a copy of the notice published and acceptance by the COUNTY, final settlement will be made as the same is due.

(b) PROVISIONS OUTLINING THE SOURCE OF SUFFICIENT FUNDS TO BE UTILIZED BY COUNTY TO FULFILL COUNTY'S OBLIGATIONS UNDER THIS CONTRACT (indicate which applies by entering an appropriate mark opposite the following):

 X The funds to be utilized by COUNTY to fulfill its obligation under this contract are funds which are held by COUNTY at the time of the execution of this contract or will become available at a date following the execution of the contract.

 The source of funds to be utilized by COUNTY in fulfilling its obligation under this contract is a grant, award, or direct reimbursement from the State, federal government, or other source which will not become available until after the execution of this contract, and the provision of this contract requiring prompt payment shall not apply until COUNTY is in receipt of the funds as provided in the contract. Upon receipt of such funds, the forty-five (45) day requirement specified in this contract shall commence and shall be enforceable as provided herein.

Section 6. Terms and Conditions

(a) *Termination of Contract for Cause/Breach of Contract.* If through any cause the CONTRACTOR shall fail to fulfill in a timely and proper manner its obligations under this Contract, or if the CONTRACTOR shall violate any of the covenants, agreements, or stipulations of this Contract, the COUNTY shall thereupon have the right to terminate this Contract by giving written notice to the CONTRACTOR of such termination and specifying the effective date of such termination. In such event, all finished or unfinished documents, data, studies, surveys, drawings, maps, models, photographs, and reports, or other materials prepared by the CONTRACTOR under this Contract or during the construction performance, shall, at the option of the COUNTY, become its property.

Notwithstanding the above, the CONTRACTOR shall not be relieved of liability to the COUNTY for damages sustained by the COUNTY by virtue of any breach of the Contract by the CONTRACTOR, and the COUNTY may withhold any payments to the CONTRACTOR for the purpose of set-off until such time as the exact amount of damages due the COUNTY from the CONTRACTOR is determined.

(b) *Termination for Convenience of the COUNTY.* The COUNTY may terminate this Contract at any time, with or without just cause, by giving written notice to the CONTRACTOR of such termination and specifying the effective date thereof, at least thirty (30) days prior to the effective date of such termination. In such event, all finished or unfinished documents and other materials, as described in the above clause, shall, at the option of the COUNTY, become its property. If the Contract is terminated by the COUNTY as provided in this subparagraph (b), the CONTRACTOR shall be entitled to receive just and equitable compensation for any work satisfactorily completed on said PROJECT.

(c) *Changes.* The COUNTY may, from time to time, request changes of the CONTRACTOR in the scope of services to be performed hereunder. Such changes, or renegotiation, including any increase or decrease in the amount of the CONTRACTOR's compensation, which is mutually agreed upon by and between the COUNTY and the CONTRACTOR, shall be incorporated in written amendments to this Contract. The Contract can be extended under mutually agreed provisions through a written amendment to this document.

(d) *Assignability.* The CONTRACTOR shall not assign any interest in this Contract, and shall not transfer any interest in the same whether by assignment or novation, without the prior written consent of the COUNTY provided, however, that claims for money by the CONTRACTOR from the COUNTY under this Contract may be assigned to a bank, trust company, or other financial institution without such approval. Written notice of any such assignment or transfer shall be promptly furnished to the COUNTY.

This Contract shall be binding upon and inure to the benefit of any successor to the COUNTY and such successor shall be deemed substituted for the COUNTY under the terms of this Contract. As used in this Contract, the term "successor" shall include any person, firm, employer, or other business entity which at any time, whether by merger, purchase, or otherwise, which assumes or is assigned responsibility of the COUNTY for the covered PROJECT. This Contract shall also be binding upon and inure to the benefit of the CONTRACTOR, his successors, executors, and administrators.

(e) *Reports and Information.* The CONTRACTOR, at such times and in such forms as the COUNTY may require, shall furnish to the COUNTY such periodic reports as it may request pertaining to the work or services undertaken pursuant to this Contract, the costs and obligations incurred or to be incurred in connection therewith, and any other matters covered by this Contract.

(f) *Findings Confidential.* All of the reports, information, data, etc., given to or prepared or assembled by the CONTRACTOR under this Contract are confidential, and the CONTRACTOR agrees that they shall not be made available to any individual or organization without the prior written approval of the COUNTY.

(g) *Waiver of Trial by Jury.* The parties to this Contract desire to avoid the additional time and expense related to a jury trial of any disputes arising hereunder. Therefore, it is mutually agreed

by and between the parties hereto, and for their successors and assigns, that they shall and hereby waive trial by jury of any claim, counterclaim, or third-party claim, including any and all claims of injury or damages, brought by either party against the other arising out of or in any way connected with this Contract and the relationship which arises herefrom. The parties acknowledge and agree that this waiver is knowingly, freely, and voluntarily given, is desired by both parties, and is in the best interest of both parties.

(h) *Compliance with Local Laws.* The CONTRACTOR shall, throughout the performance of this Contract, comply with all applicable laws, ordinances, and codes of the U. S. Government, the State of Alabama, any relevant municipality, and the COUNTY, and, specifically and without limitation, shall comply with all provisions of the Beason-Hammond Alabama Taxpayer and Citizen Protection Act, commonly referred to as the Immigration Act, as amended from time to time during the performance of this Contract, and shall document CONTRACTOR's compliance with said law and submit to the COUNTY or at the direction of COUNTY any and all affidavits and proof as are from time to time required by law or required by COUNTY .

(i) *Audits and Inspection/Access to Records/Record Retention.* At any time during normal business hours, with prior arrangement and as often as the COUNTY may deem necessary, the CONTRACTOR shall make available to the COUNTY for examination all of its records with respect to matters covered by this Contract and will permit the COUNTY to audit, examine, and make excerpts or transcripts from such records, and to make audits of all contracts, invoices, materials, payrolls, records of personnel, conditions of employment, and other data relating to all matters covered by this Contract.

The CONTRACTOR shall retain all books, documents, papers, and records which are directly pertinent to this contract for a period of six (6) years following completion of the contracted work and expiration of the Contract, unless written permission to destroy them is granted by the COUNTY.

(j) *Interest of Members of the COUNTY and Other Local Public Officials.* No officer, member, or employee of the COUNTY and no member of its governing body, and no other public official of the governing body of the locality or localities in which the PROJECT is situated or being carried out, who exercises any functions or responsibilities in the review or approval of the undertaking or carrying out of this PROJECT, shall participate in any decision relating to this Contract which affects his personal interest or the interest of any corporation, partnership, or association in which he is directly or indirectly interested or has any personal or pecuniary interest, direct or indirect, in this Contract or the proceeds thereof. The CONTRACTOR shall take appropriate steps to assure compliance.

(k) *Interest of the CONTRACTOR.* The CONTRACTOR covenants that it presently has no interest and shall not acquire any interest, direct or indirect, which would conflict in any manner or degree with the performance of services required to be performed under this Contract. The CONTRACTOR further covenants that, in the performance of this Contract, no person having any such interest shall be employed.

Section 7. Additional Services of CONTRACTOR

If authorized in writing by the COUNTY, the CONTRACTOR shall furnish additional services that are not considered as an integral part of the PROJECT plans and specifications. Under this Contract, all costs for additional services will be negotiated as to activities and compensation. Upon mutual written agreement between the COUNTY and the CONTRACTOR, and written authorization from the COUNTY to proceed, the CONTRACTOR will provide the additional service.

Section 8. Tax Responsibilities of CONTRACTOR

The parties to this Contract agree that the CONTRACTOR is an independent firm or person and that the relationship created by this Contract is that of an independent contractor. Further, the parties agree that the CONTRACTOR is not an employee of the COUNTY, and will not be treated as such for federal income tax purposes. In this regard, the CONTRACTOR acknowledges and accepts all tax responsibilities imposed by federal income tax laws, and any applicable state income tax laws, on self-employed persons, including, but not limited to, the responsibility of withholding from income the required amounts for federal income taxes, Social Security taxes, federal unemployment tax, and applicable state and local income taxes.

Section 9. Non-Exclusive Contract

The CONTRACTOR shall devote its time, attention, and energies to the fulfillment of this Contract. If, after satisfying its responsibilities to the COUNTY, the CONTRACTOR desires to render similar services to any other persons, or on behalf of any other firms, associations, or corporations, then the CONTRACTOR may contract for such services; provided, however, that in the event that the rendering of such additional services by the CONTRACTOR interferes, in the opinion of the COUNTY, with the quality of services rendered to the COUNTY, then the COUNTY shall have the option of either requesting the CONTRACTOR to cease performing such additional services or canceling this Contract.

Section 10. Independent CONTRACTOR Relationship

In the performance of the work, duties, and obligations evolving under this Contract, it is mutually understood and agreed that the CONTRACTOR is at all times serving as an independent contractor providing the COUNTY with services as a contractor and/or independent contractor. Amounts paid to the CONTRACTOR by the COUNTY as compensation for providing said services and for the performance of this Contract are for services purchased, and amounts paid to the CONTRACTOR shall be deemed to be compensation to an independent contractor and shall not be subject to any tax withholding. It is expressly understood that the COUNTY is interested only in the results to be achieved, and the conduct and control of the work will be the sole responsibility of the CONTRACTOR. The CONTRACTOR is not considered to be an agent or employee of the COUNTY for any purpose, and the CONTRACTOR will not be eligible to participate in any benefits the COUNTY provides for its own employees. It is further understood and agreed that the COUNTY does not agree to use the

CONTRACTOR exclusively. It is further understood and agreed that, except as provided herein, the CONTRACTOR is free to contract for similar services to be performed for others during the term of this Contract.

Section 11. Indemnification and Liability

The COUNTY shall not be liable for any injury to the person or property of any person, firm, or corporation resulting directly or indirectly from CONTRACTOR's performance of this Contract, and the CONTRACTOR assumes full and complete responsibility therefore. The CONTRACTOR shall remain insured under terms of a public liability insurance policy as described in the "Certificate of Insurance" attached hereto as Attachment "A" during the entire term of this Contract and for the performance of all work herein provided. The CONTRACTOR shall further indemnify the COUNTY and hold the COUNTY safe and harmless from any and all liability, lawsuits, judgments, attorney fees, and other costs incurred by the COUNTY in defending any claim or lawsuit made against the COUNTY by any person, firm, or corporation arising directly or indirectly out of any work performed by the CONTRACTOR pursuant hereto or any breach or alleged breach of duty or responsibility of the CONTRACTOR related thereto. IN WITNESS WHEREOF, the COUNTY and the CONTRACTOR have caused this Contract to be executed by their duly authorized officers on the day and year first above written.

ATTEST:

SHELBY COUNTY

By: Chad Scroggins
County Manager

Date

ATTEST:

CONTRACTOR

By (print): _____

Title: _____

Date

ATTACHMENT "A"
SUPPLEMENTAL CONDITIONS

- 1) Work must be coordinated with the COUNTY.
- 2) Construction documents, including the attached Project Plans and Specifications, are included as part of this Contract.
- 3) The CONTRACTOR must maintain work space clean and free of debris.
- 4) The CONTRACTOR's price quote dated _____, 202__ is hereby incorporated as a part of this Contract. Construction documents, including the Project Plans and Specifications, are included as part of this Contract.
- 5) By signing this contract, CONTRACTOR represents and agrees that it is not currently engaged in, nor will it engage in, any boycott of a person or entity based in or doing business with a jurisdiction with which the State of Alabama can enjoy open trade.
- 6) The CONTRACTOR shall procure and maintain public liability insurance with a minimum of One Million Dollars (\$1,000,000.00) coverage in form and substance as approved by COUNTY. A "Certificate of Insurance" shall be furnished to COUNTY and shall specify that such insurance is not subject to cancellation without prior written notice to COUNTY of at least thirty (30) days. Please request the additional insured to read: Shelby County, its officers, agents, and employees, successors or assigns.
- 7) When required by law the CONTRACTOR shall also provide to COUNTY a Certificate or Proof of Workmen's Compensation Insurance in form and substance acceptable to COUNTY.
- 8) Contractor agrees that it will fully comply with the Immigration Reform and Control Act of 1986, as amended by the Immigration Act of 1990, and the Beason-Hammon Alabama Taxpayer and Citizen Protection Act, which makes it unlawful for an employer in Alabama to knowingly hire or continue to employ an alien who is or has become unauthorized with respect to such employment or to fail to comply with the I-9 requirements or fails to use E-Verify to verify the eligibility to legally work in the United States for all of its new hires who are employed to work in the State of Alabama. Without limiting the foregoing, Contractor shall not knowingly employ, hire for employment, or continue to employ an unauthorized alien, and shall have an officer or other managerial employee who is personally familiar with the Contractor's hiring practices to execute an affidavit to this effect on the form supplies by Shelby County and return the same to Shelby County. Contractor shall also enroll in the E-Verify Program prior to performing any work, or continuing to perform any ongoing work, and shall remain enrolled throughout the entire course of its performance

hereunder, and shall attach to its affidavit the E-Verify Program for Employment Verification and Memorandum of Understanding and such other documentation as Shelby County may require to confirm Contractor's enrollment in the E-Verify Program. Contractor agrees not to knowingly allow any of its subcontractors, or any other party with whom it has a contract, to employ in the State of Alabama any illegal or undocumented aliens to perform any work in connection with the Project, and shall include in all of its contracts a provision substantially similar to the paragraph. If Contractor receives actual knowledge of the unauthorized status of one of its employees in the State of Alabama, it will remove that employee from the project, jobsite or premises of Shelby County and shall comply with the Immigration Reform and Control Act of 1986, as amended by the Immigration Act of 1990, and the Beason-Hammon Alabama Taxpayer and Citizen Protection Act. Contractor shall require each of its subcontractors, or other parties with whom it has a contract, to act in a similar fashion. If Contractor violates any term of this provision, this Agreement will be subject to immediate termination by Shelby County. To the fullest extent permitted by law, Contractor shall defend, indemnify and hold harmless Shelby County from any and all losses, consequential damages, expenses included but not limited to, attorney's fees, claims, suits, liabilities, fines, penalties, and any other costs arising out of or in any way related to Contractor's failure to fulfill its obligations contained in this paragraph. Additionally, contractor shall provide County proof that you are in compliance with the immigration law by including a notarized E-Verify Memorandum of Understanding and provide your subcontractors notice of their compliance obligations and obtain from each a notarized Affidavit of Immigration Law Compliance-Subcontractor.

- 9) The contractor, person, firm, or corporation undertaking or contracting to undertake the herein described public works project agrees to use in the execution of the contract materials, supplies, and products manufactured, mined, processed, or otherwise produced in the United States or its territories, if the same are available at reasonable and competitive prices and are not contrary to any sole source specification implemented under subsection (f) of Section 39-2-2, Code of Alabama(1975), as amended. In the event the contractor breaches the agreement to use domestic products, and domestic products are not used, there shall be a downward adjustment in the contract price equal to any realized savings or benefits to the contractor.
- 10) If work being performed interferes with normal operations of the facility, the work shall be scheduled after hours as necessary.

Debarment, Suspension and Other Responsibility Matters

As required by Executive Order 12549, Debarment and Suspensions, and implemented at 2 CFR Part 2867, for the prospective participants in primary covered transactions, as defined at 2 CFR Part 2867.20(a), the applicant certifies that it and its principals:

- A. Are not presently debarred, suspended, proposal for debarment, declared ineligible, sentenced to a denial of federal benefits by a state or federal court, or voluntarily excluded from covered transactions by any federal department or agency:
- B. Have not within a three year period preceding this covered transaction been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (federal, state, or local) or private agreement or transaction, violation of federal or state antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion or receiving stolen property, making false claims, or obstruction of justice, or commission of any offense indicating a lack of business integrity or business honesty that seriously and directly affects your present responsibility;
- C. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (federal, state or local) with commission of any of the offenses enumerated in paragraph B. of this certification; and
- D. Have not within a three year period preceding this transaction had one of more public transactions (federal, state or local) terminated for cause or default.

I/we hereby certify that I/we are in complete compliance with all of the provisions noted above as of this date _____, 20____.

Print: _____

Print: _____

Print: _____

Print: _____

Print: _____

Print: _____

**BOND
FOR PERFORMANCE OF THE WORK**

STATE OF ALABAMA
SHELBY COUNTY

KNOW ALL MEN BY THESE PRESENTS: That we, _____,
as Principal, _____ and
_____ and
_____ as Surety, are held and
firmly bound unto the County of Shelby, in the penal sum of
_____ and /100 Dollars (\$ _____), for
the payment of which sum, well and truly to be made, we hereby bind ourselves, our heirs,
executors, administrators, successors and assigns.

IN WITNESS WHEREOF, we have hereunto set our hands and affixed our seals, this _____
day of _____, 20____.

PROVIDED, HOWEVER, that the condition of this obligation is such that whereas the above bound
_____ have this day entered into a Contract with the said Shelby County
Commission for the completing the project described in the attached plans and specifications
_____ located within the said County, a copy of which said Contract is hereto
attached.

NOW, THEREFORE, in the event that said _____, as such Contractor,
shall faithfully and promptly perform said Contract and all the conditions and requirements thereof,
then this obligation shall be null and void and to no effect, otherwise to remain and be in full force
and effect.

PROVIDED, FURTHER, THAT upon failure of the said _____, to
promptly and efficiently prosecute said work, in any respect, in accordance with the Contract, the
above bound _____

_____,
as Surety, shall take charge of said work and complete the Contract at their expense, pursuant to its
terms, receiving however, any balance of the funds in the hands of said County due under said
Contract. Said Surety may, if they so elect, by written direction given to the Shelby County
Commission authorize the Commission to advertise for bids to complete the said Contract at the
expense of said Surety, and such Surety hereby agree and bind themselves to pay the expense of
the completion of such work, less any funds in the hands of the County remaining due to the above
bound Contractor.

PROVIDED, further, that said Contractor and Surety hereby agree and bind themselves to the
mode of service described in Section 39-1-1, Code of Alabama 1975, as amended, and consent
that such service shall be the same as personal service on said Contractor or Surety.

Upon completion of said Contract pursuant to its terms, if any funds remain due on said
Contract, the same shall be paid to said Principal or Surety.

The decision of said County Manager upon any question connected with the execution of
said Contract, or any failure or delay in the prosecution of the work by said Principal or Surety, shall
be final and conclusive.

The Proposal, Specifications, and the Contract hereinbefore referred to, and the Bond for Performance of the Work executed under the provisions of Section 39-1-1, Code of Alabama 1975, as amended, are made a part of this obligation and instrument is to be construed in connection therewith.

WITNESS our hands and seals this _____ day of _____ 20__.

(L.S)

(L.S.)
Contractor

Surety

By _____

Address _____

**BOND FOR
PAYMENT OF
LABOR, MATERIAL, FEED-STUFFS OR SUPPLIES**

STATE OF ALABAMA
SHELBY COUNTY

KNOW ALL MEN BY THESE PRESENTS: That we _____, as
Principal, _____ and
and _____

_____ as Sureties, are held and firmly
bound unto the County of Shelby, in the penal sum of
_____ and /100 Dollars (\$ _____), for the payment
of which sum, well and truly to be made, we hereby bind ourselves, our heirs, executors,
administrators, successors and assigns.

IN WITNESS WHEREOF, we have hereunto set our hands and affixed our seals, this
_____ day of _____, 20____.

PROVIDED, HOWEVER, that the condition of this obligation is such that whereas the above
bound _____ have this day entered into a Contract with the said
County of Shelby for the for the completing the project described in the attached plans and
specifications, to-wit: known as _____ Project, located within the said County, a
copy of which said Contract is hereto attached.

NOW, THEREFORE, in the event that said _____ as such
Contractor shall promptly make payment to all persons supplying him or them with labor, material,
feed-stuffs, or supplies for or in the prosecution of the work provided for in said Contract, then this
obligation shall be null and void and of no effect, otherwise to remain and be in full force and effect.

PROVIDED, FURTHER, in the event that the said _____ as such
contractor shall fail to make prompt payment to all persons supplying him or them with labor,
materials, feed-stuffs, or supplies for or in the prosecution of the work provided in such contract, the
above bound _____ as
Surety shall be liable for the payment of such labor, materials, feed-stuffs or supplies and for the
payment of reasonable attorney's fees incurred by the successful claimants of plaintiffs in suits on
said bond as provided in Section 39-1-1, Code of Alabama 1975, as amended, are made a part of
this obligation, and this instrument is to be construed in connection therewith.

In the event said Principal shall fail or delay the prosecution and completion of said work and
said Surety shall also fail to act promptly as herein before provided, then said County Manager
may cause ten days notice of such failure to be given, either to said Principal or Surety, and
at the expiration of said ten days, if said Principal or Surety do not proceed promptly to
execute said contract, the Shelby County Commission shall have the authority to cause said
work to be done, and when the same is completed and the cost thereof estimated, the said
principal and sureties shall and hereby agree to pay any excess in the cost of said work above the
agreed price to be paid under said Contract.

Upon completion of said Contract pursuant to its terms, if any funds remain due on said
Contract, the same shall be paid to said Principal or Surety.

The said Principal and Surety further agree as part of this obligation to pay all such damages of any kind to person or property that may result from a failure in any respect to perform and complete said Contract.

The decision of said County Manager upon any question connected with the execution of said Contract, or any failure or delay in the prosecution of the work by said Principal or Surety, shall be final and conclusive.

The Proposal, Specifications and the Contract hereinbefore referred to, and the Bond for Payment of Labor, Materials, Feed-stuffs or Supplies executed under the provisions of Section 39-1-1, Code of Alabama 1975, as amended, are made a part of this obligation, and this instrument is to be construed in connection therewith.

WITNESS our hands and seals this _____ day of _____ 20____.

_____(L.S)

_____(L.S.)
Contractor

Surety

By _____

Address _____

CERTIFICATE OF NON-SEGREGATED FACILITIES

The federally assisted construction contractor certifies that he does not maintain or provide for his employee any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated are maintained. The federally assisted construction contractor certifies further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally assisted construction contractor agrees that a breach of this certification is a violation of the equal opportunity clause in this contract. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washroom, 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 which are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, sex, or national origin, because of habit, local custom, or other reason. The federally assisted construction contractor agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the equal opportunity clause, and that he will retain such certifications in his files.

NOTICE TO PROSPECTIVE CONTRACTORS OF REQUIREMENT FOR CERTIFICATION OF NONSEGREGATED FACILITIES:

A Certification of Non-segregated Facilities must be submitted prior to the award of a contract or subcontract exceeding \$10,000, which is not exempt from the provisions of the Equal Opportunity Clause.

Certification - The information above is true and complete to the best of my knowledge and belief.

(Please Print) Name and Title of Signer

Signature Date

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

NOTICE OF AWARD

To: _____

Date: _____

Project: Shelby County Water Services Building
Project

The OWNER has considered the BID submitted by you for the above described PROJECT in the bid received May 11, 2023.

You are hereby notified that your BID has been accepted for items in the amount of
\$_____.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.
Please make your required submittals in the bid documents to be reviewed and approved prior to fabrication of the materials.

Owner

By: _____
Fred M. Gauntt III, PE

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged by _____ this the
_____ day of _____, 2023.

Contractor

By _____

Title

NOTICE TO PROCEED

To: _____ Date: _____, 2022

Project: Shelby County Water Services Building Project

You are hereby notified to commence WORK in accordance with the Agreement dated _____ on or before _____ and you are to complete the WORK within calendar days thereafter. The date of completion of all WORK is therefore approximately _____.

Shelby County, AL
Owner

By: Fred M. Gauntt, III, PE
Title: Chief Facilities Management
Officer

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by _____
this the _____ day of _____, 2023.

Contractor

By

Title

PUBLIC WORKS CONTRACT
SHELBY COUNTY COMMISSION

CHANGE ORDER

DATE: _____

CHANGE ORDER NO: 1

PROJECT: _____

CONTRACTOR: _____

CONTRACT DATE: _____
COST CODE NO: _____
CONTRACT NO. _____

YOU ARE DIRECTED TO MAKE THE FOLLOWING CHANGES IN YOUR CONTRACT:

IN STRICT ACCORDANCE WITH THE CONTRACT DOCUMENTS YOU ARE INSTRUCTED TO FURNISH:

See attached quantities

AMOUNT OF ORIGINAL CONTRACT	\$ _____
AMOUNT OF PREVIOUS CHANGES	\$ _____
AMOUNT OF THIS CHANGE	\$ _____
TOTAL AMOUNT OF ADJUSTED CONTRACT	\$ _____

NOTE: IT IS HEREBY UNDERSTOOD AND AGREED THAT THE ABOVE IS COMPENSATION IN FULL FOR CHANGES AS INDICATED. IT IS FURTHER UNDERSTOOD AND AGREED THAT ALL RIGHTS FOR ANY ADDITIONAL COMPENSATION ARE WAIVED CONCERNING THE CHANGES CONTAINED HEREIN.

Shelby County Commission

BY: _____
TITLE: Owner
DATE: _____

BY: _____
TITLE: County Manager
DATE: _____

FORM OF ADVERTISEMENT FOR COMPLETION

LEGAL NOTICE

In Accordance with Chapter 1, Title 39, Code of Alabama, 1975, notice is hereby given that _____ (Contractor), has completed the Contract for (Construction / Renovation / Alternation / Equipment / Improvement) of the "Insert Project Name".

at "Insert Address"

for the State of Alabama and the County of Shelby, Owner(s), and have made request for final settlement of said Contract. All persons having any claim for labor, materials, or otherwise in connection with this project should immediately notify:

(Architect)

(Contractor)

(Business Address)

NOTE: This notice must be run once a week for four successive weeks for projects exceeding \$50,000.00 for project less than \$50,000.00, run one time only. Proof of publication is required.

Shelby County

Affidavit for Payment of Debts Incurred on Construction Projects

Project No. _____
County _____
Contractor _____
Description and Location of Project _____

This is to certify that all known debts for labor and materials used on the project and all approved sub-contractual obligations associated with the construction of Project _____, _____ County, have been paid or will be paid within five (5) days after final payment.

Sworn to this the _____ day of _____, _____.
(Month) (Year)

(Name)

(Title)

(Contractor)

Sworn to and subscribed before me on the _____ day of _____, _____.
(Month) (Year)

(Notary)

For _____ County _____ State

My commission expires _____
(Date)



JULIE P. MAGEE
Commissioner

State of Alabama Department of Revenue

(www.revenue.alabama.gov)
50 North Ripley Street
Montgomery, Alabama 36132

MICHAEL E. MASON
Assistant Commissioner

JOE W. GARRETT, JR.
Deputy Commissioner

CURTIS E. STEWART
Deputy Commissioner

Alabama Department of Revenue NOTICE

Tax Guidance for Contractors, Subcontractors and Alabama Governmental Entities Regarding Construction-related Contracts

Legislative Act 2013-205 requires the Department of Revenue to issue Form STC-1, *Sales and Use Tax Certificate of Exemption for Government Entity Projects*, to all contractors and subcontractors working on qualifying governmental entity projects once the Form ST: EXC-01 is approved.

Each exempt entity, contractor and subcontractor must make application for qualification of the exemption using Form ST: EXC-01 for each tax-exempt project. The application is available on the department's website at <http://revenue.alabama.gov/salestax/ST-EXC-01.pdf>. Applications should be submitted directly to the Sales and Use Tax Division Central Office, P.O. Box 327710, Montgomery, AL 36132-7710.

The sales and use tax exemption provided for in Act 2013-205 applies to the purchase of building materials, construction materials and supplies, and other tangible personal property that become part of the structure pursuant to a qualifying contract entered into on or after January 1, 2014. Qualifying projects and contracts are those generally entered into with the following governmental entities, unless otherwise noted: the State of Alabama, a county or incorporated municipality of Alabama, an Alabama public school, or an Alabama industrial or economic development board or authority already exempt from sales and use taxes. **Please note that contracts entered into with the federal government and contracts pertaining to highway, road, or bridge construction or repair do not qualify for the exemption provided for in Act 2013-205.** [Reference: Sales and Use Tax Division Administrative Rule 810-6-3-.77 *Exemption for Certain Purchases by Contractors and Subcontractors in Conjunction with Construction Contracts with Certain Governmental Entities*.]

The Alabama Department of Revenue will assign each contractor and sub-contractor a consumers use tax account, if one is currently not in place, at the time the Form STC-1, *Sales and Use Tax Certificate of Exemption for Government Entity Projects*, is issued.

Contractors and sub-contractors for qualifying projects will be required to file monthly consumers use tax returns and report all exempt purchases for ongoing projects, as well as all taxable purchases on one return. These returns are required to be filed through the department's online tax return filing and payment portal, My Alabama Taxes (<https://myalabamataxes.alabama.gov>).

As another option for these types of contracts, as well as with other contracts entered into with other types of exempt entities, the Form ST:PAA1, *Purchasing Agent Appointment*, may be used. However, please be advised that the use of the Form ST:PAA1 option will require the exempt entity to be invoiced directly and pay for directly from their funds any construction and building material and supply purchases.

For additional information concerning this guidance, taxpayers should contact Sales and Use Tax Division representative Thomas Sims at 334-242-1574 or by email at Thomas.Sims@revenue.alabama.gov.

WHAT'S NEW?

TOPIC: Tax Guidance for Contractors, Subcontractors and Alabama Governmental Entities Regarding Construction-related Contracts

Legislative Act 2013-205 requires the Department of Revenue to issue Form STC-1, Sales and Use Tax Certificate of Exemption for Government Entity Projects, to all contractors and subcontractors working on qualifying governmental entity projects once the Form ST: EXC-01 is approved.

Each exempt entity, contractor and subcontractor must make application for qualification of the exemption using Form ST: EXC-01 for each tax-exempt project. The application is available on the department's website at <http://revenue.alabama.gov/salestax/ST-EXC-01.pdf>. Applications should be submitted directly to the Sales and Use Tax Division Central Office, P.O Box 327710, Montgomery, AL 36132-7710.

The sales and use tax exemption provided for in Act 2013-205 applies to the purchase of building materials, construction materials and supplies, and other tangible personal property that become part of the structure pursuant to a qualifying contract entered into on or after January 1, 2014. Qualifying projects and contracts are those generally entered into with the following governmental entities, unless otherwise noted: the State of Alabama, a county or incorporated municipality of Alabama, an Alabama public school, or an Alabama industrial or economic development board or authority already exempt from sales and use taxes. **Please note that contracts entered into with the federal government and contracts pertaining to highway, road, or bridge construction or repair do not qualify for the exemption provided for in Act 2013-205.**[Reference: Sales and Use Tax Division Administrative Rule 810-6-3-.77 Exemption for Certain Purchases by Contractors and Subcontractors in Conjunction with Construction Contracts with Certain Governmental Entities.]

The Alabama Department of Revenue will assign each contractor and sub-contractor a consumers use tax account, if one is currently not in place, at the time the Form STC-1, Sales and Use Tax Certificate of Exemption for Government Entity Projects, is issued.

Contractors and sub-contractors for qualifying projects will be required to file monthly consumers use tax returns and report all exempt purchases for ongoing projects, as well as all taxable purchases on one return. These returns are required to be filed through the department's online tax return filing and payment portal, My Alabama Taxes (<https://myalabamataxes.alabama.gov>).

As another option for these types of contracts, as well as with other contracts entered into with other types of exempt entities, the Form ST:PAA1, Purchasing Agent Appointment, may be used. However, please be advised that the use of the Form ST:PAA1 option will require the exempt entity to be invoiced directly and pay for directly from their funds any construction and building material and supply purchases.

For additional information concerning this guidance, taxpayers should contact Sales and Use Tax Division representative Thomas Sims at 334-242-1574 or by email at Thomas.Sims@revenue.alabama.gov.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SUMMARY OF WORK**

SECTION 01-1100 – Page 1 of 3

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Project description.
 - 2. Work by Others.
 - 3. Work sequence.
 - 4. Owner occupancy.
 - 5. Future work.
 - 6. Contractor's use of site and premises.
 - 7. Owner furnished Products.

1.2 PROJECT DESCRIPTION

- A. Work of this Project is described as the complete construction of a one-story, 13,500 square feet area, Type II Non-Combustible Building using a Pre-Engineered Metal Building frame with masonry veneer, metal siding, and metal roof.
- B. The use of the building will be Shelby County water services offices and stock warehouse.
- C. The Project will be constructed under a single construction contract.
- D. Work DOES NOT include a Storm Room for building occupants.
- E. Work includes Building Construction, Plumbing, HVAC, Power, Lighting, Data.
- F. Building IS NOT Fire Sprinklered.
- G. Work includes soil fill, grading and landscaping.
- H. Work includes Decorative Fencing and Vehicle gate.
- I. Work DOES NOT include preparation of an Existing Grade Topo Map.
- J. Work includes a monolithic concrete floor slab with integral column footings.
- K. Work includes asphalt and concrete pavement, sidewalks, structures, curbs and gutters.
- L. Work includes a forced main lift station.
- M. Work includes an emergency generator hookup connection.
- N. Work includes localized silt fencing, haybales, wattle, etc. at building excavation pad to comply with city and county requirements.
- O. Verify sales tax exempt status and requirements of Owner.

1.3 WORK BY OTHERS

- A. Separate Contracts:
 - 1. The Owner has or will execute contracts for additional work at the site that is excluded from the work of this Contract, and that includes:

SHELBY COUNTY WATER SERVICES BUILDING PROJECT SUMMARY OF WORK

SECTION 01-1100 – Page 2 of 3

- a. Property Boundary Survey
 - b. Property Topographic map
 - c. Force Main Route Survey
 - d. ALDOT permits
 - e. Soil Compaction Testing and Borings
 - f. Special Inspections
 - g. Radio and Communication Systems
 - h. All Utility/Service Fees (sewer, power water)
 - i. Electronic Access Systems – See Electrical
 - j. Audio / Video Systems
 - k. See ELECTRICAL for GC-installed cabling and conduit to power these items
- 2. Work under separate contracts may be executed concurrently with Work of this Contract.
 - 3. Cooperate with the Owner and separate contractors to accommodate Owner's work.

1.4 WORK SEQUENCE

- A. Construct Work in one single phase.
- B. Coordinate construction schedule and operations with the Owner.
- C. Schedule the Work to accommodate Owner's requirements.

1.5 FUTURE WORK

- A. Ensure that work of this Contract does not encroach on areas of future work.

1.6 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Contractor shall have complete and exclusive use of site and premises for execution of the Work.
- B. Move any stored products under Contractor's control that interfere with the operations of the Owner.
- C. Assume full responsibility for protection and safekeeping of products under this Contract stored on site.
- D. Obtain and pay for use of any additional storage or work areas needed for operations.
- E. Coordinate use of site and premises with the Owner:
 - 1. Employee parking: In designated areas.
 - 2. Access to site and premises: In designated areas.
 - 3. Storage and staging areas: In designated areas.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SUMMARY OF WORK**

SECTION 01-1100 – Page 3 of 3

- 4. Transport materials and equipment to and from construction area along routes approved by local jurisdiction
- F. Confine operations to construction area unless otherwise approved by Owner.
- G. If access to adjacent common or occupied spaces is required:
 - 1. Schedule operations with Owner in advance.
- H. Do not interrupt building fire or life safety systems.
- I. Do not close or obstruct exits.
- J. Do not use or store hazardous or flammable materials on premises without Owner's and local Fire Authorities approval; follow requirements of governing authorities having jurisdiction over the work.
- K. Prohibit smoking within interior spaces.

1.7 OWNER FURNISHED PRODUCTS

- A. Products that will be furnished and paid for by Owner are as follows:
 - 1. Residential Kitchen Appliances to be furnished by Owner and installed by Contractor. See Section 11 3100 for list.
 - 2. Paper Towel Holders and Toilet Tissue Roll Holders in toilet rooms to be furnished by Owner and installed by Contractor. See Section 102813.
- B. Contractor's Responsibilities to include but not be limited to:
 - 1. Designate delivery date for each product in Progress Schedule.
 - 2. Review Shop Drawings, Product Data and Samples. Submit to Architect with notification of any discrepancies or problems anticipated in use of product.
 - 3. Receive and unload products at site.
 - 4. Promptly inspect products jointly with Owner; record shortages, damage, and defective items.
 - 5. Handle products at site, including uncrating and storage.
 - 6. Protect products from exposure to elements and from damage.
 - 7. Assemble, install, connect, adjust, and finish products, as stipulated in respective specification section.
 - 8. Repair or replace any items damaged by Contractor's forces.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CONSTRUCTION DOCUMENTS**

SECTION 01 1150 – Page 1 of 1

A. Preliminary Drawings and Specifications – Prior to beginning construction, Contractor shall mark all preliminary drawings as VOID and insure no preliminary drawings will be used during construction. Contractor shall further direct his subcontractors, vendors, and trades to do likewise. At execution of the construction contract, the Contractor and his subcontractors shall certify that all contracts reflect the provisions of the current and official drawing revision that will be used to obtain permits and licenses from the Authorities Having Jurisdiction (AHJ)

B. Drawings and Specifications for Permitting – Contractor will be furnished computer .pdf files for bidding, building permits, and construction transmitted by email. These drawings and specifications will be labeled *Drawings and Project Manual For Construction* and will contain the Architect's Alabama registration seal. The Contractor is authorized to make sufficient copies as is required by the AHJ for submittals and procuring all required permits. The Project Manual may also be referred to as "Project Specifications"

C. Revised Drawings and Specifications - In the event that drawings are revised due to subsequent changes by the Owner or comments by the AHJ, the Contractor will be furnished amended documents by emailed .pdf files, either by individual sheet, or groups of sheets, or full set. Contractor is responsible for distribution and receipt of amended sheets to all subcontractors, vendors, and trades.

D. Drawings and Specifications for Construction– Contractor will maintain the official printed permit set of drawings and specifications for use as the master construction set. These drawings will be labeled *Drawings and Project Manual For Construction* and will contain the Architect's Alabama registration seal, and the AHJ certification stamp. The Contractor alone is authorized to make an unlimited number of copies for his and his sub-contractors' use, at the Contractor's expense. Such authorization shall expire at the completion of construction, and all drawings that can be accounted for, except final record sets, shall be destroyed or returned to Architect.

END OF DOCUMENT

SHELBY COUNTY WATER SERVICES BUILDING PROJECT SUBSTITUTION PROCEDURES

SECTION 01 2500 – Page 1 of 2

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Product Substitution Procedures.

1.2 GENERAL

- A. Definition: Proposal by Contractor to use manufacturer, product, material, or system different from one required in Contract Documents.
- B. Do not substitute Products unless a substitution request has been approved by Architect.
- C. Substitutions during Bidding: Refer to Instructions to Bidders.
- D. Architect and Owner will consider substitution requests within 30 days after award of Contract. After initial 30 day period, substitutions requests will be considered only due to non-availability of a specified Product through no fault of Contractor.
- E. In case of non-availability of a specified Product, notify Architect in writing as soon as non-availability becomes apparent.

1.3 SUBSTITUTION REQUESTS

- A. Submit substitution requests on copy of form bound into Project Manual.
- B. Document specified product and proposed substitution with complete data, including:
 - 1. Product identification, including name and address of manufacturer.
 - 2. Product description, performance and test data, and reference standards.
 - 3. Sample, if requested.
 - 4. Description of any anticipated effect that acceptance of proposed substitution will have on Progress Schedule, construction methods, or other items of Work.
 - 5. Description of any differences between specified product and proposed substitution.
 - 6. Difference in cost between specified product and proposed substitution.
- C. Burden of proof for substantiating compliance of proposed substitution with Contract Document requirements remains with Contractor.
- D. A request constitutes a representation that the Contractor;
 - 1. Has investigated the proposed Product and determined that it meets or exceeds the quality level of the specified Product.
 - 2. Will provide the same warranty for the substitution as for the specified Product.
 - 3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 5. Will reimburse Owner for A&E design services associated with re-approval by authorities or revisions to Contract Documents to accommodate the substitution.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SUBSTITUTION PROCEDURES**

SECTION 01 2500 – Page 2 of 2

- E. Substitutions will not be considered if:
 - 1. They are indicated or implied on Shop Drawings or other submittals without submittal of a substitution request.
 - 2. Approval will require substantial revision of Contract Documents without additional compensation to Architect and Engineers.
- F. Submit to Architect electronically in Adobe PDF format.
- G. Architect will notify Contractor of approval or rejection of each Substitution Request.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

DOCUMENT 01 2519

SUBSTITUTION REQUEST FORM

DATE: _____

TO: _____

ATTENTION: _____

PROJECT: _____

We submit for your consideration the following product as a substitution for the specified product:

Section No.	Paragraph	Specified Product
-------------	-----------	-------------------

_____	_____	_____
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Proposed Substitution: _____

Reason for Substitution: _____

Product Data:

Attach complete technical data for both the specified product and the proposed substitution. Include information on changes to Contract Documents that the proposed substitution will require for its proper installation.

Samples:

___ Attached ___ Will be furnished upon request

Does the substitution affect dimensions shown on Drawings?

___ No ___ Yes (explain) _____

Effects of proposed substitution on other Work:

Differences between proposed substitution and specified Product:

Manufacturer's warranties of the proposed substitution are:

____ Same ____ Different (explain) _____

Maintenance service and spare parts are available for proposed substitution from:

Previous installations where proposed substitution may be seen:

Project: _____ Project: _____

Owner: _____ Owner: _____

Architect: _____ Architect: _____

Date Installed: _____ Date Installed: _____

Cost savings to be realized by Owner, if proposed substitution is approved:

Change to Contract Time, if proposed substitution is approved:

____ No Change ____ Add _____ days ____ Deduct _____ days

Submittal constitutes a representation that Contractor has read and agrees to the provisions of Section 01 2500.

Submitted by Contractor;

Signature

Firm

For Use by Architect:

Based on the information supplied by the Contractor, the Architect has reviewed the proposed substitution on the basis of design concept of the Work and conformance with information given in Contract Documents.

____ Approved ____ Approved as Noted ____ Rejected

Submit Additional Information: _____

By: _____ Date: _____

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CONSTRUCTION PROGRESS SCHEDULES**

SECTION 01 3216 – Page 1 of 2

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Construction progress schedule.
- B. Related Sections:
 - 1. Section 01 1100 - Summary of Work: Work sequence.
 - 2. Section 01 2900 - Payment Procedures.

1.2 FORMAT

- A. Prepare Progress Schedule as a horizontal bar chart with separate bar for each major portion of Work or operation, identifying first work day of each week or
- B. Prepare Progress Schedule on network analysis system using the critical path method.
- C. Sequence of Listings: The chronological order of the start of each item of Work.
- D. Scale and Spacing: To provide space for notations and revisions.
- E. Sheet Size: Multiples of 8-1/2 x 11 inches.

1.3 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification Section number.
- C. Identify work of logically grouped activities.
- D. Provide subschedules to define critical portions of the entire Progress Schedule.
- E. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- F. Provide separate schedule of submittal dates for Shop Drawings, Product Data, and Samples, including:
 - 1. Dates reviewed submittals will be required from Architect.
 - 2. Decision dates for selection of finishes.
 - 3. Delivery dates for Owner furnished products and Products identified under Allowance.
- G. Coordinate content with Schedule of Values specified in Section 01 2900.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT CONSTRUCTION PROGRESS SCHEDULES

SECTION 01 3216 – Page 2 of 2

- H. Revisions:
 - 1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
 - 2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
- I. Provide narrative report to define problem areas, anticipated delays, and impact on Progress Schedule. Report corrective action taken, or proposed, and its effect.

1.4 SUBMITTAL

- A. Submit initial Progress Schedule to Owner and Architect within 15 days after date of Notice to Proceed. After review, resubmit required revised data within 10 days.
- B. Submit revised Progress Schedule to Owner and Architect with each Application for Payment.
- C. Submit electronically in Adobe PDF format.

1.5 DISTRIBUTION

- A. Distribute copies of approved Progress Schedule to project site file, Subcontractors, suppliers, and other concerned parties.
- B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in Progress Schedule.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PHOTOGRAPHIC DOCUMENTATION**

SECTION 01 3233 – Page 1 of 1

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Construction photographs.

1.2 PHOTOGRAPHY

- A. Contractor shall take or employ competent photographer to take construction record photographs during construction. Take photos no less than once per week, more frequently to show work before being covered.
- B. If requested, provide photographs taken each month just prior to date for each scheduled Application for Payment.
- C. Exterior: Photograph project from minimum of four different views at each specified time.
- D. Interior: Photograph from multiple angles to show general progress of work.
- E. Details: Photograph close up specific details that may require special attention.
- F. At successive periods of photography, take photographs from same overall view as previously taken.
- G. Utilize digital technology at minimum 1280 x 960 resolution.
- H. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.

1.3 DIGITAL FILES

- A. Index digital files in chronological sequence.
- B. Identify each view by listing:
 - 1. Name of Project.
 - 2. Orientation of view.
 - 3. Date taken.
 - 4. Sequential photograph number.

1.4 SUBMITTAL

- A. Submit digital files along with Project Record Documents.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SUBMITTAL PROCEDURES**

SECTION 01 3300 – Page 1 of 3

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Submittal procedures.
 - 2. Proposed Products list.
 - 3. Submittal schedule.
 - 4. Shop Drawings.
 - 5. Product Data.
 - 6. Samples.
 - 7. Quality control submittals.
- B. Related Sections:
 - 1. Section 01 4000 - Quality Requirements.

1.2 SUBMITTAL PROCEDURES

- A. Number each submittal with Project Manual section number and a sequential number within each section. Number resubmittals with original number and an alphabetic suffix.
- B. Identify Project, Contractor, Subcontractor or supplier, pertinent Drawing sheet and detail numbers, and specification Section number, as appropriate.
- C. Submit all submittals listed under "Submittals for Review" simultaneously for each Product or Specification Section.
- D. Where multiple Products function as an assembly, group submittals for all related Products into single submittal.
- E. Apply Contractor's stamp, signed or initialed certifying that:
 - 1. Submittal was reviewed.
 - 2. Products, field dimensions, and adjacent construction have been verified.
 - 3. Information has been coordinated with requirements of Work and Contract Documents.
- F. Schedule submittals to expedite the Project, and deliver to Architect. Coordinate submittal of related items.
- G. For each submittal, allow 14 days for Architect's review. Architect will not review incomplete submittals.
- H. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of completed Work.
- I. Revise and resubmit submittals when required; identify all changes made since previous submittal.
- J. Distribute copies of reviewed submittals to concerned parties and to Project Record Documents file. Instruct parties to promptly report any inability to comply with provisions.

1.3 PROPOSED PRODUCTS LIST

- A. Within 15 days after date of Notice to Proceed, submit a complete list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SUBMITTAL PROCEDURES**

SECTION 01 3300 – Page 2 of 3

- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.
- C. Submit electronically in Adobe PDF format.

1.4 SUBMITTAL SCHEDULE

- A. Within 15 days after date of Notice to Proceed, submit a submittal schedule showing all submittals proposed for project, including submittals listed as:
 - 1. Submittals for Review.
 - 2. Quality Control Submittals.
 - 3. Closeout Submittals.
- B. Include for each submittal:
 - 1. Specification section number.
 - 2. Description of submittal.
 - 3. Type of submittal.
 - 4. Anticipated submittal date.
 - 5. For submittals requiring Architect's review, date reviewed submittal will be required from Architect.
- C. Submit electronically in Adobe PDF format.

1.5 SHOP DRAWINGS

- A. Present information in clear and thorough manner.
- B. Identify details by reference to sheet and detail numbers or room number shown on Drawings.
- C. Reproductions of details contained in Contract Documents are not acceptable.
- D. Submit electronically in Adobe PDF format. Architect will return Submittal Review Document PDF to Contractor for printing and distribution.

1.6 PRODUCT DATA

- A. Mark each copy to identify applicable products, models, options, and other data.
- B. Supplement manufacturers' standard data to provide information unique to this Project.
- C. Submit electronically in Adobe PDF format. Architect will return Submittal Review Document PDF to Contractor for printing and distribution.

1.7 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- B. Where so indicated, submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for Architect's selection.
- C. Include identification on each sample, with full Project information.
- D. Unless otherwise specified in individual specifications, submit one of each sample.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SUBMITTAL PROCEDURES**

SECTION 01 3300 – Page 3 of 3

- E. Architect will notify Contractor of approval or rejection of samples, or of selection of color, texture, or pattern if full range is submitted.

1.8 QUALITY CONTROL SUBMITTALS

- A. Quality control submittals specified in Section 01 4000 are for information and do not require Architect's responsive action except to require resubmission of incomplete or incorrect information.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
QUALITY REQUIREMENTS**

SECTION 01 4000 – Page 1 of 3

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. References.
 - 2. Quality assurance and control of installation.
 - 3. Mockups.
 - 4. Manufacturer's field services and reports.
 - 5. Design data and calculations.
 - 6. Test reports and certifications.
 - 7. Manufacturer's installation instructions.

1.2 REFERENCES

- A. For products or workmanship specified by reference to association, trade, or industry standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Conform to edition of reference standard in effect as of date of Owner/Contractor Agreement.
- D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.3 QUALITY ASSURANCE AND CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply fully with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work by persons qualified to produce workmanship of specified quality.
- F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.4 MOCKUPS

- A. Definition:
 - 1. Mockups are field samples constructed, applied, or assembled at the project site for review by the Owner and Architect that illustrate materials, equipment, or workmanship.
 - 2. Approved mockups establish the standard of quality by which the Work will be judged.
- B. Construct, apply, or assemble specified items, with related attachment and anchorage devices, flashings, seals, and finishes.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT QUALITY REQUIREMENTS

SECTION 01 4000 – Page 2 of 3

- C. Perform work in accordance with applicable specifications sections.
- D. Erect at project site at location acceptable to Architect. Protect from damage.
- E. Removal:
 - 1. Mockups may remain as part of the Work only when so designated in individual specification sections.
 - 2. Do not remove mockups until removal is approved by Architect or upon Final Completion.
 - 3. Where mockup is not permitted to remain as part of the Work, clear area after removal of mockup has been approved by Architect.

1.5 MANUFACTURERS' FIELD SERVICES AND REPORTS

- A. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, or startup of equipment, as applicable, and to initiate instructions when necessary.
- B. Individuals to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- C. Submit report to Architect within 10 days of observation.

1.6 DESIGN DATA AND CALCULATIONS

- A. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide design data and calculations.
- B. Accuracy of design data and calculations is the responsibility of the Contractor.
- C. When so specified, prepare design data and calculations under the direction of a professional engineer licensed in the state in which the Project is located. Affix engineer's seal to submittals.
- D. Submit one copy of original stamped and signed document. In addition, submit electronically in Adobe PDF format.

1.7 TEST REPORTS AND CERTIFICATIONS

- A. When specified in individual specification Sections, require material or Product suppliers or manufacturers to provide test reports and manufacturers' certifications.
- B. Indicate that material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Submittals may be recent or previous test results on material or Product, but must be acceptable to Architect.
- D. Submit electronically in Adobe PDF format.

1.8 MANUFACTURER'S INSTALLATION INSTRUCTIONS

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
QUALITY REQUIREMENTS**

SECTION 01 4000 – Page 3 of 3

- A. When Contract Documents require that Products be installed in accordance with manufacturer's instructions:
1. Submit manufacturer's most recent printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, as applicable.
 - a. Submit in quantities specified for Product Data.
 - b. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
 - c. Identify conflicts between manufacturers' instructions and requirements of Contract Documents.
 2. Perform installation of Products to comply with requirements of manufacturer's instructions.
 3. If installation cannot be performed in accordance with manufacturer's instructions, notify Architect and await instructions.
 4. Submit electronically in Adobe PDF format.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT STRUCTURAL TESTS AND SPECIAL INSPECTIONS

SECTION 01 4100 – Page 1 of 4

PART 1 - GENERAL

1.01 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.

1.02 SUMMARY

- A. This Section includes administrative and procedural requirements required for compliance with the International Building Code, Chapter 17, Structural Tests and Special Inspections.
- B. Structural testing and special inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve contractor of responsibility for compliance with other construction document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the construction document requirements.
 - 3. Requirements for contractor to provide quality-assurance and -control services required by architect, owner, or authorities having jurisdiction are not limited by provisions of this section.
- C. The owner will engage one or more qualified special inspectors and / or testing agencies to conduct structural tests and special inspections specified in this section and related sections and as maybe specified in other divisions of these specifications.
- D. Related Sections include but are not limited to the following:
 - 1. Section 02 2000 - "Earthwork"
 - 2. Section 03 3100 - "Cast-In-Place Concrete"

1.03 DEFINITIONS

- A. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the building official.
- B. Construction Documents: Written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building permit. Construction Documents include all supplemental instructions, sketches, addenda, and revisions to the drawings and specifications issued by the registered design professional beyond those issued for a building permit.
- C. Shop Drawings / Submittal Data: Written, graphic and pictorial documents prepared and / or assembled by the contractor based on the Construction Documents.
- D. Structural Observation: Visual observation of the structural system by a representative of the registered design professional's office for general conformance to the approved construction documents. Structural observations are not considered part of the structural tests and special inspections and do not replace inspections and testing by the testing agency or special inspector.
- E. Special Inspector: A qualified person who demonstrating competence, to the satisfaction of the code enforcement official and registered design professional in responsible charge, for inspection of the particular type of construction or operation requiring special inspection. The special inspector shall be a licensed professional engineer or engineering intern or a qualified representative from the testing agency.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT STRUCTURAL TESTS AND SPECIAL INSPECTIONS

SECTION 01 4100 – Page 2 of 4

- F. Special Inspection, Continuous: The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed.
- G. Special Inspection, Periodic: The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work has been or is being performed and at the completion of the work.
- H. Testing Agency: A qualified materials testing laboratory under the responsible charge of a licensed professional engineer, approved by the code enforcement official and the registered design professional in responsible charge, to measure, examine, test, calibrate, or otherwise determine the characteristics or performance of construction materials and verify confirmation with construction documents.

1.04 QUALITY ASSURANCE

- A. Testing Agency Qualifications:
 - 1. Minimum qualifications of inspection and testing agencies and their personnel shall comply with ASTM E329-03 Standard Specification for Agencies in the Testing and / or Inspection of Materials Used in Construction.
 - a. Inspectors and individuals performing tests shall be certified for the work being performed as outlined in the appendix of the ASTM E329. Certification by organizations other than those listed must be submitted to the building official for consideration before proceeding with work.
 - 2. In addition to these requirements, local jurisdiction may have additional requirements. It is the responsibility of the testing and inspection agencies to meet local requirements and comply with local procedures.
- B. Qualifications of Special Inspector: The Special Inspector shall be a qualified person who shall demonstrate competence, to the satisfaction of the Building Official, for inspection of the particular type of construction or operation being inspected. The Special Inspector shall meet the legal qualifications of the building code having jurisdiction.
 - 1. Duties and Responsibilities of the Special Inspector:
 - 2. The Special Inspector shall observe the work assigned to ascertain, to the best of his/her knowledge that it is in conformance with the approved design drawings and specifications.
 - 3. The Special Inspector shall furnish inspection reports to the Building Official, the Architect/Engineer, and the Owner. All discrepancies shall be brought to the immediate attention of the Architect/Engineer, Contractor, and Owner. A report that the corrected work has been inspected shall be sent to the Building Official, the Architect/Engineer, and the Owner.
 - 4. The Special Inspector shall create and maintain a log of all discrepancies throughout the duration of the project. This log shall include, but is not limited to, discrepancy date, description, drawing and/or detail reference, description of as-built condition, description of any remedial work performed, and status of discrepancy. This log shall be submitted to the Architect/Engineer on a periodic basis for the review and comment. Upon completion of the project, this log shall be submitted in its entirety as an attachment to the final signed report described below.
 - 5. The Special Inspector shall submit a final signed report stating whether the work requiring special inspection was, to the best of the inspector's knowledge, in conformance to the approved plans and specifications and the applicable workmanship provisions of the building code.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
STRUCTURAL TESTS AND SPECIAL INSPECTIONS**

SECTION 01 4100 – Page 3 of 4

1.05 CONFLICTING REQUIREMENTS, REPORTS, AND TEST RESULTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to the registered design professional in responsible charge for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to the registered design profession in responsible charge for a decision before proceeding.
- C. The special inspector's reports and testing agencies results shall have precedence over reports and test results provided by the contractor.
- D. Where a conflict exists between the construction documents and approved shop drawings / submittal data, the construction documents shall govern unless the shop drawings / submittal data are more restrictive. All conflicts shall be brought to the attention of the registered design professional in responsible charge.

1.06 SUBMITTALS BY SPECIAL INSPECTOR AND / OR TESTING AGENCY

- A. Special inspectors shall keep and distribute records of inspections. The special inspector shall furnish inspection reports to the building official, and to the registered design professional in responsible charge, contractor, architect, and owner. Reports shall indicate that work inspected was done in conformance to approved construction documents. Discrepancies shall be brought to the immediate attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of the work. A final report documenting required special inspections and correction of any discrepancies noted in the inspections shall be submitted at a point in time agreed upon by the permit applicant and the building official prior to the start of work.
 - 1. Special inspection reports and test results shall include, but not be limited to, the following:
 - a. Date of inspection.
 - b. Description of inspections or tests performed including location (reference grid lines, floors, elevations, etc.).
 - c. Statement noting that the work, material, and / or product conforms or does not conform to the construction document requirements.
 - 1) Name and signature of contractor's representative who was notified of work, material, and / or products that do not meet the construction document requirements.
 - d. Name and signature of special inspector and / or testing agency representative performing the work.
- B. Schedule of Non-Compliant Work: Each agent shall maintain a log of work that does not meet the requirements of the construction documents. Include reference to original inspection / test report and subsequent dates of re-inspection / retesting.
- C. Reports and tests shall be submitted within 1 week of inspection or test. Schedule of Non-Compliant Work shall be updated daily and submitted at monthly intervals.
- D. Final Report of Special Inspections. Submitted by each agent listed in the schedule of Structural Testing and Special Inspections.

1.07 PAYMENT OF TESTING LABORATORY

- A. The Owner will pay for the initial laboratory services for the testing of materials for compliance with the requirements of the contract documents. The Contractor will be liable to

SHELBY COUNTY WATER SERVICES BUILDING PROJECT STRUCTURAL TESTS AND SPECIAL INSPECTIONS

SECTION 01 4100 – Page 4 of 4

the Owner for the cost for testing and retesting of materials that do not comply with the requirements of the contract documents and shall furnish and pay for the testing and inspection of other items as specified in these Specifications.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.01 CONTRACTOR'S RESPONSIBILITY

- A. The contractor shall coordinate the inspection and testing services with the progress of the work. The contractor shall provide sufficient notice to allow proper scheduling of all personnel. The contractor shall provide safe access for performing inspection and on site testing.
- B. The contractor shall submit schedules to the owner, registered design professionals and testing and inspecting agencies. Schedules will note milestones and durations of time for materials requiring structural tests and special inspections.
- C. The contractor shall repair and / or replace work that does not meet the requirements of the construction documents.
 - 1. Contractor shall engage an engineer / architect to prepare repair and / or replacement procedures.
 - 2. Engineer / architect shall be registered in the state in which the project is located. Engineer shall be acceptable to the registered design professional in responsible charge, code enforcement official, and owner.
 - 3. Procedures shall be submitted for review and acceptance by the registered design professional in responsible charge, code enforcement official, and owner before proceeding with corrective action.
- D. The contractor shall be responsible for costs of:
 - 1. Re-testing and re-inspection of materials, work, and / or products that do not meet the requirements of the construction documents and shop drawings / submittal data.
 - 2. Review of proposed repair and / or replacement procedures by the registered design professional in responsible charge and the inspectors and testing agencies.
 - 3. Repair or replacement of work that does not meet the requirements of the construction documents.

3.02 STRUCTURAL OBSERVATIONS

- A. Structural observations may be made periodically as determined by the registered design professional in responsible charge.

3.03 TESTING AND INSPECTION

- A. Testing and inspection shall be in accordance with the attached Schedule of Special Inspections.
- B. Reference related specifications for the minimum level of inspections and testing. Provide additional inspections and testing as necessary to determine compliance with the construction drawings.

PART 4 - 3.4 SCHEDULES AND FORMS - ATTACHED

4.01 A. STATEMENT OF SPECIAL INSPECTIONS

4.02 B. SCHEDULE OF SPECIAL INSPECTIONS (IN CONSTRUCTION DRAWINGS)

4.03 C. FINAL REPORT OF SPECIAL INSPECTIONS

END OF SECTION

STATEMENT OF FINAL INSPECTIONS

Project:
Project Address:
Permit Applicant:
Applicant Address:
Owner:
Owner Address:
Registered Design Professionals (RDP):
Architect:
Geotechnical Engineer:
Structural Engineer:
Mechanical Engineer:
Electrical Engineer:

This statement of special inspections is submitted as a condition for permit issuance in accordance with Chapter 17 of the International Building Code. It includes a *Schedule of Special Inspections* applicable to the above referenced project as well as the identity of the individuals, agencies, or firms intended to be retained for conducting these inspections.

The Special Inspector(s) shall keep records of all inspections and shall furnish interim inspection reports to the building official and to the registered design professional in responsible charge at a frequency agreed upon by the permit applicant and building official prior to the start of work. Discrepancies shall be brought to the immediate attention of the contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the building official and the registered design professional in responsible charge prior to completion of that phase of work. A *Final Report of Special Inspections* documenting required special inspections and correction of any discrepancies noted in the inspections shall be submitted by each agent at the completion of that phase of work.

Maximum frequency of interim report submittals shall not be less than_____.

The Special Inspection program does not relieve the contractor of the responsibility to comply with the Contract Documents. Jobsite safety and means and methods of construction are solely the responsibility of the Contractor.

Owner's Acknowledgement:

Signature

Date

Building Official's Acceptance:

Signature

Date

Permit No.

FINAL REPORT OF FINAL INSPECTIONS

Project:
Project Address:
Testing / Inspection Agent:

Testing / Inspection Agent Address:
Scope of Testing / Inspections:

(To be completed by Testing / Inspection Agent)

To the best of my information, knowledge, and belief, the special inspections or testing required for this project, and designated for this Agent in the *Schedule of Special Inspections* submitted for permit, have been completed in accordance with the contract documents.

Interim reports submitted prior to this final report and numbered _____ to _____ form a basis for, and are to be considered an integral part of this final report. The following discrepancies that were outstanding since the last interim report dated _____ have been corrected:

(Attach 8 1/2" x 11" continuation sheet(s) if required to complete the description of corrections)

Prepared By:

Type or print name

Signature

Date

Special Inspector's Seal

(Licensed Professional Engineer)

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
TEMPORARY FACILITIES AND CONTROLS**

SECTION 01 5000 – Page 1 of 4

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Temporary utilities.
 - 2. Field offices and sheds.
 - 3. Temporary controls.
 - 4. Protection of installed Work.
 - 5. Security.
 - 6. Progress cleaning.
 - 7. Water, erosion, sediment, dust, and mold and mildew control.
 - 8. Access roads and parking areas.
 - 9. Removal.

1.2 REFERENCES

- A. None

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

3.1 TEMPORARY ELECTRICITY

- A. Provide temporary electrical service of capacity and characteristics required for construction.
- B. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. All work to comply with National Electrical Code and all local ordinances. Provide flexible power cords as required.
- C. Maintain temporary distribution system in good condition and provide routine repairs with Owner's approval.

3.2 TEMPORARY LIGHTING

- A. Provide temporary lighting for construction and security purposes.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required. All work to comply with National Electrical Code and all local ordinances.
- C. Maintain lamps and provide routine repairs.
- D. Provide portable lights when required to provide minimum lighting levels necessary for specific work.

3.3 TEMPORARY HEAT

- A. Provide temporary heating devices required to maintain specified ambient temperatures for construction.
- B. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless otherwise indicated in individual specification sections.

3.4 TEMPORARY VENTILATION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT TEMPORARY FACILITIES AND CONTROLS

SECTION 01 5000 – Page 2 of 4

- A. Ventilate enclosed areas to facilitate curing of materials, disperse humidity, and prevent accumulations of dust, fumes, vapors, or gases.
- B. Provide temporary fan units as required to maintain clean air for construction.
- C. Provide at minimum manufacturers' ventilation requirements for temporary heating devices

3.5 TEMPORARY TELEPHONE, FACSIMILE, AND COMPUTER SERVICES

- A. Provide temporary or mobile telephone service, required during construction.
- B. Provide computer, smartphone, or tablet in Contractor's field office with internet access and email service.

3.6 TEMPORARY WATER

- A. Provide temporary water as required for construction.
- B. Extend branch piping and provide temporary hoses so that water is available at locations needed for work.
- C. Protect from freezing.
- D. Maintain distribution system and provide routine repairs with Owner's approval.

3.7 TEMPORARY SANITARY FACILITIES

- A. Provide chemical toilets for use during construction.
- B. Permanent toilets may not be used during construction.
- C. Maintain facilities in clean and sanitary condition.

3.8 FIELD OFFICES AND SHEDS

- A. Provide temporary field offices and storage sheds required for construction.
- B. Do not unreasonably encumber site or premises with excess materials or equipment.
- C. Temporary Structures:
 - 1. Portable or mobile buildings, structurally sound, tied down, weathertight, with floors raised above ground.
 - 2. Thermal transmission resistance: Compatible with occupancy and storage requirements.
 - 3. Provide connections for utility services when required.
 - 4. Provide steps and landings at entrances.
- D. Field Office:
 - 1. Size required for Contractor's use and to provide space for project meetings.
 - 2. Adequate electrical power, lighting, heating, and cooling to maintain human comfort.
 - 3. Provide facilities for storage of Project Record Documents.
 - 4. Provide thermometer mounted at convenient outside location, not in direct sunlight.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
TEMPORARY FACILITIES AND CONTROLS**

SECTION 01 5000 – Page 3 of 4

3.9 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, and to protect existing facilities and adjacent properties from construction operations.
- B. Provide barricades required by governing authorities for public right-of-ways.
- C. Fencing:
 - 1. Provide temporary fencing for construction operations.
 - 2. Construction: Commercial grade chain link.
 - 3. Height: Minimum 6 feet.
 - 4. Locate to protect construction operations, materials, and equipment.
 - 5. Provide vehicular and pedestrian gates.

3.10 EXTERIOR CLOSURES

- A. Provide temporary weathertight closures for exterior openings to provide acceptable interior working conditions, to allow for temporary heating and maintenance of ambient temperatures required in individual specification sections, to protect the Work, and to prevent entry of unauthorized persons.
- B. Provide access doors with locking hardware.

3.11 PROTECTION OF INSTALLED WORK

- A. Protect installed work from construction operations; provide special protection when required in individual specification sections.
- B. Minimize traffic, storage, and construction activities on roof surfaces. If traffic, storage, or activity is necessary, obtain recommendations for protection from roofing manufacturer.
- C. Prohibit traffic from landscaped areas.

3.12 SECURITY

- A. Provide a project security program, to:
 - 1. Protect the Work, stored products, and construction equipment from theft and vandalism.
 - 2. Prevent entry by unauthorized persons.

3.13 PROGRESS CLEANING

- A. Maintain areas free from waste materials, debris, and rubbish. Maintain site in clean and orderly condition.
- B. Provide containers for collection of waste materials, debris, and rubbish; remove and dispose of off site as required by construction activities.
- C. Periodically clean interior areas to provide suitable conditions for finish work.

3.14 TEMPORARY CONTROLS

- A. Water Control:
 - 1. Owner will grade site to drain. Prevent puddling water caused by equipment or storage.
 - 2. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
 - 3. Provide water barriers to protect site from soil erosion.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT TEMPORARY FACILITIES AND CONTROLS

SECTION 01 5000 – Page 4 of 4

- B. Erosion and Sediment Control:
 - 1. Plan and execute methods to control surface drainage from cuts, fills, borrow areas, and waste disposal areas. Prevent erosion and sedimentation.
 - 2. Minimize amount of bare soil exposed at any one time.
 - 3. Provide temporary measures such as silt fences, dikes, berms, settlement basins, and drainage systems to prevent water flow and sedimentation.
 - 4. Periodically inspect earthwork to detect erosion and sedimentation; promptly employ corrective measures.
- C. Dust Control:
 - 1. Provide dust control materials and methods to minimize dust from construction operations.
 - 2. Prevent dust from dispersing into atmosphere.
- D. Mold and Mildew Control:
 - 1. Provide continuous measures to prevent formation of mold and mildew in construction.
 - 2. Do not install materials sensitive to mold and mildew growth until protection can be provided.
 - 3. Promptly remove and replace materials exhibiting mold and mildew growth.

3.15 ACCESS ROADS AND PARKING AREAS

- A. Existing roads designated by Owner may be used for construction purposes. Do not allow heavy vehicles or construction equipment in parking areas.
- B. Provide for access by emergency vehicles.
- C. Keep fire hydrants and water control valves free from obstruction and accessible for use.
- D. Provide parking facilities for construction personnel. When parking needs exceed on site capacity, provide additional off site facilities.
- E. Maintain existing construction, and restore to original or specified condition at completion of Work.

3.16 REMOVAL

- A. Remove temporary utilities, equipment, facilities, and services when construction needs can be met by use of permanent construction or upon completion of Project.
- B. Remove foundations and underground installations; grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing and permanent facilities used during construction to original or to specified condition.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PRODUCT REQUIREMENTS**

SECTION 01 6000 – Page 1 of 2

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Products.
 - 2. Transportation and handling.
 - 3. Storage and protection.
 - 4. Reuse of existing materials.
 - 5. Product options.
- B. Related Sections:
 - 1. Section 01 2500 - Substitution Procedures.

1.2 PRODUCTS

- A. Provide interchangeable components by the same manufacturer for identical items.
- B. Do not use products containing asbestos, lead, or other known hazardous materials.
- C. Do not reuse materials and equipment removed from existing construction in completed Work, except as specifically permitted by the Contract Documents.

1.3 TRANSPORTATION AND HANDLING

- A. Coordinate delivery of Products to prevent conflict with Work and adverse conditions at site.
- B. Transport and handle Products in accordance with manufacturer's instructions.
- C. Promptly inspect shipments to ensure that Products comply with requirements of Contract Documents, are undamaged, and quantities are correct.
- D. Provide equipment and personnel to handle products by methods to prevent damage.

1.4 STORAGE AND PROTECTION

- A. Store and protect Products in accordance with manufacturer's instructions with manufacturer's seals and labels intact and legible.
- B. Store Products on site unless prior written approval to store off site has been obtained from Owner.
- C. Store Products subject to damage by elements in weathertight enclosures. Maintain temperature and humidity within ranges required by manufacturer's instructions.
- D. Exterior Storage:
 - 1. Store fabricated Products above ground; prevent soiling and staining.
 - 2. Cover products subject to deterioration with impervious sheet coverings; provide ventilation to prevent condensation.
 - 3. Store loose granular materials in well drained area on solid surfaces; prevent mixing with foreign matter.
- E. Arrange storage areas to permit access for inspection. Periodically inspect stored products to verify that products are undamaged and in acceptable condition.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PRODUCT REQUIREMENTS**

SECTION 01 6000 – Page 2 of 2

1.5 REUSE OF EXISTING MATERIALS

- A. Carefully remove, handle, protect, and store Products.
- B. Clean and refinish Products to original or specified condition.
- C. Restore operable components to working condition.
- D. Arrange and pay for transportation, storage, and handling of Products requiring off site storage, restoration, or renovation.

1.6 PRODUCT OPTIONS

- A. Products specified by reference standard only:
 - 1. Select any Product meeting the specified standard.
 - 2. Submit Product Data to substantiate compliance of proposed Product with specified requirements.
- B. Products specified by naming two or more acceptable Products: Select any named Product.
- C. Products specified by stating that the Contract Documents are based on a Product by a single manufacturer followed by the statement "Equivalent products by the following manufacturers are acceptable":
 - 1. Select the specified Product or a Product by a named manufacturer having equivalent or superior characteristics to the specified Product and meeting the requirements of the Contract Documents.
 - 2. If the specified Product is not selected, submit Product Data to substantiate compliance of proposed Product with specified requirements.
 - 3. The specified Product establishes the required standard of quality.
- D. Products specified by naming one or more Products followed by "or approved substitute" or similar statement:
 - 1. Submit a substitution request under provisions of Section 01 2500 for Products not listed.
 - 2. The specified Product establishes the required standard of quality.
- E. Products specified by naming one or more Products or manufacturers followed by the statement "Substitutions: Under provisions of Division 01":
 - 1. Submit a substitution request under provisions of Section 01 2500 for Products not listed.
 - 2. The specified Product establishes the required standard of quality.
- F. Products specified by naming one Product followed by the statement "Substitutions: Not permitted": Substitutions will not be allowed.
- G. Products specified by required performance or attributes, without naming a manufacturer or Product:
 - 1. Select any Product meeting specified requirements.
 - 2. Submit Product Data to substantiate compliance of proposed Product with specified requirements.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Survey and field engineering.
 - 2. Submittals.
 - 3. Records.
- B. Provide and pay for field engineering services required for Project:
 - 1. Survey work required in execution of Work.
- C. Work includes preparation of an Existing Grade Topo Map Survey to confirm existing grades are as indicated herein.
- D. Work includes existing building pad soils compaction tests and any required corrective action.
- E. Other professional engineering services specified or required to execute Contractor's construction methods.
- F. Original undisturbed site geotechnical report is available from the Owner on request.

1.2 QUALIFICATIONS

- A. Surveyor: Qualified land surveyor, licensed in State in which project is located.
- B. Soils Engineer: Registered professional engineer of discipline required for specific service on Project. Licensed in State in which project is located.

1.3 SUBMITTALS

- A. Submit documentation to verify accuracy of field engineering work upon Architect's request.
- B. Submit certification that elevations and locations of improvements are in conformance with Contract Documents.

1.4 SURVEY REFERENCE POINTS

- A. Existing horizontal and vertical control points for project are those designated on Drawings.
- B. Locate, verify, and protect control points prior to beginning Work; preserve permanent reference points during construction.

1.5 PROJECT SURVEY REQUIREMENTS

- A. Establish minimum of two permanent bench marks on site, referenced to survey control points. Record locations on Project Record Documents.
- B. Establish lines and levels, locate and lay out, by instrumentation:
 - 1. Site improvements:
 - a. Stakes for grading, fill, and topsoil placement.
 - b. Utility slopes and invert elevations.
 - 2. Building foundation and column locations, floor elevations, and other controlling dimensions.
 - 3. Controlling lines and levels required for mechanical and electrical trades.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
FIELD ENGINEERING**

SECTION 01 7123 – Page 2 of 2

- C. Verify property corners, easements, building setbacks, and horizontal control dimensions with information contained in Contract Documents.
- D. Promptly notify Architect of any errors or discrepancies noted; await instructions prior to proceeding with Work.

1.6 RECORDS

- A. Maintain accurate log of control and survey work.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT CONSTRUCTION WASTE MANAGEMENT

SECTION 01 7419 – Page 1 of 2

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Construction waste management goals, plan, and records.

1.2 WASTE MANAGEMENT GOALS

- A. Reuse, salvage, or recycle non-hazardous waste materials.
- B. Minimize waste sent to landfills and incinerators.
- C. Prioritize non-hazardous construction waste management in following order:
 - 1. Reduce amount of waste generated.
 - 2. Reuse material through on-site reuse or off-site salvaging, including sale or donation.
 - 3. Recycle material including diverting materials for secondary uses whenever economically feasible.
 - 4. Dispose of materials with no practical use or economic benefit at landfill.

1.3 WASTE MANAGEMENT

- A. Pro-actively manage construction and demolition waste:
 - 1. Practice efficient waste management when sizing, cutting, and installing products.
 - 2. Use all reasonable means to divert construction and demolition waste from landfills and incinerators, and to facilitate recycling and reuse.
 - 3. Return unused products and overages to supplier, or donate to non-profit group.
 - 4. Carefully install products; avoid removal of ill-timed and poorly installed products.
 - 5. Use centralized cutting areas to facilitate waste collection.
 - 6. Deliver, store, and handle products to prevent damage.
- B. Require subcontractors and suppliers to participate in waste management efforts.
- C. Construction waste includes:
 - 1. Products from demolition and removal, excluding excavated soil, and land-clearing debris.
 - 2. Excess and unusable construction products.
 - 3. Packaging materials for construction products.
 - 4. Other materials generated during construction process but not incorporated into the Work.
- D. Give consideration to:
 - 1. Availability of viable recycling markets.
 - 2. Condition of materials.
 - 3. Ability to provide material in suitable condition and in quantities acceptable to available markets.
 - 4. Time constraints imposed by internal project completion mandates.
- E. Be responsible for implementation of special programs involving rebates and similar incentives related to recycling of waste.
- F. Revenues and other savings obtained for salvage and recycling accrue to Contractor.
- G. Ensure that firms and facilities used for recycling, reuse, and disposal have legal permits for intended uses.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT CONSTRUCTION WASTE MANAGEMENT

SECTION 01 7419 – Page 2 of 2

1.4 QUALITY ASSURANCE

- A. Review and discuss waste management plan implementation and progress at Preconstruction Conference and Progress Meetings.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Designate separate areas to facilitate separation of materials for potential recycling, salvage, reuse and return.
- B. Clearly identify areas and receptacles.
- C. Keep storage areas and receptacles clean and orderly; prevent contamination of materials.
- D. Monitor storage areas; correct problems and implement preventative measures.

1.6 TRAINING

- A. Provide training of waste management methods to be used at appropriate stages of Project.
- B. Require participation of all subcontractors.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

3.1 WASTE COLLECTION

- A. Provide containers and storage areas to facilitate waste management, clearly identified.
- B. Handle recyclable materials to prevent contamination by incompatible products and materials.
- C. Separate materials by:
 - 1. Placing into marked separate containers, then transporting to recycling facility.
 - 2. Placing into single container, then transporting to recycling facility for separation.

3.2 DISPOSAL

- A. Dispose of nonhazardous waste materials that cannot be reused, recycled, or salvaged at licensed landfill or incinerator.
- B. Handle, store, and dispose of hazardous wastes in accordance with applicable codes, ordinances, rules, and regulations.

END OF SECTION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT CLOSEOUT PROCEDURES

SECTION 01 7700 – Page 1 of 4

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Closeout procedures.
 - 2. Final cleaning.
 - 3. Adjusting.
 - 4. Project record documents.
 - 5. Operation and maintenance data.
 - 6. Warranties.
 - 7. Spare parts and maintenance materials.
 - 8. Starting of systems.
 - 9. Demonstration and instructions.

1.2 CLOSEOUT PROCEDURES

- A. Final Inspection:
 - 1. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with the Contract Documents and ready for Architect's inspection.
- B. Submit Final Application for Payment showing original Contract Sum, adjustments, previous payments, retainage withheld from previous payments, and sum remaining due.
- C. Closeout Submittals:
 - 1. Evidence of compliance with requirements of governing authorities.
 - 2. Certificate of Occupancy.
 - 3. Project Record Documents.
 - 4. Operation and Maintenance Data.
 - 5. Warranties.
 - 6. Keys and keying schedule.
 - 7. Spare parts and maintenance materials.
 - 8. Evidence of payment of Subcontractors and suppliers.
 - 9. Final lien waiver.
 - 10. Certificate of insurance for products and completed operations.
 - 11. Consent of Surety to final payment.

1.3 FINAL CLEANING

- A. Execute final cleaning prior to final inspection.
- B. Clean surfaces exposed to view:
 - 1. Clean glass.
 - 2. Remove temporary labels, stains and foreign substances.
 - 3. Polish transparent and glossy surfaces.
 - 4. Vacuum carpeted surfaces; damp mop hard surface flooring.
- C. Clean equipment and fixtures to a sanitary condition.
- D. Clean or replace filters of operating equipment.
- E. Clean debris from roofs and drainage systems.
- F. Clean site; sweep paved areas, rake clean landscaped surfaces.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT CLOSEOUT PROCEDURES

SECTION 01 7700 – Page 2 of 4

- G. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.4 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.5 PROJECT RECORD DOCUMENTS

- A. Maintain following record documents on site; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other Modifications to the Contract.
 - 5. Reviewed Shop Drawings, Product Data, and Samples.
 - 6. Material Safety Data Sheets.
- B. Store Record Documents separate from documents used for construction.
- C. Record information concurrent with construction progress.
- D. Make entries neatly and accurately.
- E. Label each set or volume with title "PROJECT RECORD DOCUMENTS", project title, and description of contents.
 - 1. Organize contents according to Project Manual table of contents.
 - 2. Provide table of contents for each volume.
- F. Drawings: Mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 4. Field changes of dimension and detail.
 - 5. Details not on original Drawings.
- G. Specifications: Mark each Product section description of actual Products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and Modifications.
- H. Shop Drawings: Mark each item to record actual construction including:
 - 1. Field changes of dimension and detail.
 - 2. Details not on original Shop Drawings.
- I. Submit two printed copies, also submit electronically in Adobe PDF format.

1.6 OPERATION AND MAINTENANCE DATA

- A. Identify as "OPERATION AND MAINTENANCE INSTRUCTIONS" and title of project.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT CLOSEOUT PROCEDURES

SECTION 01 7700 – Page 3 of 4

- B. Contents:
 - 1. Directory: List names, addresses, and telephone numbers of Architect, Contractor, Subcontractors, and major equipment suppliers.
 - 2. Operation and maintenance instructions: Arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
 - a. Significant design criteria.
 - b. List of equipment.
 - c. Parts list for each component.
 - d. Operating instructions.
 - e. Maintenance instructions for equipment and systems.
 - f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.
 - 3. Project documents and certificates including:
 - a. Shop drawings and product data.
 - b. Air and water balance reports.
 - c. Certificates.
 - d. Copies of warranties and bonds.
- C. Submittal:
 - 1. Submit two printed copies, also submit electronically in Adobe PDF format at least 15 days prior to final inspection.
 - 2. Architect will notify Contractor of any required revisions after final inspection.
 - 3. Revise content of documents as required prior to final submittal.
 - 4. Submit two copies of revised documents, and submit revised documents electronically in Adobe PDF format within 10 days after final inspection.

1.7 WARRANTIES

- A. Execute and assemble documents from Subcontractors, suppliers, and manufacturers.
- B. Include Table of Contents.
- C. Submit two printed copies, also submit electronically in Adobe PDF format along with final Application for Payment.
- D. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

1.8 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.
- B. Deliver to Project site in location as directed; obtain receipt prior to final payment.

1.9 STARTING OF SYSTEMS

- A. Notify Owner and Architect at least seven days prior to startup of each system or piece of equipment.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT CLOSEOUT PROCEDURES

SECTION 01 7700 – Page 4 of 4

- B. Prior to beginning startup verify that:
 - 1. Lubrication has been performed.
 - 2. Drive rotation, belt tension, control sequences, tests, meter readings, and electrical characteristics are within manufacturer's requirements.
 - 3. Utility connections and support components are complete and tested.
- C. Execute start-up under supervision of applicable manufacturer's representative or Contractor's personnel in accordance with manufacturers' instructions.
- D. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to startup, and to supervise placing equipment or system in operation.
- E. Submit written report that equipment or system has been properly installed and is functioning correctly.

1.10 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of Products to Owner's personnel two weeks prior to date of Substantial Completion.
- B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- C. Utilize Operation and Maintenance Manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.
- D. Demonstrate startup, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed upon times, at equipment location.
- E. Prepare and insert additional data in Operation and Maintenance Manuals when need for additional data becomes apparent during instruction.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EROSION AND SEDIMENT CONTROL**

SECTION 02 010 – Page 1 of 6

PART I – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of the Contract including General and Supplementary Conditions and General Requirements apply to the work specified in this section as do the following sections of the Technical Specifications:
 - Section 02300-Earthwork
 - Section 02485-Grassing
- B. Federal, State and Local Codes shall apply to the control of storm water runoff and siltation from the site.

1.2 SUMMARY

- A. Furnish all labor, equipment, materials and services necessary for the construction of and maintaining project BMP's. Included is the installation of any additional BMP's which may become necessary due to site conditions and inspection reports as ordered by the Engineer/Construction Manager.
- B. The Contractor is solely responsible for controlling runoff and siltation from the project site, throughout all areas of the project site and all adjacent sites which may be damaged by sediment transport and deposition during construction.
- C. An erosion control plan is included in the plans. Prior to any construction activities, the Contractor must totally implement and maintain the BMP's. Full implementation of the Construction Best Management Practice Plan and/or erosion control plan is a priority of this project and is a requirement of the Contractor. The Contractor shall abide by the regulations given in the ADEM Administrative Code, Chapter 335-6-12.
- D. The Owner and/or their representative, at their discretion, shall perform or employ to perform written weekly site inspections of the total project areas. The person doing the inspections and written reports must be a Qualified Credentialed Inspector (QCI). Any rain event exceeding $\frac{3}{4}$ inch over a 24 hour period shall require a special inspection and written reports. All reports shall be copied to the Owner or their designated representative.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EROSION AND SEDIMENT CONTROL**

SECTION 02 010 – Page 2 of 6

- E. All maintenance and re-installation of existing BMP's shall be the responsibility of the Contractor and at no additional cost to the Owner. New BMP's required and not on the Erosion and Sediment Control Plan or specifications shall be the responsibility of the Contractor at no expense to the Owner.
- F. The contractor shall be responsible for storm water runoff and sediment control on the project site until final completion of the project and/or at the satisfaction of the Owner.
- G. The Owner, Engineer and their employees shall be held harmless from any issues resulting from any violations.

1.3 QUALITY ASSURANCE

- A. Reference Codes and Standards: Comply with applicable provisions and recommendations of the following:
 - 1) Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas.
 - 2) The Erosion and Sediment Control plan.
 - 3) Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction (2022) Edition, Section 665 Temporary Erosion and Sediment Control and Section 107.21 Stormwater Management, Spill Prevention and Debris Removal.
- B. Pre-Construction Conference for Earthwork, Site Clearing, and Erosion and Sediment Control shall be conducted at the Project site prior to beginning work. Representatives of the Contractor, Engineer and/or Architect will be present to discuss execution of this portion of the work.

1.4 PROJECT CONDITIONS

- A. It shall be the Contractor's sole responsibility to inspect the existing site conditions to determine any discrepancies which would affect his scope of work and to notify the Engineer/Architect in writing of any such discrepancies prior to beginning work.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EROSION AND SEDIMENT CONTROL**

SECTION 02 010 – Page 3 of 6

PART 2 – PRODUCTS

Acceptable Manufacturers: All products used shall be in compliance acceptable to the guidelines as set forth by the ALDOT Standard Specifications (2022) Edition, Section 665 Temporary Soil Erosion and Sediment Control and Section 659 Rolled Erosion Control Products.

2.1 MATERIALS

- A. Rolled Erosion Control Products (RECP) – Use products, materials and guidelines as noted in ALDOT Standard Specifications (2022) Edition, Section 659 for all applicable slopes. Follow guidelines noted in ALDOT 2022 Standard Specifications for different slopes and uses of rolled erosion control products (RECP).
- B. Temporary Rip Rap: Shall be class 2 unless noted otherwise on the plans. Riprap shall meet the requirement given in ALDOT Standard Specifications (2022) Edition, Section 814.
- C. Hay Bales shall contain a minimum of 5 cubic feet of material and having a weight of not less than 35 pounds with a minimum length of 3 feet.
- D. Silt Fence shall be constructed of a geotextile filter supported between posts with a wire mesh backing. Silt fence shall meet the requirements given in AASHTO M 288. The geotextile filter shall meet the requirements given in (ALDOT 2022) Section 810.01. All silt fences shall be Type “A” as noted on the plans.
- E. Inlet Protection shall be manufactured devices consisting of filter fabric held in place by a rigid frame. The frame should be strong enough to support the weight of the silt that accumulates on the filter. The use of sand bags, wattles, silt fence and hay bales must be approved by the Engineer in advance of use.
- F. Temporary Gravel Construction Entrance shall consist of a minimum layer of 6 inches deep of ALDOT Number 4 or approved equal coarse aggregate atop filter fabric as specified in the Alabama handbook.
- G. Ditch Checks may be constructed of any combination of rock, sand bags, hay bales, wattles and silt fence or any other approved material at locations as shown on the plans. Materials used must meet ALDOT Standard Specifications (2022) Edition.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EROSION AND SEDIMENT CONTROL**

SECTION 02 010 – Page 4 of 6

PART 3 – EXECUTION

3.1 INSTALLATION OF CBMPP OR EROSION AND SEDIMENT CONTROL PLAN

- A. Implement and construct the Construction Best Management Practices Plan (CBMPP) and/or erosion control plan as required. Perform such work and use materials noted and as set forth by the guidelines of the Alabama Handbook and ALDOT Standard Specifications 2022 Edition for Temporary Erosion and Sediment Control, Section 665.
- B. Protect the project site, streams, lakes, reservoirs, drainage systems and adjacent property owners from contamination of siltation and storm water runoff or harmful materials.
- C. Additional BMP's or required maintenance of existing BMP's shall be the responsibility of the contractor. Additional BMP's, and required maintenance of existing BMP's, shall be determined by the Owner's/Engineer's QCI/QCP or other applicable agent's inspection reports and as directed by the Engineer.
- D. The installation of silt fences shall be in conformance with the silt fence manufacturer's recommendations. All silt fences shall be properly keyed into the earth at the toe. All silt fence shall be maintained to function properly and cleaned of silt accumulation at proper intervals.
- E. Hay Bales shall be installed using key ways cut into grade or aggregate fill bedding as required. All hay bales shall be properly oriented and staked. Silt trapped by hay bale installation shall be removed and properly disposed of at proper intervals.
- F. Riprap shall be placed in accordance with ALDOT Standard Specifications (2022) Edition, Section 610 for class 2 riprap. All riprap installation shall be as directed by the Engineer or as indicated on the plans. The contractor shall maintain all riprap protection throughout the project timeline until the project is accepted. Any material displaced by any cause prior to acceptance of the project shall be replaced at the Contractor's expense. All riprap placed in unauthorized locations without prior approval of the Engineer shall be considered waste and placed at no cost to the owner.
- G. Erosion Control Netting shall be placed in accordance with ALDOT Standard Specifications (2022) Edition, Section 659. All areas to be covered by erosion control netting shall be as shown on the plans or as field conditions necessitate. Follow the

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EROSION AND SEDIMENT CONTROL**

SECTION 02 010 – Page 5 of 6

guidelines for applicable slope requirements. Note differences between temporary and permanent products.

- H. Inlet Protection shall be installed at locations and in accordance with the requirements shown on the plans for the appropriate stages of construction or as directed by the Engineer. All products shall be installed as per manufacturer's recommendations.
- I. Ditch checks shall be constructed at locations shown on the plans and BMP requirements or as directed by the engineer. Materials and products used may include rock, sand bags, hay bales, silt fence, wattles or other approved materials necessary to control sediment runoff and siltation. Silt trapped by check dams shall be removed and properly disposed of during periodic checking and maintenance.
- J. Dust Control is the responsibility of the Contractor and may be required at any time including weekends and holidays. The contractor shall prevent visible dust from leaving the project site by effective means as approved by the Engineer.
- K. All temporary soil erosion and sediment control BMP's shall be removed from the project site when no longer needed or as shown otherwise on the plans, BMP requirements, or as directed by the Engineer. Removal of temporary controls shall be only after permanent controls are in place and providing the controls of soil erosion and sediment control of the project site. Permanent control must be effective before the removal of all temporary BMP's happens. The removal of all temporary soil erosion and sediment control BMP's shall be the responsibility of the Contractor.
- L. Outlet Protection shall be as shown on the plans or as directed by the Engineer. They shall be installed in accordance with the details shown on the plans and as soon as practicable after the completion of the drainage structures.
- M. Storm Water Detention Basin shall be installed and erected as indicated on the plans. All materials used shall be in accordance with ADEM Guidelines and the maintenance of the Storm Water Detention Basin shall be the sole responsibility of the Contractor.
- N. After stabilization of the disturbed areas have been achieved, the Contractor shall remove and dispose of all temporary BMP's and dress out those areas to the proper line and grades.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EROSION AND SEDIMENT CONTROL**

SECTION 02 010 – Page 6 of 6

- O. Permanent Storm Water Detention Basin shall be cleaned out, dressed out, surrounding areas seeded and mulched, etc., and general area free of any garbage, debris, or any items which should not be left onsite.
- P. A final inspection of all BMP's will be performed by the Engineer/Architect representatives and Contractor personnel near the date of Substantial Completion. Any and all deficiencies noted shall be corrected by the Contractor at no additional cost to the Owner prior to Final Acceptance of the contract.
- Q. Contractor shall be required to maintain BMP's for a period of 45 days after date of Final Acceptance with the time frame beginning at the date of Final Acceptance.

3.2 CLEANUP AND FINAL ACCEPTANCE

- A. All trash and surplus undesirable material of every description resulting from work shall be removed from the site.
- B. At the time of final acceptance of work performed under the contract, the work covered by this section shall be complete in every respect and in proper operating and/or functioning condition. Any defects discovered in the system subsequent to this inspection shall have been corrected. Final acceptance shall not be complete until all work has been inspected and accepted by Architect/Engineer and local authority having jurisdiction. All utilities to be maintained by local authorities shall be accepted by letter with original being submitted to Architect/Engineer.
- C. All existing improvements such as, but not limited to, lawns, drives, pavements, sidewalks, and any other improvement destroyed or damaged as a result of the work performed shall be restored to its original or better condition at Contractor's expense at no additional cost to the Owner before final acceptance is granted.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SITE CLEARING**

SECTION 02 230 – Page 1 of 4

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this section as do the following sections of the technical specifications:
 - 1) SECTION 02010 – EROSION AND SEDIMENT CONTROL
- B. State and Local Codes shall control the disposal of trees, shrubs and other waste materials from the site clearing and grubbing operations.
- C. The Contractor is responsible for and shall notify the applicable local agencies prior to beginning work, obtain all required permits and shall be required to comply with their requirements.

1.2 SUMMARY

- A. Furnish all labor, materials, equipment and services necessary for the work described in this section, and in a legal manner:
 - 1) Removal of trees, brush, stumps, and other vegetation
 - 2) Topsoil stripping and storage
 - 3) Clearing and grubbing
 - 4) Erosion Control
 - 5) Rubbish and other objectionable material
- B. Site clearing and site protection work was performed prior to commencement of earthwork contract. Any remaining site clearing work shall be performed as a part of this contract and shall meet the guidelines in these documents.
- C. Contractor shall pay for all disposal fees of the required work and shall provide proof of disposal site and disposal activities.

1.3 DEFINITIONS

- A. Limits of Clearing: Shall be defined as the perimeter of clearing and grading operations as shown on the drawings.
- B. Grubbing: Shall be defined as the complete removal of any vegetation or other objects where any part of the vegetation or object is visible at the ground surface.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SITE CLEARING**

SECTION 02 230 – Page 2 of 4

- C. Topsoil: Shall be defined as natural friable clay loam surface soil reasonable free of subsoil, clay lumps, stones and other objects more than two (2) inches in diameter and free of weeds, roots and other deleterious materials.

1.4 QUALITY ASSURANCE

- A. Pre-construction Conference for earthwork, site clearing and site protection shall be conducted at the project site. Representatives of the Contractor, Engineer and Architect will be present to discuss execution of this portion of the work.

1.5 PROJECT CONDITIONS

- A. It shall be the Contractor's responsibility to inspect the existing site conditions to determine any discrepancies which would affect his scope of work and to notify the Architect in writing of any such discrepancies prior to beginning work.

PART 2 – EXECUTION

2.1 GENERAL

- A. All applicable sections and phases of the BMP's and soil erosion and sediment control plan shall be implemented and functioning prior to the beginning of any clearing and grubbing operations.
- B. Provide and maintain erosion control measures to prevent soil erosion and discharge of soil bearing water runoff or airborne dust to adjacent properties.
- C. Locate and identify all areas, vegetation and survey control points that should be protected and clearly mark all areas to help prevent them from any disturbance due to site clearing operations.
- D. Protect existing site improvements to remain free from damages during construction.
- E. Restore any damaged improvements to the original conditions as acceptable to the Architect/Engineer.
- F. Maintenance and protection of BMP's is required during ongoing clearing and grubbing operations. Protection of lakes, streams, reservoirs, drainage systems and adjacent property from siltation and Stormwater runoff is a requirement of the Contractor.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SITE CLEARING**

SECTION 02 230 – Page 3 of 4

2.2 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs and other vegetation to permit installation of new construction. Removal includes: digging out stumps and other obstructions and grubbing roots to a depth of eighteen (18) inches below exposed sub-grade.
- B. Fill depressions caused by clearing and grubbing operations with local satisfactory soil material unless other excavation of earth work is indicated to be performed. Place fill material in accordance with Section 2300 Earthwork, so as to make the surface conform to the surrounding original ground surface.

2.3 TOPSOIL

- A. Remove grasses and all other vegetation before stripping topsoil.
- B. Strip surface soil of any unsuitable material including unsuitable topsoil, trash, debris, weeds, roots, large rocks and other deleterious materials.
- C. Stockpile topsoil in areas as indicated on the plans or as directed by the Architect/Engineer. Do not intermix with subsoil and cover to prevent windblown dust. Dispose excess topsoil as waste material in designated areas as directed by the Engineer.
- D. Grade and shape topsoil stockpiles to drain surface water away from stockpiles.
- E. Maximum slopes of topsoil piles shall be three (3) horizontal to one (1) vertical.

PART 3 – DISPOSAL

3.1 GENERAL

- A. Remove all surplus soil materials, waste, unsuitable topsoil, trash, debris, trees and roots and legally dispose of them off of owner's property.
- B. Any burning of materials on site shall be performed and comply with local health department regulations and local fire department regulations.
- C. Proof of any and all permits and burning plans required shall be submitted to the Architect/Engineer prior to commencement of burning operations. Any additional mandated fire protection means shall be at the expense of the Contractor.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SITE CLEARING**

SECTION 02 230 – Page 4 of 4

3.2 CLEANUP AND FINAL ACCEPTANCE

- A. All trash and surplus undesirable material of every description resulting from work shall be removed from the site.
- B. At the time of final acceptance of work performed under the contract, the work covered by this section shall be complete in every respect and in proper operating and/or functioning condition. Any defects discovered in the system subsequent to this inspection shall have been corrected. Final acceptance shall not be complete until all work has been inspected and accepted by Architect/Engineer and local authority having jurisdiction. All utilities to be maintained by local authorities shall be accepted by letter with original being submitted to Architect/Engineer.
- C. All existing improvements such as, but not limited to, lawns, drives, pavements, sidewalks, and any other improvement destroyed or damaged as a result of the work performed shall be restored to its original or better condition at Contractor's expense at no additional cost to the Owner before final acceptance is granted.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 1 of 25

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The General Provisions of the contract including General and Supplementary Conditions and General Requirements apply to the work specified in this section as do the following sections of the Technical Specifications:
 - 1) Section 02010 Erosion and Sediment Control
 - 2) Section 02485 Grassing

1.2 SUMMARY

- A. Contractor shall provide all labor, materials, equipment and incidentals to perform all earthwork related work as shown on the drawings. Work shall include but not be limited to pavement subgrades, building subgrades, pipelines, vaults, drainage systems, soil and erosion control, berms, underdrains, conduits and other items needed to complete the subgrade work in every respect.
- B. All necessary preparation of subgrade for building slabs and roadway pavements is included.
- C. All temporary means needed to prevent discharge of sediment to water courses from dewatering systems or erosion control are included.
- D. Excavation of and backfilling of trenches is included as part of this section.
- E. All sheeting, shoring, bracing, underpinning and dewatering systems and the design of such systems is the responsibility of the Contractor and is included in this Section.
- F. The contractor is responsible for performing work at lines, locations and elevations shown on the plans. Contractor shall employ a surveying contractor or perform the duties as required to assist the contractor to perform all of the earthwork required. The contractor is responsible for any replacement and redo of any work that is not performed as shown on the plans and specifications.

1.3 CODES AND STANDARDS

- A. OSHA Standard, Title 29, Code of Federal Regulations, Part 1926, Section 650 (Subpart P–Excavations).
- B. Alabama Department of Transportation (ALDOT), Standard Specifications for Highway Construction, 2022 Edition.
- C. American Society for Testing and Materials (ASTM):
 - 1) ASTM D422, Method for Particle-Size Analysis of Soils.
 - 2) ASTM D427, Test Methods for Shrinkage Factors of Soils by the Mercury Method.
 - 3) ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
 - 4) ASTM D1556, Test Method for Density and Unit Weight of Soil in Place by the Sand Cone Method.
 - 5) ASTM D1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
 - 6) ASTM D2166, Test Method for Unconfined Compressive Strength of Cohesive Soils.
 - 7) ASTM D2922, Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods.
 - 8) ASTM D4318, Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

1.4 QUALITY ASSURANCE

- A. Obtain all necessary permits for work in roadway and jobsite areas including but not limited to excavation permits, utility construction permit and local agencies requirements. Proof of all permits is required.
- B. Perform all work in compliance with applicable requirements of governing authorities having jurisdiction.
- C. Locate all existing underground utilities in the areas of the work. If utilities are to remain in place, provide adequate means of protection during all phases of work.
- D. Perform all earthwork operations to the horizontal and vertical grades as shown on the plans unless changes have been made per change order or Engineer Construction Directive.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 3 of 25

- E. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult utility company owner and Engineer for directions as to how to proceed.
- F. Do not interrupt existing utilities serving surrounding areas or onsite areas except when permitted in writing by Engineer and then only after acceptable temporary utility services have been provided. Repair damaged utilities to the satisfaction of utility owner.
- G. Barricade open excavations occurring as part of the work and post with warning lights. Protect all danger areas at the worksite from unauthorized people in general and employees working at the jobsite.
- H. The Contractor shall employ and be responsible for survey control and layout, survey control points protection, all horizontal and vertical elevations and all surveying needed for Contractor to perform earthwork operations. Owner reserves right to spot check grades, locations and elevations at any time and location of areas as deemed necessary by Engineer.
- I. Contractor is responsible for record keeping and mapping of all as-built utilities including but not limited to conduits, water lines, storm and sanitary sewer lines and all other underground installment of required facilities. The contractor shall be required to submit for approval record maps and as-built drawings of installed systems. All "As-Built" drawings will be copied on CD and catalogued in the same format that Alabama Graphics does them.

1.5 PROJECT CONDITIONS

- A. Existing Conditions: Maintain in operational conditions all active utilities, sewers, gutters and other drain encountered in the sanitary sewer system. Repair to the satisfaction of the utility owner any surface or subsurface improvement or utility damaged during the course of the work, whether or not such improvements are indicated on the Drawings.
- B. It is the responsibility of the Contractor to determine the location and nature of all subsurface conditions with the Contract Sum reflecting and including all conditions. No claim for extra compensation, or for extension of time, will be allowed on account of the subsurface conditions, except as provided in Section 2300 Earthwork. The Contractor is reminded that all excavation is under the protective guidelines and requirements of OSHA "Safety and Health Regulation for Construction," as set forth in the Federal Register, latest revision and all such protections are the responsibility of the Contractor and shall be provided at the Contractor's expense.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT EARTHWORK

SECTION 02 300 – Page 4 of 25

- C. Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.
- D. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
- E. Contractor is to verify lengths and locations of all pipes and structures and purchase quantities based on these verified dimensions.
- F. Do not bring explosives onto site or use in work without prior written permission from authorities having jurisdiction. Contractor is solely responsible for handling, storage and use of explosive materials when their use is permitted.
- G. Contractor shall employ a Blasting Consultant to conduct a Pre-Blast survey, monitor all blasts and shall notify Architect/Engineer 48 hours in advance of such blasting. A copy of the Pre- Blast Survey shall be submitted to the Architect/Engineer prior to starting work.

1.6 SUBMITTALS

- A. Test Reports - Excavating: Submit following reports directly to Architect/Engineer from the testing services, with a copy to Contractor.
 - 1) Test reports on borrow material
 - 2) Verification of each footing subgrade
 - 3) Field density test reports
 - 4) One optimum moisture-maximum density curve for each type of soil encountered
 - 5) Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested
- B. Blasting Plan: For record purposes; approved by authorities having jurisdiction.
- C. Seismic Survey Report: For record purposes; from seismic survey agency.

1.7 DEFINITIONS

- A. Backfill: Suitable soil materials used to fill an excavation.
- B. Base: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1 ½ inch sieve and not more than 8 percent passing a No. 200 sieve.
- C. Base Course: Layer placed between the subgrade and slabs-on-grade, walkways and pavements.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 5 of 25

- D. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- E. Borrow: Suitable soil imported from off-site for use as fill or backfill.
- F. Crushed Stone Backfill: Crushed stone where specified to be used as backfill or a stone cushion for structures shall be crushed stone meeting Alabama Department of Transportation (ALDOT) Gradation #57.
- G. Drainage Course: Layer supporting slab-on-grade used to minimize capillary flow of pore water.
- H. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1 ½ inch sieve and 0 to 5 percent passing a No. 8 sieve.
- I. Excavation: Removal of material encountered above subgrade elevations.
 - 1) Earth Excavation: Removal of all materials, not including that specified under the “Clearing and Grubbing” and “Rock Excavation” items. Rocks and boulders eight (8) cubic feet or less in volume shall be classified as earth.
 - 2) Rock Excavation: Loosening. Removing and disposing of all rock in original bed, in well-defined ledges, or in boulder form. Boulders having a volume of eight (8) cubic feet or less shall not be classified as rock. Material that can be loosened, separated or ripped by means of heavy-duty power tools or excavating equipment shall not be classified as rock.
 - 3) Additional Excavation: Excavation below subgrade elevations as directed by Architect/Engineer.
 - 4) Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated dimensions without direction by Architect/Engineer. Unauthorized excavation, as well as remedial work directed by Architect/Engineer, shall be without additional compensation.
- J. Fill: Suitable soil materials used to raise existing grades.
- K. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse aggregate grading Size 67; with 100 percent passing a 1 inch sieve and 0 to 5 percent passing a No. 4 sieve.
- L. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.
- M. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- N. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below base, drainage fill, or topsoil materials.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 6 of 25

- O. Suitable Soils: As defined in the geotechnical report (if applicable), or the following ASTM D 2487 soil classification groups as a minimum; GC, GW, GP, GM, SW, SP, SC, CL, ML, SM, or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter. Rock fill may be considered suitable if approved by the Engineer prior to placement.
- P. Unsuitable Soils: As defined in the geotechnical report (if applicable), or the following soil classification groups as a minimum; ASTM D 2487 soil classification groups MH, CH, OL, OH, and PT, or a combination of these group symbols. Unsuitable soils also include suitable soils not maintained within 2 percent of optimum moisture content at time of compaction. The contractor is responsible for moisture conditioning suitable material to the required moisture content.
- Q. Utilities include on-site underground pipes, conduits, ducts, and cables.

1.8 BLASTING REQUIREMENTS

- A. Blasting: Comply with applicable requirements in NFPA 495, "Explosive Materials Code," and prepare a blasting plan reporting the following:
 - 1) Types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
 - 2) Seismographic monitoring during blasting operations.
- B. Seismic Survey Agency: An independent testing agency, acceptable to authorities having jurisdiction, experienced in seismic surveys and blasting procedures to perform the following services:
 - 1) Report types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on project site and adjacent properties.
 - 2) Seismographic monitoring during blasting operations.
- C. Contractor must obtain written permission from authorities having jurisdiction before bringing explosives to Project site or using explosives on Project Site.
- D. It shall be the sole responsibility of the Contractor to observe all laws and regulations relating to explosives, including but not limited to all Federal laws, all OSHA regulations, and all State and Local laws, regulations and ordinances applicable to explosives.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 7 of 25

- E. Persons responsible for blasting shall be present and supervise all blast design, loading, and shot firing.
- F. All blasting shall be done by competent experienced blasters. Contractor must hold a license with the State of Alabama to perform blasting.
- G. Persons responsible for directing blasting operations shall have sufficient insurance to cover the responsibilities associated with blasting operations.
- H. The successful bidder shall carry sufficient liability insurance to cover damages and claims caused by his actions or those of his employees. This coverage shall apply, but shall not be limited to, all properties or persons on, or adjacent to, the site of the construction activity that might be damaged or injured as a result of blasting operations.
- I. All laws and regulations pertaining to blasting, if more stringent than specified herein, shall become the minimum standards.
- J. The Contractor shall be solely and completely responsible for the conditions on, in or near the job site, including safety of all persons and property during performance of the work.
- K. Do not damage adjacent structures, property, or site improvements or weaken the bearing capacity of rock subgrade when using explosives.
- L. Contractor shall indemnify and hold harmless, the Owner, Architect, Engineer, Owner's Representatives and their agents and employees from any claim growing out of use, transportation and storage of explosives.

PART 2 – PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient suitable soil materials are not available from excavations.
- B. Structural Backfill:
 - 1) Suitable backfill materials shall be within moisture limits required for compaction; silty- clay, weathered shale or other suitable soil mixtures; and such soils shall not contain rock or stone in sizes greater than 3 inches.
 - 2) Native soils as excavated from the site may be used provided that they satisfy the criteria specified herein. If native soils are unsuitable, then Contractor shall furnish and install suitable soils when needed from off-site at Contractor's expense.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 8 of 25

- 3) Material for structural and general backfill may be that excavated on the site; but in the event that the excavated material is not in suitable condition at the time when it is required for backfilling purposes or the quantity of material excavated is not sufficient to make the finished fills indicated, the contractor shall provide, at his own expense, such additional suitable material as is required.
- 4) If paved areas (or areas to be paved) abut structures, then backfill material under these areas shall be crushed stone.
- 5) Contractor is responsible for removing and disposing of unsuitable materials off-site, unless otherwise specifically shown to be disposed of on-site.

C. Utility Trench Bedding and Backfill:

- 1) Bedding Materials
 - a) Where trenches are excavated in soil, bedding material shall be #57 stone to a depth of approximately 6 inches under barrel of pipe for utility and small pipe systems, and 12 inches under the barrel of the pipe for large pipe systems.
 - b) Where trenches are excavated in rock, bedding material shall be #57 stone, placed and compacted to a depth of approximately 12 inches under barrel of pipe for all utility, small, and large pipe systems.
- 2) Backfill Materials
 - a) Where trenches are excavated in soil, backfill material shall be #57 stone to ½ the depth of the pipe, then the remainder shall be suitable soil placed and compacted as described in these Specifications.
 - b) #57 stone shall be used in the following locations:
 1. For backfill where trenches are excavated in rock (to a depth of 12 inches above the top of the pipe).
 2. For backfill in trenches cut in paved streets, in paved areas, areas to be paved as part of this Contract or future work, or as specifically indicated.
 3. For backfill (to a depth of 12 inches above the highest pipe) in areas of general excavation (where pipe lines are installed and where, because of proximity of several pipe lines, individual trenches cannot be excavated), and in areas where two or more utilities cross.
 - c) Backfill trenches with concrete where trench excavations pass with 18 inches of columns, wall footings or structural edges in which trenches are carried below bottom of such structural components or other piping systems. Place concrete to level of bottom of structural item covering the piping or conduit system completely.
 - d) The top foot of depth of all trenches (except under slabs, footings, roads, walks and paved areas, along road shoulders and other areas where crushed stone may be specified or directed to be used) shall be backfilled with soil that can be smoothly dressed to match surface of ground adjoining the edges of the trench, and that will support the vegetation desired for the finished surface and required by the finished grading and grassing requirements.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 9 of 25

D. Embankment and Fill Work:

- 1) The material used in embankments and fills shall be free from frost, stumps, trees, roots, sod, muck or debris of any kind.
- 2) Only materials as specified herein and/or approved by the Engineer shall be used.
- 3) Fill and embankment materials shall not be placed on frozen ground.
- 4) In placing rock fill, rock greater than one (1) cubic foot in volume, or having any dimension greater than one (1) foot, shall not be placed in compacted fills in areas to be occupied by structures, bearing slabs, footings, roadways, walks, etc.
- 5) When placing rock fill, rock shall not be placed nearer than two (2) feet to the surface of any fill, nor nearer than three (3) feet to the wall or surface of any structures.
- 6) Rock shall not be placed in fill areas which pipes, conduits, cables, etc., are to be laid, nor shall rock be placed in trench backfill except as described in these Specifications.

PART 3 – EXECUTION

3.1 SITE PREPARATION

- A. Protect structures, utilities, sidewalks, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
- B. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways in accordance with Divisions "Soil Erosion and Sediment Control".
- C. Clean all areas to be occupied by permanent construction or embankments of all trees, brush, roots, stumps, logs, wood or other unsuitable material and debris.
- D. Protect structural subgrades and foundations against freezing temperatures or frost when needed. Provide protective insulating materials as necessary.
- E. Inspect site and note to Engineer any areas which may contain unsuitable materials, soft areas or conditions which may present problems to general excavation and fill.

3.2 DEWATERING

- A. Prevent surface water and ground water from entering excavations or from ponding on prepared subgrades and from flooding Project Site and surrounding area.
- B. Protect subgrades from softening, undermining, washout and damage by rain or water accumulation.
- C. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary ditches.
- D. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.
- E. The Contractor shall complete all dewatering operations and dispose of the water from the worksite in a manner that will not cause damage to adjacent properties or environment, nor restrict access to any new or existing facilities. No water should be drained into work areas under construction.
- F. The Contractor shall keep excavations and work areas dry until the structures or facilities to be constructed are completed and Engineer is in agreement with Contractor to discontinue dewatering operations.

3.3 DRAINAGE DITCHES

- A. New ditches and streambeds shall be cut and existing ditches shall be cleaned out and extended as required to provide for surface drainage away from structures and to divert water away from excavations.
- B. New (Permanent) Drainage Ditches:
 - 1) Flow lines shall be graded as indicated on drawings.
 - 2) The cross sections of the ditches shall conform to detail specified.
- C. Temporary Drainage Ditches:

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 11 of 25

- 1) When temporary drains have served their purpose, all such drains shall be filled and finished with suitable backfill material to conform to existing contours or finished contours. The material should be placed and compacted in accordance with these specifications.
- 2) It shall be the Contractor's responsibility to provide and maintain drainage ditches during the progress of the work.

3.4 EXCAVATION, GENERAL

- A. All excavation on this project is unclassified regardless of the character of surface and subsurface conditions encountered, including rock, soil materials and obstructions.
- B. Material encountered in grading operation that, in the opinion of the Engineer, is unsuitable or undesirable shall be undercut and removed as directed by the Engineer. All unsuitable material that is removed by the Contractor shall become the property of the contractor, except as noted in Section 1.2090 and subsequent subsections, and be disposed of offsite in a manner satisfactory to the Owner. Undercut materials shall be unsuitable material encountered in trenches for pipe lines, culverts, conduits, and roadway and structure excavation. Backfill for these areas will be with material approved by the Engineer with layers of acceptable material compacted to the same requirements as general fill for roadways.
- C. All rock excavated from the site shall be designated as rock spoil. Rock spoil must be removed and disposed of offsite unless Contractor receives written permission from Engineer to use in non-structural fill areas.
- D. Unauthorized Excavation: In the event the Contractor should excavate below the grade specified and excess excavation is not authorized by the Engineer, such excess excavation shall be backfilled to the grade specified and/or indicated with compacted crushed stone or compacted backfill material as required by the Engineer. All such excavation and backfilling of excess excavation shall be done at the Contractor's expense at no additional cost to the Owner.
- E. The Contractor is reminded that all excavation is under the protective guideline and requirements of OSHA "Safety and Health Regulations for

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 12 of 25

Construction” as set forth in the Federal Register, latest revision, and all such protections are the responsibility of the Contractor and shall be provided at Contractor’s expense.

- F. Sheet piling, shoring, bracing and sloping are methods of excavation and such methods may vary according to the Contractor’s methods of dewatering, excavating and installing the work. All such methods of accomplishing the work are the sole responsibility of the Contractor, in accordance with the OSHA guidelines.
- G. Unsuitable material shall be removed from site as directed by Engineer.

3.5 EXCAVATION FOR UTILITY TRENCHES AND SMALL PIPING SYSTEMS

- A. Excavate trenches to the indicated gradients, lines, depths and elevations as shown on the plans. Beyond building perimeters, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches for small piping systems less than 60 inches in diameter and conduits to uniform widths to provide 2 feet of clearance on each side of pipe and 12 inches for conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated. All trenches for utilities shall be a minimum of 30 inches below finished subgrade elevations.
- C. Where trenches are excavated in native soils excavation shall be carried to a depth of approximately 6 inches under barrel of pipe for placement of the specified bedding material.
- D. The pipe shall be laid on firmly compacted approved bedding material and the barrel of the pipe shall have uniform bearing for its full length. Minimum depth of bedding material shall be 6 inches in soils, or 12 inches minimum in rock excavation.
- E. Any part of the trench excavation below the grade specified shall be corrected with bedding material placed and compacted in accordance with the requirements of these specifications.
- F. Where unsuitable or unstable material is encountered at the elevation indicated, the Contractor shall excavate, with approval of the engineer,

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 13 of 25

below the grade or elevation shown and backfill such excavation with bedding or stabilizing material. Compact bedding material in accordance with these sections.

- G. Boulders and large stones, rock or shale, shall be removed to provide a clearance of at least 6 inches below all parts of the pipe or fittings and to clear width of at least 6 inches on each side of all pipe and appurtenances.
- H. Where the trench is excavated in rock or shale, the 6 inch space below the pipe shall be filled with crushed stone firmly compacted in accordance with these specifications to form a cushion for the pipe.
- I. Bell holes, of ample dimensions, shall be dug to permit joining to be properly made and to insure that the pipe is evenly supported throughout its length rather than on joints or couplings.
- J. Backfill trenches with concrete where trench excavations pass with 18 inches of columns, wall footings or structural edges in which trenches are carried below bottom of such structural components or other piping systems. Place concrete to level of bottom of structural item covering the piping or conduit system completely.
- K. No open trench shall have more than 200 linear feet of open trenches. Contractor shall backfill and compact "trench line" as needed to comply with specifications.
- L. Do not backfill trenches until tests and inspections have been made and backfilling authorized by Engineer. Use care in backfilling to avoid damage or displacement of pipe and/or conduit systems.
- M. All trenches shall be backfilled and compacted as specified.

3.6 EXCAVATION FOR CULVERT AND LARGE PIPE SYSTEMS

- A. Large pipe culverts shall mean piping systems equal to or greater than 60 inches in diameter. Trenching methods for smaller systems shall be as directed in Section 3.5. All trenching for box culverts shall be in accordance with this section.
- B. Excavate trenches to the indicated gradients, lines, depths and elevations as shown on the plans.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 14 of 25

- C. Excavate trenches to uniform widths to provide a minimum of 4 feet wider than the extent of each of the outside walls. Excavate trench walls vertically for trench bottoms to a depth of 12 inches below bottom of culvert or large piping system.
- D. Where trenches are excavated in native soils, excavation shall be carried to a minimum depth of approximately 12 inches under the barrel of the pipe for placement of the specified bedding material. Any and all unsuitable material encountered during this excavation shall be undercut and removed completely and replaced with suitable material compacted to the 12 inch below requirements or replaced with bedding material. Additional excavation and replacement material will be paid for according to Contract unit price or Contract provisions for changes in the Work.
- E. The culvert or piping system shall be laid on firmly compacted approved bedding material and the culvert or piping unit shall have uniform bearing for its full length. Minimum depth of bedding material shall be 12 inches.
- F. All trench excavation in rock or shale shall be carried out as 12 inches below bottom of culvert or piping system and a minimum of 24 inches outside of side walls. Use crushed stone bedding material for full width of trench to provide bedding for these systems.
- G. Boulders and large stones, rock or shale, shall be removed to provide a clearance of 12 inches below all parts of the bottom of the culvert or piping system and a minimum of 24 inches on each side of all culvert or piping appurtenances.
- H. All piping units shall be installed and jointed together with the approved methods and tolerances as specified in ALDOT, 2022 Edition, Section 524 and Section 530. All units and piping must be firmly joined and connected. A sealant must be applied to all jointed connections.
- I. No open trench shall have more than 200 linear feet of open trenches. Contractor shall backfill and compact trench line as needed to comply with specifications.
- J. Do not backfill trenches until Engineer has inspected culvert or piping system and as directed by Engineer. Use care in backfilling to avoid damage, separation or displacement of culvert or piping system.
- K. All trenches shall be backfilled and compacted as specified in drawings.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 15 of 25

- L. Backfill trenches with concrete where trench excavations pass with 18 inches of columns, wall footings or structural edges in which trenches are carried below bottom of such structural components or other piping systems. Place concrete to level of bottom of structural item covering the piping or conduit system completely.

3.7 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated cross sections, elevations and grades, to a distance of 8 feet beyond the edges of these walks and pavements.
- B. Where rock is encountered, the “cut line” shall be a minimum of 1 foot below the proposed subgrade and suitable material used to fill in the cut area to the proposed subgrade and compacted as specified.
- C. Roadways shall be excavated as shown on the plan cross-sections. Undercutting cut section of roadway 2 feet may be required in some areas and is included as a requirement of this contract.

3.8 SUBGRADE

- A. Notify Engineer when excavations have reached required subgrade. Tolerances for final subgrade elevations shall be plus or minus 0.1 foot. No changes to the required subgrade elevations will be allowed unless approved in writing by the Engineer.
- B. Provide survey “blue top” grade points as proof of subgrade elevations for Engineer to determine acceptance of subgrade work.
- C. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
 - 1) Additional excavation and replacement material will be paid for according to Contract unit price or Contract provisions for changes in the Work.
- D. Proof roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and other areas of excess yielding. Do not proof roll wet or saturated subgrades. Proof roll all areas where roadways, pavement areas and structures are to be constructed. Proof roll and correct all areas prior to base installation. Contractor is responsible for correcting all areas which are deemed unacceptable by Owner’s testing agency and Engineer and as directed by the Owner’s testing agency and Engineer.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT EARTHWORK

SECTION 02 300 – Page 16 of 25

- E. Reconstruct subgrades damaged by construction activities, freezing temperatures, frost, rain or accumulated water as directed by Engineer. Contractor is responsible for protecting and maintaining subgrades. No installation of base course will happen if any subgrades areas are unapproved or have become unacceptable.
- F. All one hundred-foot stations for the roadway shall be roadbed processed, if applicable, per ALDOT Specifications, 2022 Edition, Section 230.

3.9 UNDERCUTTING SUBGRADE FOR STRUCTURE AND ROADWAY

- A. Engineer or Geotechnical Consultant may approve some areas of building site as acceptable without undercut, with decision dependent upon local building site material encountered during building site construction.
- B. Backfill building site with selected local fill material (chert) compacted in 8 inch lifts to the proposed required compaction of 98 percent of the Standard Proctor density.
- C. Backfill roadway bed full width with selected local fill material (chert) compacted in 8 inch lifts to the proposed required compaction of 98 percent of the Standard Proctor density.
- D. Excavate other designated areas as deemed necessary by the Engineer or Geotechnical Consultant to the designated elevations required. Backfill all areas with suitable fill material (chert) as required.

3.10 STORAGE OF MATERIALS

- A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade and shape stockpiles to drain surface water away from stockpiles.
- B. Stockpile soil materials away from edge of excavations. Do not stock within drip line of remaining trees.
- C. Stockpile soil materials in a manner that will not cause damage to adjacent properties or environment, nor obstructed access to any new or existing facilities.
- D. Drainage lines shall not be obstructed nor shall natural drainage of the surrounding ground be altered or obstructed.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 17 of 25

- E. If Contractor mixes suitable and unsuitable soil materials, the Contractor shall furnish and install equivalent amount of suitable materials from off site at no additional cost to Owner.

3.11 BACKFILL

- A. General: Place and compact backfill in excavations promptly, but not before completing the following:
- 1) Construction below finish grade including, where applicable, damp proofing, waterproofing and perimeter insulation.
 - 2) Surveying locations of underground utilities for record documents. Contractor is responsible for production of accurate record drawings of all underground utilities and culvert/piping systems.
 - 3) Inspecting and testing underground utilities.
 - 4) Removing concrete formwork, trash and debris.
 - 5) Removing temporary shoring and bracing and sheeting.
 - 6) Embankments and fills shall not be started without the concurrence of the Engineer.
 - 7) If embankments or fill to be placed on a surface with slopes at 3:1 or steeper the surface shall be scarified and compacted to provide bond with the new material. Steep slopes may require the existing surface to be benched.
 - 8) Any wet ground to be covered by fill shall be drained and brought to a suitable moisture content and stable condition prior to installation of fill material. Underdrain piping may be required and installed prior to installation of fill material.
- B. Backfill materials:
- 1) Material for structural and general backfill may be excavated on the site and considered as suitable material. The material must be suitable at the time of backfilling. Any unsuitable material cannot be used for structural backfill. If at the time of backfilling, enough suitable material on site is not available, Contractor shall provide, at his own expense, such additional suitable material as needed.
 - 2) Native soils as excavated from the site may be used provided that they satisfy the criteria specified herein. If native soils are unsuitable, then Contractor shall furnish and install suitable soils when needed from off-site at Contractor's expense.
 - 3) Suitable backfill materials for structures shall be within moisture limits required for compaction; may contain silty-clay, weathered shale or other suitable soil mixtures, and such soils shall not contain rock or stone in sizes greater than 3 inches.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 18 of 25

- 4) Provide borrow soil materials when sufficient suitable soil materials are not available from excavations.
- 5) If paved areas (or areas to be paved) abut structures, then backfill material under these areas shall be crushed stone.
- 6) Contractor is responsible for removing and disposing of unsuitable materials off-site unless specifically shown to be disposed of on-site.

C. Bedding materials and requirements:

- 1) Utility trenches and small piping systems:
 - a. Bedding material for excavation in soil shall be ALDOT #57 Stone placed and compacted for a minimum depth of 6 inches under barrel of pipe.
 - b. Bedding material for excavation made in rock conditions shall be ALDOT #57 Stone placed and compacted to a depth of 12 inches under barrel of pipe.
- 2) Culverts and large piping systems:
 - a. Bedding materials for excavation in soil shall be ALDOT #57 Stone placed and compacted full width of trench for a minimum depth of 12 inches under barrel of pipe.
 - b. Bedding material for excavation made in rock conditions shall be ALDOT #57 Stone placed and compacted full width of trench for a minimum depth of 12 inches under barrel of large pipe or culvert.

3.12 STRUCTURAL BACKFILL

- A. Backfill shall be made around the walls of the structures as indicated; and backfill shall be placed only after the walls have gained sufficient strength to support the load. No rock shall be placed in fill within three (3) feet of the walls of structures.
- B. In all fill work, the best dirt shall be used as top soil for any planting, sprigging or sodding that may be required.
- C. Backfill material shall be placed within foundation walls, under footings or slabs, under and around piping installed under footing or slabs, under and around piping located in areas of general excavation (where because of proximity of several pipe lines individual trenches could not be excavated) as indicated.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 19 of 25

- D. All such backfill material for purposes specified hereinabove, whether obtained from suitable on-site soils, crushed stone, or from suitable off-site soils, shall be furnished and placed by the Contractor at the Contractor's expense.
- E. The Contractor shall be responsible for maintenance of the backfill; and shall promptly re-work and/or refill any areas where settlement of backfill has occurred.
- F. Place and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- G. The surface of each layer shall be kept parallel to the elevation of the finished compacted fill by use of blade graders. In proximity existing structures, leveling shall be accomplished by use of small spreaders, bulldozers or hand method.
- H. Each layer shall be compacted by use of heavy earth compaction equipment suitable for the particular type of soil/stone.
- I. Each layer shall be rolled and compacted to the specified density before the succeeding layer is placed.
- J. The final layer shall be brought to elevation of finished compacted fill before topsoil or pavement is placed to conform to the finished contour specified.

3.13 UTILITY TRENCH BACKFILL

- A. The Contractor shall notify the Engineer prior to backfilling any trench in which pipe has been installed. No extra compensation will be allowed for backfill as specified herein.
- B. Trench backfill materials shall be thoroughly compacted by means of pneumatic tampers or mechanical tampers.
- C. Each layer of trench backfill shall be carried up to the same level on both sides of the pipe so as to avoid unbalanced loading. Each layer of trench backfill shall be evenly compacted on both sides of pipe before the next layer is placed.
- D. Backfill for pipe line trenches shall be placed in 4 inch layers from the bottom of the trench to a level of 12 inches above the top of the pipe.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 20 of 25

- E. Backfill above a level 12 inches above the crown of the pipe shall be placed in layers not exceeding 6 inches in areas beneath pavement slabs, footings, etc., and 12 inches in thickness elsewhere.
- F. After the pipe has been covered to elevation three (3) feet above top of pipe, backfilling may be accomplished by use of bulldozer, bucket or other mechanical equipment if carefully performed in a manner suitable to the Engineer.
- G. #57 stone backfill shall extend out from either end (or side) of the paved areas, slab or footing and along the trench on a 1:1 slope.
- H. Where the character of the soil is such that the employment of proper and adequate drainage of the work will not enable the Contractor to secure a suitable bed for the pipe, the Engineer may request the Contractor to excavate below the specified bedding depth, and backfill the excess excavation with #57 stone. Backfill throughout remainder of trench depth shall be as specified. Additional excavation and replacement material will be paid for according to Contract unit price or Contract provisions for changes in the Work.

3.14 SPECIAL BACKFILL

- A. For utility trenches made in soil and rock conditions, backfill material, ALDOT #57 Stone, shall be placed to a depth of 6 inches and 12 inches, respectively, above
conduit or pipe, then the remainder shall be suitable soil and/or other approved materials placed and compacted in 6 inch lifts.
- B. For small storm water runoff piping systems, made in soil, backfill material, ALDOT #57 Stone, shall be placed to a depth of 1/2 pipe diameter but no more than 18 inches depth then the remainder shall be suitable soil materials placed and compacted in 6 inch lifts.
- C. For large piping systems and culverts made in soil, backfill material, ALDOT #57 Stone, shall be placed to a depth of 30 inches, then the remainder shall be suitable soil materials placed and compacted in 6 inch lifts.
- D. For any of the above utility trenches and piping systems, excavations made in roadways, parking lots and paved driveways and paved access roads, backfill shall consist of ALDOT #57 Stone placed and compacted a minimum of 12 inches depth above utility conduit or piping, and/or storm runoff piping system.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 21 of 25

- E. The top foot of depth of all trenches (except under slabs, footings, roads, walks and paved areas, along road shoulders and other areas where crushed stone may be specified or directed to be used) shall be backfilled with suitable soil that can be smoothly dressed to match surface of ground adjoining the edges of the trench, and that will support the vegetation desired for the finish surface and required by the finished grading and grassing requirements.

3.15 COMPACTION REQUIREMENTS AND BASE COURSE

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for materials compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.
- C. Compact soil to not less than the following percentages of maximum dry unit weight according to Standard Proctor Compaction Test ASTM D 698. The moisture content at the time of compaction shall be within 2 percentage points of the optimum moisture content.
- D. Under structures, building slabs, stops and pavements, scarify and re-compact top 6 inches of existing subgrade and each layer of backfill material at 98 percent.
- E. Under walkways, scarify and re-compact top 6 inches below subgrade and compact each layer of backfill or fill material at 98 percent.
- F. Under lawn or unpaved areas, scarify and re-compact top 6 inches below subgrade and compact each layer of backfill or fill material at 90 percent.
- G. Place base course material over subgrade where base course required. Compact base courses at optimum moisture content to required lines, grades, cross sections and thickness to not less than 100 percent of maximum dry unit weight according to ASTM D 1557. Shape base course to required crown elevations and cross section slope grades.
- H. When thickness of compacted base course is 6 inches or less, place materials in a single layer. When thickness of compacted base course exceeds 6 inches, place materials in equal layers with no layer more than 6 inches thick or less than 3 inches thick when compacted.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 22 of 25

- I. Protection of base layers during construction is the responsibility of the Contractor.

3.16 EMBANKMENT AND FILL WORK

- A. Only materials as specified herein and/or approved by the Engineer shall be used. The material used in embankments and fills shall be free from frost, stumps, trees, roots, sod, mulch or debris of any kind.
- B. Fill and embankment materials shall not be placed on frozen ground.
- C. Rock having any dimension greater than one 3 inches shall not be placed in compacted fills in areas to be occupied by structures, bearing slabs, footings, roadways, walks, driveways and access roads.
- D. Rock particles of 3 inches in diameter, or greater, shall not be placed in fill areas in which pipes, conduits, cables, etc., are to be laid, nor shall rock be placed in trench backfill except as described in these specifications.
- E. Rock particles of 3 inches in diameter, or greater, shall not be placed nearer than three (3) feet to the surface of any fill nor nearer than three (3) foot to the wall or surface of any structures.

3.17 MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percentage points of optimum moisture content.
- B. Do not place backfill or fill material on surfaces that are muddy, frozen or contain frost or ice.
- C. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight. Contractor is responsible for moisture conditioning if required by Owner's testing agency and Engineer.

3.18 GRADING

- A. Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines and elevations indicated. Tolerances for the final subgrade elevations shall be plus or minus 0.1 foot.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 23 of 25

- B. Provide a smooth transition between adjacent existing grades and new grades. Cut out soft spots, fill low spots and trim high spots to comply with required surface tolerances.
- C. In all areas, slope grades to direct water away from buildings and to prevent ponding. Finish all subgrades to required elevations.

3.19 FIELD QUALITY CONTROL

- A. Quality control testing during construction shall be performed by Owner's testing agency. Allow testing service personnel to inspect and approve subgrades and fill layers before further construction work is performed.
- B. Field density testing:
 - 1) Perform field density tests in accordance with ASTM D-1556 (sand cone method), ASTM D-2167 (rubber balloon method), or ASTM D-2922 (Nuclear method).
 - 2) For footing subgrades, conduct at least one density test for each strata of soil on which footings will be placed. Test areas and verify compaction for the required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with strata, when acceptable to Engineer.
 - 3) For building areas, make at least one (1) field density test of subgrade for every 2,000 square feet of building slab per lift of fill, but in no case less than 3 tests. In each compacted fill layer, make one (1) field density test for every 2,000 square feet of overlaying building slab or paved area per lift of fill, but in no case less than 3 tests.
 - 4) For foundation wall backfill, at least 2 field density tests per lift will be made at appropriate locations and elevations.
 - 5) For paving subgrade, a minimum of one density test determination shall be made for every 2,500 square feet.
 - 6) For landscape subgrade, field density tests will be made as requested to determine compaction requirements.
- C. If in the opinion of the Engineer, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, contractor shall provide additional compaction and testing at no additional expense to the Owner.

3.20 PROTECTION

- A. Protect all new graded areas from traffic and erosion. Keep all areas free of trash and debris. Provide temporary drainage as needed to prevent ponding of water within construction limits.
- B. Repair and re-establish grades in settled, eroded, rutted areas and any drainage damage areas to specified tolerances at no additional cost to the Owner.
- C. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape and compact to required density prior to further construction at no additional cost to the Owner.
- D. For any areas of finished grading, all damages from subsequent construction operations, adverse weather, water ponding and drainage issues shall be re-worked and compacted to required specifications at no additional cost to the Owner.

3.21 DISPOSAL

- A. Remove excess excavated material, all waste material, trash and all debris from jobsite and dispose of it properly in the designated offsite disposal site. Some items and acceptable excavated material can be disposed of onsite with approval of Owner and Engineer.
- B. Transport and stockpile all excess acceptable excavated soil and topsoil in acceptable areas designated by Owner and Engineer. Spread material and grass over as directed by Engineer. Unsuitable excavated soils shall be transported and disposed of offsite unless directed by Engineer for onsite disposal.

3.22 CLEANUP AND FINAL ACCEPTANCE

- A. All trash and surplus undesirable material of every description resulting from work shall be removed from the site.
- B. At the time of final acceptance of work performed under the contract, the work covered by this section shall be complete in every respect and in proper operating and/or functioning condition. Any defects discovered in the system subsequent to this inspection shall have been corrected. Final acceptance shall not be complete until all work has been inspected and

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
EARTHWORK**

SECTION 02 300 – Page 25 of 25

accepted by Architect/Engineer and local authority having jurisdiction. All utilities to be maintained by local authorities shall be accepted by letter with original being submitted to Architect/Engineer.

- C. All existing improvements such as, but not limited to, lawns, drives, pavements, sidewalks, and any other improvement destroyed or damaged as a result of the work performed shall be restored to its original or better condition at Contractor's expense at no additional cost to the Owner before final acceptance is granted.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SELECTIVE STRUCTURE DEMOLITION**

SECTION 02 419 – Page 1 of 7

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Salvage of existing items to be reused or recycled.
- B. Related Sections include the following:
 - 1. General Conditions

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.
- C. Existing to Remain or Retain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SELECTIVE STRUCTURE DEMOLITION**

SECTION 02 419 – Page 2 of 7

1. Coordinate with Owner's Project Manager, who will establish special procedures for removal and salvage.

1.5 SUBMITTALS

- A. Qualification Data: For demolition firm.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 3. Coordination for shutoff, capping, and continuation of utility services.
 4. Use of elevator and stairs.
 5. Locations of proposed dust- and noise-control temporary partitions and means of egress.
 6. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
 7. Means of protection for items to remain and items in path of waste removal from building.
- C. Pre-demolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations.

1.6 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with ANSI A10.6 and NFPA 241.
- D. Pre-Construction Conference: Conduct conference at Project site or other approved location to review methods and procedures related to selective demolition including, but not limited to, the following:
 1. Inspect and discuss condition of construction to be selectively demolished.
 2. Review structural load limitations of existing structure.
 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT SELECTIVE STRUCTURE DEMOLITION

SECTION 02 419 – Page 3 of 7

4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
5. Review areas where existing construction is to remain and requires protection.

1.7 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
 1. Comply with requirements specified in General Conditions and/or Drawings.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 1. Before selective demolition, Owner will remove the following items:
 - a. None, unless specified otherwise in the drawings or Pre-Construction Meeting.
- C. Notify Engineer of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 1. Hazardous materials, if applicable, will be removed by Owner before start of the Work.
 2. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Engineer. Owner will remove hazardous materials under a separate contract or pay additional compensation for removal executed with a change order.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations if applicable.
 1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SELECTIVE STRUCTURE DEMOLITION**

SECTION 02 419 – Page 4 of 7

- A. Verify that utilities have been disconnected and capped if applicable.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged if applicable.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Engineer.
- E. Engage a professional engineer to survey condition of existing building, if applicable, to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
 - 1. Before selective demolition or removal of existing building elements or other structures that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.
- G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
 - 1. Comply with requirements for existing services/systems interruptions specified in General Conditions and/or Drawings.
- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off indicated utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT SELECTIVE STRUCTURE DEMOLITION

SECTION 02 419 – Page 5 of 7

3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 1. Comply with requirements for access and protection specified in General Conditions and/or Drawings.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building, if applicable, and adjacent buildings and property.
 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas, if applicable.
 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations, if applicable.
 4. Cover and protect furniture, furnishings, and equipment that have not been removed, if applicable.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in General Conditions and/or Drawings.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete all applicable Work within limitations of governing regulations and as follows:
 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT SELECTIVE STRUCTURE DEMOLITION

SECTION 02 419 – Page 6 of 7

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Dispose of demolished items and materials promptly. Comply with requirements in General Conditions and/or Drawings.
- B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Engineer's approval.
- C. Removed and Salvaged Items, if applicable:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- D. Existing Items to Remain or Retain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Engineer, items may be removed to a suitable, protected storage location during selective demolition, cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SELECTIVE STRUCTURE DEMOLITION**

SECTION 02 419 – Page 7 of 7

- 4. Comply with requirements specified in General Conditions and/or Drawings.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANUP AND FINAL ACCEPTANCE

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.
- B. At the time of final acceptance of the work performed under the contract, the work covered in this section shall be complete in every respect and in proper operating condition. All surplus material of every character resulting from the work of this section shall have been removed. Any defects discovered subsequent to this inspection shall be corrected. Final acceptance shall not be complete until all work has been inspected and accepted by Architect/Engineer and/or local authorities having jurisdiction. All utilities to be maintained by local authorities shall be accepted by letter with original being submitted to Architect/Engineer.
- C. All existing improvements such as lawns, drives, pavements, sidewalks, and any other improvement destroyed or damaged as a result of the work performed shall be restored to its original or better condition at Contractor's expense at no additional cost to the Owner before final acceptance is granted.

END OF SECTION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT DECORATIVE METAL FENCES AND GATES

SECTION 02 444 – Page 1 of 5

PART 1 – GENERAL

1.01 WORK INCLUDED

The contractor shall provide all labor, materials and appurtenances necessary for installation of the industrial ornamental aluminum fence system defined herein.

1.02 RELATED WORK

Section 03 3000 - Concrete

1.03 SYSTEM DESCRIPTION

The manufacturer shall supply a total industrial ornamental aluminum fence system of the Ameristar Echelon II Genesis design. The system shall include all components (i.e., pickets, rails, posts, gates and hardware) required.

The manufacturer shall supply a total industrial ornamental cantilever gate system of the Ameristar TransPort II Genesis design. The system shall include all components (i.e., tracks, uprights, bracing, pickets, hardware, fittings, and fasteners) required.

1.04 QUALITY ASSURANCE

The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.05 REFERENCES

- ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.
- ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
- ASTM D523 - Test Method for Specular Gloss.
- ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
- ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.

1.06 SUBMITTAL

The manufacturer's submittal package shall be provided prior to installation.

1.07 PRODUCT HANDLING AND STORAGE

Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism, and theft.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT DECORATIVE METAL FENCES AND GATES

SECTION 02 444 – Page 2 of 5

PART 2 – MATERIALS

Basis for design: Ameristar Echelon II fence system and Transport II gate system, both Genesis style.

Substitutions: Under provisions of Division 01.

2.01 MANUFACTURER

The industrial ornamental aluminum fence system shall conform to Ameristar Echelon II Genesis, 2-Rail style manufactured by Ameristar Fence Products, Inc., in Tulsa, Oklahoma.

All industrial ornamental cantilever gates shall conform to the Ameristar TransPort II gate system, Genesis design, manufactured by Ameristar Perimeter Security USA Inc., in Tulsa, Oklahoma.

2.02 MATERIAL FOR FENCE

A. Aluminum material for fence framework (i.e., tubular pickets, rails, and posts) shall conform to the requirements of ASTM B221. The aluminum extrusions for posts and rails shall be Alloy and Temper Designation 6005-T5. The aluminum extrusions for pickets shall be Alloy and Temper Designation 6063-T52.

B. The manufactured framework shall be subjected to the Ameristar thermal stratification coating process (high-temperature, in-line, multi-stage, and multi-layer) including, as a minimum, a six-stage pretreatment/wash, and an electrostatic spray application of a polyester finish. The topcoat shall be a “no-mar” TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be specify Black. The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 2.

C. Material for fence pickets shall be 1" square x 0.062" thick extruded tubing. The cross-sectional shape of the rails shall conform to the manufacturer's ForeRunner™ design with outside cross-section dimensions of 1.75" square. The top wall and internal web of the rail shall be 0.070" thick; the sidewalls shall be 0.070" thick for superior vertical load strength. Picket holes in the ForeRunner rail shall be spaced 4.715" c/c. Picket retaining rods shall be 0.125" diameter galvanized steel. Fence posts and gate posts shall meet the minimum size requirements of Table 1. High quality PVC grommets shall be supplied to seal all picket-to-rail intersections.

D. Bracket to rail attachments shall be made using specially designed one-way tamperproof security nuts with carriage bolt. Bracket to post connections shall be made using self-drilling hex-head screws.

E. Aluminum castings shall be used for all rings, post caps, finials, and miscellaneous adornments.

2.02 MATERIAL FOR GATE

A. The materials used for cantilever gate shall be manufactured from ASTM B221 aluminum (designation 6063-T-6) with yield strength of 25,000 PSI, a tensile strength of 30,000 PSI and a standard mill finish. The TransPort enclosed tracks shall be manufactured from ASTM B221 aluminum (designation 6063-T-6) with a yield strength of 25,000 PSI, a tensile strength of 30,000 PSI and a standard mill finish.

B. Material for pickets shall be 1" square x 1/8" wall aluminum pickets on gate systems greater than 24' openings, gate systems less than 24' openings shall have 1" square x 16 ga. steel pickets. Picket on center spacing shall not exceed 5". Pickets shall be securely fastened to face of top and bottom enclosed track extrusions.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT DECORATIVE METAL FENCES AND GATES

SECTION 02 444 – Page 3 of 5

C. Material for gate uprights and diagonal bracing shall be 2" square x 1/4" wall aluminum. The cross-sectional shape of the enclosed-track shall confirm to the manufacturers Fast-Trak™ design with as a single extrusion consisting of a 2" x 5" channeled support with integrated 2" x 2" enclosed-track raceway. Gates less than 24' openings shall be constructed as a single track system, gates greater than 24' openings shall be constructed as a dual track system.

D. Steel material for fence posts and pickets shall be galvanized prior to forming in accordance with the requirements of ASTM A653/A653M, with minimum yield strength of 45,000 psi (310 MPa). The steel shall be hot-dip galvanized to meet the requirements of ASTM A653/A653M with a minimum zinc coating weight of 0.90 oz/ft² (276 g/m²), Coating Designation G-90. Material for gate support posts shall be 4" square x 11 Ga. tubing.

E. Suspension Rollers for enclosed tracks shall be used at each support post to track connection. Each truck assembly shall be capable of being adjusted vertically via threaded rod for fine-tune adjustment. Truck assembly shall be constructed in a way so that the primary housing for the truck rollers shall pivot via ball-bearing connection to threaded rod.

2.03 FENCE FABRICATION

A. Pickets, rails, and posts shall be pre-cut to specified lengths. ForeRunner rails shall be pre-punched to accept pickets.

B. The rail inner slide shall be fully inserted into the rail outer channel to form the raceway for the internal retaining rod. Grommets shall be inserted into the pre-punched holes in the rails, and pickets shall be inserted through the grommets so that pre-drilled picket holes align with the internal raceway of the two-part ForeRunner rails. (Note: This can best be accomplished by using an alignment template). Retaining rods shall be inserted into each ForeRunner rail so that they pass through the pre-drilled holes in each picket, thus completing the panel assembly.

C. Completed panels shall be capable of supporting a 300 lb. load (applied at midspan) without permanent deformation. Panels shall be biasable to a 25% change in grade.

D. Gates shall be fabricated using 1.75" sq. reinforced ForeRunner rail material, 2" sq. x .250" gate ends, and 1" sq. x .125" pickets. All rail and upright intersections shall be joined by welding. All picket and rail intersections shall be joined by welding.

2.03 GATE FABRICATION

A. Gate frame uprights and diagonal bracing shall be pre-fabricated and pre-punched to accept frame fasteners. Enclosed track shall be pre-punched to accept gate uprights. Pickets shall be pre-cut to specified length and predrilled to accept picket to track fasteners. Posts shall be pre-cut to specified lengths.

B. Top and bottom enclosed track extrusions shall be mechanically fastened to vertical gate uprights and intermediate supports, as required by assembly instructions. Diagonal bracing shall be mechanically fastened to vertical gate uprights and intermediate supports, as required by assembly instructions. Pickets shall be mechanically fastened to top and bottom enclosed track, as required by assembly instructions.

C. The manufactured gate components shall be subjected to the Ameristar thermal stratification coating process (high-temperature, in-line, multi-stage, and multi-layer) including, as a minimum, a six-stage pretreatment/wash and an electrostatic spray application of a polyester finish. The topcoat shall be a "no-mar" TGIC polyester powder coat finish with a minimum thickness of 2 mils (0.0508mm). The color shall be Black. The stratification-coated framework shall be capable of meeting the performance requirements for each quality characteristic shown in Table 1.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT DECORATIVE METAL FENCES AND GATES

SECTION 02 444 – Page 4 of 5

PART 3 – EXECUTION

3.01 PREPARATION

All new installation shall be laid out by the contractor in accordance with the construction plans.

3.02 FENCE INSTALLATION

Fence post shall be spaced according to Table 3, plus or minus ½". For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to posts with brackets supplied by the manufacturer. Posts shall be set in concrete footers having a minimum depth of 36" (Note: In some cases, local restrictions of freezing weather conditions may require a greater depth). The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

3.03 FENCE INSTALLATION MAINTENANCE

When cutting/drilling rails or posts adhere to the following steps to seal the exposed surfaces; 1) Remove all metal shavings from cut area. 2) Apply custom finish paint matching fence color. Failure to seal exposed surfaces per steps 1& 2 above will negate warranty. Ameristar spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray. Use of non-Ameristar parts or components will negate the manufactures' warranty.

3.04 GATE INSTALLATION

A. Cantilever support posts shall be set in concrete footers having a minimum depth of 48" (Note: In some cases, local restrictions of freezing weather conditions may require a greater depth). The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

B. Gate to be installed per manufacturers gate installation instructions. Gate shall be installed in compliance with ASTM F2200 standards.

C. Gate posts shall be spaced according to the manufacturers' drawings, dependent on clear opening. The manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacture of the gate and shall be installed per manufacturer's recommendations.

3.05 GATE INSTALLATION MAINTENANCE

When cutting/drilling posts adhere to the following steps to seal the exposed steel surfaces; 1) Remove all metal shavings from cut area. 2) Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry. 3) Apply 2 coats of custom finish paint matching fence color. Failure to seal exposed surfaces per steps 1-3 above will negate warranty. Ameristar spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray. Use of non-Ameristar parts or components will negate the manufactures' warranty.

3.05 CLEANING

The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
DECORATIVE METAL FENCES AND GATES**

SECTION 02 444 – Page 5 of 5

Table 1 – Minimum Sizes for Echelon II Posts	
Fence Posts	Panel Height
2-1/2" x 2-1/2" x .080" Alum. w/ reinforced web	Up to & Including 6' Height
3" x 3" x .120" Alum.	Over 6' Up to & Including 8' Height
4" x 4" x .250" Alum.	Over 8' Height Up to 10'

Gate Leaf	Gate Height			
	Up to & Including 4'	Over 4' Up to & Including 6'	Over 6' Up to & Including 8'	Over 8' Up to & Including 10'
Up to 4'	3" x 3" x .120" Alum.	4" x 4" x .250 Alum. or 3" x 12 Ga. steel	4" x 11 Ga. steel	4" x 11 Ga. steel
4'1" to 6'	4" x 4" x .250 Alum. or 3" x 12Ga. steel	3" x 12 Ga. steel	4" x 11 Ga. steel	4" x 11 Ga. steel
6'1" to 8'	4" x 11 Ga. steel	4" x 11 Ga. steel	4" x 11 Ga. steel	6" x 3/16" steel
8'1" to 10'	4" x 11 Ga. steel	4" x 11 Ga. steel	6" x 3/16" steel	6" x 3/16" steel
10'1" to 12'	4" x 11 Ga. steel	6" x 3/16" steel	6" x 3/16" steel	6" x 3/16" steel
12'1" to 14'	6" x 3/16" steel	6" x 3/16" steel	6" x 3/16" steel	6" x 3/16" steel

Table 2 – Coating Performance Requirements		
Quality Characteristics	ASTM Test Method	Performance Requirements
Adhesion	D3359 – Method B	Adhesion (Retention of Coating) over 90% of test area (Tape and knife test).
Corrosion Resistance	B117 & D1654	Corrosion Resistance over 1,000 hours (Scribed per D1654; failure mode is accumulation of 1/8" coating loss from scribe or medium #8 blisters).
Impact Resistance	D2794	Impact Resistance over 60 inch lb. (Forward impact using 0.625" ball).
Weathering Resistance	D822 D2244, D523 (60° Method)	Weathering Resistance over 1,000 hours (Failure mode is 60% loss of gloss or color variance of more than 3 delta-E color units).

Table 3 – Echelon II – Post Spacing By Bracket Type								
Span	For INVINCIBLE® 8' Nominal (91.25" Rail)		For CLASSIC, GENESIS, & MAJESTIC 8' Nominal (92.625" Rail)					
Post Size	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"
Bracket Type	Industrial Flat Mount (BB301)		Industrial Universal (BB302)	Industrial Universal (BB303)	Industrial Flat Mount (BB301)		Industrial Swivel (BB304)*	
Post Settings ± 1/2" O.C.	94-1/2"	95"	96"	96.5"	96"	96-1/2"	*97.5"	*98"

Span	For INVINCIBLE® 6' Nominal (71.375" Rail)		For CLASSIC, GENESIS, & MAJESTIC 6' Nominal (67.75" Rail)					
Post Size	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"	2-1/2"	3"
Bracket Type	Industrial Flat Mount (BB301)		Industrial Universal (BB302)	Industrial Universal (BB303)	Industrial Flat Mount (BB301)		Industrial Swivel (BB304)*	
Post Settings ± 1/2" O.C.	75"	75.5"	71.5"	72"	71.5"	72"	*73"	*73.5"

*Note: When using BB304 swivel brackets on either or both ends of a panel installation, care must be taken to ensure the spacing between post and adjoining pickets meets applicable codes. This will require trimming one or both ends of the panel.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
VEGETATION ESTABLISHMENT**

SECTION 02 485 – Page 1 of 9

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The General Provisions of the contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this section.
- B. Federal, State and Local codes shall apply to the control of fertilizers used on this project site.
- C. The Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition, apply to this section.

1.2 DESCRIPTION OF WORK

- A. Provide all labor, equipment, materials and services necessary to complete the Work of this Section. General extent of grassing is shown on Drawings. Work includes:
 - 1) Ground preparation, topsoil spreading and fine grading as specified.
 - 2) Furnishing, sowing, mulching, sodding and establishing an acceptable stand of grass from specified seed and/or sod on designated project areas as set forth below.
 - 3) Maintenance and Guarantee as specified.

1.3 PROJECT CONDITIONS

- A. Examine conditions under which work is to be performed and notify Engineer of unsatisfactory conditions.
- B. Do not perform work until conditions are satisfactory and acceptable.
- C. Determine location of underground utilities and perform work in a manner which will avoid all damage.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Perform Work in accordance with the following:
 - 1) Applicable Sections of the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, 2022 Edition.
 - 2) All plant materials to comply with State and Federal laws relating to inspection for disease and insect control.
 - 3) Requirements of local governing authorities.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT VEGETATION ESTABLISHMENT

SECTION 02 485 – Page 2 of 9

- B. Qualifications of Personnel: Use adequate numbers of skilled workmen trained and experienced in the Work and familiar with requirements and methods needed for performance of the Work. At all times during planting operations, have on site a man knowledgeable in horticultural practices.
- C. Certificate from sod provider certifying genetic identity and purity of the turf and freedom from most noxious or objectionable weeds.

1.5 PRODUCT DELIVERY

- A. Deliver packaged materials in manufacturer's original containers showing weight, analysis, and name of manufacturer. Protect materials from deteriorating during delivery, and while stored at the site.
- B. Sod shall not be harvested or delivered when excessively wet or dry. Sod shall be harvested, delivered and installed within a period of 36 hours.
- C. Deliver all non-packaged or non-containerized materials to site in a manner that prevent loss, damage, deterioration or contamination.
- D. Store all materials in approved locations and to prevent loss, damage, deterioration or contamination.

SECTION 2 - PRODUCTS

2.1 WATER

- A. Water shall be free from substances harmful to plant growth.
- B. Contractor shall be responsible to make all arrangements necessary to insure and adequate supply of water to meet the needs of this contract, including means and equipment.

2.2 TOPSOIL

- A. Two types of topsoil, stockpiled and furnished topsoil, may be used as necessary as part of the Grassing and Sodding Work. The term topsoil refers to both types.
- B. Stockpiled topsoil:
 - 1) Stockpiled topsoil, if available, may be used for spreading at the Contractor's option with Engineer's approval.
 - 2) Sample and test for compliance as specified herein.
- C. Furnish additional topsoil in sufficient quantity, if needed, to complete grading and planting as specified.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT VEGETATION ESTABLISHMENT

SECTION 02 485 – Page 3 of 9

- D. Topsoil shall meet the requirements of ASTM D 5268, pH range of 5.5 to 7, a minimum of 6 percent organic material content; free of stones ½ inch or larger in any dimension and other extraneous materials harmful to plant growth.

2.3 SEED

- A. Seed shall meet the requirements of the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, 2022 Edition, Section 860 with applicable zones, time frames and mixes.

2.4 FERTILIZER

- A. Fertilizer shall meet the requirements of the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, 2022 Edition, Section 860.12. Fertilizer shall be uniformly applied to all areas to be planted at the time of seeding or sodding; and the rate of application shall be a minimum of 900 pounds of 13-13-13 per acre.

2.5 MULCH

- A. Mulch shall meet the requirements of the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, 2022 Edition, Section 860.03, for Class A Mulch.
- B. Mulch for hydroseeding shall consist of specially prepared wood cellulose or a natural wood fiber containing clean whole cut chips.
- C. It shall be processed in such a manner that it will contain no growth or germination inhibiting factors and shall be dyed an appropriate color to facilitate a uniform spread of the slope by visual inspection.
- D. It shall be manufactured in such a manner that after addition and agitation in slurry tanks with fertilizers, grass seeds, water and other additives, the fibers in the material will become uniformly suspended to form a homogenous slurry; and that when hydraulically sprayed on the ground, the material will form a blotter like cover impregnated uniformly with grass seed.
- E. All such mixtures shall be used within eight (8) hours from time of mixing.

2.6 ROLLED EROSION CONTROL PRODUCTS (RECP)

- A. Erosion Control Blankets or Netting: Blankets or netting shall meet the requirements of the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, 2022 Edition, Section 860.11 and shall apply to slopes 3:1 or greater, or as directed by the Engineer.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT VEGETATION ESTABLISHMENT

SECTION 02 485 – Page 4 of 9

- B. Contractor shall meet all other erosion control measures as described elsewhere in the Contract Documents.

2.7 SOD

- A. Sod shall meet the requirements of the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, 2022 Edition, Section 860.05.
- B. Sod species shall be certified 'Tifway 419' Bermudagrass (*Cynodon dactylon*).

PART 3 - EXECUTION

3.1 GENERAL

- A. Seed and or sod, as required, all disturbed areas not designated to receive trees, shrubs or solid sod: seed all areas disturbed by grading or construction activities.
- B. Review extent of seeding and/or sodding with Owner and Engineer at site before beginning Work.
- C. Seed and/or sod immediately upon completion of ground preparation as soon as that portion of the site becomes available, to prevent erosion.
- D. The Contractor is responsible for erosion control, for reestablishing erosion areas and for subsequent clean up.
- E. Before any seeding and/or sodding occurs, the subgrade shall be prepared as specified in Subgrade Preparation.

3.2 SUBGRADE PREPARATION

- A. Hauling topsoil, conditioning areas to receive topsoil and seeding, application and ground preparation, compaction, and maintenance of finished grades shall be in full accordance with the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, 2022 Edition, 650.03 (a) through (f).
- B. Place and spread topsoil in a compacted thickness of four (4) inches over all areas to be seeded or hydro seeded.
- C. Before placement of topsoil, the subgrade shall be loosened to depth of not less than four (4) inches but not greater than eight (8) inches. The ground shall be plowed or disced in both directions if necessary to provide a smooth, uniform loose surface suitable for seed. Any rocks larger than on (1) inch in size shall also be removed from planting area.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT VEGETATION ESTABLISHMENT

SECTION 02 485 – Page 5 of 9

- D. The surfaces shall be cleared of all rock one (1) inch or larger in size, all construction debris, or other objectionable material.
- E. After placement of topsoil the surface shall be raked to remove clods, stones over one (1) inch in diameter, brush, roots, construction debris, or other objectionable material.
- F. Prepare topsoil immediately prior to seeding and/or sodding by loosening the topsoil by discing, harrowing or other approved methods. All clods and other foreign materials which are larger than one inch in any dimension shall be removed. All gullies and washouts that develop in the loosened topsoil prior to seeding shall be repaired. Seeding shall immediately follow soil preparation to avoid compaction and washouts. Seeding will not be permitted on hard or crusted topsoil surfaces.

3.3 SEEDING

- A. Equipment and application procedures to comply with the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, 2022 Edition, Section 652.03 (a) through (d), Standard Method.
- B. Seed mixes shall be permanent mix as designated in the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, 2022 Edition, Section 860, for the appropriate zone.
- C. Follow manufacturer's guidelines for the inoculation and mixing of seed.
- D. Mechanical or hydraulic seeders shall be used for sowing seed unless otherwise approved by the Engineer.
- E. No sowing of grass shall be permitted during windy weather, when the ground is crusted frozen, wet or any other unsuitable condition.

3.4 HYDROSEEDING

- A. Hydroseeding: Hydroseeding shall meet requirements of the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, 2022 Edition, Section 658.
- B. Hydroseeding shall be accomplished with approved equipment and all mixtures shall be constantly agitated from the time that they are mixed until they are finally applied to the seed bed.
- C. Nozzles or sprays shall not be directed toward the ground in such a manner as to cause erosion or runoff.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT VEGETATION ESTABLISHMENT

SECTION 02 485 – Page 6 of 9

- D. One-Step Process: Apply slurry uniformly to all areas to be seeded. Apply mulch at a minimum rate of 1500 pounds per acre dry weight but not less than the rate required to obtain specified seed-sowing rate.
- E. Two-Step Process: Apply slurry uniformly to all areas to be seeded. Apply first slurry application at a minimum rate of 500 pounds per acre dry weight but not less than the rate required to obtain specified seed-sowing rate. Apply slurry cover coat of fiber mulch at a rate of 1000 pounds per acre.

3.5 MULCHING

- A. Mulching: Mulching shall meet the requirements of the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, 2022 Edition, Section 656.
 - 1. Mulch placed can be one of two types:
 - Class A Type 1 shall be mulch not requiring an adhesive, consisting of hay or straw placed on 3H – 1V or flatter slopes.
 - Class A Type 2 shall be hay mulch, straw mulch, wood fiber or excelsion that requires an adhesive and shall be used on slopes steeper than 3H – 1V.
- B. When hay or straw is used for mulch it shall conform to the following requirements:
 - 1) It shall be spread over all seeded areas at the rate of approximately two (2) tons per acre.
 - 2) It shall be applied to a uniform depth by an approved method, and in such a manner that not more than ten (10) percent of the soil surface is exposed.
 - 3) The use of wet hay or straw will not be permitted.
 - 4) Mulch shall be applied within 48 hours after the seeding operation.
 - 5) Mulch shall be anchored to the seeded surface by discing or punching the mulch partially into the soil, by use of approved netting, or by use of other methods or materials approved by the Engineer.

3.6 SOLID SODDING

- A. Sod species shall be certified Bermudagrass (*Cynodon Dactylon*), or approved equal.
- B. Sod required to be furnished in rolls as indicated by the plans, shall measure at minimum 30 inches in width; length, as practicable for ease of handling, but in no case shorter than 6 feet.
- C. Sod shall be placed in compliance with ALDOT Specification Section 654.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
VEGETATION ESTABLISHMENT**

SECTION 02 485 – Page 7 of 9

- D. Sod shall be fine raked to finish grade to provide a smooth finished surface. Sod rows shall be placed tightly against each other with alternating joints on each row.
- E. Sod shall be watered and rolled to bond sod and smooth out rough spots.
- F. Completed sod surface shall be smooth, free of irregularities, conform to the grades and lines specified, and acceptable to the Engineer or Architect.
- G. Maintenance Period will begin at substantial completion and extend for 30 days.

3.7 FERTILIZING

- H. Thoroughly blend planting soil mix off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil mix.
 - 1) Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - 2) Mix lime with dry soil before mixing fertilizer.
- I. Fertilizer shall be uniformly applied to the designated area at the time of seeding; and rate of application shall be 900 pounds of 13-13-13 per acre.
- J. Fertilizer shall be applied using any approved method. If liquid fertilizer should be used, it shall be kept agitated during application and shall be applied in amounts sufficient to provide the same value of nutrients per acre as that specified for dry fertilizer.
- K. Fertilizers and agricultural limestone shall be applied when site is prepared for fertilization. All equipment necessary for proper handling, storing, placing and incorporating the fertilizer into the prepared ground shall be onsite in working condition when required.

3.8 TEMPORARY GRASSING

- A. Areas, sections or portions of the work site within which construction work has been completed prior to beginning of final grading and grassing, shall be protected from erosion by employment of temporary control measures such as seeding and mulching or seeding and netting. Temporary grass seeding and mulching is required in disturbed areas that are unused for extended periods of time.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT VEGETATION ESTABLISHMENT

SECTION 02 485 – Page 8 of 9

- B. All temporary erosion control and pollution control features installed by the Contractor shall be maintained by the Contractor until the site is ready for final grading and grassing.
- C. Temporary grassing required to be removed so as to permit the performance of final grading and grassing work shall be removed and ground preparation for final grassing shall be undertaken immediately after the removal of temporary grassing or other temporary erosion control measures.
- D. The Contractor must maintain temporary grassing under all circumstances until the installation of permanent grassing.

3.9 BASIS OF ACCEPTANCE

- A. The acceptance of areas designated to be seeded under this Section will be based on verification of a satisfactory stand of specified grass and legumes as determined by an on-site observation by the Engineer.
- B. A satisfactory stand is defined as a cover of living grass of the specified variety after true leaves are formed, in which gaps larger than five inches square do not occur. Areas determined by the Engineer to be solid rock will be exempt from this requirement.
- C. If a satisfactory stand is not established in any area, that area shall be reseeded until a satisfactory stand is established, without additional compensation.
- D. A satisfactory stand of healthy, permanent grass and sod is a requirement of the contract and shall be in place prior to any acceptance of close-out documents.
- E. Maintenance, Guarantee, Mobilization, and Clean-up are included in Contract Sum.

3.10 MAINTENANCE

- A. Maintain grass until acceptance of a satisfactory stand in all areas by Engineer. Sod shall be maintained until 30 days after substantial completion.
- B. Water, fill washes and otherwise protect and maintain the seeded and/or sodded areas, including any mulch or cover used.
- C. Repair damage caused by pedestrian or vehicular traffic or other causes.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
VEGETATION ESTABLISHMENT**

SECTION 02 485 – Page 9 of 9

- D. Immediately reseed, re-mulch, re-sod, repair rutted or eroded areas, or take any other measures necessary to repair unacceptable or damaged areas at any time as determined by the Engineer.
- E. Mowing: Mow grass to a height of two to two and a half (2-2 ½) inches when it reaches a height of 3 inches, or as determined by the Engineer. Grass shall receive at least one mowing before receiving acceptance.
- F. Any infestation of Armyworm, Fall Armyworm, Cutworm or Aha that appears before Final Acceptance shall be controlled with measures and procedures specified in the Alabama Department of Transportation (ALDOT) Standard Specifications for Highway Construction, 2022 Edition,, Section 666, at Contractor's expense.

3.11 GUARANTEE

- A. Guarantee the work from the time of commencement of this Contract until one year beyond the date of acceptance of a satisfactory stand in all areas.
- B. During the period of the Guarantee, repair damage caused by pedestrian or vehicular traffic or other causes, and immediately reseed, re-sod, re-mulch, repair rutted or eroded areas, or take any other measures necessary to repair unacceptable or damaged areas at any time, as determined by the Engineer.
- C. Should this Contractor fail to take immediate action upon written notice of unacceptable or damaged Work, the Owner reserves the right to have the Work done by others at the expense of the Contractor.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
ASPHALT CONCRETE PAVING**

SECTION 02 513 – Page 1 of 9

SECTION 02513 - ASPHALT CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of the contract including General and Supplementary Conditions and General Requirements apply to the work specified in this section.
- B. Federal, State and Local Codes shall apply to the control of storm water runoff and siltation from the site.

1.2 SUMMARY

- A. Extent of base course and asphalt concrete paving work is shown on Drawings. Furnish all labor, equipment, materials and services necessary to complete the work of this section.
- B. Construction and compaction of subgrade is specified in Earthwork Section.

1.3 QUALITY ASSURANCE

- A. Materials and methods of construction shall conform to the Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition, Division 400.
- B. Installation shall be by qualified contractor regularly engaged in the asphalt paving business. Use materials furnished by bulk asphalt concrete producer regularly engaged in production of hot-mix, hot-laid asphalt concrete.
- C. Manufacturer shall be a paving-mix manufacturer registered and approved by ALDOT.

1.4 SUBMITTALS

- A. Submit asphalt mix designs.
- B. Written Warranty: Submit one-year written warranty by asphalt paving contractor for all materials and workmanship.

1.5 PRE-CONSTRUCTION CONFERENCE

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
ASPHALT CONCRETE PAVING**

SECTION 02 513 – Page 2 of 9

- A. Pre-construction Conference shall be conducted at the project site. Representatives of the Contractor, Engineer and Architect will be present to discuss execution of this portion of the work.
- B. Do no paving until all conduit, sleeving and utility trenching has been installed and complete.
- C. Subgrade must be approved by Engineer prior to any installation of paving.

1.6 TESTING

- A. Asphalt materials shall conform to the Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition. No material sampling will be required if obtained from a supplier who will certify products are acceptable on State Highway Projects.
- B. Owner shall employ testing agent who will randomly core pavement at a minimum rate of one (1) core per 20,000 square feet of paving or three (3) cores, whichever is greater.
- C. Testing agent will record location of each test and file test reports with Architect/Engineer.
- D. If field tests appear to be in conflict with specified density, thickness or surface smoothness, remove as directed and replace with acceptable work.
- E. Patch and repair test sample areas for full depth of cores.
- F. Pumping, rutting, cracking or settling of any courses will also be basis for removal and replacement.

1.7 PROJECT CONDITIONS

- A. Installation Schedule:
 - 1) Install base and binder courses after following satisfactory compaction of subgrade.
 - 2) Install wearing surface after following satisfactory completion of base and binder courses.
 - 3) Use the Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition, for Weather Limitations of Asphalt Installation.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
ASPHALT CONCRETE PAVING**

SECTION 02 513 – Page 3 of 9

- 4) Contractor is responsible for providing engineering for establishment and maintenance of required lines and elevations. Contractor shall comply with lines and grades as set forth on plans unless changes have been approved by Architect/Engineer.

PART 2 - MATERIALS

2.1 BASE COURSE

- A. Crushed aggregate base material in accordance with the Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition, Section 301 and Section 825, Type “B”, to width and depth shown on drawings. In-place compacted density: 95% modified Proctor.

2.2 PRIME COAT

- A. Bituminous surface treatment Type “A”, in accordance with the requirements of the Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition, Section 401.

2.3 BITUMINOUS SURFACE TREATMENT

- A. All bituminous surface treatments shall be in accordance with the requirements of the Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition, Section 401.
 - a. The amount of bituminous material and the size and amount of cover aggregate required for the various types of surface treatments shall meet the requirements of the Bituminous Treatment Table shown in ALDOT 2022 Edition of Standard Specifications for Highway Construction subarticle 401.01(b).
- B. All materials shall comply with the requirements of Division 800, Materials, in accordance with the requirements of the ALDOT Standard Specifications for Highway Construction, 2022 Edition, as applicable.
 - a. Bituminous materials shall comply with the requirements of Section 804.
 - b. Coarse Aggregates shall comply with the requirements of Section 801.
 - c. Polymer Additives shall comply with the requirements of Section 811.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
ASPHALT CONCRETE PAVING**

SECTION 02 513 – Page 4 of 9

- C. In general, it shall be the Contractor's responsibility to select the proper sizes and amount of equipment to provide the desired results, but the following basic items shall be provided. In addition, all necessary equipment for the proper prosecution of the work shall be assembled on site and must be approved in good working condition prior to commencing work. All equipment proved unsatisfactory shall be removed, replaced, or supplemented as deemed necessary to accomplish the desired results.
 - a. Cleaning equipment, pressure distributor, aggregate spreader, and rollers shall meet the requirements of ALDOT 2022 Edition of Standard Specifications for Highway Construction subarticle 401.03(a).
- D. Bituminous surface treatments shall not be placed on a wet surface or when the Engineer will not allow the placement due to existing unfavorable weather conditions.
 - a. They shall not be placed when the temperature is expected to fall below freezing during the night regardless of daytime temperature, when the ground is frozen, or when the surface temperature is less than 32° F.
 - b. All bituminous surface treatments, except Bituminous Surface Treatment A (Prime Coat), shall not be placed when the air temperature is below 60° F. Bituminous Surface Treatment A shall not be placed when the air temperature is below 40° F.
 - c. Aggregates spread when the temperature is 70° F and above may be surface damp but not wet. Aggregates spread when the surface temperature is below 70° F shall be surface dry. Aggregates found by the Engineer to contain excessive amounts of moisture at the time of use shall be rejected.
- E. Preparation of existing surface shall meet the requirements of ALDOT 2022 Edition of Standard Specifications for Highway Construction subarticle 401.03(c).
- F. Application and preparation of bituminous material and aggregate shall meet the requirements of ALDOT 2022 Edition of Standard Specifications for Highway Construction subarticles 401.03(d) and 401.03(e) respectively.
- G. Contractor shall meet the requirements of ALDOT 2022 Edition of Standard Specifications for Highway Construction subarticle 401.04 regarding maintenance and protection of surface and traffic.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
ASPHALT CONCRETE PAVING**

SECTION 02 513 – Page 5 of 9

2.4 BINDER COURSE

- A. Bituminous concrete binder layer, plant mixed, to width and depth show on drawings, in accordance with the requirements of the Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition, Section 423 and 424 as applicable.

2.5 THICKNESS

- A. In-place compacted thickness shall be as indicated on drawings. Lines and grades shall be as shown on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.
- B. Proof-roll subgrade using heavy pneumatic-tired rollers for compaction requirements and locate areas that may need additional subgrade work.
- C. Notify Architect/Engineer in writing of any unsuitable subgrade conditions.
- D. Proceed with paving operations only after any unsatisfactory conditions have been corrected.
- E. Before placing any asphalt materials, remove loose materials from compacted subgrade.

3.2 BASE COURSE

- A. Place, spread uniformly and shape base material to proper elevations and compacted thickness shown.
- B. Begin rolling at sides and advance to center uniformly lapping each preceding track covering entire area with back wheels.
- C. Continue until aggregate is compacted to a firm, even surface and verify specified compaction.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
ASPHALT CONCRETE PAVING**

SECTION 02 513 – Page 6 of 9

3.3 PRIME COAT

- A. Apply emulsified asphalt prime coat at a rate of 0.22 to 0.25 gal. per square yard, over compacted base course.
- B. Apply to penetrate and seal, but not flood, surface.
- C. Cure and dry as long as directed by the Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition.

3.4 ASPHALT BINDER COURSE

- A. When prime coat is ready, immediately apply hot mix asphalt binder course to specified compacted thickness and smoothness.

3.5 ASPHALT WEARING SURFACE

- A. Schedule application to follow the total completion of the general construction of the project including landscaping.
- B. Immediately following application of tack coat, apply asphalt wearing course to specified compacted thickness and within specified tolerances of thickness and smoothness.

3.6 ASPHALT COURSES MIX - PLACING

A. General:

- 1) Place asphalt concrete mixture on prepared surface, spread and strike-off.
- 2) Spread mixture at minimum temperature of 225 degrees F. (107 degrees C.).
- 3) Machine spread where possible, place inaccessible and small areas by hand.
- 4) Place each course to required grade, cross-section and compacted thickness.
- 5) Place in compliance with the Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition.
- 6) Place at a rate to insure compaction, before mixture cools.

B. Pavement Placing:

- 1) Place in strips not less than 10 feet wide unless otherwise approved by the Architect/Engineer.
- 2) After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
ASPHALT CONCRETE PAVING**

SECTION 02 513 – Page 7 of 9

3.7 JOINTS

- A. Construct joints in accordance with the Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition, Section 410. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.
- 1) Clean contact surfaces and apply tack coat to joints.
 - 2) Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 - 3) Offset transverse joints, in successive courses, a minimum of 24 inches.
 - 4) Construct transverse joints as described in AL MS-22, "Construction of Hot Mix Asphalt Pavements."
 - 5) Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - 6) Compact asphalt at joints to a density within 2 percent of specified course density.

3.8 COMPACTION

A. General:

- 1) Begin rolling when mixture will bear roller weight without excessive displacement.
- 2) Do not permit heavy equipment, including rollers, to stand on pavement course before it has thoroughly set.
- 3) Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

B. Breakdown rolling:

- 1) Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge.
- 2) Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.

C. Second Rolling:

- 1) Follow breakdown rolling as soon as possible, while mixture is hot.
- 2) Continue second rolling until mixture has been thoroughly compacted.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
ASPHALT CONCRETE PAVING**

SECTION 02 513 – Page 8 of 9

D. Finish Rolling:

- 1) Perform finish rolling while mixture is still warm enough for removal of roller marks.
- 2) Continue rolling until roller marks are eliminated and course has attained maximum density.

E. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
- B. Testing agency will conduct and interpret tests and state in each report whether tested work complies with or deviates from specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- D. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- E. Surface Smoothness: Finished surface of each hot mix asphalt course will be tested for compliance with smoothness tolerances in accordance with the Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition.
- F. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979 or AASHTO T 168.
 - 1) Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
 - 2) In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188, ASTM D 1559 or ASTM D 2726.
 - a) One core sample will be taken for every 500 square yards or less of installed pavement, with no fewer than 3 cores taken.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
ASPHALT CONCRETE PAVING**

SECTION 02 513 – Page 9 of 9

- b) Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188, ASTM D 1559 or ASTM D 2726.

- G. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.10 CLEANUP AND FINAL ACCEPTANCE

- A. At completion of each operation, remove excess or spilled materials from site. Do not dump or spread excess base or asphalt materials on project site.
- B. Sweep asphalt pavement, and wash free of stains, discolorations, dirt or other foreign matter prior to final inspection.
- C. All trash and surplus undesirable material of every description resulting from work shall be removed from the site.
- D. At the time of final acceptance of work performed under the contract, the work covered by this section shall be complete in every respect and in proper operating and/or functioning condition. Any defects discovered in the system subsequent to this inspection shall have been corrected. Final acceptance shall not be complete until all work has been inspected and accepted by Architect/Engineer and local authority having jurisdiction. All utilities to be maintained by local authorities shall be accepted by letter with original being submitted to Architect/Engineer.
- E. All existing improvements such as, but not limited to, lawns, drives, pavements, sidewalks, and any other improvement destroyed or damaged as a result of the work performed shall be restored to its original or better condition at Contractor's expense at no additional cost to the Owner before final acceptance is granted.

3.11 PROTECTION

- A. After final rolling, do not permit vehicular traffic on pavement until it has hardened,
- B. Provide barricades and warning devices as required to protect pavement and the general public.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PORTLAND CEMENT CONCRETE PAVING**

SECTION 02 520 – Page 1 of 7

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The General Provisions of the contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this section. As do the following technical specifications:
SECTION 02300 – EARTHWORK.

1.2 DESCRIPTION

- A. Extent of Portland Cement concrete paving is shown on the Drawings. Work includes curbs, gutters, walkways, slope paved ditches, pavements, and medians.

1.3 QUALITY ASSURANCE

- A. Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition, Division 600 and 450, Sections 614, 618, 620, 623, 450 and 626 applies to the work described in this section.
- B. Contractor is responsible for doing all grade and layout work associated with the construction of this work. Engineer shall approve all subgrade and layout work prior to the installation of concrete.
- C. Examine surfaces to receive concrete for unacceptable conditions. Repair or replace any surfaces not ready to receive concrete.

1.4 SUBMITTALS

- A. Furnish mix designs, manufacturers product data, test reports and material certifications necessary for compliance with the specifications.
- B. Manufacturer's Product Data for reinforcement, admixtures, waterstops, joint systems, curing compounds and forming accessories.
- C. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI- certified Concrete Flatwork Technician.
- D. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

- 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PORTLAND CEMENT CONCRETE PAVING**

SECTION 02 520 – Page 2 of 7

- E. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 for testing indicated, as documented according to ASTM E548.
1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

PART 2 - MATERIALS

- A. Materials shall be as specified by the Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition, Division 800. Any deviations of such materials must be approved by Architect/Engineer prior to any installation of materials.
- B. All concrete shall have a minimum compressive strength of 3,000 PSI at 28 days unless otherwise noted and approved by Architect/Engineer. Concrete should have slump range of 4 inches +/- 1 inch and air content between 4 to 8 percent.
- C. All steel reinforcement to be used on this jobsite shall be delivered to the site bundled, tagged and marked indicating size, lengths, and certifications.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PORTLAND CEMENT CONCRETE PAVING**

SECTION 02 520 – Page 3 of 7

- A. Subgrade: Examine subgrade for elevation and compaction requirements specified under Earthwork Section 02300. Do not proceed with work until unsatisfactory conditions have been corrected.
- B. Stake out concrete paving, tying into existing work and reference points. Get Architect/Engineer's approval of layout before placing forms; adjust as described.

3.2 INSTALLATION

- A. Do not place concrete before forms, reinforcement and surface preparation have been inspected and approved by the Architect/Engineer.
- B. Forms:
 - 1) Set forms to required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.
 - 2) Check completed formwork for grades and alignment prior to installation of concrete.
 - 3) Clean forms after each use, and coat with form release agent which is non- staining, and as often as is required to insure separation from concrete without damage.
- C. Surface Preparation: Remove loose material from compacted subgrade surface immediately before concrete is placed. Moisten if required to provide a uniform dampened condition at the time concrete is placed. Do not place concrete on muddy or frozen surface.
- D. Base: Place porous fill where drawn or specified under slabs-on-grade to thickness shown.
- E. Reinforcement: Where required for exterior concrete, locate, place and support reinforcement as shown on drawings and as per American Concrete Institute (ACI) Codes.
- F. Concrete Placement:
 - 1) Comply with applicable requirements of the Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition, for the delivery, placement and finishing of concrete.
 - 2) Do not place concrete until subgrade and forms have been checked for line and grade and approved by the Architect/Engineer.
 - 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,

SHELBY COUNTY WATER SERVICES BUILDING PROJECT PORTLAND CEMENT CONCRETE PAVING

SECTION 02 520 – Page 5 of 7

reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels and joint devices.

- 4) Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than ½ hour, place a construction joint.

G. Joints:

- 1) General: Construct expansion, weakened-plane (contraction) and construction joints true-to-line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated. When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated.
- 2) Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for a period of more than ½ hour, except where such pours terminate at expansion joints. Construct joints using standard metal keyway-section forms.
- 3) Expansion Joints: Provide premolded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks and other fixed objects, unless otherwise indicated.
 - a) Extend joint filler 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. If no joint sealer is indicated, place top of joint filler flush with finished concrete surface.
 - b) Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together.
 - c) Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.
- 4) Sealant: Tar modified urethane sealant, complying with the requirements of applicable sections for preparation of joints, materials, installation and performance.

H. Concrete Finishing:

- 1) After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand method only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.
- 2) After floating, test surface for trueness with a 10 foot straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PORTLAND CEMENT CONCRETE PAVING**

SECTION 02 520 – Page 5 of 7

- 3) Work edges of slabs, gutters, back top edge of curb and formed joints with an edging tool, and round to ½ inch radius, unless otherwise indicated. Eliminate tool marks on concrete surface.
- 4) After completion of floating and troweling when excess moisture or surface sheen has disappeared, complete surface finishing, as indicated on the drawings and as follows:
 - a) Broom Finish: By drawing a fine-hair broom across concrete surface, perpendicular to line of traffic, or as indicated. Repeat operation if required to provide a fine line texture acceptable to Architect/Engineer.
- 5) Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Architect/Engineer.

I. Curing:

- 1) Protect and cure finished concrete paving, complying with applicable requirements. Use curing and sealing compound or approved moist-curing methods.

3.3 CURBS AND GUTTERS

A. Formed Placement:

- 1) Contraction Joints: Construct curb in sections 6 to 10 feet long meeting the size and shape shown in the construction drawings.
- 2) Expansion Joints: Place at ends of all returns, at not more than 30-foot intervals, and at joints between curb and parallel walk or other rigid structure.
- 3) Finish: Tamp and screed concrete as soon as placed. Remove division plates and face forms as soon as practicable; fill any honeycombed places with 1:2 mortar and give exposed surfaces a smooth, wood-float finish, without plastering. Finish square corners in ¼ inch radius and other corners to radii shown.

B. Machine Placement:

- 1) Automatic machine may be used for curb and gutter placement at Contractor's option. If machine placement is to be used, submit revised mix design and laboratory test results which meet or exceed minimums specified. Machine placement must produce curbs and gutters to required cross-section, lines, grade, finish and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT PORTLAND CEMENT CONCRETE PAVING

SECTION 02 520 – Page 6 of 7

- 2) Contraction Joints: Saw cut curb and gutter at maximum ten-foot intervals.
 - 3) All types of curbs, gutters and combinations shall be placed in one operation, to the depth of cross section specified on the plans. The use of a two-stage operation will not be permitted.
- C. Foundation: The foundation shall be constructed or excavated to the required depth below the finished surface in accordance with the cross section shown on the plans or as designated.

3.4 SLOPE PAVING

- A. The slope to be paved shall be uniformly dressed and compacted with mechanical tampers to the satisfaction of the Architect/Engineer before placing the concrete.
- B. Place forms to the required ditch shapes, slopes, grades and alignment as shown on the drawings.
- C. Prior to the installation of concrete, smooth-out and tamp-out all loose material.
- D. Install and finish concrete to the proper grades, shapes and alignment.
- E. Provide contraction joints, construction joints and expansion joints as required by Alabama Department of Transportation Standard Specifications for Highway Construction (ALDOT), 2022 Edition, Section 614.

3.5 PROTECTION AND REPAIRS

- A. Protect concrete from damage until acceptance of Work. Exclude traffic from pavement for at least 14 days after placement. Maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- B. Repair or replace broken, defective or stained concrete, as directed by Architect/Engineer.
- C. Sweep concrete pavement and wash free of stains, discolorations, dirt and other foreign material just prior to inspection.

3.6 CLEANUP AND FINAL ACCEPTANCE

- A. All trash and surplus undesirable material of every description resulting from work shall be removed from the site.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PORTLAND CEMENT CONCRETE PAVING**

SECTION 02 520 – Page 7 of 7

- B. At the time of final acceptance of work performed under the contract, the work covered by this section shall be complete in every respect and in proper operating and/or functioning condition. Any defects discovered in the system subsequent to this inspection shall have been corrected. Final acceptance shall not be complete until all work has been inspected and accepted by Architect/Engineer and local authority having jurisdiction. All utilities to be maintained by local authorities shall be accepted by letter with original being submitted to Architect/Engineer.
- C. All existing improvements such as, but not limited to, lawns, drives, pavements, sidewalks, and any other improvement destroyed or damaged as a result of the work performed shall be restored to its original or better condition at Contractor's expense at no additional cost to the Owner before final acceptance is granted.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
TRAFFIC STRIPE**

SECTION 02 525 – Page 1 of 3

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The General Provisions of the contract, including General and Supplementary Conditions and General Requirements, apply to the work in this section as do the following technical specifications:
Section 02513 Asphalt Concrete Paving

1.2 SUMMARY

- A. Contractor shall provide all labor, materials, equipment and incidentals as needed to perform permanent traffic striping at locations as shown on the plans and specified herein.
- B. Work includes permanent/temporary striping, markings and legends applied to roadway and driveway asphalt or concrete paved surfaces.
- C. All work must meet the guidelines as forth by the Alabama Department of Transportation Standard Specifications for Highway Construction, 2022 Edition, Section 701 and 703 and Federal guidelines for ADA traffic and pedestrian striping.

1.3 QUALITY ASSURANCE

- A. All materials and methods of construction shall comply with the Alabama Department of Transportation Standard Specifications for Highway Construction, 2022 Edition, and The Manual of Uniform Traffic Control Devices, latest edition.
- B. Installation shall be by a qualified contractor regularly engaged in the Traffic Roadway Striping business and has thorough knowledge of ALDOT Specifications for highway traffic striping and uniform traffic control striping and uniform traffic control, markings and legends.
- C. The manufacturer of all striping materials shall meet the procedure ALDOT-420, "Acceptance Program for Traffic Marking Materials."

1.4 SUBMITTALS

SHELBY COUNTY WATER SERVICES BUILDING PROJECT TRAFFIC STRIPE

SECTION 02 525 – Page 2 of 3

- A. Contractor may submit certificates of compliance for all materials used for traffic striping in lieu of laboratory reports from a qualified manufacturer and installer.
- B. Submit list of equipment to be used for the application of traffic striping.
- C. Certification of compliance from contractor that all materials, mixtures and equipment used for traffic striping comply with specifications.

1.5 PROJECT CONDITIONS

- A. Contractor shall comply with the Alabama Department of Transportation Standard Specifications for Highway Construction, 2022 Edition, Sections 701 and 703, for weather limitations for the installation of traffic control striping, markings, and legends.
- B. All asphalt pavement surfaces shall be allowed to cure a minimum of 14 days before application of permanent striping materials.
- C. All concrete pavement surfaces shall be allowed to cure a minimum of 30 days before application of permanent striping materials.
- D. All temporary traffic control striping, markings, and legends shall be installed as directed by Engineer. A roadway shall not be opened to traffic without traffic stripe unless approved otherwise by the Engineer.

PART 2 – PRODUCTS

- A. All traffic marking materials shall meet the requirements of the Alabama Department of Transportation Standard Specifications for Highway Construction, 2022 Edition, Section 856, and "Traffic Marking Materials" for permanent traffic marking.
- B. All paint used for traffic striping, markings, and legends shall be meet the requirements of the Alabama Department of Transportation Standard Specifications for Highway Construction, 2022 Edition, Section 701 and 703. Paint shall be Class 1, Type A, Traffic Stripes.
- C. All thermoplastic used for traffic striping, markings, and legends shall be meet the requirements of the Alabama Department of Transportation Standard Specifications for Highway Construction, 2022 Edition, Section 701 and 703. Thermoplastic material shall be Class 2, Type A, Traffic Stripe.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
TRAFFIC STRIPE**

SECTION 02 525 – Page 3 of 3

PART 3 – EXECUTION

3.1 GENERAL

- A. Contractor shall examine the conditions of the roadways and driveways on which traffic striping is to be installed. Notify Engineer in writing of any conditions which may be detrimental to the installation of traffic striping work. Do not proceed until all unsatisfactory conditions have been corrected.
- B. All mixing of materials, application of materials and equipment and procedures used shall be in conformance with the Alabama Department of Transportation Standard Specifications for Highway Construction, 2022 Edition, for Traffic Stripe.
- C. All applications and installation shall be as shown on the drawings including traffic stripe widths, colors, legends and markings. All widths and lengths shall conform to the standard drawings of ALDOT, and/or MUTCD, latest edition as applicable.
- D. Application rates and thickness of material shall be according to the Alabama Department of Transportation Standard Specifications for Highway Construction, 2022 Edition, Sections 701, 703, 856, and 857.

3.2 CLEANUP AND FINAL ACCEPTANCE

- A. All trash and surplus undesirable material of every description resulting from work shall be removed from the site.
- B. At the time of final acceptance of work performed under the contract, the work covered by this section shall be complete in every respect and in proper operating and/or functioning condition. Any defects discovered in the system subsequent to this inspection shall have been corrected. Final acceptance shall not be complete until all work has been inspected and accepted by Architect/Engineer and local authority having jurisdiction. All utilities to be maintained by local authorities shall be accepted by letter with original being submitted to Architect/Engineer.
- C. All existing improvements such as, but not limited to, lawns, drives, pavements, sidewalks, and any other improvement destroyed or damaged as a result of the work performed shall be restored to its original or better condition at Contractor's expense at no additional cost to the Owner before final acceptance is granted.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 1 of 23

PART 1 - GENERAL

1.1 SUMMARY:

- A. Section Includes:
 - 1. Formwork.
 - 2. Reinforcing.
 - 3. Cast-in place concrete including mix design, placement procedures, and finishes.
- B. Cast-in-place concrete includes the following:
 - 1. Foundations and footings.
 - 2. Slabs-on-grade.
- C. Related Documents: Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- D. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 02 2000, "Earthwork": Drainage fill under slabs on grade.
 - 2. Section 0 25140, "Portland Cement Concrete Paving": Concrete paving and walks.
 - 3. Section 05 5000, "Metal Fabrications": Metal items to be built into concrete.
 - 4. Section 07 9000, "Sealants and Joint Fillers": Sealants and joint fillers in concrete work.
 - 5. Respective Sections of Division 15 and 16, as applicable, for furnishing of inserts, anchorage and erection items required for mechanical and electrical work.
 - 6. Divisions 15 and 16, as applicable, for furnishing and setting of conduit, pipes and sleeves for mechanical and electrical equipment.

1.2 SUBMITTALS:

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
 - 1. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others if requested by Architect.
 - 2. Shop drawings for reinforcement detailing fabricating, bending, and placing concrete reinforcement. Comply with ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures" showing bar schedules, stirrup spacing, bent bar diagrams, and arrangement of concrete reinforcement. Include special reinforcing required for openings through concrete structures.
 - 3. Shop drawings for formwork indicating fabrication and erection of forms for specific finished concrete surfaces. Show form construction including jointing, special form joints or reveals, location and pattern of form tie placement, and other items that affect exposed concrete visually. Formwork drawings shall bear the seal and signature of a Professional Engineer registered in the State of Alabama.
 - 4. Architect's review is for general architectural applications and features only. Designing formwork for structural stability and efficiency is Contractor's responsibility.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 2 of 23

5. Samples of materials as requested by Architect, including names, sources, and descriptions, as follows:
 - a. Color finishes.
 - b. Normal weight aggregates.
 - c. Reglets.
 - d. Waterstops.
 - e. Vapor retarder/barrier.
6. Laboratory test reports for concrete materials and mix design test.
7. Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.
8. Minutes of preinstallation conference.

1.3 QUALITY ASSURANCE:

- A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 1. ACI 301, "Specifications for Structural Concrete for Buildings".
 2. ACI 302, "Guide for Concrete Floor and Slab Construction".
 3. ACI 304, "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".
 4. ACI 305, "Hot Weather Concreting".
 5. ACI 306, "Cold Weather Concreting".
 6. ACI 309, "Guide for Consolidation of Concrete".
 7. ACI 311, "Recommended Practice for Concrete Inspection".
 8. ACI 318, "Building Code Requirements for Reinforced Concrete".
 9. ACI 347, "Recommended Practice for Concrete Formwork".
 10. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."
 11. American Welding Society, AWS D1.4 "Structural Welding Code - Reinforcing Steel".
- B. Concrete Testing Service: Engage a testing agency acceptable to Architect to perform material evaluation tests and to design concrete mixes.
 1. Refer to Division 1 Section "Special Conditions" for additional information and requirements.
- C. Materials and installed work may require testing and retesting at any time during progress of Work. Tests, including retesting of rejected materials for installed Work, shall be done at Owner's expense.
- D. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings" and the following:

SHELBY COUNTY WATER SERVICES BUILDING PROJECT CAST-IN-PLACE CONCRETE

SECTION 03-3000 – Page 3 of 23

1. At least 35 days prior to submitting design mixes, conduct a meeting to review detailed requirements for preparing concrete design mixes and to determine procedures for satisfactory concrete operations. Review requirements for submittals, status of coordinating work, and availability of materials. Establish

preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Require representatives of each entity directly concerned with cast-in-place concrete to attend conference, including, but not limited to, the following:

- a. Contractor's superintendent.
- b. Agency responsible for concrete design mixes.
- c. Agency responsible for field quality control.
- d. Ready-mix concrete producer.
- e. Concrete subcontractor.
- f. Primary admixture manufacturers.

PART 2 - PRODUCTS

2.1 FORM MATERIALS:

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Care shall be taken with the formwork on the bottom of the slabs, which will be exposed ceilings, to avoid the need for patching or repairs following the removal of the formwork. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
 1. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I.
 2. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- D. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than -1/2 inches to the plane

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 4 of 23

1 of the exposed concrete surface.

- E. Provide ties that, when removed, will leave holes not larger than 1 inch in diameter in the concrete surface.

2.1 REINFORCING MATERIALS:

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Steel Wire: ASTM A 82, plain, cold-drawn steel.
- C. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.
- D. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar- type supports complying with CRSI specifications.
 - 1. For slabs-on-grade, use concrete bricks or supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).
- E. Bar and Rod Mats: ASTM A 184 "Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement".
- F. Threaded Dowels: Continuous threaded high-strength steel bars equal to "Lasstud" by Richmond Screw Anchor Co., Inc. Provide inserts compatible with dowels, designed for ultimate pull-out force indicated on the drawings.
- G. Mechanical Splices: Equal to "Cadweld Rebar Splices", as manufactured by Erico Products, Inc., "C" Series, for developing 125% of minimum ASTM specified yield strengths, unless otherwise noted on drawings.
- H. Steel Shapes, Plates and Rods: Conform to ASTM A 36, "Specification for Structural Steel".
- I. Do Not Weld Reinforcing Steel: Unless specifically noted on drawings. If welding is shown, conform to latest revision of AWS D12.1, "Reinforcing Steel Welding Code of the American Welding Society". Perform all welding with certified welders qualified per AWS.

2.2 CONCRETE MATERIALS:

- A. Portland Cement: ASTM C 150, Type I.
 - 1. Use one brand of cement throughout Project unless otherwise acceptable to Architect.
- B. Fly Ash: ASTM C 618, Type F.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 5 of 23

1. Limit use of fly ash to not exceed 25 percent of cement content by weight.
- C. Normal-Weight Aggregates: ASTM C 33 and as specified. Provide aggregates from a single source for exposed concrete.
 1. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
- D. Water: Potable.
- E. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.
- F. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Air-Tite, Cormix Construction Chemicals.
 - b. Air-Mix or Perma-Air, Euclid Chemical Co.
 - c. Darex AEA or Daravair, W.R. Grace & Co.
 - d. MB-VR or Micro-Air, Master Builders, Inc.
 - e. Sealtight AEA, W.R. Meadows, Inc.
 - f. Sika AER, Sika Corp.
- A. Water-Reducing Admixture: ASTM C 494, Type A.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. PSI N, Cormix Construction Chemicals.
 - b. Eucon WR-75, Euclid Chemical Co.
 - c. WRDA, W.R. Grace & Co.
 - d. Pozzolith Normal or Polyheed, Master Builders, Inc.
 - e. Plastocrete 161, Sika Corp.
- B. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Eucon 37, Euclid Chemical Co.
 - b. WRDA 19 or Daracem, W.R. Grace & Co.
 - c. Rheobuild or Polyheed, Master Builders, Inc.
 - d. Sikament 300, Sika Corp.
- C. Water-Reducing, Accelerating Admixture: ASTM C 494, Type E.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Accelguard 80, Euclid Chemical Co.
 - b. Daraset, W.R. Grace & Co.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 6 of 23

- a. Pozzutec 20, Master Builders, Inc.
- B. Water-Reducing, Retarding Admixture: ASTM C 494, Type D.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Eucon Retarder 75, Euclid Chemical Co.
 - b. Daratard-17, W.R. Grace & Co.
 - c. Pozzolith R, Master Builders, Inc.
 - d. Protard, Prokrete Industries.
 - e. Plastiment, Sika Corporation.

2.2 RELATED MATERIALS:

- A. Reglets: Where sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217-inch-thick (26-gage) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- B. Dovetail Anchor Slots: Hot-dip galvanized sheet steel, not less than 0.0336 inch thick (22 gage) with bent tab anchors. Fill slot with temporary filler or cover face opening to prevent intrusion of concrete or debris.
- C. Waterstops: Provide strip applied, flat, dumbbell-type or centerbulb-type waterstops at construction joints and other joints as indicated. Size to suit joints.
 - 1. Flexible Butyl Rubber Strip Applied Waterstops:
 - a. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
 - 1. Swellstop, as manufactured by Greenstreak.
 - 2. Synkoflex.
 - 2. Rubber Waterstops: Corps of Engineers CRD-C 513.
 - a. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
 - 1. The Burke Co.
 - 2. Progress Unlimited.
 - 3. Williams Products, Inc.
 - 3. Polyvinyl Chloride Waterstops: Corps of Engineers CRD-C 572.
 - a. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
 - 1. The Burke Co.
 - 2. Greenstreak Plastic Products Co.
 - 3. W.R. Meadows, Inc.
 - 4. Progress Unlimited.
 - 5. Schlegel Corp.
 - 6. Vinylex Corp.
- B. Vapor Barrier, General Use (except as indicated below):

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 7 of 23

- a. Product: Plastic vapor barrier. Include manufacturer's recommended adhesive or pressure-sensitive tape for sealing joints, laps and penetrations, preformed boots for penetrations, and all other components required for a complete, proper and vaporproof installation.
 - 1) Classification: Must exceed ASTM E 1745 Class "A".
 - 2) Permeance: ASTM E96: 0.03 perms or less.
 - 3) Thickness: Not less than 10 mils.
 - b. Manufacturer/Product:
 - 1) "Moistop Ultra 10", Fortifiber Building Systems Group.
 - 2) "Perminator 10 mil", W.R. Meadows
 - 3) "Griffolyn Type-105", Reef Industries, Inc.
 - 4) "Stego Wrap Class A", Stego Industries, LLC.
 - 5) "VaporBlock VB10", Raven Inc.
 - 6) "Viper Vaporcheck 10-mil", Insulation Solutions, Inc.
 - c. Locations for Use: Continuous below all new and opened building slabs, and other structural slabs, porches, stoops, pads, covered (below roofs) areas, etc., on grade, and turned-down to tops of footings.
- C. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- D. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
 - 1. Waterproof paper.
 - 2. Polyethylene film.
 - 3. Polyethylene-coated burlap.
- E. Typical Special Sealing and Curing Compound at Interior Concrete Floors which will Remain Exposed in Completed Construction – EXCEPT NOT FOR FLOORS TO BE STAINED:
 - 1. Product/Manufacturer: "Ashford Formula", as manufactured by Curecrete Chemical Company, Inc.; Springville, UT; Phone: 800-998-5664 or (801) 489- 5663.
 - 2. Provide materials, preparation and installation of the following product, in strict compliance with manufacturer's current written instructions and recommendations.
- F. Coordinate the use (or non-use) of membrane-forming compounds with the suppliers of finishes to be provided on concrete surfaces. Do not use membrane-forming compounds at locations where they may have a detrimental effect on the permanent installation of the finish materials, floor coverings, their adhesives, setting beds, etc. At such locations, utilize only dissipating type compounds.
- G. Liquid Membrane-Forming Curing Compound: Liquid-type membrane-forming curing compound complying with ASTM C 309, Type I, Class A.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 8 of 23

- A. Moisture loss not more than 0.55 kg/sq. meter when applied at 200 sq. ft./gal.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Spartan-Cote, The Burke Co.
 - b. Day-Chem Cure and Seal, Dayton Superior Corp.
 - c. Eucocure, Euclid Chemical Co.
 - d. Horn Clear Seal, A.C. Horn, Inc.
 - e. L&M Cure R, L&M Construction Chemicals, Inc.
 - f. Masterkure, Master Builders, Inc.
 - g. CS-309, W.R. Meadows, Inc.
 - h. Kure-N-Seal, Sonneborn-Chemrex.
- B. V.O.C. Compliant Acrylic Curing and Sealing Type (30 Percent): Liquid type membrane- forming curing compound complying with ASTM C 309, Type 1, Class A and B. Provide 30 percent solids minimum, for surfaces indicated to be sealed.
- C. Safe Cure and Seal: 30 percent (J-19), Dayton Superior Inc.
- D. Evaporation Control:
 - 1. Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Eucobar, Euclid Chemical Co.
 - 2. E-Con, L&M Construction Chemicals, Inc.
 - 3. Confilm, Master Builders, Inc.
- E. V.O.C. Compliant Evaporation Control: Sure Film (J-74), Dayton Superior Inc.
- F. Underlayment Compound: Free-flowing, self-leveling, pumpable, cement-based compound for applications from 1 inch thick to feathered edges.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. K-15, Ardex, Inc.
 - b. LevelLayer II, Dayton Superior Corp.
 - c. Flo-Top, Euclid Chemical Co.
 - d. Gyp-Crete, Gyp-Crete Corp.
 - e. Levelex, L&M Construction Chemicals, Inc.
 - f. Underlayment 110, Master Builders, Inc.
 - g. Thoro Underlayment Self-Leveling, Thoro System Products.
- A. Bonding Agent: Polyvinyl acetate or acrylic base.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Polyvinyl Acetate (Interior Only):
 - 1. Superior Concrete Bonder, Dayton Superior Corp.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 9 of 23

- 2. Euco Weld, Euclid Chemical Co.
 - 3. Weld-Crete, Larsen Products Corp.
 - 4. Everweld, L&M Construction Chemicals, Inc.
 - 5. Ready Bond, Symons Corp.
 - b. Acrylic or Styrene Butadiene:
 - 1. Acrylic Bondcrete, The Burke Co.
 - 2. Day-Chem Ad Bond, Dayton Superior Corp.
 - 3. SBR Latex, Euclid Chemical Co.
 - 4. Daraweld C, W.R. Grace & Co.
 - 5. Hornweld, A.C. Horn, Inc.
 - 6. Everbond, L&M Construction Chemicals, Inc.
 - 7. Acryl-Set, Master Builders Inc.
 - 8. Intralok, W.R. Meadows, Inc.
 - 9. Sonocrete, Sonneborn-Chemrex.
- B. Epoxy Adhesive: ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Resi-Bond (J-58), Dayton Superior.
 - b. Euco Epoxy System #452 or #620, Euclid Chemical Co.
 - c. Epoxite Binder 2390, A.C. Horn, Inc.
 - d. Epabond, L&M Construction Chemicals, Inc.
 - e. Concsive Standard Liquid, Master Builders, Inc.
 - f. Rezi-Weld 1000, W.R. Meadows, Inc.
 - g. Sikadur 32 Hi-Mod, Sika Corp.
- C. Interior Epoxy Sealer: Use a maximum 35 percent type.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Epoxy-Plus; Dayton Superior Inc.
 - b. Eucopoxy 1; Euclid Chemical
 - c. Oauerseal 30E; Non-Crete, Inc.
 - d. Rescon R117; Symons Corp.
 - e. Son-No-Mar; Sonneborn, Div./Chem Rex Inc.
 - f. Super Seal 35; L & M Const. Chem. Co.
- D. V.O.C. Compliant Urethane Sealer:
 - 1. Day Chem Urethane V.O.C. (J-39); Dayton Superior Inc.

2.2 PROPORTIONING AND DESIGNING MIXES:

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial
- A. mixtures or field experience methods as specified in ACI 318-05 Section 5.3.
If trial
mixtures method used, use an independent testing facility acceptable to

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 10 of 23

Architect for preparing and reporting proposed mix designs. The testing facility shall not be the same as used for field quality control testing, unless otherwise acceptable to Architect.

- B. Trial mix designs and strength tests, made by qualified independent material laboratory, in accordance with ACI 318-05 Section 5.3 are required for the following types of concrete:
 - 1. Normal weight concrete with specified strength in excess of 4000 psi.
 - 2. All concrete designs for which a suitable experience record is not available.
- C. Mix design based on a record of past performance in accordance with ACI 318-05 Section 5.3, may be provided by qualified concrete supplier or precast concrete manufacturer for concrete designs. Mix design shall be certified by an independent testing laboratory.
- D. All concrete mix designs shall include the following information:
 - 1. Proportions of cement, fine and coarse aggregate and water.
 - 2. Water/cement ratio, design strength, slump and air content.
 - 3. Type of cement and aggregates.
 - 4. Type and dosage of all admixtures.
 - 5. Type, color and dosage of integral coloring compounds, where applicable.
 - 6. Special requirements for pumping.
 - 7. Any special characteristics of the mix which require precautions in the mixing, placing or finishing techniques to achieve the finished product specified.
- E. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Architect.
- F. Design mixes to provide normal weight concrete with the following properties as indicated on drawings and schedules:
 - 1. 4000-psi, 28-day compressive strength.
 - 2. 3000-psi, 28-day compressive strength.
- G. Water-Cement Ratio: Provide concrete for following conditions with maximum water- cement (W/C) ratios as follows:
 - 1. Subjected to freezing and thawing: W/C 0.45.
 - 2. Subjected to deicers/watertight: W/C 0.40.
 - 3. Subjected to brackish water, salt spray, or deicers: W/C 0.40.
- H. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
 - 1. Ramps and sloping surfaces: Not more than 3 inches.
 - 2. Reinforced foundation systems: Not less than 1 inch and not more than 3 inches.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 11 of 23

3. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2-to-3-inch slump concrete.
 4. Other concrete: Not more than 5 inches or less than 3 inches.
- I. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in Work.

2.2 ADMIXTURES:

- A. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
- B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg.F (10 deg.C).
- C. Use high-range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water-cement ratios below 0.50.
- D. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:
 1. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic pressure:
 - a. 5.0 percent (moderate exposure); 6.0 percent (severe exposure) for 3/4- inch maximum aggregate.
 - b. 5.5 percent (moderate exposure); 7.0 percent (severe exposure) for 1/2- inch maximum aggregate.
- E. Other concrete not exposed to freezing, thawing, or hydraulic pressure, or to receive a surface hardener: 2 to 4 percent air. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

2.3 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.
 1. When air temperature is between 85 deg.F (30 deg.C) and 90 deg.F (32 deg.C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg.F (32 deg.C), reduce mixing and delivery time to 60 minutes.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 12 of 23

PART 3 - EXECUTION

3.1 GENERAL:

- A. Coordinate the installation of joint materials, vapor retarder/barrier, and other related materials with placement of forms and reinforcing steel.

3.2 FORMS:

- A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Formwork drawings shall bear the seal and signature of a Professional Engineer registered in the State of Alabama. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits:
 - 1. Provide Class A tolerances for concrete surfaces exposed to view.
 - 2. Provide Class C tolerances for other concrete surfaces.

Care shall be taken with the formwork on the bottom of the slabs, which will be exposed ceilings, to avoid the need for patching or repairs following the removal of the formwork.

- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.
- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.
- D. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 13 of 23

- F. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.3 VAPOR RETARDER/BARRIER INSTALLATION:

- A. General: Place vapor retarder/barrier sheeting in position with longest dimension parallel with direction of pour.
- B. Lap joints 6 inches and seal with manufacturer's recommended mastic or pressure- sensitive tape.

3.4 PLACING REINFORCEMENT:

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.
 - 1. Avoiding cutting or puncturing vapor retarder/barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.
- D. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.5 JOINTS:

- A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 14 of 23

- B. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed and accepted for this purpose may be used for slabs.
- C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.
- D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- E. Waterstops: Provide waterstops in construction joints as indicated. Install waterstops to form continuous diaphragm in each joint. Support and protect exposed waterstops during progress of Work. Field-fabricate joints in waterstops according to manufacturer's printed instructions.
- F. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Joint fillers and sealants are specified in Section 07900, "Sealants and Joint Fillers".
- G. Contraction (Control) Joints in Slabs-on-Grade: Construct contraction joints in slabs-on-grade to form panels of patterns as shown. Use saw cuts 1/8 inch wide by one-fourth of slab depth or inserts 1/4 inch wide by one-fourth of slab depth, unless otherwise indicated.
 - 1. Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
 - 2. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
 - 3. If joint pattern is not shown, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
 - 4. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."

3.6 INSTALLING EMBEDDED ITEMS:

- A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 15 of 23

- B. Install reglets to receive top edge of foundation sheet waterproofing and to receive through- wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
- C. Install dovetail anchor slots in concrete structures as indicated on drawings.
- D. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.7 PREPARING FORM SURFACES:

- A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form- coating compound before placing reinforcement.
- B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
 - 1. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.8 CONCRETE PLACEMENT:

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.
- D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 - 1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 16 of 23

than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.

- E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.
 - 1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
 - 2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 - 3. Maintain reinforcing in proper position on chairs during concrete placement.
- F. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- G. When air temperature has fallen to or is expected to fall below 40 deg.F (4 deg.C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg.F (10 deg.C) and not more than 80 deg.F (27 deg.C) at point of placement.
 - 1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- H. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg.F (32 deg.C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 17 of 23

- temperature immediately before embedding in concrete.
- 3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
- 4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

3.9 FINISHING FORMED SURFACES:

- A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Care shall be taken with the formwork on the bottom of the slabs, which will be exposed ceilings, to avoid the need for patching or repairs following the removal of the formwork. Repair and patch defective areas with fins and other projections completely removed and smoothed.
- C. Smooth-Rubbed Finish: Provide smooth-rubbed finish on scheduled concrete surfaces that have received smooth-formed finish treatment not later than 1 day after form removal.
 - 1. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 MONOLITHIC SLAB FINISHES:

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and where indicated.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 18 of 23

1. After placing slabs, finish surface to tolerances specified in Section 3.11. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.
 1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances specified in Section 3.11. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- C. Trowel Finish: Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or another thin film-finish coating system.
 1. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances specified in Section 3.11. Grind smooth any surface defects that would telegraph through applied floor covering system.
- D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.
- E. Nonslip Broom Finish: Apply a nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.11 MISCELLANEOUS CONCRETE ITEMS:

- A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 19 of 23

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.12 CONCRETE CURING AND PROTECTION:

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- C. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture- retaining cover curing, or by combining these methods, as specified.
 - 1. Provide moisture curing by the following methods:
 - a. Keep concrete surface continuously wet by covering with water.
 - b. Use continuous water-fog spray.
 - c. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4-inch lap over adjacent absorptive covers.
 - 2. Provide moisture-retaining cover curing as follows:
 - a. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 3. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:
 - a. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 20 of 23

- damage during curing period.
 - b. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
 - D. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
 - E. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.
 - 1. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.
- 3.13 REMOVING FORMS:**
- A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg.F (10 deg.C) for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.
 - B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days or until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
 - C. Form-facing material may be removed 4 days after placement only if shores and other
vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

3.14 REUSING FORMS:

- A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Architect.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 21 of 23

3.15 CONCRETE SURFACE REPAIRS:

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Architect.
- B. Mix dry-pack mortar, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
 - 1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
 - 2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- C. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
 - 1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.
 - 1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
 - 2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.]

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 22 of 23

3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.
 4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- E. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.
- F. Repair methods not specified above may be used, subject to acceptance of Architect.

3.16 QUALITY CONTROL TESTING DURING CONSTRUCTION:

- A. General: The Owner will employ a testing agency to perform tests and to submit test reports.
- B. Sampling and testing for quality control during concrete placement may include the following, as directed by Architect.
1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - b. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg.F (4 deg.C) and below, when 80 deg.F (27 deg.C) and above, and one test for each set of compressive-strength specimens.
 - d. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
CAST-IN-PLACE CONCRETE**

SECTION 03-3000 – Page 23 of 23

- C. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day, or for each 5000 sq ft of surface are placed; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
1. Any additional cylinder required by the Contractor for early strength gain tests for form stripping or post-tensioning are Contractor's responsibility and shall be paid for by Contractor.
 2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
 3. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 4. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
 5. Test results will be reported in writing to Architect, Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
 6. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
 7. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
MASONRY MORTARING**

SECTION 04-0513 – Page 1 of 3

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Mortar for masonry.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 04 2000 – Brick Unit Masonry.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. C91 - Standard Specification for Masonry Cement.
 - 2. C144 - Standard Specification for Aggregate for Masonry Mortar.
 - 3. C150 - Standard Specification for Portland Cement.
 - 4. C199 - Standard Test Method for Pier Test for Refractory Mortar.
 - 5. C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
 - 6. C270 - Standard Specification for Mortar for Unit Masonry.
 - 7. C1329 - Standard Specification for Mortar Cement.
- B. The Masonry Society (TMS):
 - 1. 402 - Building Code for Masonry Structures.
 - 2. 602 - Specification for Masonry Structures.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Samples: 1/2 x 1/2 inch x 3 inch long colored mortar samples.
- B. Quality Control Submittals:
 - 1. Test reports: Indicating mortar compliance with ASTM C270.
 - 2. Delivery tickets: If mortar is delivered to site dry and pre-blended, furnish delivery tickets indicating quantity, mortar type, and date of manufacture.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with TMS 402 and 602.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver cement and lime in manufacturer's original, unopened packages or containers.
- B. Protect materials from moisture absorption and damage; reject damaged containers.
- C. Store aggregate to prevent inclusion of foreign matter.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Cement:
 - 1. Essroc Cement Corp. (www.essroc.com)
 - 2. LaFarge North America, Inc. (www.lafarge-na.com)
 - 3. Lehigh Cement Co. (www.lehighcement.com)
 - 4. Texas Industries, Inc. (www.txi.com)
- B. Acceptable Manufacturers - Lime:
 - 1. Graymont Dolime (OH) Inc. (www.graymont-oh.com)
 - 2. Lhoist North America. (www.lhoist.us)
- C. Acceptable Manufacturers - Preblended Mortars and Grouts:
 - 1. Quikrete Companies. (www.quikrete.com)
 - 2. Cemex. (www.cemex.com)
- D. Acceptable Manufacturers - Colorants:
 - 1. Cathay Pigments. (www.cathaypigments.com)
 - 2. Davis Colors. (www.daviscolors.com)
 - 3. Solomon Colors. (www.solomoncolors.com)
- E. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Portland Cement:
 - 1. ASTM C150, Type I.
 - 2. For exposed surfaces, provide cement from one source throughout project.
- B. Aggregate:
 - 1. ASTM C144, standard masonry type.
 - 2. For exposed surfaces, provide aggregate from one source throughout project.
- C. Lime: ASTM C207, Type S.
- D. Colorant: Pure mineral oxide type, color to be selected from manufacturer's full color range.
- E. Water: Clean and free from oils, acids, alkalies, organic matter, and other substances in amounts deleterious to mortar or metals in masonry.

2.3 MIXING

- A. Mix mortar in accordance with ASTM C270.
- B. Jobsite Proportioning of Mortar:
 - 1. Mix using mechanical mixer. Hand mixing not permitted.
 - 2. Mix approximately three-quarters of required water, all of cement and lime, and one-half of aggregate for minimum of 2 minutes.
 - 3. Add remainder of water and aggregate; mix for minimum of 3 minutes.

- C. Dry Preblended Mortar:
 - 1. Mix using continuous, self-cleaning mixer mounted at apex of silo cone.
 - 2. Set water flow valve to provide workable consistency.
- D. Provide uniformity of color in exposed mortar.
- E. Colorant may not exceed 9 pounds per 94 pound bag of cement for mineral oxides.
- F. Thoroughly mix ingredients in quantities needed for immediate use.
- G. Discard lumpy, caked, frozen, and hardened mixes.
- H. Mortar may be retempered by adding water as required. Use mortar within 2-1/2 hours after initial mixing at ambient temperatures below 80 degrees F and within 1-1/2 hours after initial mixing at ambient temperatures over 80 degrees F.
- I. Do not add accelerators, retarders, water repellents, antifreeze compounds, or other additives without Architect's approval.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Follow requirements specified in referenced sections.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Concrete unit masonry.
 - 2. Brick unit masonry.
 - 3. Autoclaved aerated concrete unit masonry.
 - 4. Fireclay brick and clay flue linings.
 - 5. Integral flashings.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 04 0513 - Masonry Mortaring.
 - 3. Section 04 0516 - Masonry Grouting.
 - 4. Section 07 9200 - Joint Sealers.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. A153/A153M - Standard Specification for Zinc-Coating (Hot Dip) on Iron and Steel Hardware.
 - 2. A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
 - 3. A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
 - 4. A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - 5. A951 - Standard Specification for Masonry Joint Reinforcement.
 - 6. B370 - Standard Specification for Copper Sheet and Strip for Building Construction.
 - 7. C27 - Standard Classification of Fireclay and High-Alumina Refractory Brick.
 - 8. C67 - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
 - 9. C90 - Standard Specification for Hollow Loadbearing Concrete Masonry Units.
 - 10. C129 - Standard Specification for Hollow Nonloadbearing Concrete Masonry Units.
 - 11. C216 - Standard Specification for Facing Brick (Solid Units Made from Clay or Shale).
 - 12. C315 - Standard Specification for Clay Flue Linings.
 - 13. C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale).
 - 14. C744 - Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units.
 - 15. C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Concrete.
 - 16. C1019 - Standard Test Method for Sampling and Testing Grout.
 - 17. C1261 - Standard Specification for Firebox Brick for Residential Fireplaces.
 - 18. C1283 - Standard Practice for Installing Clay Flue Linings.
 - 19. C1314 - Standard Test Method for Compressive Strength of Masonry Prisms.
 - 20. C1386 - Standard Specification for Precast Autoclaved Aerated Concrete (PAAC) Wall Construction Units.
- B. The Masonry Society (TMS):
 - 1. 402 - Building Code for Masonry Structures.
 - 2. 602 - Specification for Masonry Structures.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Provide information on reinforcing and anchors including sizes, profiles, materials, and finishes.
 - 2. Samples: Concrete masonry samples in quantities showing full color and texture range.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 10 years documented experience in work of this Section.
- B. Mockup:
 - 1. Size: 4 feet high x 8 feet wide.
 - 2. Show:
 - a. Masonry color and texture range.
 - b. Mortar joint size, color, and profile.
 - c. Each bond pattern.
 - d. Anchors.
 - e. Flashings and weeps.
 - 3. Locate where directed.
 - 4. Approved mockup may remain as part of the Work.
- C. Perform Work in accordance with TMS 402 and 602.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store masonry off ground; prevent contact with materials that could cause staining or damage.
- B. Protect reinforcement and anchors from corrosion.

1.6 PROJECT CONDITIONS

- A. Wall Protection:
 - 1. During erection, cover tops of partially completed walls with strong waterproof membrane at end of each day or work stoppage.
 - 2. Extend cover minimum of 24 inches down both sides; hold securely in place.
- B. Load Application:
 - 1. Do not apply uniform loads for at least 12 hours after building masonry columns or walls.
 - 2. Do not apply concentrated loads for at least 3 days after building masonry columns or walls.
- C. Environmental Requirements:
 - 1. Hot weather requirements: If ambient temperature is over 95 degrees F or relative humidity is less than 50 percent, protect from direct sun and wind exposure for minimum 48 hours after installation.
 - 2. Cold weather requirements: Do not use frozen materials or build on frozen work.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Concrete Masonry Units:
 - 1. DecraStone by Smyrna Mix Concrete LLC (www.decrastoneblock.com)

- B. Acceptable Manufacturers - Masonry Accessories:
 - 1. Blok-Lok Ltd. (www.blok-lok.com)
 - 2. Dur-O-Wal. (www.dur-o-wal.com)
 - 3. Heckmann Building Products. (www.heckmannbuildingprods.com)
 - 4. Hohmann and Barnard, Inc. (www.h-b.com)
- C. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Concrete Masonry Units: Ground Face Block for 3' high veneer only.
 - 1. ASTM C129, solid or hollow non-load bearing type, normal weight.
 - 2. Size: Nominally 8 inches high x 16 inches long x 4 inches thick.
 - 3. Special shapes: Corners
 - 4. Surface finish: Ground and polished.
 - 5. Color: To be selected from manufacturer's full color range.
- B. Mortar: Specified in Section 04 0513.
- C. Veneer Ties: Corrugated formed sheet metal, minimum 1 inches wide x 7 inches long, 22 gage minimum thickness, hot dip galvanized, ASTM A153/A153M, B2 finish.
- D. Flashings: Polyvinyl chloride sheet, 20 mils minimum.
- E. Flashings:
 - 1. Rubberized asphalt laminated to plastic film, release paper facing, self-adhering.
 - 2. Termination mastic: Type recommended by flashing manufacturer.
- F. Flashings: Kynar finish galvalume.
- G. Weeps: Cotton rope cut straight and flush with masonry face
- H. Mortar Dropping Control: Preformed plastic mesh
- I. Joint Sealer: Specified in Section 07 9200.
- J. Cleaner: Type recommended by masonry manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

- A. Wet brick having an absorption rate in excess of 20 g per 30 square inches per minute as determined by ASTM C67 so that absorption rate when laid does not exceed this amount.
- B. Remove dirt, loose rust, and other foreign matter from reinforcement and anchors.

3.2 INSTALLATION

- A. Establish lines, levels and courses indicated. Protect from displacement.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
UNIT MASONRY**

SECTION 04-2000 – Page 4 of 5

- B. Maintain masonry courses to uniform dimensions. Form horizontal and vertical joints of uniform thickness.
- C. Lay concrete masonry in running bond. Course one masonry unit and one mortar joint to equal 8 inches.
- D. Lay masonry plumb and level. Do not adjust masonry units after mortar has set.
- E. Lay solid masonry units in full mortar bed, with full head joints. Lay hollow masonry units with face shell bedding on head and bed joints.
- F. Do not butter corners or excessively furrow joints.
- G. Machine cut masonry with straight cuts and clean edges; prevent oversized or undersized joints. Discard damaged units. Do not expose cut cells.
- H. Isolate masonry from structural members with compressible filler.
- I. When joining fresh masonry to partially set masonry, remove loose masonry and mortar; clean and lightly wet exposed surface of set masonry.
- J. Stop horizontal runs by racking back normal bond unit in each course. Toothing not permitted.
- K. Veneer Ties:
 - 1. Space ties to provide one tie per 2.67 square feet at maximum spacing of 32 inches on center horizontally.
 - 2. Locate ties within 12 inches of ends of masonry walls and openings.
- L. Control and Expansion Joints:
 - 1. Do not continue horizontal joint reinforcement through joints.
 - 2. Keep joints free from mortar and grout.
 - 3. Install joint backing and joint sealer at control joints in accordance with Section 07 9200.
 - 4. Form expansion joint as indicated on Drawings.
- M. Finishing Mortar Joints:
 - 1. Exposed locations: Tool joints to struck profile.
 - 2. Concealed locations: Cut joints flush.
- N. Flashings:
 - 1. Install flashing with outer edge flush with outside face of masonry; extend up backup 8 inches minimum and seal.
 - 2. Lap end joints 4 inches minimum and seal.
 - 3. Form end dams where flashing is stopped or interrupted.
 - 4. Apply trowel coat of mastic along flashing at top edge, seams, cuts, and penetrations.
- O. Weeps:
 - 1. Locate in head joints in first course above flashings at maximum 48 inches on center.
 - 2. Set weeps flush with exterior face of masonry
- P. Install mortar dropping control continuously in cavities above flashings.

- Q. Installation Tolerances; Maximum variation from:
1. Alignment of columns and pilasters: Plus or minus 1/4 inch.
 2. Alignment face to face of adjacent units: Plus or minus 1/8 inch.
 3. Vertical alignment of head joints: Plus or minus 1/2 inch in 10 feet.
 4. True plane of wall: Plus or minus 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.
 5. Plumb: Plus or minus 1/4 inch in 10 feet noncumulative; 1/2 inch in 20 feet or more.
 6. Level coursing: Plus or minus 1/8 inch in 3 feet; 1/4 inch in 10 feet; 1/2 inch in 30 feet.
 7. Joint thickness: Plus or minus 3/32 inch.
 8. Cross sectional thickness of walls: Plus or minus 1/4 inch.

3.3 CLEANING

- A. Protect adjacent and underlying surfaces.
- B. Apply masonry cleaner in accordance with manufacturer's instructions.
- C. Thoroughly rinse surfaces with clean water after completion of cleaning; remove all traces of cleaning solution.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Formed steel stud framing, exterior and interior walls.
 - 2. Formed steel joist framing.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Division 09: Metal Support Assemblies.

1.2 REFERENCES

- A. American Iron and Steel Institute (AISI) - Specification for the Design of Cold-Formed Steel Structural Members.
- B. American Society of Civil Engineers (ASCE) 7 - Minimum Design Loads for Buildings and Other Structures.
- C. American Welding Society (AWS) D1.3 - Structural Welding Code - Sheet Steel.
- D. ASTM International (ASTM):
 - 1. A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
 - 2. C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Board and Metal Plaster Bases.
 - 3. C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories.
 - 4. C1513 - Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
- E. Steel Framing Alliance (SFA).

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Indicate framing components, sizes, materials, finishes, and accessories.
 - 2. Shop drawings indicating all members, beams, jambs, sills, headers, connections, etc. required for complete installation of structural cold-formed framing.
- B. Quality Control Submittals:
 - 1. Certificates of Compliance: Certificate from Professional Structural Engineer responsible for light-gage structural framing system design, that system was designed in accordance with Contract Document requirements, applicable Building Codes, and generally accepted engineering practices.

1.4 QUALITY ASSURANCE

- A. Manufacturer and Installer Qualifications: Minimum 5 years documented experience in work of this Section.
- B. Manufacturer: Current member of SFA.
- C. All Structural Design framing shall be by a Professional Structural Engineer with minimum 5 years experience in the work of this Section and licensed in the State in which the Project is located.
- D. Design exterior wall stud system to withstand:
 - 1. Live and dead loads in accordance with adopted edition of the International Building Code.
 - 2. Wind pressure loads in accordance with adopted edition of the International Building Code.
- E. Design system to accommodate construction tolerances, deflection of building structural members, and clearances at openings.
- F. Welder Qualifications: AWS D1.3.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. California Expanded Metal Company. www.cemcosteel.com)
 - 2. ClarkDietrich Building Systems. (www.clarkdietrich.com)
 - 3. Marino Ware Industries. (www.marinoware.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Framing Materials:
 - 1. ASTM A1003/A1003M, galvanized sheet steel, G40 coating class.
 - 2. Fabricate components to ASTM C955.
 - 3. Studs: Channel profile, punched for utility access.
 - 4. Tracks:
 - a. Channel profile, same gauge and depth as studs, unpunched.
 - b. Top track: Deflection compensating type, deep leg runner with slotted screw holes; permit plus or minus 1/2 inch movement of overhead structure without damage to framing.
 - c. Top and Bottom track: 1-1/4 inch – 1 1/2 inch high legs.
 - 5. Joists: Channel profile, unpunched.
 - 6. Joist end closures: Channel profile, same gauge and depth as joists, unpunched.

2.3 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined by performance requirements specified.
- B. Plates, Gussets, Clips: Formed sheet steel, thickness determined by performance requirements specified.
- C. Fasteners: ASTM C1513; self-drilling, self-tapping screws.
- D. Touch Up Paint: SSPC Paint 20, Type I or II.

- E. Welding Materials: AWS D1.3; type required for materials being welded.

2.4 FABRICATION

- A. Framing components may be prefabricated using templates.
- B. Cut and fit members to tight fit.
- C. Assemble components using screw connection method.
- D. Fabricate straight, level, and true, without warp or rack.
- E. Fabrication Tolerances:
 - 1. Variation from indicated length: Maximum 1/4 inch for components up to 30 feet long; maximum 1/2 inch for components over 30 feet long.
 - 2. Variation from indicated height: Maximum 1/8 inch for components up to 5 feet high; maximum 1/4 inch for components over 5 feet high.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

- A. Install framing components in accordance with ASTM C1007, manufacturer's instructions, and approved Shop Drawings.
- B. Welding: In accordance with AWS D1.3.
- C. Make provisions for erection stresses. Provide temporary alignment and bracing.

3.2 INSTALLATION - STUD FRAMING

- A. Place top and bottom tracks in straight lines with ends butted. Fasten tracks at maximum 12 inches on center.
- B. Place studs at spacing indicated and not more than 2 inches from abutting walls and at each side of openings.
- C. Connect studs to top and bottom tracks using fastener method.
- D. Construct corners using minimum of three studs.
- E. Double studs at wall openings, door jambs, and window jambs.
- F. Do not splice studs.
- G. Erect studs, brace, and reinforce to develop full strength, to achieve design requirements.
- H. Install headers above openings and intermediate studs above and below openings to align with wall stud spacing.
- I. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- J. Diagonally brace walls at location indicated for shear construction.

3.3 INSTALLATION - JOISTS

- A. Place joists at spacings indicated and not more than 2 inches from abutting walls. Connect members to supports using fastener method.
- B. Set members parallel and level, with lateral bracing and bridging where indicated.
- C. Locate joists directly over bearing studs or load distribution member.
- D. Provide additional joists under parallel partitions when partition length exceeds one-half of joist span and around openings that interrupt one or more joists.
- E. Do not splice joists.
- F. Provide web stiffeners at reaction points and points of concentrated loads.
- G. Provide end blocking where joist ends are not otherwise restrained from rotation.

3.4 INSTALLATION TOLERANCES

- A. Maximum Variation from True Position: 1/8 inch.
- B. Maximum Variation of any Member from Plane: 1/4 inch.

3.5 ADJUSTING

- A. Touch up field connections and breaks in factory coatings with touch up paint applied in accordance with manufacturer's instructions.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Shop fabricated metal components.
 - 2. Gratings.
 - 3. Ladders and safety cages.
 - 4. Guard rails and handrails.
 - 5. Bollards.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. American Welding Society (AWS):
 - 1. D1.1 - Structural Welding Code - Steel.
- B. ASTM International (ASTM):
 - 1. A36/A36M - Standard Specification for Carbon Structural Steel.
 - 2. A123/A123M - Standard Specification for Zinc (Hot-Galvanized) Coatings on Iron and Steel Products.
 - 3. A283 - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars.
 - 4. A307 - Standard Specification for Carbon Steel Externally Threaded Standard Fasteners.
 - 5. A354 - Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners.
 - 6. A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 7. E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings.

1.3 SYSTEM DESCRIPTION

- A. Minimum design loads:
 - 1. Guard rails and handrails:
 - a. 50 pounds per linear foot applied in any direction at top, transferred via attachments and supports to building structure.
 - b. Concentrated 200 pound load applied in any direction at any point along top, transferred via attachments and supports to building structure.
 - c. Maximum deflection under loading: $L/120$.
 - 2. Concentrated and uniform loads do not need to be applied simultaneously.
- B. Fabricate guard rails and handrails in accordance with ASTM E985.

1.4 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Show dimensions, metal thicknesses, finishes, joints, attachments, and relationship of work to adjacent construction.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Minimum 10 years documented experience in work of this Section.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Substitutions: Under provisions of Division 01.

2.2 MATERIALS - STEEL

- A. Shapes: ASTM A36/A36M.
- B. Plate: ASTM A283.
- C. Checkered Plate: ASTM A1011/A1011M, diamond pattern.
- D. Sheet: ASTM A1008/A1008M.
- E. Pipe: ASTM A501.
- F. Tube: ASTM A500.
- G. Bars: ASTM A108.
- H. Bolts: ASTM A307, hexagonal head type.
- I. Primer Paint: SSPC Paint 15, Type 1, red oxide.
- J. Anchoring Cement: [Non-shrink cementitious] [Two component epoxy] type.

2.3 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items 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. Conceal fastenings where possible.
- G. Welding to conform to AWS [1.1
 1. Use welds for permanent connections where possible. Grind exposed welds smooth.
 2. Tack welds prohibited on exposed surfaces.

2.4 FINISHES

- A. Exterior Ferrous Metal: Galvanized; ASTM A123/A123M, to 1.3 ounces per square foot.
- B. Interior Ferrous Metal:
 - 1. Shop painted except steel to be encased in concrete and surfaces to be welded.
 - 2. Surface preparation: SSPC SP2 - Hand Tool Cleaning or SP3 - Power Tool Cleaning.
 - 3. Application: One coat; follow coating manufacturer's instructions.
 - 4. Minimum dry film thickness: 2.0 mils.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install items in accordance with approved Shop Drawings.
- B. Install components plumb, level, and rigid.
- C. Welding: AWS D1.1. Grind and fill exposed welds; finish smooth and flush.
- D. Install sleeved components with anchoring cement.
- E. Prevent contact of aluminum and dissimilar metals by use of zinc rich paint, bituminous coating, or non-absorptive gaskets.

3.2 ADJUSTING

- A. Clean and touch up damaged primer paint with same product as applied in shop.
- B. Clean and touch up galvanized coatings at welded and abraded surfaces in accordance with ASTM A780.

3.3 SCHEDULE

- A. This Schedule includes principal items only; refer to Drawings for additional items not listed.
- B. Guard Rails and Handrails:
 - 1. Fabricate from steel pipe or tube as drawn, stock of sizes and types indicated.
 - 2. Make bends uniform and free from buckles and other defects.
 - 3. Cut intersections square to within 1 degree and to length within 1/8 inch. Remove burrs from cut ends.
 - 4. Miter and cope intersections within 1 degree, fit to within 1/16 inch.
 - 5. Continuously weld connections.
 - 6. Where length exceeds that suitable for shipping and handling, fabricate in sections with concealed internal sleeves forming slip joints. Extend sleeves minimum 2 inches on both sides of joint; field weld and grind smooth.
- C. Bar Grating:
 - 1. NAAMM MBG 531, welded type.
 - 2. Fabricate supporting frame for opening size and configuration.
 - 3. Bearing bars: 1 1/2 inches deep x 3/16 inches wide, spaced 1 3/16 inch on center.
 - 4. Cross bars: Spaced 4" inches on center.
 - 5. Top surface: Serrated.

- D. Bollards:
1. Fabricate from steel pipe of sizes indicated.
 2. Set into concrete footing.
Fill pipe with concrete; rod to consolidate. Dome top to shed water.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Exterior gypsum wall sheathing: fiberglass-mat faced, moisture and mold resistant.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. C514 - Standard Specification for Nails for the Application of Gypsum Wallboard.
 - 2. C1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Board.
 - 3. C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
 - 4. C1280 - Standard Specification for Application of Gypsum Sheathing Board.
 - 5. C1396 - Standard Specification for Gypsum Board.
 - 6. D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Illustrate panel product types, thicknesses, and installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. GP Gypsum Corporation. (www.gp.com)
 - 2. National Gypsum Co. (www.nationalgypsum.com)
 - 3. Temple Inland. (<http://www.greenglassinfo.com>)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Exterior Sheathing:
 - 1. Type: ASTM C1177; 48" x 96" inches x 1/2 inch thick, maximum practical length, ends square cut, tongue and groove edges. "Densglass" or equivalent.

2.3 ACCESSORIES

- A. Fasteners: [ASTM C1002, Type W or S screws, hot-dip galvanized or fluoropolymer coated steel, minimum 1/2 inch penetration into framing.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with ASTM C1280 and manufacturer's instructions.
- B. Accurately cut panels to fit around openings and projections.
- C. Apply panels horizontally, tongue edge up, with ends occurring over supports. Stagger end joints in adjacent rows.

**** OR ****

- D. Apply panels vertically, with ends and edges occurring over supports.
- E. Fasten panels to framing at maximum 8 inches on center. Place fasteners minimum 3/8 inch from edges of panels; drive heads flush with surface. Stagger fasteners at abutting edges.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
ARCHITECTURAL WOOD CASEWORK**

SECTION 06 4100 – Page 1 of 4

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fabricated cabinet units.
 - 2. Plastic laminate surfaces.
 - 3. Shop finishing.
 - 4. Cabinet hardware.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 06 6116 - Solid Surfacing Fabrications.
 - 3. Section 07 9200 - Joint Sealers.

1.2 REFERENCES

- A. Architectural Woodwork Institute (AWI) Architectural Woodwork Standards.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings:
 - a. Include dimensioned plan, sections, elevations, and details, including interface with adjacent work.
 - b. Designate wood species and finishes.
 - 2. Samples:
 - a. 3 x 3 inch plastic laminate samples in each color and finish.
 - b. Each hardware component.
 - c. 12 inch long lumber samples for transparent finish.
 - d. 12 x 12 inch sheet product samples for transparent finish.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications:
 - 1. Minimum 10 years documented experience in work of this Section.
 - 2. Certified under AWI Quality Certification Program.
- B. Pre-Installation Conference:
 - 1. Convene 2 weeks prior to beginning work of this Section.
 - 2. Attendance: Architect, Owner, Contractor, installer, and related trades.
 - 3. Review, discuss and resolve:
 - a. Critical dimensions.
 - b. Product delivery and storage.
 - c. Staging and sequencing.
 - d. Protection of completed work.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver materials until proper protection can be provided, and until needed for installation.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT ARCHITECTURAL WOOD CASEWORK

SECTION 06 4100 – Page 2 of 4

1.6 PROJECT CONDITIONS

- A. Environmental Requirements: Maintain following conditions in building for minimum 7 days prior to, during, and after installation of casework:
 - 1. Temperature: 60 to 80 degrees F.
 - 2. Humidity: 30 to 70 percent.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Plastic Laminate:
 - 1. Formica Corp. (www.formica.com)
 - 2. Nevamar Co. (www.nevamar.com)
 - 3. Wilsonart International, Inc. (www.wilsonart.com)
- B. Substitutions: Not permitted.

2.2 MATERIALS

- A. Sheet Products:
 - 1. Graded in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 4 requirements for quality grade specified.
 - 2. Exposed and semi-exposed veneers: Species and cut of quality suitable for transparent finish.
 - 3. Exposed and semi-exposed veneers: Closed grain hardwood, of quality suitable for opaque finish.
 - 4. Sheet core: Plywood of thickness specified, or as appropriate for component.
- B. Lumber:
 - 1. Graded in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 3 requirements for quality grade specified, average moisture content of [6 percent.
 - 2. Exposed and semi-exposed veneers: Species and cut of quality suitable for transparent finish.
- A. Plastic Laminate: NEMA LD-3.
 - 1. High pressure decorative laminate:
 - a. Horizontal surfaces:
 - 1) Backing sheet: Grade BGF.
 - 2) Postformed surfaces: Grade HGP.
 - 3) Other surfaces: Grade HGS.
 - b. Vertical surfaces:
 - 1) Backing sheet: Grade BLF.
 - 2) Cabinet liner: Grade CLS.
 - 3) Other surfaces: Grade VGP.
 - 2. Colors: To be selected from manufacturer's full color range.
 - 3. Finish: Matte.

1.2 ACCESSORIES

- A. Solid Surfacing Countertops: Specified in Section 06 6116.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
ARCHITECTURAL WOOD CASEWORK**

SECTION 06 4100 – Page 3 of 4

- B. Fasteners: Type and size as required by conditions of use.
- C. Adhesives:
 - 1. Water based or solvent release type, compatible with backing and materials.
 - 2. Maximum volatile organic compound (VOC) content: 70 grams per liter.
- D. Finish Hardware: As scheduled at end of Section.
- E. Joint Sealers: Specified in Section 07 9200.

1.3 FABRICATION

- A. Cabinets - Plastic Laminate Finish:
 - 1. Quality: AWI/AWMAC/WI Architectural Woodwork Standards, Section 10, Custom Grade.
 - 2. Construction type: Face frame.
 - 3. Interface style: Overlay.
 - 4. Semi-exposed surfaces: High pressure decorative laminate. Fit exposed and semi-exposed sheet edges with matching laminate edging.
 - 5. Fabricate drawer bodies to full depth of drawer fronts less 1/2 inch.
- B. Cabinets - Transparent Finish:
 - 1. Quality: AWI/AWMAC/WI Architectural Woodwork Standards, Section 10, Premium Grade.
 - 2. Construction type: Face frame
 - 3. Interface style: Overlay.
 - 4. Semi-exposed surfaces: Wood to match exposed surfaces.
 - 5. Fit exposed and semi-exposed sheet edges with matching wood edging.
 - 6. Fabricate drawer bodies to full depth of drawer fronts less 1/2 inch.
- C. Shop assemble for delivery to project site in units easily handled.
- D. Prior to fabrication, field verify dimensions to ensure correct fit.
- E. Apply plastic laminate in full uninterrupted sheets; fit corners and joints to hairline. Slightly bevel arises. Apply laminate backing sheet to reverse side of laminate faced surfaces.
- F. Where field fitting is required, provide ample allowance for cutting. Provide trim for scribing and site conditions.
- G. Provide cutouts and reinforcement for plumbing, electrical, appliances, and accessories. Prime paint surfaces of cut edges.

1.4 FINISHES

- A. Factory Finishing:
 - 1. Factory finish casework in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 5.
 - 2. Finish system: Polyurethane, catalyzed or acrylic.
 - 3. Color: Custom color to be selected.
 - 4. Sheen: Satin.

PART 2 EXECUTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
ARCHITECTURAL WOOD CASEWORK**

SECTION 06 4100 – Page 4 of 4

2.1 PREPARATION

- A. Prior to installation, condition cabinets to average humidity that will prevail after installation.

2.2 INSTALLATION

- A. Install in accordance with AWI/AWMAC/WI Architectural Woodwork Standards.
- B. Set plumb, rigid and level.
- C. Scribe to adjacent construction with maximum 1/16 inch gaps.
- D. Adhere countertops, splashes, and skirts with beads of adhesive.
- E. Fill joints between cabinets, tops, splashes, and adjacent construction with joint sealer as specified in Section 07 9200; finish flush.

2.3 FINISH HARDWARE SCHEDULE

DESCRIPTION	MANUFACTURER	MODEL
Door and drawer pulls	Amerock	
Drawer slide	Knape & Vogt	
Door hinge	Knape & Vogt	
Cabinet lock	Knape & Vogt	
Adjustable shelf standards and brackets	Knape & Vogt	

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior wood trim.
 - 2. Shop finishing.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. American Wood Protection Association (AWPA) U1 - Use Category System - User Specification for Treated Wood.
- B. Architectural Woodwork Institute/Architectural Woodwork Manufacturers of Canada/Woodwork Institute (AWI/AWMAC/WI) - Architectural Woodwork Standards.
- C. ASTM International (ASTM) E84 - Standard Test Method for Surface Burning Characteristics of Materials.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings:
 - a. Include dimensioned plans, sections, elevations, and details, including interface with adjacent work.
 - b. Designate wood species and finishes.
 - 2. Samples: 12 inch long samples of each profile.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications:
 - 1. Minimum 10 years documented experience in work of this Section.
 - 2. Certified under AWI/AWMAC/WI Quality Certification Program.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver materials until proper protection can be provided, and until needed for installation.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements: Maintain following conditions in building for minimum 7 days prior to, during, and after installation of interior trim:
 - 1. Temperature: 60 to 80 degrees F.
 - 2. Humidity: 30 to 60 percent.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Interior Trim:
 - 1. Graded in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 3 requirements for quality grade specified, average moisture content of 6 percent.
 - 2. Species and cut of quality suitable for transparent finish.

2.3 ACCESSORIES

- A. Fasteners: Type and size as required by conditions of use; plain steel for interior use; hot dip galvanized steel for exterior use.
- B. Adhesives:
 - 1. Water based or solvent release type, compatible with trim and substrate materials.
 - 2. Maximum volatile organic compound (VOC) content: 30 grams per liter.

2.4 FABRICATION

- A. Quality: AWI/AWMAC/WI Architectural Woodwork Standards, Section 6, Custom Grade.
- B. Where field fitting is required, provide ample allowance for cutting.
- C. Groove back of trim applied to flat substrate, except do not groove exposed ends.
- D. Fire Retardant Treatment; treat wood in accordance with AWPA U1:
 - 1. Interior locations: Category UCFA - Fire Retardant/Interior.
 - 2. Exterior locations: Category UCFB - Fire Retardant/Exterior.

2.5 FINISHES

- A. Factory Finishing:
 - 1. Factory finish interior trim in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 5.
 - 2. Finish system: Stained wood and clear polyurethane finish.
 - 3. Color: Custom color to be selected.
 - 4. Sheen: Satin.

PART 3 EXECUTION

3.1 PREPARATION

- A. Prior to installation, condition wood to average humidity that will prevail after installation.
- B. Back prime wood installed against masonry or cementitious materials prior to installation.

3.2 INSTALLATION

- A. Install in accordance with AWI/AWMAC/WI Architectural Woodwork Standards.
- B. Install in longest practical lengths.
- C. Set plumb and level.
- D. Miter ends, corners, and intersections.
- E. Scribe to adjacent construction with maximum 1/8 inch gaps.
- F. Fasten or adhere to supporting construction.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Solid surfacing countertops with sink bowls.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 07 9200 - Joint Sealers.

1.2 REFERENCES

- A. ASTM International (ASTM) E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Indicate dimensions, component sizes, fabrication details, attachment provisions and coordination requirements with adjacent work.
 - 2. Product Data: Indicate product description, fabrication information and compliance with specified performance requirements.
- B. Closeout Submittals:
 - 1. Maintenance Data: Include recommended cleaning materials and procedures and damage repair.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Minimum 10 years documented experience in work of this Section.
- B. Fire Hazard Classification: Class A flame spread/smoke developed rating, tested to ASTM E84.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Avonite Surfaces. (www.avonitesurfaces.com)
 - 2. DuPont. (www.corian.com)
 - 3. Formica Corp. (www.formica.com)
 - 4. Wilsonart International, Inc. (www.wilsonart.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Solid Surfacing:
 - 1. Material: Homogenous sheet material composed of acrylic resins and coloring agents.
 - 2. Thickness: 1/2 inch.
 - 3. Color: To be selected from manufacturer's full color range.
 - 4. Surface finish: Satin

- B. Sinks: Molded sinks are not included on this project.

2.3 ACCESSORIES

- A. Adhesive:
 - 1. Type recommended by solid surfacing manufacturer.
 - 2. Maximum volatile organic compound (VOC) content: 70 grams per liter.
- B. Joint Sealer: Specified in Section 07 9200.

2.4 FABRICATION

- A. Fabricate components in shop to sizes and shapes indicated, in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Fabricate splashes and skirts from solid surfacing in color to match countertops.
- C. Form joints to be inconspicuous in appearance and without voids. Join pieces with adhesive.
- D. Provide holes and cutouts for mounting of sinks, trim, and accessories.
- E. Finish exposed edges to smooth, uniform bullnose profile.
- F. Allowable Tolerances:
 - 1. Maximum variation in size: 1/16 inch.
 - 2. Maximum variation in location of openings: 1/8 inch from indicated location.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Set plumb, level, and rigid.
- C. Adhere countertops, splashes, and skirts with beads of adhesive.
- D. Seal perimeter with joint sealer as specified in Section 07 9200. Finish smooth and flush.
- E. Allowable Tolerances:
 - 1. Maximum variation from level and plumb: 1/8 inch in 10 feet, noncumulative.
 - 2. Maximum variation in plane between adjacent pieces at joint: Plus or minus 1/32 inch.

3.2 ADJUSTING

- A. Sand out minor scratches and abrasions.

3.3 PROTECTION

- A. Protect surfaces from damage with nonstaining coverings.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Batt insulation in exterior wall and interior wall assemblies.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. C665 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Wood Frame and Light Construction Buildings.
 - 2. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C.

1.3 SUBMITTALS

- A. Quality Control Submittals:
 - 1. Certificates of Compliance: Certification from an independent testing laboratory that insulation meets fire hazard classification requirements.

1.4 QUALITY ASSURANCE

- A. Fire Hazard Classification:
 - 1. Noncombustible, tested to ASTM E136.
 - 2. Flame spread/smoke developed rating of 25 or less, tested to ASTM E84.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store insulation in clean, dry, sheltered area, off ground or floor, until used. Protect against wetting and moisture absorption.

1.6 PROJECT CONDITIONS

- A. Do not install until insulation until building is substantially water and weather tight.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Johns Manville. (www.jm.com)
 - 2. Knauf Insulation. (www.knaufusa.com)
 - 3. Owens Corning. (www.owenscorning.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Thermal Batt Insulation:
 - 1. Type: ASTM C665, glass fiber composition.

2. Facing: Aluminum foil vapor barrier on one side.(For vapor transmittance)
3. Type: ASTM C665, glass fiber composition.
4. Facing: Unfaced. (For sound transmittance)
5. Type: ASTM C665, glass fiber composition.
6. Facing: White vinyl on one side (For building thermal transmittance)
7. Free from urea-formaldehyde resins.
8. Thermal resistance:
 - a. 3-1/2 inches thick: R-value of 11.00.
 - b. 3-5/8 inches thick: R-value of 13.00.
 - c. 6-1/4 inches thick: R-value of 19.00.
 - d. 6-1/2 inches thick: R-value of 22.0.
 - e. 8-1/2 inches thick: R-value of 25.0.
 - f. 9 inches thick: R-value of 26.0.
 - g. 10 inches thick: R-value of 30.00.
 - h. 12 inches thick: R-value of 38.00.

2.3 ACCESSORIES

- A. Tape: Minimum 2 inches wide, pressure sensitive, foil faced, waterproof.
- B. Wire Mesh: Hexagonal galvanized steel mesh.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Friction fit between framing members.
- B. Retain in place with wire mesh secured to framing.
- C. Butt insulation to adjacent construction. Butt ends and edges.
- D. Carry insulation around pipes, wiring, boxes, and other components.
- E. Ensure complete enclosure of spaces without voids.
- F. Apply with vapor barrier facing towards interior of structure.
- G. Tape seal lapped flanges, butt ends, and tears and holes in facings.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Sheet materials for controlling moisture movement at exterior wall assemblies.
 - 2. Sheet underlayment for controlling moisture movement at roof assemblies.
 - 3. Liquid materials for controlling moisture movement at landscape planters.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. E96/E96M - Standard Test Method for Water Vapor Transmission of Materials.
 - 2. E2178 - Standard Test Method for Air Permeance of Building Materials.
 - 3. E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

1.3 QUALITY ASSURANCE

- A. Provide continuous barrier to moisture infiltration, air infiltration and exfiltration, and water vapor transmission, flashed to discharge incidental condensation and water penetration.

1.4 SUBMITTALS

- A. Product specification sheets.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Sheet Moisture Barriers:
 - 1. W. R. Grace (www.grace.com)
 - 2. Atas International (www.atas.com)
 - 3. DuPont Tyvek (www.dupont.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Moisture Barrier:
 - 1. Description: ASTM D1970; polymer modified asphalt laminated to polymer coated synthetic woven material, self adhering, with release paper facing.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT MOISTURE BARRIERS

SECTION 07 2800 – Page 2 of 3

2. Thickness: 45 mils
 3. Thermal Stability: 240 degrees F.
 4. Elongation: Minimum 250 percent, tested to ASTM D412.
 5. Tensile strength: Minimum 250 PSI, tested to ASTM D412.
 6. Water vapor transmission: Maximum 0.01 grains per square foot, tested to ASTM E96.
 7. Air permeance: Maximum 0.0002 CFM per square foot at 0.3 inch water differential pressure, tested to ASTM E2178.
 8. Assembly air permeance: Maximum 0.0008] CFM per square foot at 0.3 inch water differential pressure, tested to ASTM E2357.
- B. Weather Resistant Barrier (WRB):
1. Commercial grade air and water barrier designed for use between reinforced gypsum sheathing and metal wall panels. Flash spunbonded high density polyethylene fiber sheets with extended UV protection. Meet or exceed ASHRAE 90.1, IECC, and AASTM E2357.

2.3 ACCESSORIES

- A. Joint Tape: Minimum 2 inches wide, pressure sensitive, waterproof, compatible with moisture barrier and of type recommended by moisture barrier manufacturer.
- B. Flashing Sheet: Self adhering, rubberized asphalt laminated to HPDE facing, minimum 30 mil thick. Type recommended by moisture barrier manufacturer.
- C. Primer: Type recommended by moisture barrier manufacturer.
- D. Patching Compound: Type recommended by moisture barrier manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

- A. Clean surfaces to receive moisture barrier; remove loose and foreign matter that could impair adhesion or performance.
- B. Protect adjacent and underlying surfaces.
- C. Fill voids, holes, and cracks over 1/16 inch in width with patching compound; finish flush with adjacent surfaces. Apply one coat of moisture barrier over patched areas and allow to dry.
- D. Apply joint tape centered over sheathing joints. Lap ends 2 inches minimum Press to full bond with substrate without voids, wrinkles, bridging, or fishmouths.

1.1 INSTALLATION - SHEET MOISTURE BARRIERS

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
MOISTURE BARRIERS**

SECTION 07 2800 – Page 3 of 3

- A. Provide complete and continuous barrier.
- B. Apply primer when required by moisture barrier manufacturer.
- C. Install moisture barrier without tears, voids, and holes. Begin application at low point; weatherlap succeeding courses minimum 6 inches.
- D. Lap ends 6 inches minimum. Tape seal lapped ends and edges.
- E. Press to full bond with substrate without voids, wrinkles, bridging, or fishmouths.
- F. Seal to door and window frames, around penetrations, and at perimeter.

1.2 APPLICATION - FLUID APPLIED MOISTURE BARRIERS

- A. Apply moisture barrier in accordance with manufacturer's instructions.
- B. Apply primer to joints in substrate, inside and outside corners, and around perimeter and penetrations. Joint tape over primer; press to full bond with substrate.
- C. Apply moisture barrier by roller or spray to continuous and uniform coverage with minimum mil thickness as recommended by manufacturer.
- D. Seal to door and window frames, around penetrations, and at perimeter with flashing sheet. Press to full bond with substrate without voids, wrinkles, bridging, or fishmouths.

1.3 FIELD QUALITY CONTROL

- A. Inspect moisture barrier for damage just prior to covering.
- B. Clean damaged areas and cover with additional moisture barrier material minimum 6 inches larger than damaged area on all sides. Seal to main moisture barrier with continuous tape.

END OF SECTION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT METAL ROOF PANELS

SECTION 07 4113 – Page 1 of 4

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Preformed metal roof panel system.
 - 2. Underlayment.
 - 3. Flashings, trim, anchorage, and accessories.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 07 9200 - Joint Sealers.

1.2 REFERENCES

- A. American Society of Civil Engineers (ASCE) 7 - Minimum Design Loads for Buildings and Other Structures.
- B. American Architectural Manufacturers Association (AAMA):
 - 1. 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
- C. ASTM International (ASTM):
 - 1. A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 3. E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
 - 4. E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
- D. Energy Star Submittals for Review:
 - 1. Shop Drawings: Show configuration of panels, trim members, and closures.
 - 2. Product Data: Show system components including panels, trim, and accessories.
 - 3. Warranty: Sample warranty form.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 10 years documented experience in work of this Section.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Protect panels from contact with materials that could cause staining or discoloration of finish.

1.7 PROJECT CONDITIONS

- A. Do not install underlayment at ambient or surface temperatures less than 40 degrees F or on wet or frozen substrate.
- B. Do not install panels on wet or frozen substrate.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
METAL ROOF PANELS**

SECTION 07 4113 – Page 2 of 4

1.8 WARRANTIES

- A. Furnish manufacturer's 30 year warranty providing coverage against rupture, perforation, or structural failure of aluminum-zinc alloy coated panels.
- B. Furnish manufacturer's / installer's 30 year warranty providing coverage against water leakage through roofing system.
 - 1. Make repairs to roofing system required due to defects in materials or workmanship resulting in water leakage into or through roofing system.
 - 2. Include cost of labor and materials necessary to make required repairs.
 - 3. Not limited to specific dollar amount.
 - 4. Transferable to subsequent building owners during warranty period.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. AEP-Span. (www.aepspan.com)
 - 2. Berridge Manufacturing Co. (www.berridge.com) Cee-Lock Panel
 - 3. Centria Architectural Systems. (www.centria.com)
 - 4. Fabral. (www.fabral.com)
 - 5. MBCI. (www.mbc.com) LokSeam Panel
 - 6. Pac Clad (www.pac-clad.com) Snap-Clad Panel

BASIS OF DESIGN: MBCI ULTRA-DEK – 24 GA. 18" OR 24" WIDE CONCEALED FASTENING SYSTEM, SMOOTH PANEL.

- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Aluminum-Zinc Alloy Coated Steel Sheet:
 - 1. ASTM A792, Commercial Quality, AZ50 aluminum-zinc alloy coating.
- B. Underlayment:
 - 1. ASTM E108 Class A Fire Rating, Commercial Quality Synthetic Roofing Underlayment, minimum 30 mils. Self-adhering type or mechanically attached.

2.3 ACCESSORIES

- A. Fasteners:
 - 1. Underlayment: Hot-dip galvanized steel screws, length to penetrate minimum 3/4 inch into sheathing.
 - 2. Panels and trim: 300 Series stainless steel, type best suited to application; head color to match panels where exposed, with neoprene gasketed washers.
- B. Panel Clips: Hot-dip galvanized steel, thermally responsive, designed to fit between two adjacent panels and secure both panels.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
METAL ROOF PANELS**

SECTION 07 4113 – Page 3 of 4

- C. Panel End Closures: Sponge neoprene, cut to fit panel configuration, minimum 1 inch depth.
- D. Joint Sealers: Specified in Section 07 9200.

2.4 FABRICATION

- A. Fabricate panels from minimum 24 gage aluminum-zinc alloy coated steel sheet.
- B. Provide in maximum length possible. Avoid lapping when possible.
- C. Panel Profile:

3" tall trapezoidal seam, concealed fastening system, 18" or 24" wide panel, straited with 2 ribs.
Basis of Design: MBCI ULTRA-DEK – 24 ga.
- D. Trim: Profiles as indicated or as required, fabricated from same material as panels.
- E. Roll form panels and trim to required profiles in longest practical lengths.

2.5 FINISHES

- A. Panels and Trim: AAMA 621, fluoropolymer coating containing minimum 70 percent PVDF resins, custom color to be selected from manufacturer's full color range.

PART 3 EXECUTION

3.1 INSTALLATION OF UNDERLAYMENT

- A. Starting at low edge, apply one ply of underlayment horizontally over substrate.
- B. Where unavoidable, lap ends 6 inches minimum.
- C. Fasten top of each strip under overlapping strip to hold strip in position until roofing panels are installed.
- D. Extend flashing minimum 4 inches up abutting vertical surfaces.

3.2 INSTALLATION OF METAL PANELS

- A. Install in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Install aligned, level, and plumb.
- C. Fasten panels using concealed panel clips.
- D. Install panels in continuous lengths from eave to ridge without end joints.
- E. Install trim to maintain visual continuity of system.
- F. Install joint sealers and gaskets to prevent water penetration.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
METAL ROOF PANELS**

SECTION 07 4113 – Page 4 of 4

- G. Flash penetrations through roofing with metal trim to match panels:
 - 1. Lap flashings over roof panels 12 inches minimum on all sides and seal with double bead of joint sealer.
 - 2. Install metal draw band and joint sealer at top of pipe penetrations.
 - 3. Install water diverter at uphill side of square and rectangular penetrations.

- H. Installation Tolerances:
 - 1. Variation from location: Plus or minus 1/4 inch.
 - 2. Variation from plane: 1/4 inch in 10 feet.

3.3 ADJUSTING

- A. Touch up field cuts and abrasions on finished surfaces to match factory finish.

END OF SECTION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT METAL WALL PANELS

SECTION 07 4213 – Page 1 of 3

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Preformed metal wall panel system.
 - 2. Flashings, trim, anchorage, and accessories.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 07 9200 - Joint Sealers.

1.2 REFERENCES

- A. American Society of Civil Engineers (ASCE) www.asce.org7 - Minimum Design Loads for Buildings and Other Structures.
- B. ASTM International (ASTM)www.astm.org:
 - 1. A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 3. E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements: Design system to withstand:
 - 1. Live loads in accordance with International Building Code.
 - 2. Minimum wind pressures in accordance with International Building Code, with maximum allowable deflection of L/180, tested in accordance with ASTM E330.
 - 3. Movement caused by an ambient temperature range of 120 degrees F and a surface temperature range of 160 degrees F.

1.4 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Show configuration of panels, trim members, and closures.
 - 2. Product Data: Show system components including panels, trim, and accessories.
 - 3. Warranty: Sample warranty form.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 10 years documented experience in work of this Section.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Protect panels from contact with materials that could cause staining or discoloration of finish.

1.7 PROJECT CONDITIONS

- A. Do not install panels on wet or frozen substrate.

1.8 WARRANTIES

- A. Furnish manufacturer's 30 year warranty providing coverage against rupture, perforation, or structural failure of aluminum-zinc alloy coated panels.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:

Horizontal Panels:

1. MBCI. (www.mbc.com) Basis of Design: Masterline 16 concealed fastener metal wall panels, Coverage width 16", 24 ga. Smooth finish. Horizontal installation.
2. Berridge (www.berridge.com) Basis of Design: HR-16 concealed fastener metal wall panels, Coverage width 16", 24 ga. Smooth finish. Horizontal installation.

Vertical Panels # 1

1. MBCI (www.mbc.com) Basis of Design: PBR exposed fastener metal wall panels, Coverage width 36", 4 rib, 26 ga. Smooth finish. Vertical installation.
2. Berridge (www.berridge.com) Basis of Design: R panel exposed fastener metal wall panels, Coverage width 36", 4 rib, 26 ga. Smooth finish. Vertical installation.

Vertical Panels # 2

1. MBCI. (www.mbc.com) Basis of Design: FW-120-1 concealed fastener metal wall panels, Coverage width 12", 6" bead, 24 ga. Smooth finish. Vertical installation.
2. Berridge (www.berridge.com) Basis of Design: FW-112 concealed fastener metal wall panels, Coverage width 12", 6" bead, 24 ga. Smooth finish. Vertical installation.

- B. Substitutions: Not permitted.

2.2 MATERIALS

- A. Aluminum-Zinc Alloy Coated Steel Sheet:
 1. ASTM A792, Commercial Quality, AZ50 aluminum-zinc alloy coating.

2.3 ACCESSORIES

- A. Fasteners: 300 Series stainless steel, type best suited to application; head color to match panels where exposed, with neoprene gasketed washers.
- B. Panel Clips: Hot-dip galvanized steel, thermally responsive, designed to fit between two adjacent panels and secure both panels.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
METAL WALL PANELS**

SECTION 07 4213 – Page 3 of 3

- C. Panel End Closures: Sponge neoprene, cut to fit panel configuration, minimum 1 inch depth.
- D. Joint Sealers: Specified in Section 07 9200.

2.4 FABRICATION

- A. Trim: Profiles as indicated or as required, fabricated from same material as panels.
- B. Roll form panels and trim to required profiles in longest practical lengths.

2.5 FINISHES

- A. Panels and Trim: AAMA 621, fluoropolymer coating containing minimum 70 percent PVDF resins, color to be selected from manufacturer's full color range.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Install panels horizontally in strict accord with manufacturer's instructions, aligned, level, and plumb.
- C. Fasten panels to supports with exposed fasteners, aligned, straight, and true with adjacent fastenings.
- D. Locate panel joints over supports.
- E. Lap end joints 4 inches minimum.
- F. Install trim to maintain visual continuity of system.
- G. Install joint sealers and gaskets to prevent water penetration.
- H. Installation Tolerances:
 - 1. Variation from location: Plus or minus 1/4 inch.
 - 2. Variation from plane: 1/4 inch in 10 feet.

3.2 ADJUSTING

- A. Touch up field cuts and abrasions on finished surfaces to match factory finish.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Copings.
 - 2. Edge flashings.
 - 3. Gutters and downspouts.
 - 4. Flashings at metal roofing.
 - 5. Counterflashings over membrane roof base flashings.
 - 6. Counterflashings at roof mounted equipment and utility penetrations.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 07 9200 - Joint Sealers.

1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 1. 611 - Voluntary Specification for Anodized Architectural Aluminum.
 - 2. 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
 - 3. 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Architectural Extrusions and Panels.
 - 4. 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Architectural Extrusions and Panels.
- B. American National Standards Institute/Single Ply Roofing Institute (ANSI/SPRI) ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
- C. ASTM International (ASTM):
 - 1. A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
 - 2. A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - 3. A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 4. B32 - Standard Specification for Solder Metal.
 - 5. B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 6. B370 - Standard Specification for Copper Sheet and Strip for Building Construction.
 - 7. B506 - Specification for Copper-Clad Stainless Steel Sheet and Strip for Building Construction.
 - 8. B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products.
- D. Sheet Metal and Air Conditioning Manufacturer's Association International (SMACNA) - Architectural Sheet Metal Manual.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Show locations, types and thicknesses of metal, profiles, dimensions, fastening methods, provisions for expansion and contraction, and joint details.

1.4 QUALITY ASSURANCE

- A. Fabricator and Installer Qualifications: Minimum 10 years documented experience in work of this Section.
- B. Design, fabricate, and install metal copings, gravel stops, and edge flashings in accordance with ANSI/SPRI ES-1.
- C. Conform to SMACNA Manual for nominal sizing of gutters and downspouts for rainfall intensity determined by a storm occurrence of 1 in 5 years.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Precoated Aluminum-Zinc Alloy Coated Steel Sheet:
 - 1. ASTM A792/A792M, Commercial Quality, AZ50 aluminum-zinc alloy coating, 24 gage core steel unless noted otherwise.
 - 2. Finish: AAMA 621, fluoropolymer coating, containing minimum 70 percent PVDF resins, color to be selected from manufacturer's full color range.

2.2 ACCESSORIES

- A. Solder: ASTM B32.
- B. Fasteners: Same material and finish as sheet metal, with neoprene gasketed washers where exposed.
- C. Joint Sealers: Specified in Section 07 9200.

2.3 FABRICATION

- A. Fabricate components in accordance with SMACNA Manual.
- B. Profiles:
 - 1. Gutters: 6 X 6 Box Gutters. See exact profile on Drawings.
 - 2. Downspouts: 4" x 5", 24 gage.
 - 3. Fabricate end caps, downspout outlets and headers, straps, brackets, and downspout strainers in profile to suit gutters and downspouts.
- C. Solder shop formed joints. After soldering, remove flux and wash clean.
- D. Fabricate corners in single units with minimum 24 inch long legs. Miter corners.
- E. Fabricate vertical faces with bottom edge formed outward 1/2 inch and hemmed to form drip.
- F. Form sections accurate to size and shape, square and free from distortion and defects.
- G. Provide for thermal expansion and contraction in sheet metal:
 - 1. Gutters:
 - a. Place expansion joints at maximum 50 feet on center.
 - b. Locate expansion joints between downspouts; prevent water flow over joint.

- 2. Other sheet metal:
 - a. Provide expansion joints in sheet metal exceeding 15 feet in running length.
 - b. Place expansion joints at 10 feet on center maximum and maximum 2 feet from corners and intersections.
- 3. Joint width: Consistent with types and sizes of materials, minimum width 1/8 inch.
- H. Fabricate expansion joints in metal copings, edge flashings, and gravel stops with backing and cover plates formed to flashing profile, minimum 8 inches long.
- I. Unless otherwise indicated, provide minimum 3/4 inch wide flat lock seams; lap in direction of water flow.
- J. Fabricate cleats and starter strips of same material as sheet metal.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install flashing and sheet metal as indicated and in accordance with SMACNA Manual.
- B. Install cleats and starter strips before starting installation of sheet metal. Fasten at 6 inches on center maximum.
- C. Secure flashings with concealed fasteners where possible.
- D. Apply plastic cement between metal and bituminous flashings.
- E. Fit flashings tight, with square corners and surfaces true and straight.
- F. Seam and seal field joints.
- G. Separate dissimilar metals with bituminous coating or non-absorptive gaskets.
- H. Reglets:
 - 1. Install reglets true to line and level. Seal top of surface mounted reglet with joint sealer.
 - 2. Install flashings into reglets to form tight fit. Secure with lead or plastic wedges at 9 inches on center maximum. Seal remaining space with joint sealer.
- I. Gutters: Secure with straps spaced maximum 36 inches on center and within 12 inches of ends.
- J. Downspouts:
 - 1. Secure with hidden, offset downspout brackets spaced maximum 8 feet on center and within 2 feet of ends and elbows.
 - 2. Flash downspouts into gutters and fasten.
 - 3. Flash upper sections into lower sections minimum 2 inches at joints; fasten sections together.
- K. Apply joint sealers as specified in Section 07 9200.

3.2 CLEANING

- A. Clean sheet metal; remove slag, flux, stains, spots, and minor abrasions without etching surfaces.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Joint backup materials.
 - 2. Joint sealers.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. C510 - Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants.
 - 2. C719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
 - 3. C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants.
 - 4. C834 - Standard Specification for Latex Sealing Compounds.
 - 5. C919 - Standard Practice for Use of Sealants in Acoustical Applications.
 - 6. C920 - Standard Specification for Elastomeric Joint Sealants.
 - 7. C1193 - Standard Guide for Use of Joint Sealants.
 - 8. C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants.
 - 9. C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
 - 10. D2203 - Standard Test Method for Staining from Sealants.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Indicate sealers, primers, backup materials, bond breakers, and accessories proposed for use.
 - 2. Warranty: Sample warranty form.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Minimum 10 years documented experience in work of this Section.
- B. Maximum Volatile Organic Compound (VOC) Content; interior sealers and accessories:
 - 1. Sealants 250 grams per liter.
 - 2. Primers for non-porous substrates: 250 grams per liter.
 - 3. Primers for porous substrates: 775 grams per liter.
- C. Laboratory Pre-Construction Testing:
 - 1. Obtain representative samples of actual substrate materials.
 - 2. Test sealers and accessories for following:
 - a. Adhesion: Test to ASTM C794 and ASTM C719; determine surface preparation and required primer.
 - b. Compatibility: Test to ASTM C1087; determine that materials in contact with sealers do not adversely affect sealant materials or sealant color.
 - c. Staining: Test to ASTM D2203, ASTM C510, or ASTM C1248; determine that sealants will not stain joint substrates.

- d. Pre-construction testing is not required when sealant manufacturer furnishes data acceptable to Architect based on previous testing for materials matching those of this Project.
- D. Field Pre-Construction Testing: Test each joint sealer and joint substrate before beginning work of this Section:
 - 1. Install sealers in mockups using joint preparation methods and materials recommended by sealer manufacturer.
 - 2. Install field-test joints in inconspicuous location.
 - 3. Test sealers using manufacturer's standard field adhesion test; verify joint preparation and primer required to obtain optimum adhesion of sealants to joint substrate.
 - 4. When test indicates sealant adhesion failure, modify joint preparation, primer, or both and retest until joint passes sealant adhesion test.

1.5 PROJECT CONDITIONS

- A. Do not apply sealers at temperatures below 40 degrees F unless approved by sealer manufacturer.

1.6 WARRANTIES

- A. Furnish manufacturer's and applicator's 10 year warranty providing coverage for sealers and accessories that fail to provide air and water tight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Metzer/McGuire. (www.metzermcguire.com)
 - 2. BASF Building Systems. (www.buildingsystems.basf.com)
 - 3. Dow Corning Corp. (www.dowcorning.com)
 - 4. GE Silicones. (www.siliconeforbuilding.com)
 - 5. Pecora Corp. (www.pecora.com)
 - 6. Sika Corp. (www.sikausa.com)
 - 7. Tremco, Inc. (www.tremcosealants.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Joint Sealer Type 1: Pavement
 - 1. ASTM C920, Grade P, multiple component polyurethane type, self-leveling and slope grades.
 - 2. Movement capability: Plus or minus 50 percent.
 - 3. Color: To be selected from manufacturer's full color range.
- B. Joint Sealer Type 2: Exterior
 - 1. ASTM C920, Grade NS, single component butyl rubber type, non sag.
 - 2. Movement capability: Plus or minus 12-1/2 percent.
 - 3. Color: To be selected from manufacturer's full color range.
- C. Joint Sealer Type 3: Interior
 - 1. ASTM C834, single component acrylic latex, non sag.
 - 2. Movement capability: Plus or minus 25 percent.

3. Color: White, paintable.
- A. Joint Sealer Type 4: Damp Locations
 1. ASTM C920, Grade NS, single component silicone, non sag, mildew resistant.
 2. Movement capability: Plus or minus 25 percent.
 3. Color: To be selected from manufacturer's full color range.
- B. Joint Sealer Type 5:
 1. ASTM C920, Grade NS, single component polyurethane or polysulfide type, non sag, recommended by manufacturer for continuous water immersion.
 2. Movement capability: Plus or minus 25 percent.
 3. Color: To be selected from manufacturer's full color range.
- C. Joint Sealer Type 6:
 1. ASTM C834, single component acrylic latex, non sag, non-hardening, recommended by manufacturer for acoustical applications.
 2. Movement capability: Plus or minus 5 percent.
 3. Color: White, paintable.

2.2 ACCESSORIES

- A. Primers, Bondbreakers, and Solvents: As recommended by sealer manufacturer.
- B. Joint Backing:
 1. ASTM C1330, closed cell polyethylene foam, preformed round joint filler, non absorbing, non staining, resilient, compatible with sealer and primer, recommended by sealer manufacturer for each sealer type.
 2. Size: Minimum 1.25 times joint width.

2.3 MIXES

- A. Mix multiple component sealers in accordance with manufacturer's instructions.
 1. Mix with mechanical mixer; prevent air entrainment and overheating.
 2. Continue mixing until color is uniform.

PART 3 EXECUTION

3.1 PREPARATION

- A. Remove loose and foreign matter that could impair adhesion. If surface has been subject to chemical contamination, contact sealer manufacturer for recommendation.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Protect adjacent surfaces with masking tape or protective coverings.
- D. Sealer Dimensions:
 1. Minimum joint size: 1/4 x 1/4 inch.
 2. Joints 1/4 to 1/2 inch wide: Depth equal to width.
 3. Joints over 1/2 inch wide: Depth equal to one half of width.

3.2 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Install sealers and accessories in accordance with ASTM C1193.
- C. Install acoustical sealers and accessories in accordance with ASTM C919.
- D. Install joint backing to maintain required sealer dimensions. Compress backing approximately 25 percent without puncturing skin. Do not twist or stretch.
- E. Use bondbreaker tape where joint backing is not installed.
- F. Fill joints full without air pockets, embedded materials, ridges, and sags.
- G. Tool sealer to smooth profile.
- H. Apply sealer within manufacturer's recommended temperature range.

3.3 CLEANING

- A. Remove masking tape and protective coverings after sealer has cured.
- B. Clean adjacent surfaces.

3.4 SCHEDULE

JOINT LOCATION OR TYPE	SEALER TYPE
Exterior Joints:	
Joints in horizontal surfaces subject to pedestrian or vehicular traffic	1
Joints in above-grade surfaces	2
Interior Joints:	
Saw cut slab control joints	5
control joints	
Joints in toilet rooms, countertops, kitchens	4
Joints in acoustical assemblies	6
Other joints	3

END OF SECTION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT

HOLLOW METAL DOORS AND FRAMES

SECTION 08 1113 – Page 1 of 4

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Hollow steel doors and frames.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 08 7100 - Door Hardware.
 - 3. Section 08 8000 - Glazing.
 - 4. ELECTRICAL Section: Conduit and wiring between strike hardware and power supply and security system.

1.2 REFERENCES

- A. American National Standards Institute (ANSI)/Steel Door Institute (SDI):
 - 1. A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finished Painted Steel for Steel Doors and Frames.
 - 2. A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frame Anchors and Hardware Reinforcings.
 - 3. A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
 - 4. A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
 - 5. A250.11 - Recommended Erection Instructions for Steel Frames.
- B. ASTM International (ASTM):
 - 1. A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
 - 2. A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 - 3. A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - 4. C518 - Standard Test Method for Steady State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 5. E413 - Classification for Rating Sound Insulation.
- C. National Fire Protection Association (NFPA) 80 - Standard for Fire Doors and Fire Windows.
- D. Steel Door Institute (SDI) 117 - Manufacturing Tolerances for Standard Steel Doors and Frames.
- E. Underwriters Laboratories (UL):
 - 1. 10B - Standard for Fire Tests of Door Assemblies.
 - 2. 10C - Standard for Positive Pressure Fire Tests of Door Assemblies.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Show locations, elevations, dimensions, model designations, fire, thermal, acoustical ratings, preparation for hardware, and anchoring details.
 - 2. Product Data: Show elevations, dimensions, gages of metal, hardware reinforcing gages and locations, and anchor types.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT HOLLOW METAL DOORS AND FRAMES

SECTION 08 1113 – Page 2 of 4

- B. Quality Control Submittals:
 - 1. Certificates of Compliance: Certification that products furnished comply with ANSI/SDI A250.3, ANSI/SDI 250.4, and ANSI/SDI A250.10.

1.4 QUALITY ASSURANCE

- A. Exterior Doors: ANSI/SDI A250.8.
 - 1. Grade: II - Heavy Duty, 18 gage.
 - 2. Galvannealed finish
 - 3. Model: 1 - Full Flush, seamless
 - 4. Exterior doors: Maximum thermal transmittance U-value of 0.50, tested to ASTM C518.
- B. Exterior Door Frames: ANSI/SDI A250.8, Grade II - Heavy Duty, 16 gage, Galvannealed finish.
- C. Interior Drywall Door Frames: ANSI/SDI A250.8, Grade II - Heavy Duty, 16 gage. Galvannealed where noted.
- D. Fire Door and Frame Construction: Conform to UL 10B/C.
- E. Fire Rated Door and Frame Assemblies: Conform to NFPA 80.
- F. Storm Room Doors and Frames: Conform to ICC 500 and FEMA 361.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Ship door frames with removable angle spreader; do not remove until frame is installed.
- B. Store doors upright in protected, dry area, off ground or floor, with at least ¼ inch space between individual units.
- C. Do not cover with non vented coverings that create excessive humidity.
- D. Remove wet coverings immediately.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Ceco Door. (www.cecodoor.com)
 - 2. Curries. (www.curries.com)
 - 3. Pioneer Industries, Inc. (www.pioneerindustries.com)
 - 4. Steelcraft. (www.steelcraft.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Galvanized Steel Sheet:
 - 1. ASTM A653/A653M, hot dipped, Structural Quality, Class G40 galvanized.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT

HOLLOW METAL DOORS AND FRAMES

SECTION 08 1113 – Page 3 of 4

- B. Door Core:
 - 1. Exterior doors: Rigid polystyrene insulation.

2.3 ACCESSORIES

- A. Glass, Glazing Sealers, and Accessories: Specified in Section 08 8000.
- B. Primer: Zinc rich type.

2.4 FABRICATION

- A. Fabricate doors and frames in accordance with ANSI/SDI A250.8.
- B. Fabricate exterior doors and frames from galvanized steel sheet.
- C. Doors:
 - 1. Fabricate from minimum 18 gage sheets.
 - 2. Close top and bottom edges of doors with steel channel, minimum 14 gage, extending full width of door, and spot welded to both faces, with top channel flush and bottom channel recessed.
 - 3. Fill voids between vertical steel stiffeners with batt insulation.
 - 4. Fabricate vertical door edges as vertical seam edge filled, dressed smooth, intermittently welded seams, edge filled, dressed smooth, or continuously welded seam, dressed smooth.
- D. Frames:
 - 1. Fabricate from minimum 16 gage sheets.
 - 2. For knock-down frames, provide self aligning tabs and slots to hold corners in alignment.
 - 3. For welded frames, close corner joints tight with trim faces mitered and face welded, full profile welded, or continuously welded and ground smooth.
 - 4. Anchors:
 - a. Provide one anchor at each jamb for each 30 inches of door height.
 - b. Design anchors to provide positive fastenings to adjacent construction.
 - c. Provide one floor anchor welded to each jamb.
 - 5. Terminate stops 6 inches above finished floor. Cut bottom edge of stop at 45 degree angle and close.
 - 6. Where frames will be filled with concrete or grout, install silencers in frames before erection.
 - 7. Mullions for paired doors: Removable type, of same profiles as jambs.
- E. Accurately form to required sizes and profiles.
- F. Grind and dress exposed welds to form smooth, flush surfaces.
- G. Do not use metallic filler to conceal manufacturing defects.
- H. Fabricate with internal reinforcement for hardware specified in Section 08 7100; weld in place.
- I. Glazing Stops:
 - 1. Manufacturer's standard, screw on type with mitered corners.
 - 2. Form stops from minimum 20 gage steel; pre-fit for field glazing.
 - 3. Locate screws within 1 inch of ends of stops and maximum 8 inches on center.
 - 4. Install glazing stops on secure side of frames.
- J. Louvers:
 - 1. Manufacturer's standard, inverted "Y" blade type.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
HOLLOW METAL DOORS AND FRAMES**

SECTION 08 1113 – Page 4 of 4

2. Frames: Minimum 20 gage steel.
3. Blades: Minimum 24 gage steel.
4. Weld blades to frame with one molding integral with louver.
5. Install loose molding on secure side of door.

A. Design Clearances:

1. Between door and frame: Maximum 1/8 inch.
2. Between meeting edges of pairs of doors:
 - a. Non-fire rated doors: 3/16 inch plus or minus 1/16 inch.
 - b. Fire-rated doors: 1/8 inch plus or minus 1/16 inch.
3. Undercut:
 - a. Non-fire rated doors: Maximum 3/4 inch.
 - b. Fire-rated doors: Comply with NFPA 80.
4. Between face of door and stop: 1/16 to 3/32 inch.

2.2 Manufacturing Tolerances: In accordance with SDI-117.FINISHES

- A. Dress tool marks and surface imperfections to smooth surfaces.
- B. Clean and chemically treat steel surfaces.
- C. Touch up damaged metallic coatings.
- D. Apply manufacturer's standard rust inhibiting primer paint, air-dried or baked on, meeting requirements of ANSI/SDI A25010.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install doors and frames in accordance with ANSI/SDI A250.11.
- B. Set plumb and level.
- C. Secure to adjacent construction using fastener type best suited to application.
- D. Install glass as specified in Section 08 8000.
- E. Install hardware in accordance with Section 08 7100.

3.2 ADJUSTING

- A. Touch up minor scratches and abrasions in primer paint to match factory finish.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood veneer faced flush doors.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 08 7100 - Door Hardware.
 - 3. Section 08 8000 - Glazing.

1.2 REFERENCES

- A. Architectural Woodwork Institute/Architectural Woodwork Manufacturers of Canada/Woodwork Institute (AWI/AWMAC/WI) - Architectural Woodwork Standards.
- B. ASTM International (ASTM) E90 - Standard Test Method for Measurement of Airborne-Sound Transmission Loss of Building Partitions.
- C. Forest Stewardship Council (FSC) STD-40-004 - Chain of Custody Standard.
- D. National Fire Protection Association (NFPA) 80 - Standard for Fire Doors and Fire Windows.
- E. Underwriters Laboratories (UL):
 - 1. 10B - Standard for Fire Tests of Door Assemblies.
 - 2. 10C - Standard for Positive Pressure Fire Tests of Door Assemblies.
- F. Window and Door Manufacturers Association (WDMA) - I.S.1A - Industry Standard for Architectural Flush Wood Doors.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Show locations, elevations, dimensions, fire ratings, and preparation for hardware.
 - 2. Warranty: Sample warranty form.
- B. Quality Control Submittals:
 - 1. Certificates of Compliance: Manufacturer's certification that doors comply with specified acoustical requirements.

1.4 QUALITY ASSURANCE

- A. Fire Door Construction: Conform to UL 10B.
- B. Installed Fire Rated Door Assembly: Conform to NFPA 80.

1.5 DELIVERY, STORAGE AND HANDLING

SHELBY COUNTY WATER SERVICES BUILDING PROJECT

FLUSH WOOD DOORS

SECTION 08 1416 – Page 2 of 3

- A. Package doors in heavy plastic with identifying marks; slit plastic wrap on site to permit ventilation, but do not remove from plastic until ready to install.
- B. Store doors flat and level, fully supported with spacers between doors to allow for air circulation, in protected, dry area.
- C. Environmental Requirements: Maintain following conditions in building for minimum 7 days prior to, during, and after installation of doors:
 - 1. Temperature: 60 to 80 degrees F.
 - 2. Humidity: 25 to 55 percent.

1.6 WARRANTIES

- A. Furnish manufacturer's warranty providing coverage against defects in materials and workmanship and warpage beyond specified amount.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Algoma Hardwoods, Inc. (www.algomahardwoods.com)
 - 2. Eggers Industries. (www.eggersindustries.com)
 - 3. Marshfield DoorSystems, Inc. (www.marshfielddoors.com)
 - 4. Oshkosh Door Co. (www.oshkoshdoor.com)
 - 5. VT Industries, Inc. (www.vtindustries.com)
- B. Substitutions: Allowable with prior approval. Submit data guaranteeing equivalency.

2.2 MATERIALS

- A. Flush Wood Doors:
 - 1. AWI/AWMAC/WI Architectural Woodwork Standards, Section 9.
 - 2. Core type:
 - a. Solid, fire rated: Fire-Resistant Composite Core.
 - b. Solid, non rated: Particleboard or Medium Density Fiberboard.
 - 3. Wood veneers faces:
 - a. Birch species, rotary cut, of quality suitable for stained finish.

2.3 FABRICATION

- A. Fabricate doors in accordance with AWI/AWMAC/WI Architectural Woodwork Standards, Section 9.
 - 1. Grade: Premium.
 - 2. Performance Level: Heavy Duty.
 - 3. Edge Type: Solid wood.
 - 4. Number of plies: Minimum 3.
- B. Premachining: Machine doors at factory to receive hardware specified in Section 08 7100.

PART 3 EXECUTION

3.1 PREPARATION

- A. Condition doors to average humidity that will be encountered after installation.

3.2 INSTALLATION

- A. Install doors in accordance with WI/AWMAC/WI Architectural Woodwork Standards.
- B. Install doors plumb and level.
- C. Field Fitting to Frames:
 - 1. Fire rated doors:
 - a. Width: Cut lock edge only; 3/16 inch maximum.
 - b. Height: Cut bottom edge only; 1 inch maximum.
 - 2. Non-rated doors:
 - a. Width: Cut hinge and lock edges equally.
 - b. Height: Cut bottom edge only; maximum 3/4 inch.
 - 3. Edge clearances:
 - a. Jambs and head: 1/8 inch maximum between door and frame.
 - b. Sills without thresholds: 1/8 inch maximum between door and top of finish floor.
 - c. Sills with thresholds: 1/4 inch maximum between door and top of threshold.
- D. Seal field cut surfaces with same finish as door faces.
- E. Install door hardware in accordance with Section 08 7100.
- F. Installation Tolerances:
 - 1. Warp: Maximum 1/8 inch in any 3'-0" x 7'-0" portion of door, measured with taut string or straight edge on concave face of door.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
OVERHEAD COILING DOORS**

SECTION 08 3323 – Page 1 of 3

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Steel overhead coiling doors.
 - 2. Operating hardware, controls, and supports.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 08 7100 - Door Hardware.

1.2 REFERENCES

- A. American Society of Civil Engineers (ASCE) 7 - Minimum Design Loads for Buildings and Other Structures.
- B. ASTM International (ASTM):
 - 1. A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- C. National Fire Protection Association (NFPA) 80 - Standard for Fire Doors and Fire Windows.
- D. Underwriters Laboratories (UL) 10B - Standard for Fire Tests of Door Assemblies.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements: Design doors to withstand:
 - 1. Positive and negative design wind loads in accordance with Building Code without permanent deformation or damage.
 - 2. Movement caused by an ambient temperature range of 120 degrees F and a surface temperature range of 160 degrees F.
- B. Operation: Electric or Chain hoist as shown on Drawings.

1.4 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
 - 2. Product Data: Provide information on component construction, anchorage method, and hardware.
 - 3. Samples: 3 x 3 inch coating samples showing available colors.
- B. Closeout Submittals:
 - 1. Operation and Maintenance Data.

1.5 QUALITY ASSURANCE

- A. Fire Door Construction: Conform to UL 10B.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
OVERHEAD COILING DOORS**

SECTION 08 3323 – Page 2 of 3

- B. Installed Fire Rated Door Assembly: Conform to NFPA 80.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. CHI Overhead Doors. (www.chiohd.com)
 - 2. Janus International Corporation. (www.janusintl.com)
 - 3. Raynor. (www.raynor.com)
 - 4. Overhead Door Corp. (www.overheaddoor.com)
 - 5. Cornell Cookson (www.cornellcookson.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Galvanized Steel Sheet:
 - 1. ASTM A653/A653M, Structural Quality, G90 coating class.

2.3 COMPONENTS

- A. Curtain:
 - 1. Material: Roll formed galvanized steel sheet, minimum 22 gage.
 - 2. Profile: Flat.
 - 3. Slat face width: 1-1/2 inches.
 - 4. Core: Nominal 2 PCF density foamed-in-place polyurethane insulation.
 - 5. Slat ends: Equip with end locks to act as wearing surface and prevent lateral movement.
 - 6. Bottom bar: Steel angle.
- B. Guides: Steel angles or roll formed channels.
- C. Counterbalance: Adjustable, enclosed, helical torsion spring with grease sealed ball bearings or self lubricating graphite bearings for rotating members.
- D. Weather Seals:
 - 1. Full width flexible seal attached to lintel to seal against slats.
 - 2. Full height seals attached to guides.
 - 3. Full width loop type bottom seal attached to bottom bar.
- E. Electric hoist operation.
- F. Lock: Slide bolt type mounted on both ends of bottom bar at interior; locks keyed alike.

2.4 FINISHES

- A. Galvanized Steel: Powder coat, color to be selected from manufacturer's full color range.

PART 3 EXECUTION

3.1 INSTALLATION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
OVERHEAD COILING DOORS**

SECTION 08 3323 – Page 3 of 3

- A. Install door assembly in accordance with manufacturer's instructions.
- B. Anchor to adjacent construction without distortion or stress.
- C. Fit and align door assembly including hardware, level and plumb, to provide smooth operation.
- D. Make connections between power supply, operator, and controls.
- E. Make connections between door release mechanism and fire alarm and detection system.

3.2 ADJUSTING

- A. Adjust doors for smooth operation throughout full operating range.

END OF SECTION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

SECTION 08 4113 – Page 1 of 4

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum entrance doors and frames.
 - 2. Aluminum framed glazed storefronts.
 - 3. Glass infill panels.
 - 4. Door hardware.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 07 9200 - Joint Sealers.
 - 3. Section 08 7100 - Door Hardware.
 - 4. Section 08 8000 - Glazing.

1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 1. 611 - Voluntary Specification for Anodized Architectural Aluminum.
 - 2. 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
 - 3. 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Architectural Extrusions and Panels.
 - 4. 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Architectural Extrusions and Panels.
 - 5. 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Architectural Extrusions and Panels.
- B. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA) A156.3 - Exit Devices.
- C. American Society of Civil Engineers (ASCE) 7 - Minimum Design Loads for Buildings and Other Structures.
- D. ASTM International (ASTM):
 - 1. B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 2. B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 3. E283 - Standard Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors.
 - 4. E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors under the Influence of Wind Loads.
 - 5. E331 - Standard Test Method for Water Penetration of Exterior Windows, Doors, and Curtain Walls by Uniform Static Air Pressure Differential.
 - 6. E547 - Standard Test Method for Water Penetration of Exterior Windows, Doors, and Curtain Walls by Cyclical Static Air Pressure Differential.
 - 7. E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
 - 8. E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

SECTION 08 4113 – Page 2 of 4

- E. Underwriters Laboratories (UL) 305 - Safety Panic Hardware.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements: Design exterior systems to withstand:
 - 1. Design wind pressure in accordance with the International Building Code, with maximum allowable deflection of L/175 tested in accordance with ASTM E330.
 - 2. Movement caused by an ambient temperature range of 120 degrees F and a surface temperature range of 160 degrees F.
- B. Performance Requirements:
 - 1. Air infiltration, tested to ASTM E283.
 - a. Entrances:
 - 1) Single door: Maximum 0.5 CFM per minute per linear foot of perimeter crack, at static pressure differential of 6.24 PSF.
 - 2) Pairs of doors: Maximum 1.0 CFM per minute per linear foot of perimeter crack, at static pressure differential of 1.567 PSF.
 - b. Storefront: 0.06 CFM per square foot of fixed area at static pressure differential of 6.24 PSF.
 - 2. Water infiltration: No uncontrolled water leakage, tested to ASTM E331/ E547 at minimum test pressure of 6.24 PSF for inswing doors and 8.0 15.0 PSF for outswing doors and storefront.
 - 3. Uniform structural loading: No glass breakage or permanent damage to fasteners or system components, tested to ASTM E330 at 1.5 times design pressure.
 - 4. Thermal transmittance due to conduction (Uc): Maximum 0.60 tested to AAMA 1503 on two 6'-0" x 6'-0" units with 1 inch clear insulating glass.
 - 5. Condensation resistance factor (CRF): Minimum 50 tested to AAMA 1503.

1.4 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, trim, sealers, hardware, and accessories.
- B. Quality Control Submittals:
 - 1. Test Reports: Certified results of previous tests by a recognized independent laboratory substantiating compliance with specified design and performance criteria, current within past 5 years.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 10 years documented experience in work of this Section.
- B. Conform to ADA and ANSI 117.1 accessibility codes for locating hardware and for door opening force requirements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. EFCO Corporation. (www.efcocorp.com)
 - 2. Kawneer Co., Inc. (www.kawneer.com)
 - 3. Oldcastle BuildingEnvelope. (www.oldcastlebe.com)
 - 4. Tubelite, Inc. (www.tubeliteinc.com)

SHELBY COUNTY WATER SERVICES BUILDING PROJECT ALUMINUM FRAMED ENTRANCES AND STOREFRONTS

SECTION 08 4113 – Page 3 of 4

- 5. YKK AP America, Inc. (www.ykkap.com)

- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Aluminum:
 - 1. Extrusions: ASTM B221, 6063-T5 alloy and temper.
 - 2. Sheet: ASTM B209, alloy and temper best suited to application.

2.3 COMPONENTS

- A. Storefront: Flush glazing system designed to receive 1 inch insulating glass panels, by means of elastomeric gaskets; 2 and 4 inch face width x 4-1/2 inch depth, front glass application, thermally broken.
- B. Entrance Doors: Wide-stile configuration with nominal 5 inch vertical stiles and top rail and 10 inch bottom rail to comply with ADA requirements. Provide heavy duty continuous piano hinge attached to door jamb face.
- A. Door Hardware: Specified in Section 08 7100 and Door Schedule on Drawings.

1.2 ACCESSORIES

- A. Fasteners:
 - 1. Series 300 stainless steel for wet locations and exposed fasteners.
 - 2. Stainless or fluoropolymer coated steel for other locations.
- B. Joint Sealers: Specified in Section 07 9200.
- C. Glass and Glazing Accessories: Specified in Section 08 8000.
- D. Weatherstripping: Replaceable, nonporous synthetic wool pile type or resilient bulb type.

1.3 FABRICATION

- A. Fabricate with minimal clearances and shim spaces around perimeter.
- B. Accurately fit and secure joints and intersections. Make joints flush, hairline, and weathertight.
- C. Fabricate in largest practical units.
- D. Conceal fasteners and attachments from view.
- E. Fabricate aluminum components with integral low conductance thermal barrier located between exterior and interior exposed components that eliminates metal-to-metal contact.
- F. Doors:
 - 1. Through-bolted construction.
 - 2. Fabricate stiles and rails of minimum 0.125 inch thick extrusions and glass stops from minimum 0.050 inch thick extrusions.
 - 3. Provide weatherstripping at door head, jambs, meeting stiles, and sills.
 - 4. Prepare with internal reinforcements for door hardware.

1.4 FINISHES

- A. Aluminum: AAMA 611, Architectural Class II anodized to 0.0004 inch minimum thickness, clear finish.

PART 2 EXECUTION

2.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Install components plumb and level, in proper plane, free from warp and twist.
- C. Anchor to supporting construction.
- D. Set thresholds and sill members exposed to weather in mastic and secure.
- E. Install hardware using templates provided by manufacturer.
- F. Install glass and accessories in accordance with Section 08 8000.
- G. Installation Tolerances:
 - 1. Maximum variation from plumb or level: 1/8 inch in 3 feet or 1/4 inch in any 10 feet, whichever is less.
 - 2. Maximum misalignment of members abutting end to end: 1/32 inch.
 - 3. Sealant space between framing members and adjacent construction: 1/2 inch plus or minus 1/8 inch.

2.2 ADJUSTING

- A. Adjust hardware for smooth operation.
- B. Adjust doors to operate with maximum opening forces in accordance with applicable accessibility code:
 - 1. Interior doors: 5.0 pounds in accord with ADA requirements.
 - 2. Exterior doors: 8.5 pounds in accord with ADA requirements.
- C. Touch up minor scratches and abrasions to match original finish.
- D. Adjust weatherstripping to contact appropriate surfaces and form weather seal.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
DOOR HARDWARE**

SECTION 08 7100 – Page 1 of 5

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Hardware for steel and wood doors.
 - 2. Weatherstripping and thresholds.
 - 3. Sound and smoke seals.
 - 4. Hardware for other sections referencing this section.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. ELECTRICAL Section: Conduit and wiring between strike hardware and power supply and security system.

1.2 REFERENCES

- A. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):
 - 1. A156.1 - Butts and Hinges.
 - 2. A156.2 - Bored and Preamsembled Locks and Latches.
 - 3. A156.3 - Exit Devices.
 - 4. A156.4 - Door Controls - Closers.
 - 5. A156.5 - Auxiliary Locks and Associated Products.
 - 6. A156.13 - Mortise Locks and Latches.
 - 7. A156.18 - Materials and Finishes.
 - 8. A156.31 - Electric Strikes.
- B. National Fire Protection Association (NFPA):
 - 1. 80 - Standard for Fire Doors and Windows.
 - 2. 105 - Installation of Smoke Control Door Assemblies.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Schedule hardware by door type and location; show door size, hand, thickness, edge bevel, hardware components and quantities, keying, and finishes.
 - 2. Product Data: Manufacturer's descriptive data for each component.
 - 3. Samples: One sample of lockset. Sample will be returned for installation on Project.
 - 4. Warranty: Sample warranty form.
- B. Closeout Submittals:
 - 1. Copy of approved hardware schedule.
 - 2. Keying list.
 - 3. Keys; tag with mark corresponding to keying schedule.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 10 years documented experience in work of this Section.
- B. Provide hardware labeled by recognized independent testing laboratory and meeting requirements of NFPA 80 for fire rated doors.
- C. Provide smoke gasketing at fire rated doors in accordance with NFPA 105.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT DOOR HARDWARE

SECTION 08 7100 – Page 2 of 5

- D. Conform to ADA / ANSI 117.1 for locating hardware and for door opening force requirements.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Pack hardware items separately, with fasteners, installation instructions, and templates.
- B. Mark containers with item number corresponding to hardware schedule.

1.6 WARRANTIES

- A. Furnish manufacturer's 10 year warranty for operation and finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Butt Hinges:
 - 1. Bommer Industries, Inc. (www.bommer.com)
 - 2. Hager Companies. (www.hagerco.com)
 - 3. McKinney Products Co. (www.mckinneyhinge.com)
 - 4. Stanley Hardware. (www.stanleyworks.com)
- B. Acceptable Manufacturers - Continuous Hinges:
 - 1. Hager Companies. (www.hagerco.com)
 - 2. McKinney Products Co. (www.mckinneyhinge.com)
 - 3. Pemko Manufacturing Co. (www.pemko.com)
 - 4. Stanley Hardware. (www.stanleyhardware.com)
- C. Acceptable Manufacturers - Locksets, Latchsets, Deadbolts, and Cylinders:
 - 1. Best Access Systems. (www.bestaccess.com)
 - 2. Corbin Russwin Architectural Hardware. (www.corbin-russwin.com)
 - 3. Schlage Lock Co. (www.schlage.com)
 - 4. Sargent Mfg. (www.sargentlock.com)
 - 5. Yale Security, Inc. (www.yalelocks.com)
- D. Acceptable Manufacturers - Closers:
 - 1. Corbin Russwin Architectural Hardware. (www.corbin-russwin.com)
 - 2. Dorma Door Controls, Ltd. (www.dorma-usa.com)
 - 3. LCN Closers. (www.lcnclosers.com)
 - 4. Sargent Mfg. (www.sargentlock.com)
 - 5. Yale Security, Inc. (www.yalelocks.com)
- E. Acceptable Manufacturers - Exit Devices:
 - 1. Corbin Russwin Architectural Hardware. (www.corbin-russwin.com)
 - 2. Sargent Mfg. (www.sargentlock.com)
 - 3. Von Duprin. (www.vonduprin.com)
 - 4. Yale Security, Inc. (www.yalelocks.com)
- F. Acceptable Manufacturers - Door Seals:
 - 1. Hager Companies. (www.hagerco.com)
 - 2. National Guard Products, Inc. (www.ngpinc.com)

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
DOOR HARDWARE**

SECTION 08 7100 – Page 3 of 5

3. Pemko Manufacturing Co. (www.pemko.com)
4. Reese Enterprises, Inc. (www.reeseusa.com)

G. Substitutions: Under provisions of Division 01.

H.

2.2 MANUFACTURED UNITS

A. Butt Hinges:

1. Description: ANSI/BHMA A156.1, full mortise type, five knuckle, non rising pin, hole in bottom tip for pin removal.
2. Exterior outswinging doors: Provide set screw in barrel making hinge non-removable when door is closed.
3. Weight: Normal weight.
4. Bearing type: Ball bearing.
5. Size: 4-1/2 x 4-1/2

B. Locksets, Latchsets, Deadbolts, and Cylinders:

1. Locksets and latchsets:
 - a. Type: ANSI/BHMA [A156.13, Grade 2, lever handles.
 - b. Lever design: Equivalent to Schage AS Series "Saturn" design
2. Electromechanical locksets:
 - a. Same manufacturer and construction as locksets.
 - b. Solenoid activated locking device.
3. Strike plates: Curved lip, minimum lip projection necessary to protect door frame and trim and to conceal edges of strike cutout.
4. Strike boxes: Steel.
5. Cylinders: Six pin, solid brass, removable core type.
6. Keys: Solid brass or nickel silver.
7. Keying:
 - a. Construction key locks to be replaced
 - b. Master key locks in accord with master key system defined by Owner.
 - c. Key alike, cross key, or otherwise key as directed by Owner.
 - d. Provide four keys for each lock and 6 master keys [for each master key system].
 - e. Inscribe keys with lock manufacturer [and notation DO NOT DUPLICATE].

C. Electric Strikes:

1. Type: ANSI/BHMA A156.31.
2. Operation Options:
 - a. Fail safe: In locked position, strike is energized. Release occurs by switching device or power failure.
 - b. Fail secure: In locked position, strike is not energized. Release occurs by energizing switching device. *This method must be fed by emergency power at exit pathway doors.*

D. Closers:

1. Description: ANSI/BHMA A156.4, overhead exposed, metal cover, sized to door conditions.
2. Construction: Cast aluminum body, rack and pinion operation with compression spring, fully hydraulic.
3. Closing and latching speeds and backcheck: Controlled by independently adjustable concealed valves.
4. Mounting: Surface mounted, non handed with universal regular or parallel arm. Suitable for mounting on 1-3/4 inch minimum door top rail or transom bar without drop plate.
5. Adjustable opening force and delayed closing in accordance with ADA / ANSI accessibility codes.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
DOOR HARDWARE**

SECTION 08 7100 – Page 4 of 5

- E. Exit Devices:
 - 1. Description: ANSI/BHMA A156.3, Grade 1, crash bar type.
 - 2. Type: Rim.
 - 3. Cylinders: Same as specified above for locksets.
- F. Door Stops: Wall or Floor (as best suited) mounted housing with resilient bumper.
- G. Push - Pull Plates: 16 gage, square edges, 4 x 16 inches, secured with through bolts.
- H. Door Pulls: Wire profile, 12 inches center-to-center of mounting holes.
- I. Kick Plates:
 - 1. Type: 16 gage, square edges, secured with flathead countersunk screws.
 - 2. Size: 8 inches high x door width less 2 inches.
- J. Flush Bolts: With dustproof strike.
- K. Silencers: At all door frames
- L. Weatherstripping: Head and jambs: At exterior doors
- M. Threshold: At exterior doors.
- N. Rain Drip: Not required.

2.3 FINISHES

- A. Finishes: To ANSI/BHMA A156.18.
- B. Door Closers: Finish No. 689
- C. Hinges: US26D
- D. Thresholds and Door Seal Housings: Clear anodized.
- E. Locksets and Lever Handles: US26D

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install hardware in accordance with approved hardware schedule and manufacturer's instructions.
- B. Install mortise items flush with adjacent surfaces.
- C. Install locksets, closers, and trim after finish painting.
- D. Set thresholds in mastic and secure.
- E. Mount closers so that closers and closer arms are not visible on corridor or public side of doors or on exterior of building.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
DOOR HARDWARE**

SECTION 08 7100 – Page 5 of 5

- F. Mounting Heights - Finished Floor to Center Line of:
 - 1. Locksets: 40 inches.
 - 2. Push and pull plates: 42 inches.
 - 3. Dead locks: 48 inches.
 - 4. Push pad exit devices: 40 inches.
 - 5. Cross bar exit devices: 40 inches.
 - 6. Top hinge: Maximum 10 inches from frame head.
 - 7. Bottom hinge: Maximum 12-1/2 inches from floor.
 - 8. Intermediate hinges: Equally spaced.
- G. Connect electric hardware to power supply and security system as specified in ELECTRICAL Section.
- H. Set key cabinet in place, place keys in cabinets, label and index.

3.2 PROTECTION

- A. Remove or protect hardware until painting is completed.

3.3 ADJUSTING

- A. Test and adjust hardware for quiet, smooth operation, free from binding and rattling.
- B. Adjust doors to operate with maximum opening forces in accordance with ADA / ANSI 117.1 accessibility codes.
 - 1. Interior non-fire rated doors: 5.0 pounds.
 - 2. Interior fire-rated doors: 15.0 pounds.
 - 3. Exterior doors: 8.5 pounds.
 - 4. Minimum closing speed: 5 seconds (90 degrees to 12 degrees open)

3.4 DOOR HARDWARE SCHEDULE SHOWN ON DRAWINGS.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Glass for other sections referencing this Section.
 - 2. Framed mirrors.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA) 800 - Voluntary Specifications and Test Methods for Sealants.
- B. American National Standards Institute (ANSI) Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings.
- C. American Society of Civil Engineers (ASCE) 7 - Minimum Design Loads for Buildings and Other Structures.
- D. ASTM International (ASTM):
 - 1. C509 - Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
 - 2. C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants.
 - 3. C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
 - 4. C920 - Standard Specification for Elastomeric Joint Sealants.
 - 5. C1036 - Standard Specification for Flat Glass.
 - 6. C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT, Coated and Uncoated Glass.
 - 7. C1115 - Standard Specification for Dense Elastomeric Silicone Rubber Gaskets and Accessories.
 - 8. C1172 - Standard Specification for Laminated Architectural Flat Glass.
 - 9. C1184 - Standard Specification for Structural Silicone Sealants.
 - 10. C1281 - Standard Specification for Preformed Tape Sealants for Glazing Applications.
 - 11. C1294 - Standard Test Method for Compatibility of Insulating Glass Edge Sealants with Liquid-Applied Glazing Materials.
 - 12. C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
 - 13. E119 - Standard Test Method for Fire Tests of Building Construction and Materials.
 - 14. E152 - Standard Test Method for Fire Test of Door Assemblies.
 - 15. E163 - Standard Test Method for Fire Tests of Window Assemblies.
 - 16. E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.
 - 17. E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.
 - 18. E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.
 - 19. F1233 - Standard Specification for Security Glazing Materials and Systems.
- E. Consumer Product Safety Commission (CPSC) 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

- F. Glass Association of North America (GANA):
 - 1. Engineering Standards Manual.
 - 2. Glazing Manual.
 - 3. Laminated Glass Design Guide.
- G. Insulating Glass Manufacturers Alliance (IGMA):
 - 1. IGMA TB-3001 - Sloped Glazing Guidelines.
 - 2. SIGMA TM-3000 - Glazing Guidelines for Sealed Insulating Glass Units.
- H. National Fenestration Rating Council (NFRC):
 - 1. 100 - Procedure for Determining Fenestration Product Thermal Properties.
 - 2. 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficients at Normal Incidence.
 - 3. 300 - Procedures for Determining Solar Optical Properties of Simple Fenestration Products.
- I. Underwriters Laboratories (UL) 752 - Standard for Safety Bullet-Resisting Equipment.

1.3 SYSTEM DESCRIPTION

- A. Glass Thicknesses:
 - 1. Indicated thicknesses are minimums; select actual glass thicknesses by analyzing loads and conditions.
 - 2. Size glass to withstand positive and negative wind pressure acting normal to plane in accordance with the International Building Code as measured in accordance with ASTM E330.
 - 3. Provide glass in thicknesses and strengths to meet or exceed following criteria:
 - a. Comply with ASTM E1300.
- B. Thermal and Optical Performance Properties: Provide glass meeting specified performance properties, based on manufacturer's published test data for units of thickness indicated:
 - 1. U-factor: Per NFRC 100 expressed as Btu/square foot x hour x degree F.
 - 2. Solar heat gain coefficient: Per NFRC 200.
 - 3. Solar optical properties: Per NFRC 300.

1.4 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Descriptive data and performance attributes for insulated glass.
 - 2. Samples: 12 x 12 inch glass samples.
 - 3. Warranty: Sample warranty form.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 10 years documented experience in work of this Section.
- B. Regulatory Requirements:
 - 1. Provide safety glass for locations subject to human impact as required by The International Building Code.
 - 2. Safety glass: Tested and labeled to CPSC 16 CFR 1201.
- C. Fire Rated Glass Assemblies: Conform to ASTM E119, E152, E163.
- D. Bullet Resistant Glass: UL 752, Level 4.

- E. Laminated Safety Glass: ASTM C1172 and ANSI Z97.1

1.6 PROJECT CONDITIONS

- A. Perform glazing when ambient temperature is above 40 degrees F.
- B. Perform glazing on dry surfaces.

1.7 WARRANTIES

- A. Insulating Glass Units: Provide manufacturer's 20 year warranty against material obstruction of vision through unit due to:
 - 1. Intrusion of dust or moisture.
 - 2. Internal condensation.
 - 3. Film formation on internal glass surfaces caused by failure of hermetic seal except failure caused in whole or in part by breakage or fracturing of any portion of glass surface.
- B. Glass Coatings: Provide manufacturer's 20 year warranty against peeling, cracking, or deterioration of coating under normal conditions.
- C. Laminated Safety Glass Units: Provide manufacturer's 20 year warranty against manufacturing defects resulting in edge separation, delamination, or material obstruction of vision through glass surface
- D. Mirrors: Provide manufacturer's 10 year warranty against silver spoilage resulting from manufacturing defects.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Glass:
 - 1. Guardian Industries Corp. (www.guardian.com)
 - 2. Oldcastle BuildingEnvelope. (www.oldcastlebe.com)
 - 3. Pilkington Architectural. (www.pilkington.com)
 - 4. PPG Industries, Inc. (www.ppgglazing.com)
 - 5. Viracon, Inc. (www.viracon.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS - GLASS

- A. Clear Tempered Glass: ASTM C1048, Type 1 transparent flat, Class 1 clear, Quality q3 glazing select, Kind FT fully tempered.
- B. Tinted Tempered Glass:
 - 1. Type: ASTM C1048, Type 1 transparent flat, Class 2 tinted heat absorbing and light reducing, Quality q3 glazing select, Kind FT fully tempered.
 - 2. Color: As selected from manufacturer's solar heat reducing selection.
- C. Patterned Safety Glass: ASTM C1048, Kind FT fully tempered, Condition A uncoated surfaces, Type II - patterned glass, flat, Class 1 - clear, Quality q8 - glazing, Form 3 - patterned, Finish patterned one side, Pattern 516.(Furnished and installed by Door Manufacturer)

SHELBY COUNTY WATER SERVICES BUILDING PROJECT GLAZING

SECTION 08 8000 – Page 4 of 6

- D. Mirror Glass: ASTM C1036, Type I transparent flat, Class 1 clear, Quality q2 mirror.

2.3 ACCESSORIES

- A. Setting Blocks: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone; 80 to 90 Shore A durometer hardness.
- B. Spacers: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone; 50 to 60 Shore A durometer hardness.
- C. Glazing Gaskets:
1. Dense compression gaskets: ASTM C864, neoprene or EPDM, or ASTM C1115, silicone or thermoplastic polyolefin rubber, molded or extruded shape to fit glazing channel retaining slot; black color.
 2. Soft compression gaskets: ASTM C509, Type II, black, molded or extruded, neoprene, EPDM, silicone or thermoplastic polyolefin rubber, of profile and hardness required to maintain watertight seal; black color.
- D. Butt Joint Glazing Sealant: ASTM C920, Type S, Grade NS, Class 25; single component silicone, low modulus type, non sag, black or neutral color.
- E. Glazing Sealant: ASTM C920, Type S, Grade NS, Class 25; single component silicone, low modulus, non sag, black or neutral color.
- F. Sealant Backing: ASTM C1330, Type O, size and density to control glazing sealant depth and produce optimum glazing sealant performance.
- G. Primer: As recommended by glazing sealant manufacturer.
- H. Glazing Tape: ASTM C1281 and AAMA 800; butyl based elastomeric tape with integral resilient tube spacer, 10 to 15 Shore A durometer hardness, black color, coiled on release paper; widths required for installation.

**** OR ****

- I. Glazing Tape: AAMA 800; closed cell polyvinyl chloride foam, maximum 2 percent water absorption by volume, designed for 25 percent compression percent for air barrier and vapor retarder seal, black color, coiled on release paper over adhesive on two sides; widths required for installation.
- J. Mirror Frame: Roll formed stainless steel channel, satin finish, 1/2 x 1/2 inch, 18 gage, mitered corners. Size as shown on Toilet Room Accessories and Drawings.

2.4 FABRICATION

- A. Annealed Glass: Comply with ASTM C1036.
- B. Tempered Glass:
1. Comply with ASTM C1048.
 2. Process in horizontal position so that inherent roller distortion will run parallel to building floor lines after installation.
- C. Sealed Insulating Glass:
1. Comply with ASTM E2190.
 2. Fabricate spacer bar frame of tubular aluminum filled with desiccant.

3. Bond spacer bar frame to glass panes with twin primary seals.
4. Fill space outside frame to glass edge with elastomeric sealant.
- D. Laminated Safety Glass: (Holding Room)
 1. Comply with ASTM C1172 and ANSI Z97.1.
 2. Laminate glass with laminating film by manufacturer's standard heat and pressure process.
 3. Cut glass to required size at factory.
 4. Discard glass with voids, delamination, or entrapped dirt or foreign matter.
- E. Bullet-Resisting Glass: (Customer Service desks)
 1. Comply with UL 752. Level 4.
 2. Laminate glass with laminating film by manufacturer's standard heat and pressure process.
 3. Cut glass to required size at factory. Treat edges to prevent moisture intrusion.
 4. Discard glass with voids, delamination, or entrapped dirt or foreign matter.
 5. Discard glass with voids, delamination, or entrapped dirt or foreign matter.
- F. Low-E Coated Glass: Apply low-emissivity coating to scheduled glass surface.
- G. Reflective Coated Glass: Apply selected metallic-based optical coating to scheduled glass surfaces.

PART 3 EXECUTION

3.1 PREPARATION

- A. Clean glazing rabbets; remove loose and foreign matter.
- B. Remove protective coatings on metal surfaces.
- C. Clean glass just prior to installation.

3.2 INSTALLATION - GENERAL

- A. Install glass in accordance with glass manufacturer's instructions.
- B. Maintain manufacturer's recommended edge and face clearances between glass and frame members.

3.3 INSTALLATION - SILICONE GLAZING METHOD

- A. Mask both sides of joint for full length.
- B. Install temporary glass retainers to align faces of glass.
- C. Provide temporary joint backing for one side of joint.
- D. Apply sealant to completely fill spaces; tool to smooth, slightly concave surface.
- E. Allow sealant to cure minimum time required by manufacturer. Remove temporary backing and fill voids with additional sealant.

3.4 INSTALLATION - GASKET GLAZING METHOD

- A. Fabricate gaskets to fit openings; allow for stretching of gaskets during installation.

- B. Set soft compression gasket against fixed stop or frame with bonded miter cut joints at corners.
- C. Set glass centered in openings on setting blocks.
- D. Install removable stops and insert dense compression gaskets at corners, working toward centers of glass, compressing glass against soft compression gaskets to produce weathertight seal.
- E. Seal joints in gaskets.
- F. Allow gaskets to protrude past face of glazing stops.

3.5 INSTALLATION - MIRRORS

- A. Support mirrors on concealed hanger brackets. Anchor rigidly to wall construction.
- B. Place plumb and level without distortion.

3.6 PROTECTION

- A. After installation, mark glass with an 'X' using removable plastic tape.

3.7 SCHEDULE

- A. Exterior Insulating Storefront Glass: Vitro / PPG SOLARBLUE

- 1. Description:
 - a. Outboard lite: 1/4 inch thick BLUE tinted glass, tempered where required
 - b. Inboard lite: 1/4 inch thick clear glass, tempered where required.
- 2. Total unit thickness: 1" inch.
- 3. Performance characteristics:
 - a. Visible transmittance: 50 percent.
 - b. Solar transmittance: 49 percent.
- 4. Locations: Aluminum-framed storefront and storefront windows

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fixed rectangular and triangular attic louvers and frames.
 - 2. Insect screens.
 - 3. Blank off panels.
 - 4. FEMA 361 / ICC 500 Wall Ventilation Louvers
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. Air Movement and Control Association International, Inc. (AMCA) Standard 500 - Test Methods for Louvers, Dampers and Shutters.
- B. American Architectural Manufacturers Association (AAMA):
 - 1. 611 - Voluntary Specification for Anodized Architectural Aluminum.
 - 2. 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
 - 3. 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Architectural Extrusions and Panels.
 - 4. 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Architectural Extrusions and Panels.
- C. American Society of Civil Engineers (ASCE) 7 - Minimum Design Loads for Buildings and Other Structures.
- D. ASTM International (ASTM):
 - 1. A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 3. E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors under the Influence of Wind Loads.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements: Design louvers to withstand:
 - 1. Design wind pressure in accordance with ASCE 7 and IBC Building Code with maximum allowable deflection of L/180, tested in accordance with ASTM E330.
 - 2. Movement caused by an ambient temperature range of 120 degrees F and a surface temperature range of 160 degrees F.
- B. Performance Requirements: Bear AMCA Certified Ratings Seal for air performance.

1.4 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Include locations, elevations, sections, dimensions, materials, finishes, attachment, and relationship to adjacent construction.

- 2. Samples:
 - a. 3 x 3 inch metal samples showing available prefinished colors.
- B. Quality Control Submittals:
 - 1. Certificates of Compliance: AMCA licensed test data.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Airolite Company. (www.airolite.com)
 - 2. Construction Specialties, Inc. (www.c-sgroup.com)
 - 3. Industrial Louvers. (www.industriallouvers.com)
 - 4. Greenheck (www.greenheck.com)
 - 5. Ruskin Co. (www.ruskin.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Aluminum:
 - 1. ASTM B221, 6063-T5 or T6 alloy and temper.
- B. Screen: Insect screen mesh aluminum.

2.3 COMPONENTS

- A. Metal Louvers:
 - 1. Type: Fixed blade.
 - 2. Depth: 4 inches.
 - 3. Blade angle: 45 degrees.
 - 4. Blade spacing: 4 inches on center.
 - 5. Blade profile: Straight. Drainable.

2.4 ACCESSORIES

- A. Anchors: Stainless or Corrosion resistant coated steel, type best suited to application.

2.5 FABRICATION

- A. Fabricate frame from minimum 0.081inch thick aluminum.
- B. Fabricate blades from minimum 0.081 inch thick aluminum.
- C. Fit components to hairline joints. Weld connections, with welds ground smooth and filled.
- D. Join vertical mullions with I-shaped slip connection.
- E. Fabricate horizontal mullions to appear as single louver.
- F. Mount screen in rewirable U-shaped frame.

- G. Provide metal sheeting of same material and finish as frame to blank out unused portions of louvers.

2.6 FINISHES

- A. Aluminum: AAMA 2605, fluoropolymer coating containing minimum 70 percent PVDF resins, color to be selected from manufacturer's full color range.

2.7 FEMA 361 / ICC 500 WALL LOUVERS (STORM ROOM WALL LOUVERS)

- A. Heavy Duty Welded Aluminum Storm Room ventilation grille with V-style blades
- B. 12" X 12" X 5" interior recess mounted into 12" CMU wall.
- C. Greenheck AFL-501 or approved equivalent.
- D. Provide interior insulated cover panel.
- E. Provide additional exterior standard louver at metal wall face.
- F. See Drawings for height and location.

2.8 INSULATED ACCESS PANEL

- A. 12" X 12" hinged aluminum access door and frame with cam latch, mill finish – Larson L-AI or approved equivalent.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Set plumb, level, and rigid, with flush hairline joints.
- C. Anchor to supporting construction.
- D. Prevent contact of aluminum and dissimilar metals by use of zinc rich paint, bituminous coating, or non absorptive gaskets.
- E. Install screen on inside face.
- F. Install blank out sheeting over unused portions of louver.

3.2 ADJUSTING

- A. Touch up minor scratches and abrasions in finish coat to match factory finish.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Metal stud interior partition framing.
 - 2. Metal interior wall furring.
 - 3. Suspended metal channel interior ceiling framing.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. A591/A591M - Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Weight (Mass) Applications.
 - 2. A641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - 3. A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
 - 4. C645 - Standard Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.
 - 5. C754 - Standard Practice for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Wall board, Backing Board, or Water-Resistant Backing Board.
- B. Gypsum Association (GA) GA-600 - Fire Resistance Design Manual.
- C. Underwriters Laboratories, Inc. (UL) - Fire Resistance Directory.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Illustrate framing types, gages, and locations.

1.4 QUALITY ASSURANCE

- A. Fire Resistance Ratings:
 - 1. Construct assemblies to achieve fire resistance ratings indicated on Drawings, in accordance with applicable or referenced GA or UL design number.
 - 2. If requirements of assembly numbers referenced conflict with Contract Document requirements, conform to assembly requirements.
- B. Deflection Limits:
 - 1. Limit deflection of partitions to following limits, based on 5 PSF uniform design load.
 - a. Interior partitions: L/240.
 - b. If partition height exceeds stud manufacturer's limiting height for applicable loading and deflection, install bracing above ceiling, decrease stud spacing, or increase stud gage.
 - 2. Limit deflection of ceilings to L/360.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. California Expanded Metal Company. (www.cemcosteel.com)
 - 2. ClarkDietrich Building Systems. (www.clarkdietrich.com)
 - 3. Marino Ware Industries. (www.marinoware.com)

- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Steel: ASTM A1003/1003M, Class G40 hot dip galvanized.

2.3 COMPONENTS

- A. Provide components in accordance with ASTM C645.
- B. Studs: Non-load bearing rolled steel, channel shaped, punched for utility access.
- C. Top and Bottom Runners:
 - 1. Same material and finish as studs, channel shaped.
 - 2. Deflection compensating top runners: Deep leg runners with slotted screw holes; permit plus or minus 1/2 inch movement of overhead structure without damage to partition.
- D. Suspended Ceiling Framing:
 - 1. Runner channels: 1-1/2 inches deep, cold rolled, channel shaped, 16 gage core steel.
 - 2. Furring channels: Hat shaped, 7/8 inch deep, 16 gage core steel.
- E. Suspended Soffit Framing:
 - 1. Runner channels: 1-1/2 inches deep, cold rolled, 16gage core steel.
 - 2. Furring channels: 3/4 inch deep, cold rolled, 16 gage core steel.
- F. Resilient Channels: 1/2 inch deep x 2-1/2 inches wide, Z-shaped 25 gage core steel.
- G. Wall Furring Channels: Hat shaped, 3/4 inch deep, 25 gage core steel.

2.4 ACCESSORIES

- A. Fasteners: 3/8 inch long pan head screws.
- B. Wire: ASTM A 641, galvanized steel.
 - 1. Hanger wire: 8 gage.
 - 2. Tie wire: 18 gage, soft annealed.
- C. Wall Furring Brackets: Galvanized steel, two piece adjustable type.
- D. Furring Channel Clips: Galvanized steel.

PART 3 EXECUTION

3.1 INSTALLATION OF PARTITION AND CEILING SOFFIT FRAMING

- A. Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Attach top and bottom runner channels at ends and 24 inches on center maximum.

- C. Position studs vertically in runners, spaced maximum 16 inches on center unless indicated otherwise.
- D. Install deflection compensating top runner at partitions extending to structure. Cut studs 1/2 inch shorter than required length and fit into top runner. Fasten studs to top runner in manner permitting runner movement.
- E. Locate studs maximum 2 inches from door frames and abutting construction.
- F. Use double studs on both sides of openings in partitions.
- G. Install horizontal runner as header above openings in partitions. Install studs from header to top runner.
- H. Brace furred partitions with adjustable bracket located at mid height.
- I. Provide wood or metal bracing in partitions to receive and support fixtures, trim, accessories and other applied items.
- J. Brace ceiling height partitions to structure at 48 inches on center maximum.

3.2 INSTALLATION OF WALL FURRING

- A. Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Space channels 24 inches on center maximum and within 3 inches of corners; secure at maximum 24 inches on center with fasteners staggered on alternating flanges.
- C. Nest channels minimum 8 inches at splices; secure with two fasteners in each flange.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Acoustical insulation.
 - 2. Gypsum board.
 - 3. Cementitious panels.
 - 4. Taping and bedding of gypsum board.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 07 9200 - Joint Sealers.

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. A108.11 - Interior Installation of Cementitious Backer Units.
 - 2. A118.9 - Test Methods and Specifications for Cementitious Backer Units.
- B. ASTM International (ASTM):
 - 1. C475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - 2. C514 - Standard Specification for Nails for the Application of Gypsum Wallboard.
 - 3. C665 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Wood Frame and Light Construction Buildings.
 - 4. C1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Board.
 - 5. C1047 - Standard Specifications for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - 6. C1178 - Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel.
 - 7. C1396 - Standard Specification for Gypsum Board.
 - 8. C1629 - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.
 - 9. D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- C. Gypsum Association (GA):
 - 1. GA-214 - Levels of Gypsum Board Finish.
 - 2. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.
 - 3. GA-600 - Fire Resistance Design Manual.
- D. Underwriters Laboratories, Inc. (UL) - Fire Resistance Directory.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Illustrate panel product types, thicknesses, and locations; acoustical insulation; and accessories.

1.4 QUALITY ASSURANCE

- A. Fire Resistance Ratings:
 - 1. Construct assemblies to achieve fire resistance ratings indicated on Drawings, in accordance with applicable and referenced GA or UL design number.

2. If requirements of assembly numbers referenced conflict with Contract Document requirements, conform to assembly requirements.

1.5 PROJECT CONDITIONS

- A. Do not install gypsum board until building is substantially weathertight.
- B. Maintain temperature in spaces in which work is being performed above 50 degrees F during and after installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Gypsum Panels:
 1. CertainTeed Gypsum, Inc. (www.certainteed.com)
 2. GP Gypsum Corporation. (www.gp.com)
 3. National Gypsum Co. (www.nationalgypsum.com)
 4. Temple-Inland. (www.templeinland.com)
 5. USG Corporation. (www.usg.com)
- B. Acceptable Manufacturers - Cementitious Panels:
 1. James Hardie Building Products, Inc. (www.jameshardie.com)
- C. Substitutions: Under provisions of Division 01.

2.2 MATERIALS - GYPSUM PANELS

- A. Regular Gypsum Board: ASTM C1396; 48 inches wide x 5/8 inch thick, maximum practical length, tapered edge.
- B. Fire Resistant Gypsum Board: ASTM C1396, Type X; 48 inches wide x 5/8 inch thick, maximum practical length, tapered edge; apply to fire rated assemblies.
- C. Gypsum Backing Board:
 1. ASTM C1178, fiberglass mat faced; 48 inches wide x 5/8 inch thick, maximum practical length, water resistant; apply to walls to receive tile at janitor closets and toilet rooms.
 2. Mold resistance: Minimum 10, tested to ASTM D3273.

2.3 ACCESSORIES

- A. Fasteners: ASTM C1002, Type S screws.
- B. Acoustical Insulation:
 1. ASTM C665, Type I, glass fiber composition, unfaced.
 2. Free from urea-formaldehyde resins, phenol, acrylics, and artificial colors.
- C. Adhesive:
 1. Type recommended by gypsum panel manufacturer.
 2. Maximum volatile organic compound (VOC) content: 50 grams per liter.

- D. Trim Accessories: ASTM C1047.
 - 1. Material: Formed steel, minimum 26 gage core steel, hot dip galvanized finish, expanded flanges or extruded PVC, perforated flanges.
 - 2. Corner reinforcement: GA-216, Type CB-100 x 100.
 - 3. Casing: GA-216, Type LC.
 - 4. Control joint.
- E. Acoustical Sealer: Specified in Section 07 9200.
- F. Joint Treatment Materials:
 - 1. Reinforcing tape and joint compound; ASTM C475.
 - 2. Joint compound; maximum volatile organic compound (VOC) content: 250 grams per liter.

PART 3 EXECUTION

3.1 INSTALLATION OF GYPSUM PANELS

- A. Install panels and accessories in accordance with ASTM C754, GA-216, and manufacturer's instructions.
- B. Accurately cut panels to fit around openings and projections. Do not tear face paper or break gypsum core.
- C. Apply panels in most economical layout, with all ends and edges occurring over supports.
- D. Apply panels at fire-rated assemblies as required by design assembly.
- E. Stagger joints on opposite sides of partitions.
- F. Do not locate joints to align with edges of openings unless a control joint is installed.
- G. Mechanically fasten[single layer panels to framing. Place fasteners minimum 3/8 inch from edges of panels; drive heads slightly below surface. Stagger fasteners at abutting edges.
- H. Apply face layer of double layer applications with joints offset from those in base layer; secure with mechanical fasteners to framing or with adhesive to base layer.
- I. At deflection compensating head tracks, cut panels 1/2 inch short of structure at head; do not secure panels to top runner channel.
- J. Treat cut edges and holes in moisture resistant gypsum board with joint sealer.
- K. Where recessed items occur in fire rated partitions, box item on all sides with gypsum board as required to maintain continuity of fire rating.

3.2 INSTALLATION OF ACOUSTICAL PARTITIONS

- A. Extend acoustical partitions past intersecting non-acoustical partitions.
- B. Install acoustical insulation:
 - 1. Butt to framing members and adjacent construction.
 - 2. Carry around pipes, wiring, outlets, and other construction without voids.
 - 3. Press against one gypsum board surface to form slight air space on opposite side.

- C. Seal acoustical partitions at perimeter and around penetrations:
 - 1. Apply continuous bead of sealer between gypsum panel edges and adjacent construction.
 - 2. Seal space between gypsum panels at control joints, prior to installing metal control joint.
 - 3. Apply sealer to penetrations through partitions.

3.3 INSTALLATION OF CEMENTITIOUS PANELS

- A. Install in accordance with ANSI A108.11 and manufacturer's instructions.
- B. Apply panels horizontally, with ends occurring over supports. Stagger end joints in adjacent rows.
- C. Cut panels to fit around openings and projections.
- D. Mechanically fasten panels to framing at maximum 12 inches on center.

3.4 INSTALLATION OF ACCESSORIES

- A. Install in accordance with manufacturer's instructions.
- B. Install corner reinforcement at outside corners. Use single lengths where length of corner does not exceed standard length.
- C. Install casings where indicated and where gypsum board abuts dissimilar materials or stops with edge exposed.
- D. Install control joints at ceilings:
 - 1. At maximum 50 feet on center.
 - 2. Where ceiling framing changes direction.
- E. Install control joints at walls and partitions:
 - 1. At changes in backup material.
 - 2. At maximum 30 feet on center.
 - 3. Above one jamb of openings in partitions.

3.5 JOINT TREATMENT

- A. Treat joints and fasteners in gypsum board in accordance with GA-214.
- B. Levels of Finish:
 - 1. Covered Surfaces to receive tile or wood wainscot: **Level 2** finish.
 - 2. All Other Surfaces: **Level 5** finish.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Ceramic, Porcelain, Quarry tile floor and wall finishes.
 - 2. Marble thresholds.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 07 9200 - Joint Sealers.

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. A108/A118/A136.1 - American National Standard for Installation of Ceramic Tile.
 - 2. A137.1 - Specifications for Ceramic Tile.
- B. ASTM International (ASTM):
 - 1. A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - 2. A185/A185M - Standard Specification for Welded Steel Wire Reinforcement, Plain, for Concrete.
 - 3. C144 - Standard Specification for Aggregate for Masonry Mortar.
 - 4. C150 - Standard Specification for Portland Cement.
 - 5. C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
 - 6. C847 - Standard Specification for Metal Lath.
 - 7. C1028 - Standard Test Method for Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
 - 8. D226 - Standard Specification for Asphalt Saturated Organic Felt Used in Roofing and Waterproofing.
 - 9. D227 - Standard Specification for Coal-Tar Saturated Organic Felt Used in Roofing and Waterproofing.
 - 10. D4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.
 - 11. D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial and Agricultural Applications.
- C. Tile Council of North America (TCNA) - Handbook for Ceramic Tile Installation.
- D. Resilient Floor Covering Institute (RFCI) - FloorScore Certification Program.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Manufacturer's installation, cleaning, and maintenance instructions.
 - 2. Samples:
 - a. Tile: Two Full size samples in each color.
 - b. Grout: 1/2 x 1/2 x 3 inch long actual samples showing available colors.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 10 years documented experience in work of this Section.

- B. Tile and Trim Units: Meet ANSI A137.1, Standard Grade.
- C. Static Coefficient of Friction for Floor Tile: Minimum 0.60, tested to ASTM C1028 in dry condition.
- D. Mockup:
 - 1. Size: 2 x 4 feet.
 - 2. Show: Tile colors and patterns, joint profile, and control joint.
 - 3. Locate where directed.
 - 4. Approved mockup may remain as part of the Work.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver mortar, adhesive, and grout containers bearing hallmark certifying compliance with reference standards.
- B. Protect adhesive containers from freezing and overheating according to manufacturer's instructions.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements: Maintain minimum ambient temperature of 50 degrees F during and after installation.

1.7 MAINTENANCE

- A. Extra Materials: 2 % of each tile.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Tile:
 - 1. American Marazzi Tile, Inc. (www.marazzitile.com)
 - 2. American Olean Tile Co., Inc. (www.aotile.com)
 - 3. Dal-Tile Corp. (www.daltileproducts.com)
 - 4. Florida Tile Industries, Inc. (www.floridatile.com)
 - 5. Interceramic USA. (www.interceramicusa.com)
 - 6. Summitville Tiles, Inc. (www.summitville.com)
 - 7.
- B. Acceptable Manufacturers - Setting and Grouting Materials:
 - 1. BASF Corporation. (www.buildingsystems.basf.com)
 - 2. Bostik, Inc. (www.bostik-us.com)
 - 3. Laticrete International, Inc. (www.laticrete.com)
 - 4. Mapei Corporation. (www.mapei.us)
 - 5. TEC. (www.tecspecialty.com)
- C. Substitutions: Under provisions of Division 01.

2.2 MATERIAL

- A. Ceramic Tile Basis of Design:

DalTile "Parkway Series" Wall and Floor Tile
9"X12" and 6"X6" sizes

2.3 ACCESSORIES

- A. Grout:
 - 1. ANSI [A118.6, polymer modified dry set type, sanded.
 - 2. Color: To be selected from manufacturer's full color range.
- B. Joint Sealers: Specified in Section 07 9200.
- C. Joint Tape: Waterproof, perforated bedding tape.
- D. Thresholds: Class A white marble, honed finish, beveled both sides, radiused from bevels to vertical planes, one piece for full width of door or opening. Comply with ADA/ANSI accessibility requirements.

PART 3 EXECUTION

3.1 PREPARATION

- A. Clean surfaces to remove loose and foreign matter that could impair adhesion.
- B. Remove ridges and projections. Fill voids and depressions with patching compound compatible with setting materials.
- C. Allowable Substrate Tolerances:
 - 1. Thin set method:
 - a. Maximum variation in substrate surface: 1/8 inch in 8 feet.
 - b. Maximum height of abrupt irregularities: 1/32 inch.
- D. Test concrete substrate to ASTM D4263; do not install tile until surfaces are sufficiently dry.

3.2 INSTALLATION

- A. Minimize pieces less than one half size. Locate cuts to be inconspicuous.
- B. Lay tile to pattern shown on Drawings furnished by Architect. Do not interrupt tile pattern through openings.
- C. Joint Widths: Large size ceramic and ceramic mosaic tile: 3/8 inch.
- D. Make joints watertight, without voids, cracks, excess mortar, or excess grout. Align joints in wall and floor of same-sized tile.
- E. Fit tile around projections and at perimeter. Smooth and clean cut edges. Ensure that trim will completely cover cut edges.
- F. Install Trim:
 - 1. Inside corners: Cove units.
 - 2. Outside corners: Bead units.

- 3. Base: Base units.
- 4. Exposed tile ends: Bullnose units.

G. Allow tile to set for a minimum of 48 hours before grouting.

H. Grout tile joints in accordance with ANSI A108.10 without excess grout.

I. Control Joints:

- 1. Provide control joints at:
 - a. Changes in backup material.
 - b. Changes in plane.
 - c. Over joints in substrate.
 - d. Maximum 24 feet on center at interior locations except maximum 12feet at surfaces exposed to direct sunlight.
 - e. Maximum 16 feet on center at exterior locations.
- 2. Form joints per TCNA Method EJ-171.
- 3. Install joint backing and joint sealer as specified in Section 07 9200.

3.3 ADJUSTING

A. Remove and replace pieces that have been damaged during installation.

3.4 PROTECTION

A. Provide protection for completed work using nonstaining sheet coverings.

B. Prohibit traffic on tile floors for minimum 3 days after installation.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Suspended metal ceiling grid system.
 - 2. Acoustical panels.
 - 3. Vinyl Faced ceiling panels.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. A641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - 2. C635 - Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
 - 3. C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
 - 4. E1264 - Standard Classification of Acoustical Ceiling Products.
- B. Ceiling and Interior Systems Construction Association (CISCA) - Ceiling Systems Handbook.
- C. Underwriters Laboratories, Inc. (UL) - Fire Resistance Directory.

1.3 SUBMITTALS

- A. Submittals for Review:
 - a. Manufacturer's Literature and cut sheets
- B. Quality Control Submittals:
 - 1. Certificates of Compliance: Certification from an independent testing laboratory that acoustical panels meet fire hazard classification requirements.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 10 years documented experience in work of this Section.
- B. Fire Hazard Classification: Not rated

1.5 PROJECT CONDITIONS

- A. Environmental Requirements: Install in approximately same conditions of temperature and humidity as will prevail after installation.

1.6 MAINTENANCE

- A. Extra Materials: One unopened carton of each acoustical panel.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Suspension System:
 - 1. Chicago Metallic Corporation. (www.chicago-metallic.com)
 - 2. USG Corporation. (www.usg.com)
- B. Acceptable Manufacturers - Acoustical Units:
 - 1. Certainteed Corporation (www.certainteed.com)
 - 2. USG Corporation. (www.usg.com)
 - 3. Armstrong W.I. (www.armstrong.com)
- C. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Suspension Grid System (Steel):
 - 1. ASTM C635, intermediate duty, die cut, interlocking ends.
 - 2. Grid type: Exposed T.
 - 3. Material: Galvanized steel.
 - 4. Runners: 1-1/2 inches high, 15/16 inch exposed width, flush profile.
 - 5. Perimeter molding: Angle shape.
 - 6. Finish: Factory applied enamel paint, sprayed and baked, white color to match acoustical panels
 - 7. Accessories: Stabilizer bars, clips, splices.
- B. Suspension Grid System (Aluminum):
 - 1. ASTM C635, intermediate duty, die cut, interlocking ends.
 - 2. Grid type: Exposed T.
 - 3. Material: Extruded aluminum for damp areas where indicated.
 - 4. Runners: 1-1/2 inches high, 15/16 inch exposed width, flush profile.
 - 5. Perimeter molding: Angle shape.
 - 6. Finish: Factory applied enamel paint, sprayed and baked, white color to match acoustical panels
 - 7. Accessories: Stabilizer bars, clips, splices.
 - 8.
- C. Acoustical Panels: Basis of Design: USG 86785
 - 1. Size: 24 x 24 inches x 3/4 inch thick.
 - 2. Surface Texture: Fine Textured Stipple.
 - 3. Edge configuration: Square Reveal (FL)
 - 4. Color: White
 - 5. Performance requirements: Tested in accordance with ASTM E1264.
 - 6. Max NRC: .70.
 - 7. Class A
- D. Vinyl Faced Panels: Basis of Design: USG 3260
 - 1. Size: 24 x 24 inches x 1/2 inch thick.
 - 2. Surface Texture: Smooth
 - 3. Edge configuration: Square
 - 4. Color: White
 - 5. Performance requirements: Tested in accordance with ASTM E1264.
 - 6. Class A

2.3 ACCESSORIES

- A. Support Channels: Galvanized steel; size and type to suit application.
- B. Security hold-down panel clips for Vinyl Faced Panels in Toilet Rooms.
- C. Hanger Wire:
 - 1. ASTM A641, minimum 12 gage minimum galvanized steel.
- D. Touch-Up Paint: Color to match acoustical panels and suspension grid.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install ceilings in accordance with ASTM C636 and CISCA Handbook.
- B. Minimize panels less than one half size.
- C. Install molding around perimeters and abutting surfaces. Miter molding at exterior corners; cut flanges and bend web to form interior corners.
- D. Space hanger wires maximum 48 inches on center. Install additional hangers where required to support light fixtures and ceiling supported equipment. Support recessed light fixtures at all 4 corners.
- E. Do not suspend hangers directly from metal deck. Attach steel channel horizontally to adjacent framing members; place hanger at regular spacing.
- F. Hang suspension system independent of walls, columns, ducts, pipes, and conduit.
- G. Where ducts or other equipment prevent regular spacing of hangers:
 - 1. Reinforce nearest related hangers to span extra distance, or:
 - 2. Suspend steel channel horizontally beneath duct or equipment; place hanger at regular spacing.
- H. Install main tees at maximum 48 inches on center.
- I. Install cross tees to form 24 x 24 inch modules. Lock cross tees to main tees.
- J. Support ends of tees on flange of perimeter molding.
- K. Place acoustical panels with edges resting flat on suspension grid.
- L. Cutting Acoustic Units:
 - 1. Cut to fit irregular grid and perimeter edge trim and around penetrations.
 - 2. Locate cuts to be concealed.
 - 3. Cut and field paint exposed edges of reveal edge units to match factory edge.
- M. Installation Tolerances: Ceilings level to 1/8 inch in 12 feet measured in any direction.

3.2 ADJUSTING

- A. Touch up minor scratches and abrasions to match factory finish.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient wall base.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM) F1861 - Standard Specification for Resilient Wall Base.
- B. Resilient Floor Covering Institute (RFCI) - FloorScore Certification Program.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Samples: 2x4 inch long samples.

1.4 MAINTENANCE

- A. Extra Materials: Minimum 50' of roll goods, or one box 48" length of each profile and color.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Base:
 - 1. Allstate Rubber Corp. (www.allstaterubber.com)
 - 2. Armstrong World Industries. (www.armstrong.com)
 - 3. Burke Flooring. (www.burkeflooring.com)
 - 4. Johnsonite, Inc. (www.johnsonite.com)
 - 5. Roppe Corp. (www.roppe.com)
- B. Acceptable Manufacturers – Installation Materials:
 - 1. BASF Corporation. (www.buildingsystems.basf.com)
- C. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Resilient Base:
 - 1. Type: ASTM F1861, thermoplastic rubber.
 - 2. Thickness: 0.125 inch.
 - 3. Profile: Coved.
 - 4. Height: 4 inches.
 - 5. Length: Continuous rolls.
 - 6. Color: To be selected from manufacturer's full color range.
 - 7. Finish: Matte.
 - 8. End units and outside corners: Preformed; profile, size, and color to match base.

2.3 ACCESSORIES

- A. Adhesive:
 - 1. Water based, waterproof, recommended by base manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

- A. Prepare surfaces to receive base:
 - 1. Remove materials that could interfere with adhesion.
 - 2. Fill low spots with patching compound; finish flush with adjacent surface.
 - 3. Remove high spots, ridges and nibs.

3.2 INSTALLATION

- A. Apply adhesive continuously to back of base.
- B. Maintain top edge true to line and bottom edge in continuous contact with floor. Butt joints tight; butt base tight to adjacent construction.
- C. Do not install pieces less than 24 inches long.
- D. Miter and butt inside corners.
- E. At outside corners install preformed corner pieces.
- F. At exposed ends, install premolded units.
- G. Scribe to door frames and other interruptions.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient tile flooring.
 - 2. Resilient stair treads and risers.
 - 3. Reducers.
 - 4. Grounding tape.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. D2047 - Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring Surfaces as Measured by the James Machine.
 - 2. E648 - Standard Test Method for Flooring Radiant Panel Test.
 - 3. F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 - 4. F970 - Standard Test Method for Static Load Limit.
 - 5. F1066 - Standard Specification for Vinyl Composition Tile.
 - 6. F1344 - Standard Specification for Rubber Floor Tile.
 - 7. F1700 - Standard Specification for Solid Vinyl Floor Tile.
 - 8. F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
 - 9. F2195 - Standard Specification for Linoleum Floor Tile.
- B. Resilient Floor Covering Institute (RFCI) - FloorScore Certification Program.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Provide data on specified products, describing physical and performance characteristics.
 - 2. Samples:
 - a. Flooring: 6 x 6 inch samples in each color and pattern.
 - b. Stair treads and risers: 6" long samples in each color.
 - c. Reducers: 4 inch long samples in each color.
- B. Quality Control Submittals:
 - 1. Certificates of Compliance: Certification from an independent testing laboratory that flooring meets fire hazard classification requirements.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 10 years experience in work of this Section.
- B. Fire Hazard Classification: Class I rated, tested to ASTM E648. Flame spread 0-25, smoke developed less than 450.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT RESILIENT TILE FLOORING

SECTION 09 6519 – Page 2 of 4

- C. Static Coefficient of Friction: Minimum 0.5 tested to ASTM D2047.

1.5 PROJECT CONDITIONS

- A. Maintain temperature in spaces to receive flooring between 70 and 90 degrees F for 24 hours before, during, and for minimum 48 hours after installation.
- B. Maintain minimum temperature of 55 degrees F after flooring is installed, except as otherwise specified.

1.6 MAINTENANCE

- A. Extra Materials: One unopened carton of each color and pattern.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers - Vinyl Composition Tile:
 - 1. Armstrong World Industries. (www.armstrong.com)
 - 2. Azrock. (www.azrock.com)
 - 3. Mannington Resilient Floors. (www.mannington.com)
 - 4. Tarkett, Inc. (www.tarkett.com)
- B. Acceptable Manufacturers – Luxury Vinyl Tile
 - 1. Mohawk Group (www.mohawkgroup.com) No substitution.
- C. Acceptable Manufacturers - Stair Treads and Risers:
 - 1. Armstrong World Industries. (www.armstrongfloors.com)
 - 2. Azrock. (www.azrock.com)
 - 3. BurkeMercer Flooring Products. (www.burkemercer.com)
 - 4. Endura Rubber Flooring. (www.endura-flooring.com)
 - 5. Johnsonite, Inc. (www.johnsonite.com)
 - 6. Roppe Corp. (www.roppe.com)
- D. Acceptable Manufacturers - Installation Materials:
 - 1. BASF Corporation. (www.buildingsystems.basf.com)
- E. Substitutions: No Substitution on Luxury Vinyl Tile.

2.2 MATERIALS

- A. Vinyl Composition Tile:
 - 1. ASTM F1066, Class 2 - Through Pattern.
 - 2. Size: 12 x 12 inches x 1/8 inch thick.
 - 3. Color: To be selected from manufacturer's standard colors.
 - 4. Static load limit: Minimum 125 PSI, tested to ASTM F970.
- B. Stair Treads:
 - 1. Type:
 - 2. Composition: Rubber.
 - 3. Thickness: 3/16 inch.
 - 4. Color: To be selected from manufacturer's full color range.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
RESILIENT TILE FLOORING**

SECTION 09 6519 – Page 3 of 4

- C. Stair Risers:
 - 1. Composition: Rubber.
 - 2. Profile: Smooth, coved at bottom edge.
 - 3. Thickness: 0.125 inch.
 - 4. Color: To be selected from manufacturer's full color range.
- D. Luxury Vinyl Tile:
 - 1. Mohawk Hot & Heavy Collection COO89 Lineate Color 948 Figured

2.3 ACCESSORIES

- A. Reducer Strips: Solid thermoplastic rubber composition, 1 inch wide by flooring thickness, tapered, color to match tile or wall base. ADA compliant.
- B. Leveling Compound: White, premixed, latex based.
- C. Adhesive:
 - 1. Water based, waterproof, recommended by flooring manufacturer.
 - 2. Maximum volatile organic compound (VOC) content: 50 grams per liter.
- D. Grounding Tape: 1/2 inch wide copper tape.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that concrete floors have cured a minimum 28 days and do not exhibit negative alkalinity, carbonization, or dusting.

3.2 PREPARATION

- A. Clean substrate; remove loose and foreign matter that could impede adhesion or performance of flooring.
- B. Fill cracks, voids, and depressions in substrate with leveling compound.
- C. Grind off high spots and projections in substrate; leave smooth and level to 1/8 inch in 10 feet.
- D. Test substrate for moisture content to ASTM F1869; do not install flooring until moisture emission level is acceptable to flooring manufacturer.

3.3 INSTALLATION OF TILE

- A. Install in accordance with manufacturer's instructions.
- B. Mix materials from multiple containers to ensure shade variations are consistent when flooring is placed.
- C. Spread only enough adhesive to permit installation of flooring before initial set.
- D. Lay flooring with joints parallel to building lines to produce symmetrical pattern.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
RESILIENT TILE FLOORING**

SECTION 09 6519 – Page 4 of 4

- E. Install flooring to pattern indicated. Allow minimum half-size units at room or area perimeter.
- F. Set flooring in place; press with heavy roller to attain full adhesion.
- G. Scribe flooring to walls, columns, cabinets, and other appurtenances to produce tight joints. Ensure that base, trim, plates, or escutcheons will completely cover cut edges.
- H. Extend flooring into recesses and under equipment.

Terminate flooring directly under closed door at openings where adjacent floor finish is dissimilar.
- A. Install grounding tape at static-dissipating flooring in accordance with manufacturer's instructions. Ground to building ground system.

1.2 INSTALLATION OF REDUCER STRIPS

- A. Install where tile stops with edge exposed; set in adhesive.
- B. Center strips under closed doors where flooring terminates at door openings.
- C. Install in longest practical lengths; butt ends tight.
- D. Scribe to abutting surfaces.

1.3 INSTALLATION OF STAIR TREADS AND RISERS

- A. Apply adhesive uniformly over substrate; remove adhesive that has dried or filmed over.
- B. Accurately cut to required sizes and profiles without gaps.
- C. Fit tight to treads, risers, and stringers.

1.4 ADJUSTING

- A. Correct tiles that are not seated; replace damaged tiles.

1.5 CLEANING

- A. Clean flooring, wax, and machine buff in accordance with manufacturer's instructions.

1.6 PROTECTION

- A. Do not allow traffic on flooring until adhesive has set.
- B. Cover areas subject to traffic with protective covering.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Tile carpeting.
 - 2. Edgings and Cap strips.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. D2859 - Standard Test Method for Flammability of Finished Textile Floor Covering Materials.
 - 2. D4258 - Standard Practice for Surface Cleaning Concrete for Coating.
 - 3. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 4. E648 - Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
 - 5. E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 - 6. F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- B. Carpet and Rug Institute (CRI):
 - 1. 104 - Standard for Installation Specification of Commercial Carpet.
 - 2. Indoor Air Quality Testing Program.
- C. National Fire Protection Association (NFPA) 253 - Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Indicate carpet tile locations, dye lot limitations, direction of carpet tile in each room or area, and type and location of edgings.
 - 2. Samples:
 - a. Carpet tile: Full size samples in each color and pattern.
 - b. Edgings: Cap strips: 4 inch long samples showing available colors.
 - 3. Warranty: Sample warranty form.
- B. Quality Control Submittals:
 - 1. Certificates of Compliance: Certification from an independent testing laboratory that carpet tiles meet fire hazard classification requirements.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 10 years documented experience in work of this Section.
- B. Fire Hazard Classification: Class I rated, tested to NFPA 253, ASTM E648.
- C. Fire Hazard Classification: Maximum smoke density rating of 450, tested to ASTM E662.

1.5 PROJECT CONDITIONS

- A. Do not begin installation until painting and finishing work have been completed.
- B. Environmental Requirements:
 - 1. Temperature of spaces and subfloor between 65 and 90 degrees F.
 - 2. Humidity in spaces to receive carpet tiles between 20 and 65 percent.

1.6 WARRANTIES

- A. Furnish manufacturer's / applicator's 10 year warranty providing coverage against defective materials and workmanship.

1.7 MAINTENANCE

- A. Extra Materials: 2% of each color and pattern.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Interface, Inc. (www.interfaceinc.com)
- B. Acceptable Manufacturers – Installation Materials:
 - 1. BASF Corporation. (www.buildingsystems.basf.com)
- C. Substitutions: Carpet Substitution Not Permitted

2.2 MATERIALS

- A. Carpet Tiles: Interface Style: Earth Color: Plateau

2.3 ACCESSORIES

- A. Adhesive:
 - 1. Waterproof, latex based cement formulated specifically for installing carpet tiles; recommended by carpet tile manufacturer.
 - 2. Maximum volatile organic compound (VOC) content: 50 grams per liter.
- B. Edgings: Preformed rubber, profile required to suit conditions, color to be selected from manufacturer's full color range.
- C. Cap Strip: Preformed rubber profile required to suit conditions, color to be selected from manufacturer's full color range.
- D. Leveling Compound: Premixed, latex based.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that concrete floors have cured a minimum 28 days and do not exhibit negative alkalinity, carbonization, or dusting.

3.2 PREPARATION

- A. Clean substrate; remove loose and foreign matter that could impede adhesion or performance of flooring.
- B. Fill cracks, voids, and depressions with leveling compound.
- C. Grind ridges and high spots smooth.
- D. Test substrate for moisture content to ASTM F1869; do not install carpet tiles until moisture emission level is acceptable to carpet tile manufacturer.

3.3 INSTALLATION OF CARPET TILES

- A. Install in accordance with CRI 104.
- B. Install carpet tile and adhesive in accordance with manufacturers' instructions.
- C. Blend carpet tiles from different cartons to ensure minimal variation in color match.
- D. Lay out each room or area to minimize tiles less than one half size.
- E. Cut tile clean. Fit tiles tight to intersection with vertical surfaces without gaps.
- F. Lay carpet tile to aligned pattern, with tile direction alternating to next unit, set parallel to building lines.
- G. Locate change of color or pattern between rooms under door centerline.
- H. Fully adhere carpet tiles to substrate.
- I. Bind cut edges where not concealed by edge strips.

3.4 INSTALLATION OF EDGINGS

- A. Install strips where carpet tiles abut dissimilar flooring materials; secure to subfloor.
- B. Center strips under doors where carpet tiles terminate at door openings.
- C. Install in longest practical lengths; butt ends tight.
- D. Scribe to abutting surfaces.

3.5 CLEANING

- A. Clean spots as recommended by carpet tile manufacturer.
- B. Cut off loose threads flush with top surface.
- C. Clean with commercial vacuum cleaner.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Vinyl wall coverings.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM) E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Manufacturer's descriptive data for each wall covering.
 - 2. Samples: 24 x 24 inch wall covering samples in each color and pattern.
- B. Quality Control Submittals:
 - 1. Certificates of Compliance: Certification from an independent testing laboratory that wall covering meets fire hazard classification requirements.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 10 years documented experience in work of this Section.
- B. Fire Hazard Classification: Tested to ASTM E84 and NFPA 265 with following results:
 - 1. Flame spread: Maximum 25.
 - 2. Smoke density: Maximum 450.
- C. Mockup:
 - 1. Size: 6 feet wide x full height.
 - 2. Show: Wall covering color and pattern. Include one seam.
 - 3. Locate where directed.
 - 4. Approved mockup may remain as part of the Work.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store materials in clean, dry storage area at minimum 40 degrees F and normal humidity.
- B. Do not store rolls in upright position.

1.6 PROJECT CONDITIONS

- A. Maintain minimum temperature of 50 degrees F in areas to receive wall covering for three days prior to, during, and after installation.

1.7 MAINTENANCE

- A. Extra Materials: 5 percent of each color and pattern.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. MDC Interior Solutions www.mdcwall.com
- B. Substitutions: Not Permitted

2.2 MATERIALS MDC MODERN INDUSTRY GUNMETAL 3063MI / 4131

- 1. Type II Commercial Contract grade.
- 2. Weight: 20 ounces minimum per linear yard.
- 3. Color: To be selected from manufacturer's full color range.
- 4. Content: Fabric-backed vinyl
- 5. Backing: Osnaburg
- 6. Width: 54 inches.
- 7. Fire Rating Class A: Flame Spread 15, Smoke Developed 10.

2.3 ACCESSORIES

- A. Sealer: Type recommended by wall covering manufacturer.
- B. Adhesive:
 - 1. Type recommended by wall covering manufacturer; water based, mildew resistant.
 - 2. Maximum volatile organic compound (VOC) content: 50 grams per liter.
- C. Patching Compound: White latex type.

PART 3 EXECUTION

3.1 PREPARATION

- A. Prepare substrate to receive wall covering:
 - 1. Remove high spots.
 - 2. Fill holes, cracks, and depressions with patching compound; sand smooth and flush.
 - 3. Remove loose and foreign matter that could impair adhesion.
 - 4. Apply sealer as recommended by wall covering manufacturer.
- B. Remove wall covering from packaging, place in installation area, and allow to acclimatize for minimum 24 hours prior to installation.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

- B. Install panels vertically.
- C. Do not locate joints within 6 inches of corners. Horizontal joints not permitted.
- D. Smooth wall covering to eliminate bubbles and ensure adhesion. Remove excess adhesive from seams immediately.
- E. Use panels in exact order they are cut from roll. Reverse every other panel of non matching patterns.
- F. Fill in above and below openings with panels cut in consecutive order from roll.
- G. Install wall covering free from bubbles, wrinkles, open or loose seams, and other visible defects.

END OF SECTION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT PAINTING

SECTION 09 9100 – Page 1 of 6

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Surface preparation and field application of paints.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. D4442 - Standard Test Method for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
 - 2. D6886 - Standard Test Method for Speciation of the Volatile Organic Compounds (VOCs) in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography.
- B. Green Seal, Inc. (GS) 11 - Standard for Paints and Coatings.
- C. Master Painters Institute (MPI) - Architectural Painting Specification Manual.
- D. Society for Protective Coatings (SSPC) - Painting Manual.
- E. South Coast Air Quality Management District (SCAQMD) Rule 1113 - Architectural Coatings.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Manufacturer's data on materials proposed for use including:
 - a. Product designation and grade.
 - b. Product analysis and performance characteristics.
 - c. Standards compliance.
 - d. Material content.
 - e. Mixing and application procedures.
 - 2. Samples:
 - a. 12 x 12 inch texture samples on gypsum board backing.
 - 3. Paint Schedule: Indicate types and locations of each surface, paint materials, and number of coats to be applied.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Minimum 10 years documented experience in work of this Section.
- B. Materials, Preparation, and Workmanship: Conform to MPI Painting Manual.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Container Labels: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage rates, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

- B. Paint Materials: Store at ambient temperature from 45 to 90 degrees F in ventilated area, or as required by manufacturer's instructions.

1.6 PROJECT CONDITIONS

- A. Do not apply materials when surface and ambient temperatures or relative humidity are outside ranges required by paint manufacturer.
- B. Maintain ambient and substrate temperatures above manufacturer's minimum requirements for 24 hours before, during, and after paint application.
- C. Do not apply materials when relative humidity is above 85 percent or when dew point is less than 5 degrees F different than ambient or surface temperature.
- D. Provide minimum lighting level of 30 footcandles at substrate surface.

1.7 MAINTENANCE

- A. Extra Materials: 5 gallons of each color and sheen.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Sherwin Williams. (www.sherwin-williams.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Paints:
 - 1. As scheduled at end of Section, or approved substitute.
 - 2. Free from all forms of lead and mercury.
- B. Maximum Volatile Organic Compound (VOC) Content for interior paints, coatings, and accessories, tested to ASTM D6886:
 - 1. Primers: 100 grams per liter.
 - 2. Flat paints and coatings: 50 grams per liter.
 - 3. Non-flat paints and coatings: 50 grams per liter.
 - 4. Rust preventative coatings: 100 grams per liter.
 - 5. Clear wood finishes: 275 grams per liter.
 - 6. Stains: 100 grams per liter.
 - 7. Dryfall coatings: 150 grams per liter.

2.3 ACCESSORIES

- A. Accessory Materials: Paint thinners and other materials required to achieve specified finishes; commercial quality.

- B. Patching Materials: Latex filler.
- C. Fastener Head Cover Materials: Latex filler.

2.4 MIXES

- A. Deliver paints pre-mixed and pre-tinted.
- B. Uniformly mix to thoroughly disperse pigments.
- C. Do not thin in excess of manufacturer's recommendations.
- D. Re-mix paint during application; ensure complete dispersion of settled pigment and uniformity of color and gloss.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Test shop applied primer for compatibility with subsequent coatings.
- B. Measure moisture content of surfaces using electronic moisture meter. Do not apply coatings unless moisture content of surfaces are below following maximums:
 - 1. Gypsum board: 12 percent.
 - 2. Masonry and concrete: 12 percent.
 - 3. Wood: 15 percent, measured to ASTM D4442.
 - 4. Concrete floors: 8 percent.

3.2 PREPARATION

- A. General:
 - 1. Protect adjacent and underlying surfaces.
 - 2. Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
 - 3. Correct defects and clean surfaces capable of affecting work of this section.
 - 4. Seal marks that may bleed through surface finishes with shellac.
- B. Impervious Surfaces: Remove mildew by scrubbing with solution of trisodium phosphate and bleach. Rinse with clean water and allow to dry.
- C. Gypsum Board:
 - 1. Fill minor defects with filler compound. Spot prime defects after repair.
- D. Concrete and Masonry:
 - 1. Remove dirt, loose mortar, scale, salt and alkali powder, and other foreign matter.
 - 2. Remove oil and grease with solution of trisodium phosphate; rinse and allow to dry.
 - 3. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- E. Concrete Floors:
 - 1. Remove contamination, acid etch, and rinse floors with clear water. Allow to dry.
 - 2. Verify that required acid-alkali balance has been achieved.

- F. Galvanized Steel: SSPC Method SP1 - Solvent Cleaning.
- G. Uncoated Ferrous Metals: SSPC Method SP2 - Hand Tool Cleaning or Method SP3 - Power Tool Cleaning.
- H. Shop Primed Ferrous Metals:
 - 1. SSPC Method SP2 - Hand Tool Cleaning or Method SP3 - Power Tool Cleaning.
 - 2. Feather edges to make patches inconspicuous.
 - 3. Prime bare steel surfaces.
- I. Interior Wood:
 - 1. Wipe off dust and grit.
 - 2. Seal knots, pitch streaks, and sappy sections with sealer.
 - 3. Fill nail holes and cracks after primer has dried; sand between coats.
- J. Exterior Cement Board:
 - 1. Remove dust, grit, and foreign matter.
 - 2. Seal knots, pitch streaks, and sappy sections.
- K. Existing Surfaces:
 - 1. Remove loose, flaking, powdery, and peeling paints.
 - 2. Lightly sand glossy painted surfaces.
 - 3. Fill holes, cracks, depressions and other imperfections with patching compound; sand flush with surface.
 - 4. Remove oil, grease, and wax by scraping; solvent wash and thoroughly rinse.
 - 5. Remove rust by wire brushing to expose base metal.

3.3 APPLICATION

- A. Apply paints in accordance with MPI Painting Manual, Premium Grade finish requirements.
- B. Apply primer or first coat closely following surface preparation to prevent recontamination.
- C. Do not apply finishes to surfaces that are not dry.
- D. Apply coatings to minimum dry film thickness recommended by manufacturer.
- E. Apply each coat of paint slightly darker than preceding coat unless specified otherwise.
- F. Apply coatings to uniform appearance without laps, sags, curtains, holidays, and brush marks.
- G. Allow applied coats to dry before next coat is applied.
- H. When required on deep and bright colors apply an additional finish coat to ensure color consistency.
- I. Continue paint finishes behind wall-mounted accessories.
- J. Sand between coats on interior wood and metal surfaces.
- K. Match final coat to approved color samples.
- L. Where clear finishes are specified, tint fillers to match wood. Work fillers into grain before set. Wipe excess from surface.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT PAINTING

SECTION 09 9100 – Page 5 of 6

- M. Prime concealed surfaces of exterior wood and interior wood in contact with masonry or cementitious materials with one coat primer paint.
- N. Mechanical and Electrical Components:
1. Paint factory primed equipment.
 2. Remove unfinished and primed louvers, grilles, covers, and access panels; paint separately.
 3. Paint exposed and insulated pipes, conduit, boxes, ducts, hangers, brackets, collars, and supports unless factory finished.
 4. Do not paint name tags or identifying markings.
 5. Paint exposed conduit and electrical equipment in finished areas.
 6. Paint duct work behind louvers, grills, and diffusers flat black to minimum of 18 inches or beyond sight line.
- O. Do not Paint:
1. Surfaces indicated on Drawings or specified to be unpainted or unfinished.
 2. Surfaces with factory applied finish coat or integral finish.
 3. Architectural metals, including brass, bronze, stainless steel, and chrome plating.

3.4 ADJUSTING

- A. Touch up or refinish disfigured surfaces.

3.5 CLEANING

- A. Remove paint from adjacent surfaces.

3.6 PAINT SCHEDULE

- A. Types of paint listed herein are set forth as standard of quality and type of coating required for each type of surface.
1. Paint exposed surfaces of types listed in Paint Schedule.
 2. Paint other exposed surfaces not specifically listed with not less than two coats of appropriate type of coating.
- B. Prime coat may consist of touch up on shop primed and existing surfaces with intact coatings.

SUBSTRATE	MANUFACTURER	PRIMER	TOP COATS
Exterior Surfaces:			
Ferrous and Galvanized Metals		Exterior Alkyd Enamel Primer, 1 coat	Exterior Alkyd Industrial Enamel Semi-Gloss Finish, 2 coats
Cement Board, Opaque Finish		Exterior Latex Enamel Primer, 1 coat	Exterior Latex Enamel Semi-Gloss Finish, 2 coats

SHELBY COUNTY WATER SERVICES BUILDING PROJECT PAINTING

SECTION 09 9100 – Page 6 of 6

SUBSTRATE	MANUFACTURER	PRIMER	TOP COATS
Interior Surfaces:			
Gypsum Board, Latex Enamel Finish		Interior Latex Gypsum Board Primer, 1 coat	Interior Latex Enamel Eggshell Finish, 2 coats
Gypsum Board, Knock-down Finish		Interior Latex Gypsum Board Primer, 1 coat	Interior Latex Enamel Eggshell Finish, 2 coats
Ferrous and Galvanized Metals		Exterior Alkyd Enamel Primer, 1 coat	Exterior Alkyd Industrial Enamel Semi-Gloss Finish, 2 coats
Wood, Opaque, Latex Enamel Finish		Interior Latex Wood Primer, 1 coat	Interior Latex Enamel Semi-Gloss Finish, 2 coats
Wood, Transparent Finish		Wood Stain, 2 coats	Clear Polyurethane, 2 coats

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Plastic interior panel signs.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Include sign locations, sizes, mounting heights, and content.

1.3 QUALITY ASSURANCE

- A. Conform to ADA / ANSI 117.1 accessibility codes for sign design, construction, location, and mounting height.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. APCO Graphics, Inc. (www.apcosigns.com)
 - 2. Best Sign Systems, Inc. (www.bestsigns.com)
 - 3. Seton Identification Products. (www.seton.com)
 - 4.
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Signs:
 - 1. Type: Melamine plastic laminate with contrasting color core, non static, fire retardant, self extinguishing, matte finish.
 - 2. Thickness: 1/8 inch.
 - 3. Face and core colors: To be selected from manufacturer's full color range.

2.3 ACCESSORIES

- A. Adhesive: Tape: Double sided, waterproof, pressure sensitive.

2.4 FABRICATION

- A. Fabricate signs by reverse engraving process to produce characters and graphics in contrasting color, raised 1/32 inch.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
INTERIOR PANEL SIGNS**

SECTION 10 1423 – Page 2 of 2

- B. Sign Size: 6" wide X 9" high.
- C. Characters:
 - 1. Height: 3/4 inch.
 - 2. Style: Sans serif style, upper case.
- D. Pictograms: Universal accessibility symbols, 6 inches high.
- E. Provide Braille indications for each character.
- F. Corners: 1/2 inch radius.
- G. Edges: Square.

PART 3 EXECUTION

3.1 PREPARATION

- A. Clean surfaces of loose and foreign matter.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Locate signs on wall adjacent to scheduled doors.
 - 1. Horizontal: 9" centerline sign to door leaf edge
 - 2. Vertical: Fit sign between 48" and 60" above floor plane.

3.3 SCHEDULE

LOCATION	SIGN SIZE	CONTENT
Men's Toilets	6X9 inches	"MEN" and male pictogram
Women's Toilets	6X9 inches	"WOMEN" and female pictogram
Unisex Toilets	6X9 inches	Male and Female pictogram

END OF SECTION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT

DIMENSIONAL LETTERS

SECTION 10 1429 – Page 1 of 2

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Aluminum individual letters.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 1. 611 - Voluntary Specification for Anodized Architectural Aluminum.
 - 2. 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Architectural Extrusions and Panels.
 - 3. 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Architectural Extrusions and Panels.
 - 4. 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Architectural Extrusions and Panels.
- B. ASTM International (ASTM):
 - 1. A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - 2. B85 - Standard Specification for Aluminum-Alloy Die Castings.
 - 3. B209 - Standard Specification for Aluminum-Alloy Sheet and Plate.
 - 4. E527 - Standard Practice for Numbering Metals and Alloys.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Indicate character style, layout, dimensions, materials, finishes, and attachment.
 - 2. Samples: Typical letter in specified size, style, and finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. A.R.K. Ramos Mfg. Co., Inc. (www.arkramos.com)
 - 2. Gemini, Inc. (www.signletters.com)
 - 3. National Sign, Inc. (www.natsign.com)
 - 4. Leeds Architectural Letters (www.leedssign.com)

- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Aluminum Plate:
 - 1. ASTM B209, alloy and temper best suited to application.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
DIMENSIONAL LETTERS**

SECTION 10 1429 – Page 2 of 2

**** OR ****

- B. Aluminum Castings:
 - 1. ASTM B85, alloy and temper best suited to application.

2.3 ACCESSORIES

- A. Anchors: Type best suited to application.

2.4 FABRICATION

- A. Fabricate letters in accordance with approved Shop Drawings.
- B. Cut letters from 1/4 inch thick aluminum

**** OR ****

- C. Cast letters from aluminum, free from pits, gas holes, and warped surfaces.
- D. Hand tool to sharp, clean edges.
- E. Character Style: See Drawings
- F. Height: See Drawings
- G. Mounting Method: Pin surface mounted.

2.5 FINISHES

- A. Aluminum: AAMA 2605, fluoropolymer coating containing minimum 70 percent PVDF resins, to be selected from manufacturer's full color range.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install letters in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Set plumb, level, rigid, and aligned.

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Corner guards.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Indicate profiles, accessories, and attachments.

1.3 QUALITY ASSURANCE

- A. Corner Guards in Fire Rated Partitions: Tested and approved by recognized independent testing laboratory with fire resistance rating equivalent to partition construction.

1.4 PROJECT CONDITIONS

- A. Do not install guards until after painting and finishing work is completed.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Balco, Inc. (www.balcousa.com)
 - 2. Construction Specialties, Inc. (www.c-sgroup.com)
 - 3. Inpro Corporation. (www.inprocorp.com)
 - 4. Pawling Corp. (www.pawling.com)
- B. Substitutions: Under provisions of Division 01.

2.2 COMPONENTS

- A. Corner Guards:
 - 1. Type: Surface mounted, rigid vinyl, colored polycarbonate.
 - 2. Attachment: Countersunk fasteners
 - 3. Size: 2 inches X 2 inches x 72 inches high.
 - 4. Color: To be selected from manufacturer's full color range.

2.3 ACCESSORIES

Fasteners: Type best suited to application, exposed heads of same material and finish as guards.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure metal retainers to framing.
- C. Install closure pieces at top of corner guards.
- D. Place vinyl guards securely into retainer.
- E. Set plumb, level, and rigid.
- F. Install only at Corridors, outside corners.

END OF SECTION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT TOILET ACCESSORIES

SECTION 10 2813– Page 1 of 3

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Toilet, bath, and shower accessories.
 - 2. Framed mirrors.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 10 2116 – Plastic Toilet Compartments

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium.
 - 2. C1036 - Standard Specification for Flat Glass.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data:
 - a. Schedule accessories by room; show plans and elevations, and identify room name and number, type and quantity of accessories, and mounting heights.
 - b. Include manufacturer's brochures showing sizes, details of function, finishes, and attachment methods.
 - 2. Warranty: Sample warranty form.

1.4 QUALITY ASSURANCE

- A. Strictly conform to ADA and ANSI 117.1 requirements for locating accessories.

1.5 WARRANTIES

- A. Furnish manufacturer's 10 year warranty providing coverage against mirror silver spoilage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. A and J Washroom Accessories. (www.ajwashroom.com)
 - 2. American Specialties, Inc. (www.americanspecialties.com)
 - 3. Bobrick Washroom Equipment, Inc. (www.bobrick.com)
 - 4. Bradley Corp. (www.bradleycorp.com)
 - 5. GAMCO. (www.gamcousa.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

SHELBY COUNTY WATER SERVICES BUILDING PROJECT TOILET ACCESSORIES

SECTION 10 2813– Page 2 of 3

- A. Stainless steel fabricated toilet accessories.
- B. Mirror Glass: ASTM C1036, Type I, Class 1, Quality q1, 3/16 inch thick.

2.3 ACCESSORIES

- A. Fasteners: Stainless steel where exposed, hot dip galvanized where concealed; type best suited to substrate conditions.

2.4 FABRICATION

- A. Use stainless steel for exposed surfaces; galvanized steel may be used in concealed locations.
- B. Form exposed surfaces from single sheet of stock, free from joints, and flat, without distortion.
- C. Weld joints of fabricated components and grind smooth.
- D. Fabricate grab bars of tubing, free of visible joints, return to wall with end attachment flanges.
- E. Provide hangers, adapters, anchor plates, and accessories required for installation.
- F. Key locks on dispensers alike; furnish six keys.
- G. Mirrors:
 - 1. Frame: One piece, roll formed stainless steel channel, 1/2 x 1/2 inch, with corners mitered.
 - 2. Mirror: Apply one coat of silver, one coat of electroplated copper, and one coat of organic mirror backing compound to back surface of glass.
 - 3. Backing: Galvanized steel sheet.
 - 4. Isolate glass from frame and backing with resilient, waterproof padding.
- H. Shop assemble units and package complete with anchors and fittings.

2.5 FINISHES

- A. Stainless Steel: No. 4 satin.
- B. Galvanizing: ASTM A123/A123M to 1.25 ounces per square foot.
- C. Chrome Plating: ASTM B456, Type SC 2.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Set plumb, level, square, and rigid.
- C. Install wiring between power supply and accessories.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
TOILET ACCESSORIES**

SECTION 10 2813– Page 3 of 3

3.2 SCHEDULE

MARK	DESCRIPTION	MANUFACTURER	MODEL NO.
A	Paper Towel Dispensers	Furnished by Owner and installed by Contractor	
B	Toilet Tissue Dispenser	Furnished by Owner and installed by Contractor	
C	Soap Dispenser	Disposable units Furnished by Owner	
D	Framed Mirrors		
E	Grab Bars	ASI	3801 series
F	Robe Hooks	ASI	0751 series
G	Mop Holder	See Plumbing Drawings	
H	Towel Bars	ASI Satin Stainless Steel 18" or 24" see dwgs.	7355 series

END OF SECTION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Portable fire extinguishers.
 - 2. Cabinets.
 - 3. Brackets.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM) E814 - Standard Test Method for Fire Tests of Through-Penetration Firestops.
- B. National Fire Protection Association (NFPA) 10 - Portable Fire Extinguishers.
- C. Underwriters Laboratories (UL):
 - 1. 299 - Dry Chemical Fire Extinguishers.
 - 2. 711 - Rating and Fire Testing of Fire Extinguishers.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Indicate cabinet locations and mounting heights.
 - 2. Product Data: Include data on extinguishers and cabinets, cabinet dimensions, operational features, materials, finishes, and anchorage.
- B. Closeout Submittals:
 - 1. Maintenance Data: Include test, refill, or recharge schedules and re-certification requirements.

1.4 QUALITY ASSURANCE

- A. Provide fire extinguishers complying with UL 711 and International Building Code.
- B. Cabinets in Fire Rated Partitions: Tested in accordance with ASTM E814 with fire resistance rating equivalent to adjacent construction.
- C. Conform to applicable accessibility code for locating extinguishers.

1.5 PROJECT CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.1 MANUFACTURERS

SHELBY COUNTY WATER SERVICES BUILDING PROJECT FIRE EXTINGUISHERS AND CABINETS

SECTION 10 4413– Page 2 of 2

- A. Acceptable Manufacturers:
 - 1. Ansul Incorporated. (www.ansul.com)
 - 2. JL Industries. (www.jlindustries.com)
 - 3. Larsen's Mfg. Co. (www.larsensmfg.com)
 - 4. Potter Roemer. (www.potterroemer.com)

- B. Substitutions: Under provisions of Division 01.

2.2 COMPONENTS

- A. Extinguishers:
 - 1. Multi-purpose dry chemical type, UL 299, cast steel tank, Class 4A:80B:C, 10 pound nominal capacity.
- B. Cabinets:
 - 1. Formed galvanized steel sheet, 18 gage minimum.
 - 2. Configuration: Semi-recessed, sized to accommodate extinguishers.
 - 3. Trim: Flat trim. Returned to wall surface.
 - 4. Door:
 - a. Vertical glass style, equipped with recessed pull handle, latch, and keyed lock. Key locks alike; furnish six keys.
 - b. Hinge doors for 180 degree opening with continuous piano hinge.
 - c. Glazing: Clear tempered glass.
 - d. Graphics: Letter FIRE EXTINGUISHER vertically on door in red die-cut vinyl pressure sensitive letters.
 - e.
- C. Brackets: Formed galvanized steel, sized to accommodate extinguisher.

2.3 ACCESSORIES

- A. Mounting Hardware: Type best suited to application.

2.4 FINISHES

- A. Cabinet: Interior: Baked enamel, color to be selected from manufacturer's standard colors.
- B. Brackets: Baked enamel, black color.
- C. Extinguishers: Baked enamel, red color.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install cabinets and brackets in accordance with manufacturer's instructions.
- B. Set plumb, level, and rigid.
- C. Mounting heights in strict accord with ADA and ANSI 117.1 accessible height requirements.
- D. Place an extinguisher in each cabinet and on each bracket.

END OF SECTION

PART 1 - GENERAL

1.01 Related Documents

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, shall apply to work specified in this section.

1.02 General Description of Work

A. Work in this section shall include design, fabrication and installation of a complete aluminum sunshade system in accordance with the drawings and this specification.

1.03 References

- A. Aluminum Design Manual 2000, Specifications & Guidelines for Aluminum Structures.
- B. ASCE 7, Minimum Design Loads for Buildings and Other Structures.
- C. American Architectural Manufacturers Association (AAMA)
- D. American Society for Testing and Materials (ASTM)

1.04 Related Sections

- A. Concrete Work - Section 03300
- B. Masonry Work - Section 04200
- C. Miscellaneous Metals - Section 05500
- D. Flashing and Sheet Metal - Section 07600
- E. Sealants - Section 07900

1.05 Submittals

- A. Product Data: Submit manufacturer's product information, specifications and installation instructions for components and accessories.
- B. Shop Drawings: Submit complete erection drawings showing attachment system, column and gutter beam framing, transverse cross sections, covering and trim details, and optional installation details to clearly indicate proper assembly of components, sealed by a State Registered Structural Engineer in the state in which the work is being performed.
- C. Calculations: Submit complete structural design calculation sealed by State Registered Structural Engineer registered in the state in which the work is being performed.
- D. Design and engineering of attachment surfaces are not covered in this specification and scope of work.

E. Quality Assurance

A. Codes and standards: Comply with provisions of the following except as otherwise indicated: Local building codes including the 2003 International Building Code, latest addition with amendments, if any. AWS (American Welding Society) standards for structural aluminum welding.

B. Manufacturer: Obtain aluminum sunshade system from only one (1) manufacturer, although several may be indicated as offering products complying with requirements.

C. Installer Qualifications: Firm with not less than three (3) years experience in installation of aluminum walkway covers of type, quantity and installation methods similar to work of this section.

D. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible, to insure proper fitting of work.

E. Coordination: Coordinate work of this section with work of other sections which interface with covered walkway system (sidewalk, curbs, building fascias, etc.).

1.06 Warranty

A. Provide manufacturer's standard one-year warranty that shall include, but not limited to, coverage for structural, water tightness and finish beginning the day of Substantial Completion of Installation.

PART 2 - PRODUCT

2.01 Manufacturers

A. Contract documents are based on products manufactured by:

- **Tennessee Valley Metals, Inc.,
190 Industrial Park Road, Oneonta, AL 35121
205.274.9500, fax 205.274.9501
800.551.2579,
sales@tvmetals.com , www.tvmetals.com**

B. Interested manufacturers will be considered for substitution only when the following conditions are met: Complete details, including sizes of all members and structural calculations showing loads applied in accordance with the specification must be submitted to the architect for review. Submit complete details with structural properties (moment of inertia, section modulus, modulus of elasticity, etc.) for all proposed sections (bents, columns, decking and other structural members).

2.02 Materials

- A. Aluminum Extrusions: All sections shall be extruded aluminum 6063 alloy, heat treated to T-6 temper.
- B. Finishes: For factory baked enamel finish, specify AAMA 603.8 standard or custom color.

For fluoropolymer (Kynar) finish, AAMA 605.2, two or three coats.

For satin anodized finish, specify 204.R1 meeting Aluminum Association specification AA-M-10C-22A21.

2.03 Components

- A. Supports: Aluminum plates or tubing of size and shape as indicated on drawings. (Rod and clevis is available as an option.)
- B. Deck: Deck shall be extruded aluminum airfoil blades or “Z” louvers of size as indicated on drawings. (Tubular shapes are available as an option).
- C. Fascia: Fascia shall be extruded aluminum gutter or tubing. Size as indicated on drawings.
- D. Flashing: Flashing shall be .032” aluminum (min.). All thru-wall flashing is completed by others.
- E. Fasteners: All exposed fasteners shall be stainless steel.

2.04 Fabrication

- A. Deck Construction: Deck shall be manufactured of extruded material.

PART 3 - EXECUTION

3.01 Preparation

- A. Erection shall be performed after all concrete, masonry, and roofing work in the vicinity is complete and cleaned.

3.02 Cleaning

- A. All protective cover components shall be cleaned promptly after installation.

3.03 Protection

- A. Extreme care shall be taken to protect materials during and after installation.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
APPLIANCES AND EQUIPMENT**

SECTION 11 3100 – Page 1 of 1

PART 1 GENERAL

1.1 SUMMARY

A. Responsibilities:

1. Refrigerator. Furnished and Installed by Owner
2. Range: Furnished and Installed by Owner
3. Range Hood: Furnished by Owner, Installed by Contractor.
4. Ice Machine: Furnished and Installed by Owner.
5. Lockers: Furnished and Installed by Owner.

B. Related Sections:

1. Division 01: Administrative, procedural, and temporary work requirements.
2. PLUMBING and ELECTRICAL sections.

1.2 DELIVERY, STORAGE AND HANDLING

- A. Receive and store appliances and equipment with manufacturer's protective coverings in place; do not remove until just prior to installation.

PART 2 EXECUTION

2.1 INSTALLATION

- A. Install appliances and equipment in accordance with manufacturer's instructions.
- B. Set plumb, level, and aligned.
- C. Connect to domestic water.
- D. Connect to power supply.

2.2 ADJUSTING

- A. Adjust for proper operation.

APPLIANCE DESCRIPTION	MANUFACTURER	MODEL	FINISH
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Contact Owner for all
appliance specifications prior
to installation.

END OF SECTION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT METAL BUILDING SYSTEMS

SECTION 13 3419- Page 1 of 6

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Pre-engineered, shop fabricated structural steel building frame.
 - 2. Metal wall and roof panel system including trim and accessories.
 - 3. Thermal insulation.
 - 4. Gutters and downspouts.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Division 07 4113: Metal Roof Panels
 - 3. Division 07: 4213 Metal Wall Panels

1.2 REFERENCES

- A. American Architectural Manufacturers Association (AAMA)www.aamanet.org:
 - 1. 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
 - 2. 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Architectural Extrusions and Panels.
 - 3. 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Architectural Extrusions and Panels.
- B. American Institute of Steel Construction (AISC)www.aisc.org - Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.
- C. American Iron and Steel Institute (AISI)www.steel.org - Specifications for Cold-Formed Members.
- D. American Society of Civil Engineers (ASCE)www.asce.org 7 - Minimum Design Loads for Buildings and Other Structures.
- E. American Welding Society (AWS)www.aws.org D1.1 - Structural Welding Code - Steel.
- F. ASTM International (ASTM)www.astm.org:
 - 1. A36/A36M - Standard Specification for Carbon Structural Steel.
 - 2. A307 - Standard Specification for Low-Carbon Steel Externally and Internally Threaded Standard Fasteners.
 - 3. A325 - Standard Specification for High-Strength Bolts for Structural Steel Joints, Including Suitable Nuts and Plain Hardened Washers.
 - 4. A572/A572M - Standard Specification for High Strength Low Alloy Columbium-Vanadium Steels of Structural Quality.
 - 5. A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 6. A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
 - 7. A992/A992M - Standard Specification for Steel for Structural Shapes.
 - 8. A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - 9. C665 - Standard Specification for Mineral Fiber Thermal Insulation for Light Frame Construction and Manufactured Housing.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT METAL BUILDING SYSTEMS

SECTION 13 3419– Page 2 of 6

G. Metal Building Manufacturers Association (MBMA) www.mbma.com:

1. Common Industry Practices.
2. Low Rise Building Systems Manual.

H. Society for Protective Coatings (SSPC) www.sspc.org - Painting Manual.

1.3 SYSTEM DESCRIPTION

A. Pre-Engineered Metal Building System:

1. Clear span rigid frame. Primary framing: Rigid frame of rafter beams and columns, rigid frame end wall, and wind bracing.
2. Secondary framing: Purlins, girts, eave struts, clips, and other items indicated or required.
3. Wall and roof panels: Preformed, prefinished metal panels with sub-girt framing and insulation.

B. Design Requirements:

1. Design framing and panels in accordance with MBMA Manual.
2. Design structural steel members and light gage steel framing in accordance with AISC Specifications.
3. Total load deflection: $L/240$.
4. Welded connections: In accordance with AWS D1.1.
5. Anchor bolts: Design anchor bolts to resist horizontal and uplift reactions at column bases.
6. Tolerances: Meet fabrication tolerances specified in MBMA Common Industry Practices.
7. Thermal expansion and contraction: Withstand movement caused by an ambient temperature range of 120 degrees F and a surface temperature range of 160 degrees F.

C. Design Loads: Design system to withstand:

1. Live and dead loads in accordance with Building Code.
2. Design wind pressure in accordance with the International Building Code with maximum allowable deflection of $L/180$.
3. Weight of additional imposed loads of mechanical and electrical systems, ceiling, roofing, and other elements.
4. Special loads: Concentrated loads as indicated.
5. Limit deflection of framing members supporting exterior glazed assemblies to $L/360$.
6. Primary frame lateral drift:
 - a. Base wind pressures for purposes of calculating lateral drift of primary frames on 50 year mean recurrence interval using scheduled wind speed.
 - b. Limit deflection of framing members to $H/100$.

1.4 SUBMITTALS

A. Submittals for Review:

1. Shop Drawings:
 - a. Include for structural components:
 - 1) Plans, elevations, and sections showing location of components.
 - 2) Details showing anchoring, fastening, and interface with other work.
 - b. Include for panels:
 - 1) Configuration of panels, trim members, and closures.
 - 2) Assembly of system components, including typical and special conditions.
2. Product Data: Include description of system components and verify compliance with specified requirements.
3. Samples: Panel samples in profile proposed, showing available colors in each color.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT METAL BUILDING SYSTEMS

SECTION 13 3419– Page 3 of 6

1.5 QUALITY ASSURANCE

- A. Designer Qualifications: Professional Structural Engineer licensed in state in which project is located.
- B. Installer Qualifications: Minimum 10 years documented experience in work of this Section.
- C. Welder Qualifications: AWS D1.1.
- D. Size gutters and downspouts for rainfall intensity determined by a storm occurrence of one in 10 years.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store steel above ground on platforms, skids, or other supports; separate with wooden separators.
- B. Protect steel from corrosion.
- C. Prevent damage to prime coat; use wooden protectors to prevent damage from chain or cable cinches.
- D. Protect panels and trim from contact with materials that could cause staining or discoloration of finish.

1.7 WARRANTIES

- A. Furnish manufacturer's 30 year warranty providing coverage against flaking, chipping, cracking, fading, or delamination of panel finish.
- B. Furnish manufacturer's 30 year warranty providing coverage against rupture, perforation, or structural failure of aluminum-zinc alloy coated panels.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Butler Manufacturing Co. (www.butlermfg.com)
 - 2. Ceko Building Systems. (www.cecobuildings.com)
 - 3. Gulf States Manufacturers. (www.gulfstatesmanufacturers.com)
 - 4. Star Building Systems. (www.starbuildings.com)
 - 5. A & S Building Systems. (www.a-s.com)
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Framing:
 - 1. Primary components: ASTM A572/A572M, Grade 50.
 - 2. Secondary components: ASTM A1008/A1008M.
 - 3. Fasteners:
 - a. Primary framing: ASTM A325.
 - b. Secondary framing: ASTM A307.
 - 4. Primer paint: SSPC Paint 15, Type 1, red oxide.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT

METAL BUILDING SYSTEMS

SECTION 13 3419– Page 4 of 6

- B. Metal Wall and Roof Panels, Gutters, Downspouts, Trim, and Closures: 24 ga. core steel. ASTM A792/A792M aluminum-zinc alloy coated steel, Commercial Quality, AZ50 coating class.
- C. Panel Closures: Die cut compressible filler to fit panel configuration.
- D. Fasteners: Stainless or plated steel, type as required; head color to match panels where exposed, with nylon or neoprene washers.
- E. Wall and Roof Insulation: ASTM C665, Radiant foil faced fiberglass blankets. R-values as shown on drawings and energy compliance documents.

2.3 FABRICATION

- A. Steel Framing Components:
 - 1. Fabricate structural steel in accordance with AISC and AISI Specifications.
 - 2. Welding: AWS D1.1.
- B. Wall Panels:
 - 1. Aluminum-zinc alloy coated steel sheet, 24 and 26 gage.
 - 2. Panel Profile: See Drawings for panel description.
 - 3. Single piece from base to top of wall.
 - 4. Trim members: Form from same material and gage and with same finish as panels.
- C. Roof Panels:
 - 1. Aluminum-zinc alloy coated steel sheet, 24 gage.
 - 2. Panel Profile: See Drawings for panel description.
 - 3. Ridge assembly designed to allow thermal movement.
 - 4. Factory punched at ends to match holes in eave member.
 - 5. Designed to fasten to supports by means of thermally responsive panel clips.
 - 6. Single piece from ridge to eave where possible.
 - 7. Trim members: Form from same material and gage and with same finish as panels.
- D. Gutters and Downspouts:
 - 1. Aluminum-zinc alloy steel sheet, 24 gage.
 - 2. Fabricate end caps, downspout outlets and headers, straps, brackets, and downspout strainers in profile to suit gutters and downspouts.

2.4 FINISHES

- A. Framing Members: Shop paint steel surfaces except surfaces to be welded and contact surfaces of high strength friction type bolted connections.
 - 1. Surface preparation: SSPC SP2 - Hand Tool Cleaning or SP3 - Power Tool Cleaning.
 - 2. Application: One coat; follow coating manufacturer's instructions.
 - 3. Minimum dry film thickness: 2.0 mils.
- B. Panels and Trim: AAMA 2605, fluoropolymer coating containing minimum 70 percent PVDF resins, color to be selected from manufacturer's full color range.

PART 3 EXECUTION

3.1 ERECTION OF FRAMING SYSTEM

- A. Install in accordance with AISC and AISI Specifications, manufacturer's instructions, and approved Shop Drawings.
- B. Fit members square against abutting components.
- C. Position members plumb, square, and level.
- D. Temporarily brace members until permanently fastened.
- E. Do not splice load bearing members.
- F. Align and adjust various members forming parts of a complete frame or structure after assembly but before fastening.
- G. Rigidly connect members using welds or bolts.
- H. Installation Tolerances:
 - 1. Maximum variation from location: Plus or minus 1/4 inch.
 - 2. Maximum variation from plane: 1/4
- I. Install in accordance with manufacturer's instructions and approved Shop Drawings.
- J. Install aligned, level, and plumb.
- K. Permanently fasten panels to supports in concealed locations. Fasten panels using concealed panel clips. Exposed fasteners permitted on trim members only.
- L. Locate panel joints over supports.
- M. Lap end joints 4 inches minimum.
- N. Install trim to maintain visual continuity of system.
- O. Install joint sealers and gaskets to prevent water penetration.
- P. Flash penetrations through roofing with metal trim to match panels:
 - 1. Lap flashings over roof panels 12 inches minimum on all sides and seal with double bead of joint sealer.
 - 2. Install metal draw band and joint sealer at top of pipe penetrations.
 - 3. Install water diverter at uphill side of square and rectangular penetrations.

3.2 INSTALLATION OF GUTTERS AND DOWNSPOUTS

- A. Gutters: Secure with straps spaced maximum 36 inches on center and within 6 inches of ends.
- B. Downspouts:
 - 1. Secure with straps spaced maximum 8 feet on center and within 2 feet of ends and elbows.
 - 2. Flash downspouts minimum 3 inches into gutters and fasten.
 - 3. Flash upper sections into lower sections minimum 2 inches at joints; fasten sections together.

3.3 ADJUSTING

- A. After erection of structural steel, touch up bolt heads and nuts, field welds, and abrasions with same primer used in shop.
- B. Touch up field cuts, scratches, and abrasions on exposed panel surfaces and trim to match factory finish.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - PLUMBING**

SECTION 22 0500 – Page 1 of 10

PART 1 – GENERAL

1.1 SCOPE:

- A. Provisions of this Section apply to all Plumbing work.
- B. Include the provisions of General Conditions as part of this Section.
- C. Provide all labor, materials, equipment, and services necessary for the completion of all Plumbing work shown or specified, complete and ready for operation, consisting in general of the following:
 - 1. A system of sanitary drain, waste, and vent piping.
 - 2. A system of domestic water piping.
 - 3. A system of natural gas piping.
 - 4. Providing plumbing fixtures and equipment as shown on drawings.
- D. Give required notices, file drawings, obtain and pay for permits, deposits and fees necessary for the installation of the Plumbing work. Obtain and pay for inspections required by laws, ordinances, rules, regulations or public authority having jurisdiction. Obtain and pay for certificates of such inspections, and file such certificates with Owner.
- E. "Provide" means to furnish and install, complete and ready for operation.

1.2 DRAWINGS:

- A. Plumbing Drawings are diagrammatic and subject to requirements of Architectural Drawings and conditions existing in the field. Plumbing Drawings indicate generally the location of components and are not intended to show all fittings or all details of the work.
- B. Follow the drawings closely, coordinate dimensions with Architectural Drawings and field conditions. DO NOT scale Plumbing drawings for location of system components.
- C. Make no changes without Architect's written permission. In case of doubt, obtain Architect's decision before proceeding with work. Failure to follow this instruction shall make the Contractor liable for damage to other work and responsible for removing and repairing defective or mislocated work in proper manner.
- D. Contractor for Plumbing work is responsible for coordinating with all trades.

1.3 APPLICABLE CODES AND STANDARDS:

- A. Comply with the current editions of the following Codes and Standards:
 - 1. ANSI/B31.9 - Code for Building Services Piping

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - PLUMBING**

SECTION 22 0500 – Page 2 of 10

2. NFPA 54 - National Fuel Gas Code
3. NFPA 70 - National Electrical Code
4. NFPA 90A – Installation of Air Conditioning and Ventilating Systems
5. NFPA 101 - Safety to Life from Fire in Buildings and Structures
6. Other standards as referenced in other sections of Division 22
7. 2021 International Building Code if no local code
8. 2021 International Plumbing Code if no local code
9. 2021 International Fuel Gas Code if no local code
10. 2021 International Mechanical Code if no local code
11. 2015 International Energy Conservation Code if no local code

1.4 QUALIFICATIONS OF SUBCONTRACTOR:

- A. The Plumbing Subcontractor shall meet the following minimum qualifications:
1. He shall have been in business as a Plumbing Contractor for at least 3 years prior to the date of opening bids.
 2. He shall have a current Master Plumber's Certificate of competency issued by the State of **Alabama** and the City and County in which work occurs.
 3. He shall have a satisfactory experience record with Plumbing installation of character and scope comparable with this project and shall have completed three such installations in the past three years.
 4. If the Plumbing Subcontractor, with the Engineer's approval, uses a Sub-Subcontractor to provide another discipline that the Subcontractor does not normally furnish, that Sub-Subcontractor shall meet the same qualifications as the Subcontractor.

1.5 CONFLICTS AND INTERFERENCES:

- A. If systems interfere or conflict, the Architect shall decide which equipment to relocate regardless of which was first installed.

1.6 WORKMANSHIP:

- A. Do all work in a neat and first-class manner. Remove and replace work not done in such manner as directed by the Architect.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - PLUMBING**

SECTION 22 0500 – Page 3 of 10

1.7 COOPERATION:

- A. Cooperate with all other crafts. Perform work in a timely manner. Do not delay the execution of other work.

1.8 VISITING SITE:

- A. Visit site and become familiar with location and various conditions affecting work. No additional allowance will be granted because of lack of knowledge of such conditions.

1.9 MATERIALS:

- A. Unless otherwise noted, provide new, standard, first-grade materials throughout. **Unless otherwise noted, all pipe, fittings and valves shall be made in the United States of America.**
- B. Where materials or products are specified by manufacturer's name, brand, trade name, or catalog reference, such named materials or products shall be the basis of the estimate, without substitution, and shall be furnished under the contract unless requests for equivalents are approved as noted below. Where two or more brands are named the choice of these shall be optional with the Contractor.
- C. Equivalents will be considered only if written request for approval has been received by the Architect (from a general contract bidder) 10 days prior to the date established for receipt of Proposals. Each request shall include the name of the material or equipment for which an equivalent is proposed and a complete description of the proposed equivalent including drawings, cuts, performance and test data, and deviation from the specification and any other information necessary for evaluation. A statement setting forth any changes in other materials, equipment or other Work that incorporation of the equivalent may require shall be included. The burden of proof of the merit of the proposed equivalent is upon the proposer. The Architect's decision of approval or disapproval of a proposed equivalent is final.
- D. If the Architect approves any proposed equivalent prior to receipt of Proposals, approval will be set forth in an Addendum. **DO NOT RELY UPON APPROVALS MADE IN ANY OTHER MANNER.**
- E. No proposed equivalent will be considered after the Contract has been executed, except as described in the General Conditions.
- F. Within 45 days of execution of contract and before ordering materials or equipment, submit to Architect and obtain his approval of a detailed list showing each item which is to be furnished by make, trade name, catalog number, or the like; together with manufacturer's specifications, certified prints, and other data sufficient for making comparisons with items specified. When approved, such schedule shall be of equal force with these specifications in that no variation there from shall be allowed except with Architect's written approval. Submit PDF format files for approval. Provide PDF files of approved data for project close-out.
- G. Similar items of equipment shall be the product of the same manufacturer.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - PLUMBING**

SECTION 22 0500 – Page 4 of 10

1.10 SHOP DRAWINGS:

- A. Before starting work, submit and obtain approval of detailed drawings of the following, fully dimensioned (including elevations of piping) and drawn to 1/4" to 1'-0" scale.
- B. Engineers' CAD/electronic drawings files will be available upon request for the convenience of the contractor and for use in preparation of shop drawings. A signed agreement between the Engineer and Contractor shall be remitted to the Engineer prior to delivery of CAD/electronic drawing files.

1.11 RECORD DRAWINGS:

- A. When work starts the Architect will furnish two complete sets of white prints of the Plumbing Drawings. All corrections, variations, and deviations, including those required by change orders, if any, must be recorded in colored ink or colored pencil at the end of each working day on these drawings. The marked prints shall be available at all times for the Architect's inspection.
- B. Prior to examining the request for final payment or making any response thereto, the Architect shall receive from the Contractor one complete set of the white prints, marked as stated above, indicating the actual completed installation of the work included under this contract.
 - 1. Accurately show location, size and elevation of new exterior utility work and its relationship to any existing utilities, obstructions, etc., contiguous to the area of work.
 - 2. Block out areas modified by change-order & identify them by change-order number.
 - 3. The Architect will forward the marked white prints to the Consulting Engineers for review. They will then be returned by the Architect to the Contractor for use in preparing record drawings.
- C. When work is completed, the Engineers' CAD/electronic drawing files will be made available upon request for the convenience to the contractor and for use in preparing record drawings. Contractor shall transfer the information from the marked white prints to the CAD files, removing all superseded data in order to show the actual completed conditions.

1.12 PROTECTION OF EQUIPMENT:

- A. During construction, protect Plumbing equipment from damage or deterioration.
- B. When installation is complete, clean equipment and make ready for painting.

1.13 INSTALLATION OF EQUIPMENT:

- A. Install equipment to provide normal service access to all components.
- B. Where drawings show sufficient space for removing components, install equipment to provide such clearance. ***Provide space at all equipment power and control panels as required by local codes.***

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - PLUMBING**

SECTION 22 0500 – Page 5 of 10

- C. Install equipment in accordance with manufacturer's instructions. If manufacturer's instructions conflict with contract documents, obtain Architect's decision before proceeding.
 - D. All equipment shall be firmly fastened in place:
 - 1. Pad mounted equipment shall be secured to pads using poured in place anchor bolts or cinch anchors.
 - 2. Vibration isolators shall be secured to floors or pads and equipment shall be bolted to the isolators.
- 1.14 EQUIPMENT SUPPORTS:
- A. Provide supports for piping and equipment. Hot dip galvanize after fabrication all grillage, supports, etc., located outdoors. Prime coat and paint all grillage, supports, etc. located indoors. Where noted provide 304 stainless steel supports. At the Contractor's option, all grillage, supports, etc. located outdoors may be 304 stainless steel instead of hot dip galvanized.
 - B. Set floor-mounted equipment on concrete pads or platforms (as indicated) of height shown, but not less than 3-1/2" high. Chamfer pads 1". Extend pad 6" beyond equipment in all directions. Provide pads as follows:
 - 1. Water heaters: 6" high, No. 4 rebar 12" o.c. both ways.
- 1.15 CUTTING AND PATCHING AND INCIDENTAL WORK:
- A. Set sleeves and inserts and lay out and form openings in walls, beams, girders and structural floors in this Section.
 - B. Cut, patch and repair as required to accomplish Plumbing Work and finish to match adjacent work. Architect's approval required before cutting any part where strength or appearance of finished work is involved.
 - C. Provide all motors incidental to the Plumbing systems. Wiring of motors, switches and starters is included in "Electrical Sections".
 - D. Furnish motor starters as specified below.
- 1.16 FLASHING:
- A. General: Furnish all pitch cups, metal base flashing and counter flashing required for Plumbing Work. Installation of above items is specified in Roofing Section.
 - B. Pitch Cups: 20 gauge galvanized steel, at least 8" deep, bases mitered and soldered and extending at least 4" horizontally.
 - C. Metal Base Flashing: Galvanized steel for ferrous items, and stainless steel for stainless steel items. Minimum thickness 22 gauge (0.034") galvanized steel, 20 gauge (0.038") stainless steel, 0.032" aluminum. Bases mitered and soldered extending out at least 4" horizontally and 8" vertically.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - PLUMBING**

SECTION 22 0500 – Page 6 of 10

- D. Metal Counter Flashing: Of material and gauges specified for base flashing, lapping base flashing at least 3".
- E. Vent Pipe and Roof Drain Flashing: Specified in "Roofing Section".
- F. Shower pans specified in another section. Securely clamp drain to pan under this section.

1.17 EXCAVATION & BACKFILLING:

- A. Include all excavation and backfilling required to bring the work to line and grade shown, including excavation of rock and all other materials which may be encountered.
- B. Excavate trenches wide enough for proper installation of work. Grade trench bottoms evenly. Provide bell holes as necessary to insure uniform bearing for pipes. Excavate minimum 6" below pipe. Refill cuts below required pipe grade with sand or compacted gravel. Support pipe continuously along its entire length. (Do not use piers to support piping.)
- C. Backfill after inspection by Architect and authorities having jurisdiction. Backfill compacted areas (engineered fill) with sand or fine gravel (89/10) in accordance with requirements of "Sitework" no less than 95% compactancy. Backfill paved areas with sand or fine gravel (89/10) compacted to meet requirements of Paving Section. Backfill shall be free of rock, wood, steel, brick, etc. Do not disturb pipe. Restore or repair pavements and the like after backfilling, matching adjacent work.
- D. Resod grassed areas and replace bushes, etc.

1.18 MOTORS, STARTERS & ELECTRICAL EQUIPMENT:

- A. Provide electrical equipment compatible with the current shown on electrical drawings. Verify current characteristics before ordering equipment.
- B. Should the Contractor with the Architect's approval make changes in electrical equipment from that shown on the Electrical Drawings, the Contractor shall be responsible for the cost of required changes.
- C. Provide factory installed fuses in all equipment requiring fusing for branch circuit protection.

1.19 SLEEVES:

- A. For pipe through floors inside fire rated chases or through non-fire-rated walls: 20 gauge galvanized steel, 1" larger than pipe or pipe covering.
- B. For pipe through concrete beams: schedule 40 black steel pipe, 1" larger than pipe or pipe covering.
- C. For pipe passing through floors outside fire rated chases and fire rated wall and partitions, provide 20 gauge steel sleeve leaving the annular space between pipe or pipe covering as required by UL systems. Where pipe is insulated, insulation shall be continuous thru sleeve. Refer to Section Through- Penetrations Firestop Systems where included in the contract documents, Otherwise, seal between sleeve and pipe or pipe covering with 3M Brand Fire

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - PLUMBING**

SECTION 22 0500 – Page 7 of 10

- D. Barrier CP 25WB caulk, Flamestop V, Specified Technologies, Inc. "Spec Seal Sealant", Rectorseal Corp. Metacaulk 950 or Hilti FSTONE bearing UL listing for actual conditions of installation, thickness and application in strict accord with UL reference for each type installation. Any equivalents must meet the 10 day prior approval provision and must show UL approval for all conditions, bare pipe, insulated pipe, etc. For plastic piping material submittal must show UL approval for each application and if caulk comes in direct contact with pipe, it must be compatible and not injurious to the pipe.
 - E. Set sleeves before concrete is poured or masonry is erected. In existing construction, groutsleeves firmly in place.
 - F. Extend floor sleeves 1-1/2" above finish floor in areas where floor is subject to being wet during normal usage (Plumbing rooms, toilets, etc.).
 - G. Where exposed pipes pass through walls and partitions in finished spaces, provide chrome plated F & C plates or escutcheons.
- 1.20 PAINTING:
- A. Refinish equipment damaged during construction to new condition.
- 1.21 VALVE CHARTS:
- A. In all mechanical rooms, provide charts showing number and locations of all labeled valves, type of service, etc. Laminate in heavy plastic and provide brass grommets for attaching to wall. Attach to wall with anchors and brass screws.
 - B. In existing buildings include existing valves in the charts of new valves.
- 1.22 EQUIPMENT IDENTIFICATION:
- A. Provide 2" x 3" or larger laminated plastic nameplates with 1/2" numbers and letters in colors specified below. Screw tags to equipment in obvious locations. Engrave equipment designation and numbers as shown on plans and drawings on upper half of tag, leaving lower half of tag for future engraving by Owner.
 - B. Provide similar nameplates for motor starters furnished under Division 26.
 - C. Secure nameplates with acorn head screws.
 - D. Colors:
 - 1. Equipment connected to utility power only - black letters on white nameplates.
 - 2. Equipment connected to emergency power - red letters on white nameplates.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - PLUMBING**

SECTION 22 0500 – Page 8 of 10

1.23 ACCESS DOORS:

- A. Furnish and install access doors for valves, fire dampers, dampers, controls, air vents, and other items located above non-liftout ceilings or behind partitions or walls. Doors in non-fire rated walls and ceilings: 16-gauge steel with hinges and screwdriver latches. Doors in fire rated walls and ceilings: UL labeled with fire rating equal to fire rating of wall or ceiling. Doors in security ceilings to be 10 ga. steel panels, white powder coat, 2" x 2" x 3/16" steel angle frame heavy duty butt hinges with security screws. Provide door styles compatible with adjoining surfaces as selected by Architect. Size doors to permit removal of equipment and/or maintenance. Doors: Bar-Co, Nystrom, Williams Bros., or equal.
- B. Mark lay-in ceilings with colored vinyl self adhering disc stuck on grid adjacent to maintenance access points.

1.24 TESTS, CLEANING & ADJUSTMENTS:

- A. All tests shall be witnessed by the Architect in addition to authorities having jurisdiction. A minimum of 72 hour notice is required prior to performance of test.
- B. After systems have been installed complete, adjust and test systems for proper operation and correct all noise or vibration conditions. Perform all tests as required by local codes. Contractor shall furnish testing equipment. **All piping pressure tests shall be hydrostatic tests.**
- C. If local codes are more stringent than the following, local codes shall govern.
- D. Sanitary Systems:
 - 1. Test piping by stopping lower outlets and filling with water to 10' hydrostatic head. Stop leaks and repeat test until watertight. All joints shall be exposed throughout test.
 - 2. Provide "Ball Test" on all piping 3" and larger with ball 1/2" smaller than pipe diameter.
- E. Domestic water piping: Test by applying pressure (by temporary pump or compressed air connection) to total hydrostatic pressure 1-1/2 times street pressure but not less than 150 psig for not less than 4 hours. Immediately and completely stop all leaks. On completion of roughing-in, cap all outlets, make connections with house supply line, and put under full water pressure. After testing, leave general pressure on until ready to install fixture (except when necessary to drain to avoid freezing during construction). After completion of all tests, repairs and installation of fixtures, flush all domestic hot and cold water piping with water to remove sediment and scale and then disinfect. Disinfect piping with hypochlorite solution of chlorine or compressed chlorine gas applied through an approved chlorinator. Operate valves and faucets several times to insure the chlorine reaches all parts of the system. Feed water and chlorination agent into the system at rates that will provide a residual chlorine content of not less than 50 ppm after a retention period of 6 hours. Upon completion of treatment, flush treated water from each system until the water supply is satisfactory to the public health authority having jurisdiction. Provide Architect a certificate of compliance from the local Health Department as required.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - PLUMBING**

SECTION 22 0500 – Page 9 of 10

- F. Natural Gas Piping Tests: After all piping is roughed in but before connection to main or to appliances or equipment, test piping for tightness as required by local gas company; or in the absence of such requirements, apply in Architect's presence an air pressure test equal to 25 psig, which piping shall maintain without pressure drop for at least four hours. Stop all leaks shown up by such test and repeat test until piping is airtight. Black steel piping below grade shall be Holiday tested prior to backfilling.
 - G. Shower Floor:
 - 1. Test shower floors for tightness after membrane is installed and clamped to shower drain with 3" of water for 4 hours with no loss of water.
 - H. Start-Up and Service:
 - 1. The Contractor and factory authorized service representative for the water heaters shall place each item of such equipment into satisfactory operation with all automatic and safety devices. Further, all adjustment service required shall be performed during the warranty period.
 - 2. In addition, submit equipment manufacturers' start-up reports for items listed above. See Paragraph "Project Close-Out", below.
 - 3. The Contractor shall balance all hot water pumps and circuit setters to flow shown on drawings. Balancing shall not be started until 1) Systems have been completed, including leak testing and cleaning and until systems have been refilled, pumps are rotating correctly, and strainers have been cleaned and baskets used for the ultimate installation have been installed, and 2) Expansion tanks have been installed and correct system pressure is being maintained, and system has been vented and is free from air.
 - a. Adjust circuit setters to meet design GPM requirements. Measure and record GPM.
 - b. Produce a report documenting the measured flows and submit three (3) copies of the report to the Architect.
- 1.25 WARRANTY & INSTRUCTIONS:
- A. See General Conditions - One-Year Warranty.
 - B. Contractor shall and hereby does warrant all materials, workmanship and equipment furnished and installed by him to be free from defects for a period of one year after date of substantial completion of the Contract. Should any defects in material, workmanship, or equipment be made known to Contractor within the one-year warranty period, Contractor shall replace such materials, workmanship, or equipment without charge.
 - C. Provide PDF of manufacturer's operating and maintenance manuals and parts lists for all equipment and materials furnished. Provide a maintenance schedule listing routine maintenance operations and suggested frequency thereof. Include all warranty dates on equipment and guarantees.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - PLUMBING**

SECTION 22 0500 – Page 10 of 10

- D. During the period of tests, adjust all controls, regulators, etc., to comply with these Specifications.
- E. Make available to the Owner, without additional cost, service and adjustment of the equipment for the guarantee period.

1.26 PROJECT CLOSE-OUT:

- A. Prior to the issuance of a certificate for final payment, submit to Architect and obtain his approval of the following:
 - 1. Record drawings – plumbing: PDF files and CAD files.
 - 2. Equipment Submittal Data PDF files.
 - 3. Equipment operating and maintenance manuals PDF files.
 - 4. Maintenance schedule.
 - 5. Equipment warranty dates and guarantees.
 - 6. Circulating hot water balance report.
 - 7. Certificate of disinfection of domestic water lines as required by local authority.
 - 8. List of Owner's Personnel who have received maintenance instructions.
 - 9. Install valve charts in Mechanical Rooms.
 - 10. Submit factory start-up reports for:
 - a. Water heater
 - 11. Include with insulation material submittal letters from the insulation material manufacturer certifying that the insulation material does not contain asbestos in any shape, form or quantity.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
MATERIALS AND METHODS - PLUMBING**

SECTION 22 1000 – Page 1 of 6

PART 1 - GENERAL

1.1 SCOPE:

- A. Section 22 0500 - "General Provisions - Plumbing" shall apply to and become part of this Section.

PART 2 - MATERIALS: Unless otherwise noted, all pipe, fittings and valves shall be manufactured in the United States of America

NOTE: All materials used in systems that may be used for potable water shall meet the Reduction of Lead in Drinking Water Act.

2.1 SANITARY, WASTE AND VENT PIPING:

- A. Inside building to foundation wall: Vent piping: Cast iron. Waste piping above floor 2" or smaller: Cast iron, or DWV copper. Other waste and vent piping above slab on grade: Cast iron. Piping below slab on grade: PVC-DWV plastic. Piping from discharge of equipment that will convey water at a temperature greater than 140°F shall be cast iron. Pipe exposed in mechanical rooms or housekeeping rooms shall be cast iron. Piping in return air plenums shall not be PVC.
- B. Outside building (from foundation wall to sewer provided under the Civil Section) 2'-0" or more below grade in non-traffic areas: PVC-DWV, or cast iron. Less than 2'-0" cover and in traffic areas: Cast iron or Ductile iron.
- C. Cast iron hub-and-spigot soil pipe: tar coated with cast iron fittings of corresponding weight. Service weight, ASTM Specification A 74.
- D. Cast iron soil pipe: cast iron no-hub pipe and fittings, CISPI Standard 301, ASTM A888 shall be used only above slab on grade.
- E. Ductile iron pipe: Class 52, ASTM A746, ANSI/AWWA C151/A21.51 cement lined, fittings of corresponding weight, but not cement lined.
- F. DWV copper pipe: copper drainage tube DWV meeting ASTM B 306 with cast bronze solder joint drainage fittings, ANSI B-16-23.
- G. PVC-DWV plastic pipe: PVC-DWV, ASTM D-2665 shall not be used in ceiling plenum return. Solid core only permitted. Cell core not allowed. Provide PVC to cast iron adaptors below slab on grade for caulking or compression joint. No hub bands are not allowed. As an alternative provide coupling equal to Mission Heavyweight at the finish floor.
- H. Joints for cast iron piping: compression gasket especially made for cast iron soil pipe, ASTM FC-564-85.
- I. Joints for no-hub cast iron piping: no-hub neoprene gasket and stainless steel coupling CISPI Standard 310 & ASTM C1277. Joints for 4" and larger shall be 4-band heavy-weight equal to Husky. No hub bands are not allowed below slab on grade.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
MATERIALS AND METHODS - PLUMBING**

SECTION 22 1000 – Page 2 of 6

- J. Joints in ductile iron pipe: push on joints applied as directed by manufacturer meeting ANSI/AWWA C111/A21.11 requirements.
- K. Joints for PVC-DWV plastic pipe: solvent welded cement, ASTM D-2564, made in accord with ASTM D-2855. Provide cast iron to PVC adaptors, for caulking or compression joint when connecting to a cast iron drain or when converting from cast iron to PVC.
- L. Install vent stacks through roof. Terminate 6" above finish roof or according to local code. Flashing is specified under Roofing Section.

2.2 DOMESTIC WATER PIPING:

- A. Domestic Water piping within building: copper tube. Water piping outside building: copper tube.
- B. Copper tube, ASTM B-88, copper water tube, type "L" hard temper inside building, type "K" outside building. Fittings: wrought copper water tube fittings, ANSI B 16.18 or B 16.22.
- C. Joints on copper tube: soldered as recommended by manufacturer, using 95-5 solder. Lead free solder, flux, etc. is required. Mechanically formed tee fitting, as created by T-Drill, is an acceptable method of installation. All joints created in this manner shall be brazed in compliance with code and in accordance with manufacturer's recommendation. Soft solder joints are prohibited. Installation shall be performed by certified T-Drill crafts people.
- D. Provide temporary construction water at site as required.

2.3 PLUMBING VALVES:

- A. Supply water piping valves as specified. All valves shall meet the Reduction of Lead in Drinking Water Act.
 - 1. Ball valves: (2" and smaller) all bronze, 600 psig WOG, 150 psig WSP, stainless ball and stem, full port, Teflon seats, stem packing seal and thrust washer. Nibco T585-66-LF or S-585-66-LF, Watts, Apollo, Milwaukee or Josam. Provide extension stem capable of clearing 2" insulation, with memory stop, when operated will not disturb vapor seal of insulation.
 - 2. Check valves 2" and smaller: All bronze, 125 psig WSP, swing check, Nibco S-413-Y-LF, Milwaukee or Watts.
 - 3. Water pressure reducing valves: For low flow Watts LFU5B; higher capacity Watts Series LF115, or Wilkins, Conbraco or Cash Acme, complete with inlet strainer, unions and inlet and outlet pressure gauges.
 - 4. Calibrated balancing valves ("Circuit Setter"): 125 psig WP, 2" and smaller bronze, screwed; 2-1/2" and larger IBBM, flanged plug valves. All with indicator for angular position of valve, meter connections with positive shut-off valves and internal seals to prevent leakage around stem. Valves should have a locking device to prevent opening past preset position. For each valve provide a flow vs. differential pressure vs. angular position calibration chart and pre-formed foam insulation suitable for temperatures from 35 to 250F. Nibco 1810LF (small) or 737 (large), Armstrong, B&G, Taco or equal.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
MATERIALS AND METHODS - PLUMBING**

SECTION 22 1000 – Page 3 of 6

- B. Natural gas valves: Plug cocks – 2-1/2" and larger, Resun R-1431, AGA seal of approval, 175 psi; 2" and smaller, Milwaukee BB2-100, Nibco FP-600, Conbraco GB-10/11, GB-50 series, or Resun R-1430 with CSA seal of approval, 175 psi.

2.4 PIPE HANGERS:

- A. General: Pipe hangers, Anvil, PHD, Michigan Hanger, B-Line or Elcen. Anvil figure numbers are given for reference. Provide copper clad or plastic coated hangers on bare copper lines.
- B. Equip pipe hangers with vibration isolators as specified under Vibration Isolators.
- C. Pipe hangers for lines 3" and smaller: adjustable wrought ring hangers, Anvil Fig. 97 or 69 or wrought clevis hangers.
- D. Pipe hangers for piping 4" and larger: adjustable wrought clevis hangers.
- E. Parallel piping graded in same direction may be grouped on trapezes. Trapezes for line 4" and smaller, Unistrut P2000 channel, or equal, with rods sized as specified below for largest pipe on trapeze. Guide lines on (but not anchor to) trapezes using Unistrut Series P1100 clamps. Trapezes shall not exceed 3' in length. Space lines to allow at least 3" clear between adjacent pipe or pipe covering and between pipes or pipe covering and rods. Space trapezes as specified for pipe hangers based upon smallest size of pipe on trapeze.
- F. Provide riser clamps on pipe risers on each floor. Clamps in contact with copper or plastic pipe, plastic coated.
- G. Beam Clamps: Anvil Fig. 228.
- H. Inserts for hangers in concrete structures: Underwriter's listed cast iron inserts. Anvil Fig. 282.
- I. For fasteners in existing concrete structures use drilled in expansion anchors with load rating at least 150% of pipe hanger rating (powder driven anchors are not acceptable).
- J. Size rods for pipe hangers not smaller than the following: 3/8" rods for pipe up to 2", 1/2" for 2-1/2" and 3" pipe, 5/8" rods for 4" and 5" pipe, 3/4" rods for 6" pipe, and 7/8" rods for 8", 10" and 12" pipe, 1" rods for 14" and 16" pipe and 1-1/8" rods for 18" pipe.
- K. Support plumbing water, medical gas and vacuum piping within stud partitions with brackets as manufactured by P&M Bracket Company, Sumner Products, B-Line Ruff-in or Holdrite. Wire is expressly prohibited. Support horizontal plumbing soil and waste piping within stud partitions with Unistrut anchored to floor. Provide fire treated wood backing where required to anchor fixtures and brass securely.
- L. Space pipe hangers at maximum: 5' intervals for cast iron pipe. Pipe hanger spacing for screwed, solder joint and welded piping: 1/2" and 3/4", 6 ft.; 1" to 1-1/4", 8 ft.; 1-1/2" to 2-1/2", 10 ft.; 3" and over, 12 ft. Install additional hangers at change of direction and valve clusters.
- M. Install pipe hangers on insulated pipe over pipe covering. Provide factory fabricated insulated pipe shields equal to Pipe Shields, Inc. "Thermal Hanger Shields" or Tru-Balance insulated saddles at hangers. Provide shield insulation of rigid calcium silicate indoors or rigid Perlite Silicate outdoors, the

SHELBY COUNTY WATER SERVICES BUILDING PROJECT MATERIALS AND METHODS - PLUMBING

SECTION 22 1000 – Page 4 of 6

same thickness as adjacent pipe covering. (At Contractor's option, pipe shields may be field fabricated using rigid calcium silicate or foamglass insulation with ASJ and 20 gauge galvanized steel protector. Shield length: 1.5 times nominal pipe size but not less than 4".)

2.5 THERMOMETERS AND GAUGES:

- A. Non-mercury in glass blue reading separable socket industrial thermometers with die cast aluminum or high impact plastic casings of appropriate pattern for each installation, 9" scale lengths and ranges shown, Palmer, Trerice or Weksler. Install thermometers in brass or stainless steel wells. Equip thermometers installed in insulated lines with 1" extension stems or stems long enough to permit unions to clear insulation whichever is greater.
- B. Where shown install brass thermometer wells with screwed caps. Install wells at an angle to retain oil. Size well to fit thermometers specified.
- C. Enlarge pipe 2" and smaller to 2-1/2" at thermometers and thermometer wells.
- D. Install 4-1/2" dial pressure gauges where shown. Gauges shall have bronze or stainless steel bourdon tubes, 316 stainless steel movement, aluminum or polypropylene solid front cases, adjustable micrometer pointer and accuracy Grade 2A not less than 1/2% of full scale over the entire range, without mounting flange. Gauges shall be Ashcroft 1279, Marsh Series P01, Trerice 450-B, Weksler AA44-2 or U.S. Gauge 1980L with minimum bourdon tube diameter of 3". Provide ball valves for all pressure gauges. Provide siphons for steam gauges.
- E. Where shown, provide temperature and pressure measurement plugs and caps equal to Peterson Equipment Co., Inc. "Pete's plug with Nordel seats and seals". Provide one Pressure and Temperature Kit consisting of a 0-100 psi pressure gauge with adaptors, and two thermometers (25-125°F and 0-220°F), all in carrying cases. Provide nipples for Pete's plugs as required to extend through pipe insulation.

PART 3 - EXECUTION

3.1 PIPE INSTALLATION:

- A. Cut pipe square and ream full size after cutting. Clean pipe. Make threaded joints with Teflon tape. Do not spring pipe into place.
- B. Slope Sanitary Drain Lines:
 - 1. 3" and larger: minimum 1/8" per 1'.
 - 2. Less than 3": minimum 1/4" per 1'.
- C. Install piping to allow for expansion. Make connections to plumbing fixtures and all equipment to eliminate undue strains in piping and equipment. Furnish necessary fittings and bends to avoid springing of pipes during assembly.
- D. Install chrome plated floor and ceiling plates on pipe passing through finished surfaces in finished spaces.
- E. Make horizontal water line size reductions using eccentric reducers (tops flat).

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
MATERIALS AND METHODS - PLUMBING**

SECTION 22 1000 – Page 5 of 6

- F. Install 3/4" ball valve drains with hose adaptors at low points of water piping and at bases of all risers (where shown provide larger drains). Provide screwed caps with chains on hose adaptors.
- G. Make connections to equipment using screwed unions in sizes 2" and smaller and flanged unions in sizes 2-1/2" and larger. Install unions in all piping connections to each piece of equipment. Provide unions on all sides of control valves.
- H. Wherever ferrous pipes or tanks and copper tubing connect, provide dielectric insulating unions or couplings, equal to Victaulic style 47, "V-line" insulating couplings as manufactured by Lochinvar, thread to thread or CTS fabrication flange adaptors for flange connections.
- I. Near heating and air conditioning equipment requiring water provide valved and capped water outlets of sizes shown for connection to equipment, including reduced pressure principal backflow preventers. Make final connections under HVAC work. ***Note that all piping and insulation downstream from backflow preventer must be painted yellow.***
- J. Run piping concealed, except where specifically shown or specified to be exposed. Plumb all vertical lines and run mains parallel to building walls unless specifically shown otherwise.
- K. Lay underground pressure piping so top of pipe is at least 18" below finished grade. Support all underground piping solidly along body of pipe. Strongly suspend other piping from building construction.
- L. Pipe shall be braced at flexible connections to prevent blowouts under operating conditions.
- M. Lay out and grade all gas piping so as to have a minimum of trapped lines. Where trapping of pipe is unavoidable, provide 4" to 6" scale pocket at low point, with removable cap fitting accessible for cleaning out pocket. Install 175 psig WP bronze cock and union at all connections to gas-fired equipment.
- N. Install no gas piping beneath interior slabs on grade. Where gas piping must be installed below slab on grade, pipe must be encased in steel pipe sealed and vented to exterior as shown on detail.
- O. Run no piping or tubing in direct contact with slag fill. Where necessary to pass through slag, protect piping with not less than two wrappings of polyvinyl chloride tape or equivalent protection approved by Architect.
- P. Provide water hammer arrestors equal to Wilkins WH2950XL. Refer to drawings for location and P.D.I. size. Shock arrestors are required on all equipment with solenoid shutoff valves such as washing machines and dishwashers whether shown or not. Select WH2950XL for use with fixtures which may supply drinking water. Equal by Josam, J.R. Smith, Wade, or Sioux Chief is acceptable.

3.2 INSTALLATION OF VALVES:

- A. Provide shut-off valves in supply and return connections to each item of equipment. Locate valves to isolate each item to facilitate maintenance and/or removal.
- B. Provide check valve in discharge line adjacent to each pump.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
MATERIALS AND METHODS - PLUMBING**

SECTION 22 1000 – Page 6 of 6

- C. Locate valves in piping connections to heat exchangers, water heaters, etc., so heads and tube bundles can be removed without disconnecting equipment or piping other than union or flange connections immediately adjacent to the equipment.
- D. Provide sweat to screw adaptors where required.
- E. Install with valve stems upright or horizontal.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
THERMAL AND ACOUSTICAL INSULATION FOR PLUMBING SYSTEMS**

SECTION 22 1500 – Page 1 of 3

PART 1 - GENERAL

1.0 GENERAL:

- A. All insulation shall be installed by an insulation contractor in business a minimum of 3 years as an insulation contractor and has completed projects similar in scope to this project.

1.1 SCOPE:

- A. Section 22 0500 - "General Provisions – Plumbing" shall apply to and become part of this Section.
- B. Repair existing insulation at points of connection and/or alterations to existing work.
- C. "Exposed" is defined as: Exposed to view when construction is complete. (Items which are not "exposed" are considered "concealed".)
- D. The use of any material containing asbestos is strictly prohibited.
- E. Include with insulation material submittal letters from the insulation material manufacturer certifying that the insulation material does not contain asbestos in any shape, form or quantity.

1.2 INSULATION:

- A. Comply with NFPA 90A.
- B. Pipe hanger shields are specified in Section 22 1000 - "Materials and Methods - Plumbing."
- C. Use insulation and adhesives with Underwriter's Laboratories and ASTM E-84 flame spread rating not over 25 without evidence of continued progressive combustion, and smoke developed rating not exceeding:
 - 1. 50 for pipe covering located in air ducts, plenum or casings.
 - 2. 150 for all other pipe and equipment insulation.

PART 2 - MATERIALS

2.1 FIBERGLASS PIPE COVERING:

- A. Snap-on glass fiber insulation minimum density 5#/cu. ft. maximum thermal conductivity at 75°F mean temperature 0.25 BTU/(hr)(sq. ft.)(°F/in) with UL rated vinyl coated and embossed vapor barrier laminate of aluminum foil and kraft reinforced with glass fiber yarns (ASJ). For domestic hot water circulating system, thermal conductivity shall be 0.27 BTU/(h)(sq.ft.)(°F/in.) at 75°F mean temperature.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
THERMAL AND ACOUSTICAL INSULATION FOR PLUMBING SYSTEMS**

SECTION 22 1500 – Page 2 of 3

- B. For all lines seal jacket with self sealing lap. Butt adjoining sections of insulation tightly and seal with self-adhering butt joint strips.
 - C. Cover fittings to thickness of adjacent covering with factory pre-molded fitting covers. Cover flanged valve bodies and flanged unions. Do not cover screwed unions on hot lines. Finish concealed fittings with a skim-coat of mastic and when mastic is dry, fitting shall be covered with glass fab and vinyl acrylic mastic unless otherwise noted below. Zeston type fitting covers may be substituted for glass fab and final coat of mastic on concealed fittings provided fire and smoke ratings are met. Finish fittings exposed in equipment rooms, boiler room, and in finished spaces with vinyl acrylic mastic over glass fab over mastic.
 - D. At contractor's option, concealed tees may be insulated with field fabricated tee covers consisting of straight pipe covering on run of tee with notch at branch together with pipe covering on branch contoured to fit notch. Glass fab over skim coat of mastic shall be applied around main, lapping contoured joint at branch by 2" minimum for the full 360° of joint. Cover entire fitting covering with vinyl-acrylic mastic over glass fab, 1/8" thick (dry) coat. Submit sample of fabricated tee covering to Architect for approval before work is begun.
- 2.2 FOAMED PLASTIC PIPE COVERING: (DO NOT USE IN PLENUMS UNLESS COMPLIES WITH PARAGRAPH 1.2 ABOVE):
- A. Fire retardant foamed plastic pipe covering, maximum K factor at 75°F mean temperature not exceeding 0.27 BTU/(hr)(sq.ft.)(°F/in).
 - B. Pipe covering may be seamless insulation slipped over piping before erection or may be slit longitudinally and installed over erected piping.
 - C. Make fitting covers from segments of pipe covering.
 - D. Cement all joints and seams in accordance with manufacturer's instruction.
 - E. Fit pipe hangers over insulation (see PIPE HANGERS). Use hanger shields as specified under pipe hangers.
 - F. Where exposed outside, cover insulation with aluminum jacket.
 - G. Armacell, Aeroflex or Normaco.

PART 3 - INSTALLATION

3.1 PLUMBING PIPING:

- A. Bodies of floor drains and floor sinks serving refrigeration equipment, AC units and ice machines and traps and waste piping between such drains and waste stack: "Foamed plastic pipe covering", 1" thick.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
THERMAL AND ACOUSTICAL INSULATION FOR PLUMBING SYSTEMS**

SECTION 22 1500 – Page 3 of 3

- B. Cold water piping, interior, above grade: "Fiberglass pipe covering", 1" thick. Pipe insulation in partitions and chases may be 1/2" thick.
- C. Hot water piping, interior, above grade: "Fiberglass pipe covering", 1" thick. Pipe insulation in partitions and chases may be 1/2" thick. All piping in recirculating system shall have 1" thick insulation for up to 1-1/4" pipe, and 1-1/2" thick insulation for 1-1/2" and larger pipe.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PLUMBING FIXTURES AND EQUIPMENT**

SECTION 22 2000 – Page 1 of 4

PART 1 - GENERAL

1.1 SCOPE:

- A. Section 22 0500 - "General Provisions - Plumbing" and Section 22 1000 - "Materials and Methods - Plumbing" shall apply to and become part of this Section.

PART 2 - PRODUCTS

2.1 DRAINS:

NOTE: Provide all floor drains and floor sinks with an ASSE 1072 barrier type trap seal protection device equal to Trap Guard.

- A. Mechanical Room Floor Drains (MFD): J.R. Smith 2330 with sediment bucket, deep seal trap, and trap primer connection where shown or required.
- B. Floor and shower drain (FD)(SD): J.R. Smith 2005A with 6" nickel bronze grate. Select square top for tile floors. Provide deep seal trap on all floor drains.
- C. Floor Sink (FS): J.R. Smith 3413, 8" diameter, 6" deep porcelain enameled cast iron interior with full three quarter cast iron porcelain enameled grate and dome bottom strainer.

2.2 WALL HYDRANT:

- A. J.R. Smith 5509-QT or Prier C-634, with integral backflow preventer, latching cover, freeze-proof and of proper length for wall in which installed, verify with Architect finish of stainless steel, polished bronze, nickel bronze or rough bronze box face. Valve must be on building side of exterior wall insulation. Install with center line 24" above finish grade. Provide Owner with one loose key for each wall hydrant. For existing or pre-cast exterior walls use J.R. Smith 5609-QT.

2.3 HOSE BIBB:

- A. T&S B-0736-P0L, chrome-plated with removable tee handle in finished areas, and Model No. B-0736-RGH rough bronze in unfinished areas complete with vacuum breaker. Provide to Owner one loose key for each loose key hose bibb.

2.4 CLEANOUTS:

- A. Furnish and install cleanouts where indicated on drawings and at all 90-degree bends, angles, upper terminals and not over 50' apart on straight runs. All cleanouts on cast iron piping to have bronze countersunk rectangular tapered slotted plugs. PVC waste piping cleanouts shall be standard of piping system used. Flush-with-floor cleanout access covers shall have non-skid covers. All wall cleanout access covers shall have polished satin finish. All cleanouts shall be full size of pipe, 8" and less.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PLUMBING FIXTURES AND EQUIPMENT**

SECTION 22 2000 – Page 2 of 4

- B. Exposed Cleanouts: Cast brass plug type, J.R. Smith 4470T.
- C. Wall type cleanout plug and access covers, J.R. Smith 4472T. Cleanout plug must be within 1" of finish wall and must be tapped for access cover. On PVC plastic waste pipe in wall: Cleanout access cover J.R. Smith 4710.
- D. Floor type cleanout access covers in unfinished areas: J.R. Smith 4239L/LXH-NB. Finished areas: J.R. Smith 4111L/LXH-NB. Plug must be within 3" of finished floor. Provide 4193L/LXH-NB covers where installed in terrazzo floors. Grout cleanout below access cover to seal watertight. Provide option 14 cleanout carpet markers where installed in carpeted floors.
- E. **Coordinate the exact location of all cleanouts with the Architect.**

2.5 PLUMBING FIXTURES:

- A. Unless otherwise specified, all fixtures complete as catalogued, white color, exposed metal trim chromium plated. Fixtures shall be without discoloration, chips or flaws and shall be free from cracks. Warped or otherwise imperfect fixtures will not be acceptable.
- B. Clean all fixtures to a clean and sanitary condition.
- C. Fixtures and brass shall be securely anchored. Carriers shall be securely anchored to floor with lag bolts, as recommended by the manufacturer. Do not conceal until Architect has observed anchors.
- D. Flush valve supports equal to Sloan "YJ" shall be installed 1" below vacuum breaker, on all flush valves. Flush valves on A.D.A. water closets must be set so that handle is to the wide side of the stall and handle is no more than 44" above finish floor. Urinal flush valves on A.D.A. urinals shall be no more than 44" above finish floor.
- E. Seal wall hung fixtures at wall with white caulk. Seal countertop fixtures with clear silicone sealant. Seal floor mounted fixtures at floor with grout.
- F. All fixtures noted to be A.D.A. approved must be set with great care to assure proper mounting height and proper distance from wall. Elevation of flush valves shall be coordinated with grab bars (see Architect). All shower control valves for ADA showers shall be set with centerline 44" above finish floor.
- G. All supplies, stops, faucets, etc. on fixtures that could be used for drinking water shall meet the Reduction of Lead in Drinking Water Act.
- H. Contractor shall coordinate all sinks and faucets with casework/millwork shop drawings prior to purchase of sink/faucet. In particular, coordinate A.D.A. vs. non-A.D.A. fixtures with casework/millwork. Failure to do so will make contractor liable for incorrect fixtures.
- I. All items complete as catalogued as follows:

WC-1 Water Closet (ADA, floor mount, 1.6 gpf): Kohler K-96057, 16-1/2" floor to rim, to meet A.D.A., Sloan Regal 111 flush valve complete with "YJ" pipe support and Church 295 NSSC white open front seat. Install flush valve with handle on wide side of stall or room. Must meet A.D.A.

UR-1 Urinal (Standard Height, 0.5 gpf): Kohler K-4991-ET complete with Sloan Regal 186-0.5 flush valve with "YJ" pipe support, and J.R. Smith 637 carrier. Set with lip 24" A.F.F.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT PLUMBING FIXTURES AND EQUIPMENT

SECTION 22 2000 – Page 3 of 4

LAV-1 Lavatory (Wall mount, ADA, 0.5 gpf): Kohler K-2006, wall hung, McGuire LF165 supplies with stops, 8872 P-trap, 155A strainer and tailpiece. Delta 86T1153 metered faucet, 0.5 gpm, finish by Arch. Provide J.R. Smith 700 or 700D carrier and set with rim 31" A.F.F. Include ASSE 1070 point of use mixing valve equal to Wilkins ZW3870T for public lavatories. Provide trap wrap for exposed p-trap, supplies and stops.

SK-1 Sink (Two-compartment, stainless steel, ADA): Elkay ECTSRAD33226TBG dual mount, 18-gauge stainless steel with LK-35 waste strainers and tailpieces, continuous waste, McGuire LF165 supplies with stops and 8912 P-trap, Delta 9113-DST, pullout kitchen faucet, 9" reach, finish by Arch. Include trap wrap for trap and supplies. Must meet ADA.

SH-1 Shower (Shower compartment by G.C., valve, heads and drain by Plumbing, ADA): Delta T17TH925 thermostatic shower system, rough-in and trim, shower, hand shower, diverter valves s/s bar with slide, 3-function shower head.

JR-1 Janitor's Receptor (Floor mount, terrazzo): Stern Williams MTB-2424, 24" x 24" x 10" deep pre-cast terrazzo with aluminum guards on exposed sides and silicone sealant at walls. Provide splash catcher panels on adjacent walls. Provide T&S B-667-RGH faucet with spring checks. Set 42" above finish floor complete with 48" long heavy-duty hose.

EWC-1 Electric Water Cooler (Single, filter): Elkay EZS8L stainless steel water cooler, complete with ball valve stop and McGuire 8872 P-trap.

EWC-2 Electric Water Cooler (Single, ADA, bottle filler, filter): Elkay LZS8WSLK stainless steel water cooler, complete with ball valve stop and McGuire 8872 P-trap.

2.6 PLUMBING EQUIPMENT:

- A. **TMV Thermostatic Mixing Valve:** Lawler Series 801, set to 120°F. Minimum flow 1 gpm, up to 25 gpm at 10 psi drop.
- B. **EWH-1 Electric Water Heater:** Rheem ELD52-TB, tank type. Install per detail.

2.7 EQUIVALENT MANUFACTURERS:

- A. Where Kohler fixtures are listed above, Zurn, American Standard, or Toto may be utilized.
- B. Where Sloan flush valves are listed above, Zurn or Delaney may be utilized.
- C. Where Smith is listed above, Josam, Watts, Zurn or Wade may be utilized.
- D. Where Elkay water coolers are mentioned above, Halsey Taylor, Sunroc, or Oasis may be utilized.
- E. Where Taco is listed above, the equal of B&G, Armstrong, or Thrush may be utilized.
- F. Where Elkay sinks are listed above, Just may be utilized.
- G. Where Church water closet seats are listed above, Zurn, Beneke, Bemis, Centoco or Olsonite may be utilized.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
PLUMBING FIXTURES AND EQUIPMENT**

SECTION 22 2000 – Page 4 of 4

- H. Where Lawler combination pressure balanced and thermostatic mixing valves are listed above, Powers, Symmons, or Leonard may be utilized.
- I. Where T&S Brass is listed above, Chicago Brass, Cambridge or Zurn may be utilized.
- J. Where Delta is listed above, Moen, Symmons or Elkay may be utilized.
- K. Where Rheem water heaters are listed above, Lochinvar, A.O. Smith, State or Bradford White may be utilized.
- L. Where Stern Williams is listed above, Fiat, or Zurn may be utilized.
- M. Where McGuire is listed above, the equal of Zurn, Watts, Dearborn or Brasscraft may be utilized.
- N. Where Delta is listed above, Symmons or Powers may be used.

PART 3 - EXECUTION:

3.1 MANUFACTURER'S INSTRUCTIONS:

- A. Install all plumbing equipment and fixtures as recommended by the manufacturer's recommendations.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - HVAC**

SECTION 23 0500 – Page 1 of 14

PART 1 – GENERAL

1.1 SCOPE:

- A. Provisions of this Section apply to all Heating, Ventilating, and Air Conditioning (HVAC), and Test and Balance work.
- B. Include the provisions of General Conditions as part of this Section.
- C. Provide all labor, materials, equipment, and services necessary for the completion of all HVAC work shown or specified, complete and ready for operation, consisting in general of the following:
 - 1. Split system heat pump and exhaust systems serving the office areas.
 - 2. Exhaust fans and unit heaters serving the warehouse area.
- D. Give required notices, file drawings, obtain and pay for permits, deposits and fees necessary for the installation of the HVAC work. Obtain and pay for inspections required by laws, ordinances, rules, regulations or public authority having jurisdiction. Obtain and pay for certificates of such inspections, and file such certificates with Owner.
- E. "Provide" means to furnish and install, complete and ready for operation.

1.2 USE OF BUILDING SYSTEMS FOR TEMPORARY HEAT/AIR CONDITIONING DURING CONSTRUCTION:

- A. Building HVAC systems shall not be used during construction unless the following conditions are met:
 - 1. All return air and outside air openings shall have temporary filter media installed over inlet side of openings and secured air tight there-to.
 - 2. Air filters of quality specified for ultimate use shall be installed in the air handling units.
 - 3. Motors shall have correct overload elements installed in the starters.
 - 4. All safety controls shall be in operation.
- B. Contractor shall turn system over to Owner in condition equal to that which would have occurred if the systems had not been used during construction.

1.3 DRAWINGS:

- A. HVAC Drawings are diagrammatic and subject to requirements of Architectural Drawings and conditions existing in the field. HVAC Drawings indicate generally the location of components and are not intended to show all fittings or all details of the work.
- B. Follow the drawings closely, coordinate dimensions with Architectural Drawings and field conditions. DO NOT scale HVAC drawings for location of system components.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - HVAC**

SECTION 23 0500 – Page 2 of 14

- C. Make no changes without Architect's written permission. In case of doubt, obtain Architect's decision before proceeding with work. Failure to follow this instruction shall make the Contractor liable for damage to other work and responsible for removing and repairing defective or miss-located work in proper manner.
- D. DO NOT scale drawings to locate ceiling diffusers. COORDINATE with lighting and ceiling grids. Contractor for HVAC work is responsible for coordinating with all trades.
- E. Drawings and specifications are complementary. Work shown or specified in one is binding as if shown or specified in both. Any discrepancies between the drawings and specifications shall be brought to the attention of the Consultant for clarification during the bidding period. No allowance shall be subsequently made to the Contractor by reason of his failure to have brought said discrepancies to the attention of the Consultant during the bidding period or by reason of any error on the Contractor's part.
- F. No attempt has been made to establish the required sections or splits of equipment relative to the size of access into the space, building, etc. Contractor shall establish all said splits, sections, etc. necessary to install equipment complete without undue disassembly of equipment or demolition of building parts at site of work.

1.4 APPLICABLE CODES AND STANDARDS:

- A. Comply with the current editions of the following Codes and Standards:
 - 1. ANSI/B31.9 - Code for Building Services Piping
 - 2. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration
 - 3. ASHRAE 62.1 - Ventilation for Acceptable Indoor Air Quality
 - 4. ASHRAE 90.1 – Energy Compliance
 - 5. NFPA 70 - National Electrical Code
 - 6. NFPA 90A - Installation of Air Conditioning and Ventilating Systems
 - 7. NFPA 101 - Safety to Life from Fire in Buildings and Structures
 - 8. Other standards as referenced in other sections of Division 23
 - 9. 2021 International Building Code if no local code
 - 10. 2021 International Plumbing Code if no local code
 - 11. 2021 International Mechanical Code if no local code
 - 12. 2015 International Energy Conservation Code

1.5 QUALIFICATIONS OF SUBCONTRACTOR:

- A. The HVAC Subcontractor shall meet the following qualifications:

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - HVAC**

SECTION 23 0500 – Page 3 of 14

1. He shall have been in business as a HVAC contractor for at least 3 years prior to the date of opening bids and shall have held a license from the **Alabama** State Licensing Board for General Contractors for at least 3 years.
2. He shall have a satisfactory experience record with HVAC installations of character and scope comparable with this project, and for at least 3 years prior to the date of opening bids shall have had an established service department capable of providing service inspection or full maintenance contracts.
3. If the HVAC subcontractor, with the Engineer's approval, uses a sub-subcontractor to provide another discipline that the subcontractor does not normally furnish, that sub-subcontractor shall meet the same qualifications as the subcontractor.

1.6 CONFLICTS AND INTERFERENCES:

- A. If systems interfere or conflict, the Architect shall decide which equipment to relocate regardless of which was first installed.

1.7 WORKMANSHIP:

- A. Do all work in a neat and first-class manner. Remove and replace work not done in such manner as directed by the Architect.

1.8 COOPERATION:

- A. Cooperate with all other crafts. Perform work in a timely manner. Do not delay the execution of other work.

1.9 VISITING SITE:

- A. Visit site and become familiar with location and various conditions affecting work prior to bid. No additional allowance will be granted because of lack of knowledge of such conditions. No consideration shall be given to future claims due to existing conditions. Any discrepancies or interferences shall be reported immediately to the Architect/Consultant.

1.10 MATERIALS:

- A. Unless otherwise noted, provide new, standard, first-grade materials throughout. **Unless otherwise noted, all pipe, fittings and valves shall be made in the United States of America.**
- B. Where materials or products are specified by manufacturer's name, brand, trade name, or catalog reference, such named materials or products shall be the basis of the estimate, without substitution, and shall be furnished under the contract unless requests for equivalents are approved as noted below. Where two or more brands are named the choice of these shall be optional with the Contractor.
- C. Equivalents will be considered only if written request for approval has been received by the Architect (from a general contract bidder) 10 days prior to the date established for receipt of Proposals. Each request shall include the name of the material or equipment for which an equivalent is proposed and a complete description of the proposed equivalent including drawings, cuts, performance and test data, and deviation from the specification and any other information necessary for evaluation. A statement setting forth any changes in other materials, equipment or other Work that incorporation of the

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - HVAC**

SECTION 23 0500 – Page 4 of 14

equivalent may require shall be included. The burden of proof of the merit of the proposed equivalent is upon the proposer. The Architect's decision of approval or disapproval of a proposed equivalent is final.

- D. If the Architect approves any proposed equivalent prior to receipt of Proposals, approval will be set forth in an Addendum. **DO NOT RELY UPON APPROVALS MADE IN ANY OTHER MANNER.**
- E. No proposed equivalent will be considered after the Contract has been executed, except as described in the General Conditions.
- F. Within 45 days of execution of contract and before ordering materials or equipment, submit to Architect and obtain his approval of a detailed list showing each item which is to be furnished by make, trade name, catalog number, or the like; together with manufacturer's specifications, certified prints, and other data sufficient for making comparisons with items specified. When approved, such schedule shall be of equal force with these specifications in that no variation there from shall be allowed except with Architect's written approval. Submit PDF format files for approval. Provide PDF files of approved data for project close-out.
- G. Similar items of equipment shall be the product of the same manufacturer.

1.11 SHOP DRAWINGS:

- A. Before starting work, submit and obtain approval of detailed drawings of the following, fully dimensioned (including elevations of ductwork and piping) and drawn to 1/4" to 1'-0" scale.
- B. Engineers' CAD/electronic drawings files will be available upon request for the convenience of the contractor and for use in preparation of shop drawings. A signed agreement between the Engineer and Contractor shall be remitted to the Engineer prior to delivery of CAD/electronic drawing files.

1.12 RECORD DRAWINGS:

- A. When work starts the Architect will furnish two complete sets of white prints of the HVAC Drawings. All corrections, variations, and deviations, including those required by change orders, if any, must be recorded in colored ink or colored pencil at the end of each working day on these drawings. The marked prints shall be available at all times for the Architect's inspection.
- B. Prior to examining the request for final payment or making any response thereto, the Architect shall receive from the Contractor one complete set of the white prints, marked as stated above, indicating the actual completed installation of the work included under this contract.
 - 1. Accurately show location, size and elevation of new exterior utility work and its relationship to any existing utilities, obstructions, etc., contiguous to the area of work.
 - 2. Block out areas modified by change-order & identify them by change-order number.
 - 3. The Architect will forward the marked white prints to the Consulting Engineers for review. They will then be returned by the Architect to the Contractor for use in preparing record drawings.
- C. When work is completed, the Engineers' CAD/electronic drawing files will be made available upon request for the convenience to the contractor and for use in preparing record drawings. Contractor shall transfer the information from the marked white prints to the CAD files, removing all superseded data in order to show the actual completed conditions.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - HVAC**

SECTION 23 0500 – Page 5 of 14

- D. Ductwork and Control Drawings may be CAD files or a set of mylar reproducible shop drawings up-dated to show actual conditions at completion of work. Include the contract drawings equipment schedules and details edited to show actual completed conditions.
- E. HVAC piping drawings may be prepared as noted above, or HVAC piping may be added to the ductwork shop drawings noted above.

1.13 PROTECTION OF ROTATING PARTS:

- A. For this paragraph only, "exposed" shall mean located in a casing or room or plenum with door large enough to admit a man.
- B. Equip exposed belt drives with belt guards with holes for measuring speeds of driven shafts.
- C. Provide exposed couplings with coupling guards.
- D. Equip propeller fan wheels with wheel guards.
- E. Equip inlets and outlets of exposed centrifugal fans with 1-1/2" #10 Diamond mesh galvanized steel screens.
- F. Equip all exposed plug fans with wheel screens.

1.14 PROTECTION OF EQUIPMENT:

- A. During construction, protect mechanical equipment from damage or deterioration.
- B. When installation is complete, clean equipment and make ready for painting.

1.15 INSTALLATION OF EQUIPMENT:

- A. Install equipment to provide normal service access to all components.
- B. Where drawings show sufficient space for removing components, install equipment to provide such clearance. Provide space at all equipment power and control panels as required by local codes.
- C. Install equipment in accordance with manufacturer's instructions. If manufacturer's instructions conflict with contract documents, obtain Architect's decision before proceeding.
- D. All equipment shall be firmly fastened in place:
 - 1. Pad mounted equipment shall be secured to pads using poured in place anchor bolts or cinch anchors.
 - 2. Vibration isolators shall be secured to floors or pads and equipment shall be bolted to the isolators.
 - 3. Air devices connected by flexible duct shall be secured independently of all other building systems to prevent falling if grid shifts.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - HVAC**

SECTION 23 0500 – Page 6 of 14

1.16 EQUIPMENT SUPPORTS:

- A. Provide supports for ductwork, piping and equipment. Hot dip galvanize after fabrication all grillage, supports, etc., located outdoors. Prime coat and paint all grillage, supports, etc. located indoors. Where noted provide 304 stainless steel supports. At the Contractor's option, all grillage, supports, etc. located outdoors may be 304 stainless steel instead of hot dip galvanized.
- B. Set floor-mounted equipment on concrete pads or platforms (as indicated) of height shown, but not less than 3-1/2" high. Chamfer pads 1".

1.17 CUTTING AND PATCHING AND INCIDENTAL WORK:

- A. Set sleeves and inserts and lay out and form openings in walls, beams, girders and structural floors in this Section.
- B. Cut, patch and repair as required to accomplish HVAC Work and finish to match adjacent work. Architect's approval required before cutting any part where strength or appearance of finished work is involved.
- C. Provide all motors incidental to the HVAC systems. Wiring of motors, switches and starters is included in "Electrical Sections".
- D. Do all control wiring required for HVAC work and all power wiring required by Control Panels, Control System, and Control Devices.
- E. Furnish motor starters as specified below.
- F. Final water connections to services are included in this Section.
- G. Permanent drain connections from AC units, etc., and auto air vents to nearest floor drain are included in this Section.
- H. Door louvers are not included in this Section.

1.18 EXCAVATION & BACKFILLING:

- A. Include all excavation and backfilling required to bring the work to line and grade shown, including excavation of rock and all other materials which may be encountered.
- B. Excavate trenches wide enough for proper installation of work. Grade trench bottoms evenly. Provide bell holes as necessary to insure uniform bearing for pipes. Excavate minimum 6" below pipe. Refill cuts below required pipe grade with sand or compacted gravel. Support pipe continuously along its entire length. (Do not use piers to support piping.)
- C. Backfill after inspection by Architect and authorities having jurisdiction. Backfill compacted areas (engineered fill) with sand or fine gravel (89/10) in accordance with requirements of "Sitework" no less than 95% compactancy. Backfill paved areas with sand or fine gravel (89/10) compacted to meet requirements of Paving Section. Backfill shall be free of rock, wood, steel, brick, etc. Do not disturb pipe. Restore or repair pavements and the like after backfilling, matching adjacent work.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - HVAC**

SECTION 23 0500 – Page 7 of 14

- D. Resod grassed areas and replace bushes, etc.

1.19 MOTORS, STARTERS & ELECTRICAL EQUIPMENT:

- A. Provide electrical equipment compatible with the current shown on electrical drawings. Verify current characteristics before ordering equipment.
- B. Should the Contractor with the Architect's approval make changes in electrical equipment from that shown on the Electrical Drawings, the Contractor shall be responsible for the cost of required changes.
- C. Provide factory installed fuses in all equipment requiring fusing for branch circuit protection.
- D. Motors: 1750 RPM open drip-proof construction unless otherwise shown or specified. Integral horsepower motors shall meet NEMA premium efficiency levels as stated in the latest version of NEMA MG-1. Allis-Chalmers, General Electric, Goulds, Louis Allis, Westinghouse.
- E. Where motors are shown or scheduled to be connected to a variable frequency drive, this motor shall be an inverter duty rated by the motor manufacturer and shall comply with NEMA MG1, Article 31.
- F. Where shown on Electrical Drawings, furnish increment wound motors for 2-step starting.
- G. Do not run motors until correct overload elements are installed in starters. Trading overload elements for elements of correct size for motors actually furnished shall be included in this Section.
- H. Unless otherwise shown or specified for single phase motors provide manual starters equal to Square D Class 2510. When installed in equipment rooms provide surface mounted enclosure, and when installed in finished walls outside equipment rooms provide flush mounted enclosure, key operated.
- I. Provide H-O-A switches, fused control circuit transformers, auxiliary contacts, etc., as shown on control diagrams or required by control sequences (and/or arrange for these items to be furnished with the starters specified in Division 26, Electrical Work.)
- J. All starters shall be the product of the same manufacturer.
- K. All control panels, electrical assemblies, etc. must bear a label from a recognized testing laboratory as an assembly, not as individual components.

1.20 SLEEVES:

- A. For pipe through floors inside fire rated chases or through non-fire-rated walls: 20 gauge galvanized steel, 1" larger than pipe or pipe covering.
- B. For pipe through concrete beams: schedule 40 black steel pipe, 1" larger than pipe or pipe covering.
- C. For pipe passing through floors outside fire rated chases and fire rated walls and partitions, provide 20 gauge steel sleeve leaving the annular space between pipe or pipe covering as required by UL systems. Where pipe is insulated, insulation shall be continuous thru sleeve. Refer to Through-Penetration Firestop Systems where included in the contract documents. Otherwise, seal between sleeve and pipe or pipe covering with 3M Brand Fire Barrier CP 25WB caulk, Flamestop V, Specified Technologies, Inc. "Spec Seal Sealant", Rectorseal Corp. Metacaulk 950 or Hilti FSTONE bearing UL listing for actual

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - HVAC**

SECTION 23 0500 – Page 8 of 14

conditions of installation, thickness and application in strict accord with UL reference for each type installation. Any equivalents must meet the 10 day prior approval provision and must show UL approval for all conditions, bare pipe, insulated pipe, etc. For plastic piping material submittal must show UL approval for each application and if caulk comes in direct contact with pipe, it must be compatible and not injurious to the pipe.

- D. Set sleeves before concrete is poured or masonry is erected. In existing construction, grout sleeves firmly in place.
- E. Sleeves for ducts: see fire dampers (Section: Air Distribution).
- F. Extend floor sleeves 1-1/2" above finish floor in areas where floor is subject to being wet during normal usage (mechanical rooms, toilets, etc.).
- G. Where exposed ducts pass through walls and partitions, provide 4" wide 20 gauge galvanized steel closure plates except at grilles and registers. Fit closure plates snugly to duct and secure to wall. Grout around ducts and sound absorbers at equipment room walls.
- H. Where exposed pipes pass through walls and partitions in finished spaces, provide chrome plated F & C plates or escutcheons.

1.21 PAINTING:

- A. Refinish equipment damaged during construction to new condition.
- B. Paint all non-potable water pipe and insulation yellow in accordance with Plumbing Code using paint of type specified in Painting Section.
- C. Paint un-insulated duct surfaces visible through grilles and registers flat black.
- D. Prime and paint all bare, exposed, exterior piping using type specified in Painting Section.
- E. Prime and paint all grillage, supports, etc. located indoors except where noted to be galvanized.
- F. Other painting is specified in Painting Section, Finishes Division.

1.22 PIPE IDENTIFICATION:

- A. Identify all piping exposed to view or accessible through removable ceilings or access panels with plastic snap-on pipe line markers. Color code markers in accordance with ANSI A13.1. Show pipe contents and direction of flow. (Markers on lines 8" OD and smaller shall be taped in place; on lines over 8" OD secure with spring clips.) Markers shall be equal to Craftmark, Brady, Seton or Brimar.
- B. Protect all factory identification tags, nameplates, model and serial numbers, stenciling, etc., during construction and replace if damaged.
- C. Label Spacing and Extent:
 - 1. On straight run of pipes: Above suspended ceilings space labels approximately 10 feet on center; elsewhere, 20 feet on center.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - HVAC**

SECTION 23 0500 – Page 9 of 14

2. Wherever a pipe enters or leaves a room or building.
3. At change of direction.
4. At main valves and control valves (not equipment valves).
5. At manifolds.
6. On risers, just above and below floors.

1.23 EQUIPMENT IDENTIFICATION:

- A. Provide 2" x 3" or larger laminated plastic nameplates with 1/2" numbers and letters in colors specified below. Screw tags to equipment in obvious locations. Engrave equipment designation and numbers as shown on plans and drawings on upper half of tag, leaving lower half of tag for future engraving by Owner.
- B. Provide similar nameplates for motor starters furnished under Division 23.
- C. Secure nameplates with acorn head screws.
- D. Colors:
 1. Equipment connected to utility power only - black letters on white nameplates.
 2. Equipment connected to emergency power - red letters on white nameplates.

1.24 EXHAUST FAN IDENTIFICATION:

- A. 2" X 3" or larger laminated plastic nameplates with red letters and numbers on white background, identifying type of fan, number according to plans, and rooms served. Engrave on upper half of tag, leaving lower half for engraving by Owner. Fasten with acorn head screws.

1.25 ACCESS DOORS:

- A. Furnish and install access doors for valves, fire dampers, dampers, controls, air vents, and other items located above non-liftout ceilings or behind partitions or walls. Doors in non-fire rated walls and ceilings: 16-gauge steel with hinges and screwdriver latches. Doors in fire rated walls and ceilings: UL labeled with fire rating equal to fire rating of wall or ceiling. Doors in security ceilings to be 10 ga. steel panels, white powder coat, 2" x 2" x 3/16" steel angle frame heavy duty butt hinges with security screws. Provide door styles compatible with adjoining surfaces as selected by Architect. Size doors to permit removal of equipment and/or maintenance. Doors: Bar-Co, Nystrom, Williams Bros., or equal.
- B. Mark lay-in ceilings with colored vinyl self adhering disc stuck on grid adjacent to maintenance access points.

1.26 TESTS, CLEANING & ADJUSTMENTS:

- A. Air System:

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - HVAC**

SECTION 23 0500 – Page 10 of 14

1. Duct Cleaning:
 - a. Clean new duct system(s) before testing, adjusting, and balancing.
 - b. Use service openings for entry and inspection.
 - 1) Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation as recommended by insulation manufacturer. Comply with Section 236000 "Air Distribution" for access panels and doors.
 - 2) Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 - 3) Remove and reinstall ceiling to gain access during the cleaning process.
 - c. Particulate Collection and Odor Control:
 - 1) When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 - 2) When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
 - d. Clean the following components by removing surface contaminants and deposits:
 - 1) Air outlets and inlets (registers, grilles, and diffusers).
 - 2) Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 - 3) Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 - 4) Coils and related components.
 - 5) Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
 - 6) Supply-air ducts, dampers, actuators, and turning vanes.
 - 7) Dedicated exhaust and ventilation components and makeup air systems.
 - e. Mechanical Cleaning Methodology:
 - 1) Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
 - 2) Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - HVAC**

SECTION 23 0500 – Page 11 of 14

- 3) Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
 - 4) Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
 - 5) Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
 - 6) Provide drainage and cleanup for wash-down procedures.
 - 7) Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.
2. When system has been completed, remove all trash and dirt, leave all balancing dampers open and install specified filters in all equipment. Check all fan motors for rotation. Provide all items as required for work specified in Section 237000 "HVAC Testing & Balancing".
- B. At the beginning of the first heating season, adjust and balance operating phases and repeat at the beginning of the first cooling season or vice-versa, as the case may be, all without charge.
- C. Compressor Test: The compressors shall have an oil acidity test performed in the presence of Engineer at the time of job completion. After units have operated for 30 days, the oil shall be tested again for acidity. If oil tests acid either time, it shall be drained and refilled with new and unused oil. Tests shall be repeated each 30 days and oil replaced until tests show neutral. Reports should be made in writing to the Architect.

1.27 WARRANTY & INSTRUCTIONS:

- A. See General Conditions - One-Year Warranty.
- B. Contractor shall and hereby does warrant all materials, workmanship and equipment furnished and installed by him to be free from defects for a period of one year after date of substantial completion of the Contract. Should any defects in material, workmanship, or equipment be made known to Contractor within the one-year warranty period, Contractor shall replace such materials, workmanship, or equipment without charge.
- C. All reciprocating and scroll refrigeration compressors shall bear 5-year non-pro-rated parts warranty.
- D. After completion of the work, Contractor shall operate the equipment which he installs for a period of (10) working days, as a test of satisfactory operating conditions. During this time, Contractor shall instruct the Owner's operating personnel in the correct operation of the equipment.
- E. Provide PDF of manufacturer's operating and maintenance manuals and parts lists for all equipment and materials furnished. Provide a maintenance schedule listing routine maintenance operations and suggested frequency thereof. Include all warranty dates on equipment and guarantees.
- F. Any work performed on new or existing air conditioning/refrigeration equipment, whether inside or out, that requires removing the refrigerant from the system will require the use of a recovery/recycling unit. Intentional release of the refrigerant, regardless of type, will not be allowed.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - HVAC**

SECTION 23 0500 – Page 12 of 14

- G. Any refrigerant removed from a system that has been properly recycled and has not been exposed to "burn out" can and should be reused in the system. Refrigerant that has been contaminated and cannot be reused after being properly recycled shall be reclaimed by the contractor and returned to the proper company representative.
- H. During the period of tests, adjust all controls, regulators, etc., to comply with these Specifications.
 - 1. Control manufacturer's letter of certification.
 - 2. Air balance report PDF files. (See Section 237000 "HVAC Testing & Balancing").
 - 3. Equipment Submittal Data PDF files.
 - 4. Equipment operating and maintenance manuals PDF files.
 - 5. Maintenance schedule.
 - 6. Equipment warranty dates and guarantees.
 - 7. List of Owner's Personnel who have received maintenance instructions.
 - 8. Include with insulation material submittal letters from the insulation material manufacturer certifying that the insulation material does not contain asbestos in any shape, form or quantity.

1.28 TRAINING OF OWNER PERSONNEL:

- A. The General Contractor shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed.
- B. The Engineer shall be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment.
 - 1. The HVAC Engineer shall determine the special needs and areas where training will be most valuable. The Owner and Engineer shall decide how rigorous the training should be for each piece of commissioned equipment. The HVAC Engineer shall communicate the results to the Subs and vendors who have training responsibilities.
 - 2. Each Sub and vendor responsible for training shall submit a written training plan to the HVAC Engineer for review and approval prior to training. The plan will cover the following elements:
 - a. Equipment (included in training)
 - b. Intended audience
 - c. Location of training
 - d. Objectives
 - e. Subjects covered (description, duration of discussion, special methods, etc.)
 - f. Duration of training on each subject

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - HVAC**

SECTION 23 0500 – Page 13 of 14

- g. Instructor for each subject
 - h. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.)
 - i. Instructor and qualifications
- 3. For the primary HVAC equipment, the Controls Contractor shall provide a short discussion of the control of the equipment during the HVAC or electrical training conducted by others.
- 4. The controls contractor shall attend sessions other than the controls training, as requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.
- 5. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
- 6. Training shall include:
 - a. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
 - b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.
 - c. Discussion of relevant health and safety issues and concerns.
 - d. Discussion of warranties and guarantees.
 - e. Common troubleshooting problems and solutions.
 - f. Explanatory information included in the O&M manuals and the location of all plans and manuals in the facility.
 - g. Discussion of any peculiarities of equipment installation or operation.
 - h. The format and training agenda in The Commissioning Process, ASHRAE Guideline 0-2005.
 - i. Classroom sessions shall include the use of overhead projections, slides, video/audio-taped material as might be appropriate.
- 7. Hands-on training shall include start-up, operation in all modes possible, including manual, start-up shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.
- 8. The HVAC contractor shall fully explain and demonstrate the operation, function and overrides of any local packaged controls, not *controlled* by the central control system.
- 9. Training shall occur after functional testing is complete, unless approved otherwise by the Owner.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GENERAL PROVISIONS - HVAC**

SECTION 23 0500 – Page 14 of 14

10. Minimum Duration of Training. The HVAC contractor shall provide training on each piece of equipment according to the following schedule.

Hours	System
4	Split System AC or Heat Pumps
1	Spot Unit Heaters
1	Restroom Central Exhaust Fans

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
MATERIALS AND METHODS - HVAC**

SECTION 23 1000 – Page 1 of 3

PART 1 - GENERAL

1.1 SCOPE:

- A. Section 23 0500 - "General Provisions - HVAC" shall apply to and become part of this Section.

PART 2 - MATERIALS: (All pipe, fittings and valves shall be manufactured in the United States of America)

2.1 HVAC DRAIN PIPING:

- A. Standard weight galvanized steel pipe ASTM A106 with galvanized malleable iron fittings, or type L hard copper with wrought copper sweat fittings, at Contractor's option.
- B. Provide rubber drain traps for roof mounted AC Units. Trim traps so units will drain under operating conditions.
- C. Provide drain traps for AC unit drain pans. Size traps as required to drain under operating conditions. See trap detail on drawings.

2.2 REFRIGERATION PIPING:

- A. Type L hard drawn copper tubing with wrought copper sweat fitting joints: Stay Brite-8 silver bearing solder with continuous flow of dry nitrogen through lines.
- B. Size all lines per manufacturer's recommendations and requirements based on actual line lengths, distances, and elevations, so as to ensure oil return at minimum loading.
- C. Small lines 5/8" OD and smaller may be soft copper with flare fittings, provided that all joints are exposed for visual inspection.

2.3 PIPE HANGERS:

- A. General: Pipe hangers, Anvil, PHD, Michigan Hanger, B-Line or Elcen. Anvil figure numbers are given for reference. Provide copper clad or plastic coated hangers on bare copper lines.
- B. Equip pipe hangers with vibration isolators as specified under Vibration Isolators.
- C. Pipe hangers for lines 3" and smaller: adjustable wrought ring hangers, Anvil Fig. 97 or 69 or wrought clevis hangers.
- D. Pipe hangers for piping 4" and larger: adjustable wrought clevis hangers.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
MATERIALS AND METHODS - HVAC**

SECTION 23 1000 – Page 2 of 3

- E. Parallel piping graded in same direction may be grouped on trapezes. Trapezes for line 4" and smaller, Unistrut P2000 channel, or equal, with rods sized as specified below for largest pipe on trapeze. Guide lines on (but not anchor to) trapezes using Unistrut Series P1100 clamps. Trapezes shall not exceed 3' in length. Space lines to allow at least 3" clear between adjacent pipe or pipe covering and between pipes or pipe covering and rods. Space trapezes as specified for pipe hangers based upon smallest size of pipe on trapeze.
- F. Provide riser clamps on pipe risers on each floor. Clamps in contact with copper or plastic pipe, plastic coated.
- G. Beam Clamps: Anvil Fig. 228.
- H. Inserts for hangers in concrete structures: Underwriter's listed cast iron inserts. Anvil Fig. 282.
- I. For fasteners in existing concrete structures use drilled in expansion anchors with load rating at least 150% of pipe hanger rating (powder driven anchors are not acceptable).
- J. Size rods for pipe hangers not smaller than the following: 3/8" rods for pipe up to 2", 1/2" for 2-1/2" and 3" pipe, 5/8" rods for 4" and 5" pipe, 3/4" rods for 6" pipe, and 7/8" rods for 8", 10" and 12" pipe, 1" rods for 14" and 16" pipe and 1-1/8" rods for 18" pipe.
- K. Space pipe hangers at maximum: Pipe hanger spacing for screwed, solder joint and welded piping: 1/2" and 3/4", 6 ft.; 1" to 1-1/4", 8 ft.; 1-1/2" to 2-1/2", 10 ft.; 3" and over, 12 ft. Install additional hangers at change of direction, valve clusters, and at all duct and unit mounted coils.
- L. Install pipe hangers on insulated pipe over pipe covering. Provide factory fabricated insulated pipe shields equal to Pipe Shields, Inc. "Thermal Hanger Shields" or Tru-Balance insulated saddles at hangers. Provide shield insulation of rigid calcium silicate indoors or rigid Perlite Silicate outdoors, the same thickness as adjacent pipe covering. (At Contractor's option, pipe shields may be field fabricated using rigid calcium silicate or foamglass insulation with ASJ and 20 gauge galvanized steel protector. Shield length: 1.5 times nominal pipe size but not less than 4".)
- M. Wrap bare copper refrigerant lines with sheet lead or molded plastic sleeve at hangers.
- N. Install steel pipe saddles on insulated lines at hangers. Tack weld saddles to pipe.

PART 3 - EXECUTION

3.1 PIPE INSTALLATION:

- A. Cut pipe square and ream full size after cutting. Clean pipe. Make threaded joints with Teflon tape. Do not spring pipe into place.
- B. Provide welding material and labor in accordance with the welding procedures of the Heating, Piping, and Air Conditioning Contractors' National Association or other approved procedure conforming to the requirements of ANSI B31.9 "Building Service Piping". Employ only welders fully qualified in the above specified procedure and currently certified by recognized testing authority. Use either electric arc or oxyacetylene welding. Provide full perimeter welds at both face end and collar end of each slip-on flange.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
MATERIALS AND METHODS - HVAC**

SECTION 23 1000 – Page 3 of 3

- C. Install piping to allow for expansion. Make connections to all equipment to eliminate undue strains in piping and equipment. Furnish necessary fittings and bends to avoid springing of pipes during assembly.
- D. Pitch air conditioning unit drain lines down in direction of flow 1" in 20'.
- E. Install chrome plated floor and ceiling plates on pipe passing through finished surfaces in finished spaces.
- F. Run piping concealed, except where specifically shown or specified to be exposed. Plumb all vertical lines and run mains parallel to building walls unless specifically shown otherwise.
- G. Pipe shall be braced at flexible connections to prevent blowouts under operating conditions.
- H. Run no piping or tubing in direct contact with slag fill. Where necessary to pass through slag, protect piping with not less than two wrappings of polyvinyl chloride tape or equivalent protection approved by Architect.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
THERMAL AND ACOUSTICAL INSULATION FOR HVAC SYSTEMS**

SECTION 23 1500 – Page 1 of 4

PART 1 - GENERAL

1.0 GENERAL:

- A. All external duct insulation and flexible duct shall be legibly printed or identified at intervals not greater than 36 inches with the name of the manufacturer, the thermal resistance R-value at the specified installed thickness and the flame spread and smoke-developed indexes of the composite materials.

1.1 SCOPE:

- A. Section 23 0500 - "General Provisions – HVAC" shall apply to and become part of this Section.
- B. "Exposed" is defined as: Exposed to view when construction is complete. (Items which are not "exposed" are considered "concealed".)
- C. The use of any material containing asbestos is strictly prohibited.
- D. Include with insulation material submittal letters from the insulation material manufacturer certifying that the insulation material does not contain asbestos in any shape, form or quantity.

1.2 INSULATION:

- A. Comply with NFPA 90A.
- B. Pipe hanger shields are specified in Section 23 1000 - "Materials and Methods - HVAC."
- C. Use insulation and adhesives with Underwriter's Laboratories and ASTM E-84 flame spread rating not over 25 without evidence of continued progressive combustion, and smoke developed rating not exceeding:
 - 1. 50 for pipe covering located in air ducts, plenum or casings.
 - 2. 150 for all other pipe, duct and equipment insulation.

PART 2 - MATERIALS

2.1 FOAMED PLASTIC PIPE COVERING: (DO NOT USE IN PLENUMS UNLESS COMPLIES WITH PARAGRAPH 1.2 ABOVE):

- A. Fire retardant foamed plastic pipe covering, maximum K factor at 75°F mean temperature not exceeding 0.27 BTU/(hr)(sq.ft.)(°F/in).
- B. Pipe covering may be seamless insulation slipped over piping before erection or may be slit longitudinally and installed over erected piping.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT THERMAL AND ACOUSTICAL INSULATION FOR HVAC SYSTEMS

SECTION 23 1500 – Page 2 of 4

- C. Make fitting covers from segments of pipe covering.
- D. Cement all joints and seams in accordance with manufacturer's instruction.
- E. Fit pipe hangers over insulation (see PIPE HANGERS). Use hanger shields as specified under pipe hangers.
- F. Where exposed outside, cover insulation with aluminum jacket (see below).
- G. Armacell, Aeroflex or Normaco.

2.2 ALUMINUM JACKET (PIPING):

- A. 0.016" thick smooth aluminum jacket with laminated polyethylene and kraft paper adhered liner.
- B. Roll jacket slightly smaller than insulation diameter and secure in place with flat aluminum bands 12" o.c. Lap jacket minimum 2" and place overlap at $\pm 120^\circ$ arranged to shed water.
- C. Finish fittings on aluminum jacketed lines with 1/8" thick (dry) coat of vinyl acrylic mastic reinforced with glass cloth. In addition, provide preformed aluminum fitting jackets for outdoor fittings.
- D. Seal all joints on fitting covers with silicone sealant.

2.3 DUCT INSULATION, EXTERNAL, FOR CONCEALED DUCTS:

- A. Flexible glass fiber insulation with foil-scrim-kraft (FSK) facing. Flame spread classification, 25 or less, smoke developed rating not exceeding 50. Minimum density, 1 lb./cu. ft., maximum thermal conductivity at 75°F mean temperature 0.26 BTU/(hr)(sq. ft.)(°F/in).
- B. Fire-retardant foamed plastic insulating board having a thermal conductivity at 75° mean temperature not exceeding 0.27 BTU/(hr)(sq.ft.)(°F/in.). Fasten in place and seal joints with adhesive in accordance with insulation manufacturer's instructions.
 - 1. Finish: Vimaso 749 vapor-block mastic – color grey.
 - 2. Armacell, Aeroflex or Normaco.

2.4 DUCT INSULATION, EXTERNAL, FOR EXPOSED INDOOR DUCTS:

- A. Fire retardant foamed plastic insulation. Paint with Vimaso 749 vapor-block mastic – color grey. (Do not use in plenums unless complies with Article 1.2.) Armacell, Aeroflex or Normaco.
- B. 6 lb/cu. ft. fiberglass board with FSK facing and thermal conductivity not exceeding 0.22 BTU/(hr)(sq.ft)(°F/in) at 75°F mean temperature.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
THERMAL AND ACOUSTICAL INSULATION FOR HVAC SYSTEMS**

SECTION 23 1500 – Page 3 of 4

PART 3 - INSTALLATION

3.1 HVAC PIPING:

- A. Refrigerant suction lines and hot gas bypass lines: "Cellular glass pipe covering, rigid," 1" thick for lines 2-5/8" OD and smaller, 1-1/2" thick for lines 3-1/8 OD and larger. Jacket lines located outdoors with aluminum jacket.
- B. AC Unit drain lines: "Foamed Plastic Pipe Covering", 1/2" thick.

3.2 DUCT INSULATION, EXTERNAL, FOR CONCEALED DUCTS:

- A. For flexible glass fiber insulation:
 - 1. Lap jacket and vapor seal all joints and seams with suitable mastic.
 - 2. On rectangular ducts 30" wide and wider, support insulation with weld pins and speed clips 18" on centers. Seal weld pins with mastic and FSK tape.
 - 3. Thickness and Extent: All sheet metal supply and outside air ducts not specified to be lined: Minimum 2" thick except as noted below. Note: Conical and straight spin-ins on both lined and unlined ducts shall be insulated as noted below. (See Foamed Plastic Insulation below.)
- B. All metal surfaces of ceiling diffuser (CD) located above the ceiling: 2" thick (seal air tight to diffusers).
- C. Foamed Plastic Insulation:
 - 1. Insulate portions of fire damper sleeves in insulated ducts, which are not concealed in walls, partitions and floors as specified with 3/4" thick foamed plastic insulation. Do not extend the insulation through the wall, floor or partition. Seal to wall and glass fiber insulation (or if lined duct seal foamed plastic insulation to duct with 3" lap over liner). On externally insulated duct, lap glass fiber insulation over foamed plastic and seal to foamed plastic.
 - 2. Insulate all flexible connectors in sheet metal ducts with 1" thick foamed plastic sheet with joints sealed. Extend insulation minimum 3" upstream and downstream of flex connector joints and seal to sheet metal duct.
 - 3. Insulate portions of lined ducts at manual dampers with 3/4" thick foamed plastic insulation overlapping the liner a minimum 3" upstream and downstream of the damper. Seal foamed plastic insulation to duct.
 - 4. Insulate all casings, headers and return bends on duct-mounted coils, and coils at terminal units with 3/4" thick foamed plastic insulation. Headers and return bends shall be insulated with 3/4" foamed plastic cemented inside galvanized sheet metal covers gasketed to coil casing.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
THERMAL AND ACOUSTICAL INSULATION FOR HVAC SYSTEMS**

SECTION 23 1500 – Page 4 of 4

- 5. Insulate all unlined ducts with dampers, all conical branch duct fittings and straight branch duct spin-ins with 3/4" thick foamed plastic insulation. Glass fiber insulation on the branch ducts shall overlap foamed plastic insulation on the conical fittings and spin-ins. Seal fiberglass to foamed plastic. For connections of flexible duct to spin-ins or conical branch duct fittings, connect flexible duct inner liner to sheet metal with specified clamps and lap outer liner and insulation over foamed plastic and clamp with Panduit strap. Seal flex duct outer cover to spin-in or conical fitting insulation. Insulation contractor shall submit sample of spin-in and conical fitting insulation and flexible duct connection for approval.
- D. Insulate portions of fire damper sleeves in insulated ducts which are not concealed in walls, partitions and floors as specified in A or B above. Do not extend the insulation through the wall, floor or partition.

3.3 DUCT INSULATION, EXTERNAL, FOR EXPOSED DUCTS:

- A. Insulate all exposed supply, return and outside air ducts and exposed return bends, headers and casings of all duct mounted coils not specified to be lined with 1" thick foamed plastic insulation cemented in place with adhesive in accordance with insulation manufacturer's instructions.
- B. Insulate all exposed supply, return and outside air ducts located in Mechanical Room with 2" thick 6#/cu. ft. fiberglass board with FSK jacket. Secure board with weld pins and speed clips 12" on centers. Seal clip indentations with mastic. Seal all joints and seams with mastic.
- C. Cover all angles, seams and joint reinforcing with insulation and seal vapor tight.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
HEATING AND AIR CONDITIONING EQUIPMENT AND SPECIALTIES**

SECTION 23 5000 – Page 1 of 4

PART 1 - GENERAL

1.1 SCOPE:

- A. Section 23 0500 – “General Provisions – HVAC” shall apply to and become part of this Section.

PART 2 - EQUIPMENT AND SPECIALTIES

2.1 HEAT PUMP OUTDOOR UNIT

- A. Outdoor unit: a single or multiple reciprocating compressors, heat transfer coil, fans, and inter-connecting piping and controls all enclosed in a single casing. For multiple compressor units provide separate refrigerant circuits.
- B. Casings: designed for outdoor installation, constructed of not lighter than (20) gauge galvanized steel with baked enamel finish over bonderizing. Provide access panels, condenser inlet guards and fan outlet guards.
- C. Compressors: Welded hermetic, spring isolated, with reversible oil pumps. Refrigerant: R410A.
- D. Coils: aluminum fins securely bonded to seamless copper tubes. Fans: direct driven propeller fans with weather protection for fan motors.
- E. Provide suction and discharge service valves, liquid stop valve, and solenoid change-over valves.
- F. Controls: factory wired and located in a readily accessible location. Compressor motor shall have line voltage (multi-step) contactor and both temperature and current sensitive overload devices. Include high and low pressure switches, short cycle timer, crank case heater, defrost thermostat, and defrost timer.
- G. Mount outdoor units on poured in place pad as shown.
- H. Provide 5 year non-pro-rated compressor parts warranty.
- I. Heat pumps shall be: Carrier, Rheem or Owner approved equal (Submit request Prior to Bid).

2.2 HEAT PUMP INDOOR UNITS:

- A. Indoor units: supply fans, coils, filters, and drip pans, horizontal or vertical as shown.
- B. Casings: galvanized steel not lighter than (22) gauge, reinforced with angles or formed shapes with baked enamel finish over bonderizing. Casing panels: removable for access to fans, motors, coils, and bearings. Provide knockouts for piping and electrical connections. Casing shall be insulated with 1" thick foil-faced duct liner meeting the requirements of NFPA 90A.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
HEATING AND AIR CONDITIONING EQUIPMENT AND SPECIALTIES**

SECTION 23 5000 – Page 2 of 4

- C. Provide statically and dynamically balanced belt or direct driven centrifugal fans with self aligning ball bearings, adjustable speed motor (pulley) (3 speed), (and adjustable motor base). (Size belt drives for 50% overload.) Fan motor and drive shall be located inside unit cabinet. Provide fan starting relay for each unit.
- D. Coils: include refrigerant coils and electric heating coils. Refrigerant coils shall consist of nonferrous fins securely bonded to seamless copper tubes, and shall bear AHRI approved ratings.
- E. Drain pans: provide corrosion resistant coating and insulating corrosion-resistant fill.
- F. Filters: 1" thick throwaway filters. Turn equipment over to Owner with clean filters.
- G. Electric Heaters:
 - 1. All heaters shall be listed in the Underwriters Laboratories, Inc. Electrical Appliance & Utilization Equipment list.
 - 2. Heaters shall have ceramic supported nichrome wire elements, flanged mounting plate, NEMA 1 control box containing contactors for heaters, factory wired to terminal strips and 1/2" insulation between mounting plate and control box. All sheet metal parts in air stream aluminized or galvanized steel. Provide spaces at terminal end of heater so that internal duct insulation will not cause hot spots.
 - 3. Equip heaters with factory wired automatic high limit control and a supplementary independent thermal device to disconnect all power circuits in case automatic high limit fails. Equip heaters shall be supplied with control circuits suitable for 24 volt control, factory wired to terminal blocks in control box.
 - 4. Provide staging as required by code, but not fewer stages than those shown.
- H. Indoor Units: of same manufacturer as outdoor units.
- I. Provide insulated plenum bases as shown.

2.3 SPLIT SYSTEM HEAT PUMP - VRF:

- A. Split system air conditioners shall consist of a wall or ceiling mounted indoor section, outdoor heat pump unit, connecting refrigerant piping, and electronic controls. System shall be UL rated.
- B. Indoor unit shall consist of centrifugal evaporator fan(s), evaporator coil, drain pan with condensate pump and safety switch, all enclosed in a plastic casing equipped with adjustable supply grille and return air grille. Provide 3 pole disconnect switch.
- C. Outdoor unit shall consist of compressor, condenser coil, condenser fan, and controls, all enclosed in a metal grided cabinet suitable for roof or pad mounting. Provide refrigerant piping kit, pre-insulated, properly sized for capacity shown. (See drawings to determine length.)

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
HEATING AND AIR CONDITIONING EQUIPMENT AND SPECIALTIES**

SECTION 23 5000 – Page 3 of 4

- D. Controls shall consist of a wall mounted remote controller utilizing a microprocessor. Functions shall include:
1. Computerized dehumidification.
 2. Operation mode setting.
 3. Self-diagnostic display.
 4. Room temperature display.
 5. Twenty-four hour on-off timer.
 6. Fan speed indicator.
 7. Memory.
- E. Split system heat pump – VRF shall be Daikin, Fujitsu or Owner approved equal.

2.4 AIR FILTERS:

- A. Type filters: Replaceable filters. Maximum face velocity 500 fpm, maximum initial resistance 0.4" WG, minimum 90% NBS test efficiency using atmospheric dust, minimum ratio of media area to face area 25:1. All components fire retardant and suitable for use in 100% RH atmosphere. Turn system over to Owner with clean filters (and furnish 2 sets spare filters for each unit).

2.5 CENTRIFUGAL WALL EXHAUSTERS:

- A. Fans: AMCA certified air and sound ratings, belt or direct driven as shown with permanently oiled bearings, statically and dynamically balanced backward curved blade wheels and spun aluminum housing with disconnect switches, back draft damper and outlet bird screen. For belt driven fans provide V-belt drive sized for 50% overload, adjustable pitch motor pulley and adjustable motor base.
- B. Fans: Greenheck, Acme, Penn or Loren Cook.

2.6 IN-LINE CENTRIFUGAL FANS:

- A. AMCA approved air and sound rated direct or belt driven fans as scheduled, complete with V-belt drives sized for 50% overload, self aligning grease lubricated ball bearings, adjustable pitch motor pulleys, adjustable motor bases and statically and dynamically balanced backward curved blade wheels, all enclosed in a galvanized steel housing with inlet bell and outlet duct collars. (Fan wheel and motor assembly shall be hinged for access.)
- B. Fans shall be Greenheck type SQ, Carnes, Peerless, Acme, Penn or Loren Cook.

2.7 ELECTRIC UNIT HEATERS:

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
HEATING AND AIR CONDITIONING EQUIPMENT AND SPECIALTIES**

SECTION 23 5000 – Page 4 of 4

- A. UL listed electric unit heaters having capacity shown with resiliently mounted direct driven propeller fan with guard, finned-sheathed heating elements, and enameled steel enclosure not lighter than 20 gauge. Heater shall be equipped with automatic reset high limit controls, power contactors and control transformer for 24 volt control, factory wired to terminal strips.
- B. For horizontal heaters provide adjustable horizontal louvers.
- C. For each unit heater provide room thermostat to cycle contactor and fan. Mechanical Contractor shall provide and install all control wiring in conduit and all control accessories as required for connecting wall mounted thermostat.
- D. Electric Unit Heater: Markel 5100 Series or equivalent by Chromalox, Erincraft or Berko.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
AIR DISTRIBUTION**

SECTION 23 6000 – Page 1 of 5

PART 1 - GENERAL

1.1 SCOPE:

- A. Section 23 0500 – “General Provisions – HVAC” shall apply to and become part of this Section.

1.2 SHOP DRAWINGS:

- A. See Section 23 0500 – “General Provisions – HVAC”.
- B. Ductwork Shop Drawings shall include details of duct construction: seams, joints, gauges, reinforcing, elevations, and hanger details for each pressure class and size range together with details of turning vanes, branch connections, dampers and access doors. Include access door locations and sizes. Identify on the shop drawings duct sections as they will be identified for fabrication and installation. Provide section drawings of locations where ducts cross or demonstrate with elevations that ducts will fit.

PART 2 - PRODUCTS

2.1 GENERAL:

- A. Air terminal submittal data shall include, for each terminal, both radiated and discharge sound power in DB re 10 to the minus 12 watts in octave bands 2 through 7. All air terminal controls shall be installed in a unit mounted control panel and shall be UL listed as an assembly.

2.2 GRILLES, REGISTERS AND DIFFUSERS:

- A. General: Air devices may be Price, Titus, Krueger, Nailor, or approved equal. Titus part numbers are given for reference. Coordinate border and frame types for air devices with ceiling types as shown on Architectural Reflected Ceiling Plan.
- B. Rectangular Louver Face Diffusers One-, Two-, Three-, Four-Way or Corner Throw (LD or CD): Fixed pattern louver face diffusers, all aluminum with white enamel finish, removable cores latched in place, opposed blade dampers, adjustable multiblade scoops, #TDC,-AA.
- C. Curved Blade Diffusers, One-, Two-, Three-, Four-Way Throw (CBD-I, -2, -3, -4): All aluminum adjustable curved blade diffusers with plaster frames, opposed blade dampers and multiblade scoops, white enamel finish #250-AA.
- D. Supply Registers (SR): Adjustable vertical face bars, adjustable horizontal rear bars, opposed blade dampers, plaster frames, adjustable multiblade scoops, all aluminum with prime coat finish: #272.
- E. Wall Return Registers (WRR): All aluminum, aluminum lacquer finish, horizontal bars fixed at about 35° angle, plaster frames, opposed blade damper #350. (Wall Return Grilles {WRG} Delete opposed blade damper).
- F. Wall Exhaust Registers (WER): Same as wall return registers.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
AIR DISTRIBUTION**

SECTION 23 6000 – Page 2 of 5

G. Ceiling Return Registers (R): All aluminum, 1/2" x 1/2" x 1/2" cube core, plaster frame, opposed blade dampers, white enamel finish #50F. Omit dampers for registers not attached to return ductwork.

H. Ceiling Exhaust Registers (E) and Ceiling Transfer Registers (T): Same as Ceiling Return Registers.

2.3 FLEXIBLE DUCT CONNECTIONS:

A. Install Neoprene coated glass cloth flexible connections at all duct connections to all fans, all AC Units and all powered induction units.

B. Install flexible connections in all ducts at building expansion joints.

2.4 DUCTWORK - GENERAL:

A. Unless otherwise shown or specified construct ducts of galvanized steel sheet metal using gauges and recommended details as contained in the current edition of the SMACNA HVAC Duct Construction Standards. Ductwork shall include supply air, exhaust air, return air, and outdoor air ducts, together with all necessary fittings, splitters, dampers, quadrants, flexible connections, sleeves, hangers, support, braces, etc. Hang and install ducts in a neat and workmanship manner with adequate bracing and cross breaking to prevent breathing, rattling, and vibration. **DO NOT USE SNAP-LOCK SEAMS.**

B. Install Duro-Dyne locking quadrants and Duro-Dyne end bearings on all splitters and manual volume dampers located above accessible ceiling and Young #315 regulator, and Duro-Dyne end bearings elsewhere. Provide stand-offs for quadrants on externally insulated ducts. (Refer also to "Sheet Metal Specialties.")

C. Duct dimensions are **net dimensions inside insulation**. Determine gauges by actual duct size.

D. All duct turns (except as noted below for 90 degree turns) shall be radiused with a centerline radius of 1.5 times the duct width in the plane of the turn. At the contractor's option, 90 degree turns may be square throat elbows vanned to provide a dynamic loss coefficient ("C") not greater than 0.2 or shall be radiused. Do not use "push on" vane runners. Duct turns less than 20 degrees may be mitered. Do not use off-sets that reduce the cross-sectional area of the duct.

E. Duct Sealing: Seal duct seams and joints after assembly as noted below. Seal entire circumference of all branch duct connections, tapping collars and spin-ins. Seal ducts using mastic sealant equal to solvent based United Duct Sealer.

1. Class A Seal: Seal all joints and seams and leak test at pressure specified. Leakage cfm per 100 sq. ft. duct surface area shall not exceed 8 times the square root of the test pressure in inches of water and no leaks shall be audible.
2. Class B Seal: Seal entire circumference of all transverse joints, seal all longitudinal joints.
3. Class C Seal: Seal entire circumference of all transverse joints.
4. Class D Seal: Seal corners of transverse joints.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT AIR DISTRIBUTION

SECTION 23 6000 – Page 3 of 5

2.5 DUCTWORK - LOW PRESSURE:

- A. Ductwork, Low Pressure, shall include: All supply, return, outside air and exhaust duct.
- B. Construct ducts in accordance with SMACNA Duct Construction Standards for pressure and seal classes noted below. Do not use snap-lock seam.
- C. Pressure and Seal Classes: 2" Pressure Class, Class "B" Seal.
- D. Seal all existing supply, return and exhaust ducts which are an integral part of new or modified systems (but which are not externally insulated) as specified above for new work of the same type.
- E. Hang ducts using 1"x12-gauge galvanized straps at transverse joints but not greater than 8 ft. apart.
- F. Provide galvanized sheet steel metal ducts of sizes shown on plans, construct, hang, support and reinforce in accordance with 2" Pressure Class as contained in the current edition of the SMACNA Duct Construction Standards. Use reinforcement noted for the longest side on all sides of the duct and bolt together at corners with minimum 5/16" diameter bolts. Do not penetrate duct at reinforcement with screws. **DO NOT USE SNAP-LOCK SEAMS.**

2.6 DUCTWORK LOW PRESSURE ROUND:

- A. Low pressure round ductwork includes all round supply, return, outside air, and exhaust ductwork.
- B. Ductwork: Factory fabricated single-wall galvanized steel round spiral lock seam ducts of 28 gauge for ducts up to 14" in diameter, 26 gauge for ducts from 15" to 26" in diameter, 24 gauge for ducts 27" to 36" in diameter, and 22 gauge for ducts over 36" in diameter.
- C. Fabricate fittings by continuous brazing or electric welding. Thickness of metal for round fittings: 26 gauge for fittings up to 14" in diameter, 24 gauge for fittings 15" to 26" in diameter, 22 gauge for all fittings over 26" in diameter. Elbows shall have a center-line radius of 1.5 diameters, 5 piece construction. Take-offs shall be 45 degree laterals. Splitters (tees) shall be reducing Y-Branch with dampers.
- D. Make transverse joints using beaded slip couplings, sealing compound equal to solvent based United Duct Seal and sheet metal screws.
- E. Provide hanger straps per SMACNA table no more than 8 ft. apart. Straps shall encircle duct. Do not penetrate ductwork at hangers.
- F. No adhesive labels shall be placed on the exposed surface of exposed ductwork.
- G. Ductwork and fittings shall be United McGill Airflow, Semco, Spiral Systems, Spiral Pipe of Texas or Eastern Sheet Metal round duct and fittings, 2" WG standard.

2.7 FLEXIBLE DUCTS:

- A. Flexible duct connectors: 2 element spiral construction composed of galvanized steel supporting spiral and coated woven textile fabric with metal or mineral base, UL listed as Class I Air Duct and Connector (UL 181).

SHELBY COUNTY WATER SERVICES BUILDING PROJECT AIR DISTRIBUTION

SECTION 23 6000 – Page 4 of 5

- B. Flexible connectors shall not exceed 5 feet in length and turns shall not exceed 20 degrees with maximum of two turns.
- C. Make connections between flexible ducts and other equipment using galvanized steel draw bands with plated screws and buckles and United Duct seal for high and medium pressure ducts and nylon draw bands for low pressure ducts.
- D. Factory insulate cold flexible ducts using insulation equivalent to that specified for cold ducts minimum R5 rating and provide continuous vapor barrier at connections to other ducts and equipment.
- E. Hang ducts in accordance with manufacturer's instructions.
- F. Flexible ducts: Thermaflex M-KC, EverClean, or Flexmaster Type 4M.

2.8 WEATHER LOUVERS:

- A. Louvers shall be AMCA certified 6" thick extruded aluminum drainable stationary louvers with minimum 0.08" thick blades and frame and minimum 50% free area nominal. Equip with 1/2" mesh aluminum birdscreen on inside of louver. Color to be selected by Architect. Finish to be manufacturer's Kynar 500 Fluoropolymer coating conforming to AAMA 605.2. Provide samples of color and finish to Architect for approval. Air pressure drop shall not exceed 0.15" WG at maximum air velocity of 850 FPM through free area. Water penetration shall not exceed 0.01 ounces per SF of free area.
- B. Louvers shall be Ruskin ELF6375DX or equivalent by Greenheck, or approved equal.

2.9 AUTOMATIC DAMPERS:

- A. Provide and install automatic dampers as shown on plans, scheduled, or as required. Coordinate size, quantity and locations of automatic dampers with automatic control work as required. Dampers shall be factory fabricated with extruded aluminum blades and frames.
- B. Damper frames shall be 5" x 1" x .125" (minimum thickness) extruded aluminum hat channel with hat shaped mounting flanges on both sides of the frame. Each corner shall be reinforced with two die formed internal braces and machine staked for maximum rigidity or integral overlapping gusset reinforcements in each corner to assure square corners and provide maximum resistance to racking.
- C. Damper blades shall be airfoil type extruded aluminum with metal blade to metal blade overlap. Each blade shall be maximum 6" depth with integral structural reinforcing tube running full length. Minimum thickness of blade shall be 0.070". Each blade shall be symmetrical relative to its axle pivot point, presenting identical performance characteristics with air flowing in either direction through the damper. Provide symmetrical blades of varying size as required to completely fill the damper opening. Blade orientation is horizontal. Blade operation is parallel or opposed. Blades shall be contained within the damper frame.
- D. Blade edge seals shall be flexible and suitable for -72°F to +275°F mechanically locked in extruded blade slots yet easily replaceable in field. Jamb seals shall be flexible stainless steel, compression type to prevent leakage between the end of the blade and the damper frame. Use of blade end to overlap the frame for jamb seal is not acceptable. Adhesive or clip-on type blade or jamb seals are not acceptable.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT AIR DISTRIBUTION

SECTION 23 6000 – Page 5 of 5

- E. Bearings shall be non-corrosive molded synthetic. Axles shall be 1/2" plated steel hexagonal shaped and to provide positive locking connection to blade. Linkage shall be concealed out of airstream, within frame to reduce pressure drop, noise and maintenance.
- F. Provide and install Electric, 24 or 120V AC, spring return, 2-position or modulating damper actuator(s) as specified in controls specification sections or as indicated on drawings. Actuator(s) shall be sized as required to sufficiently open/close dampers under operating conditions. Multiple actuators shall be provided as required.
- G. Install dampers in accordance with manufacturer's installation instructions and requirements. Install dampers square and free from racking.
- H. Dampers must be accessible to allow inspection, adjustment, and replacement of components. Provide and install access doors as specified and required.
- I. Provide and install bracing for multiple section assemblies to support assembly weight and to hold against system pressure. Attach multiple damper section assemblies together in accordance with manufacturer's instructions. Install support mullions as reinforcement between assemblies as required.
- J. Submittal shall include leakage, maximum airflow and maximum pressure ratings based on AMCA Publication 500. Damper shall be tested and licensed in accordance with AMCA 511 for Air Performance and Air Leakage. Damper shall meet the leakage requirements of the International Energy Conservation Code by leaking less than 3 cfm/sq. ft. at 1" of static pressure and shall be AMCA licensed as Class 1A.
- K. Saw-mark ends of damper rods parallel to blades.
- L. Rectangular dampers shall be Ruskin Model CD50, Greenheck VCD-43, or preapproved equivalent.
- M. Round dampers shall be Ruskin Model CDRS25, Greenheck VCDR-53, or preapproved equivalent.

2.10 ACCESS DOORS:

- A. Access doors in apparatus casings are specified under APPARATUS CASINGS.
- B. Access doors in low pressure ducts: galvanized steel frame flange mounted permanently secured to duct with a hinged gasketed access port held in place with thumb operated latches. Doors in insulated ducts: double thickness with insulation. Doors in non-insulated ducts: a single thickness. Size doors to permit removal of equipment or maintenance. Minimum 18" x 18" in ducts 20" or greater. Minimum 12" x 12" in ducts 14" to 18" and minimum 8" x 12" in ducts 10" to 12". If duct is less than 10", enlarge duct at access door (and fire damper, if applicable) to allow minimum 8" x 12" access door. Kees "FH" series standard pressure flanged mount. Install for flush interior on double wall doors.
- C. Mark access points in lift-out ceilings with colored vinyl stick-on discs. Locate discs on grid adjacent to point of access and coordinate location of access doors in non-accessible ceiling with General Contractor.

END OF SECTION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT

HVAC TESTING AND BALANCING

SECTION 23 7000 – Page 1 of 6

PART 1 - GENERAL

- A. Provisions of Section 23 0500 - "General Provisions - HVAC" shall apply to and become a part of this section.
- B. The HVAC testing and balancing work specified in this section shall be done by an Associated Air Balance Council (AABC) member or by a National Environmental Balancing Bureau (NEBB) member (and an AABC "National Project Performance Guarantee" shall be provided for the project). The Testing and Balancing Agency's (TABA) project manager shall be an AABC certified or NEBB certified testing and balancing engineer and be responsible for supervision of and certification of the work herein specified.
- C. The Testing and Balancing agency will be employed by the mechanical contractor.
- D. The balancing agency shall submit records of experience in the field of air and hydronic system balancing or any other data as requested by the Engineer. The supervisory personnel for the firm shall have at least five (5) years' experience, and all the employees used in this project shall be qualified technicians in this specific field.
- E. The balancing agency shall furnish all necessary calibrated instrumentation to adequately perform the specified services. An inventory of all instruments and devices in possession of the balancing agency may be required by the Engineer to determine the balancing agency's performance capability.

1.2 SCOPE:

- A. All air balance work shall be done in accordance with the AABC National Standards for Testing and Balancing Heating & Air Conditioning Systems (AABC National Standards), or NEBB National Standards edition in force at time of bidding. If these specifications set forth more stringent requirements than the AABC National Standards, these specifications shall prevail.
- B. The systems to be balanced and/or tested shall include:
 - 1. All HVAC and exhaust systems.

1.3 DOCUMENTS:

- A. The architect will provide the balancing agency one copy of each of the following documents:
 - 1. Project drawings and specifications.
 - 2. Approved construction revisions pertaining to the HVAC systems.
 - 3. Approved submittal data on HVAC equipment and systems to be installed under Division 23.
 - 4. Approved HVAC shop drawings.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT HVAC TESTING AND BALANCING

SECTION 23 7000 – Page 2 of 6

5. Approved HVAC wiring diagrams, control diagrams and equipment brochures, as appropriate.

1.4 COORDINATION:

- A. The TABA shall perform its services in close coordination with the work specified in Division 23.
- B. The plans and specifications indicate meters, valves, dampers, etc. for the purpose of adjusting the HVAC systems to obtain optimum operating conditions. In the event that any of meters, valves, dampers, etc. have been installed in a manner which will not permit their being used for their intended purpose, TABA shall so notify the Mechanical Contractor so that the above items may be correctly installed as specified in the other sections of Division 23.
- C. Work included in this section shall not be started until the systems involved meet the following conditions:
 - 1. Air Distribution Systems
 - a. Systems have been completed (including sealing and/or leak testing where specified) with all components properly installed and ready for operation, fans are rotating correctly, motor starters have correct overload elements, variable speed drives have been put into operation and clean filters (of the type required for finished system) have been installed.
 - b. All dampers, including automatic dampers, are operating smoothly and without binding and that the automatic dampers close tightly and open wide without binding.
 - 2. Automatic Control System:
 - a. Systems have been completed and are operating as designed.
 - 1) Installation is complete, all instruments (including room thermostats) have been field calibrated and operate correctly, and are set for design operating conditions.
 - 2) TABA personnel have been instructed in the proper use of and in changing set points of the various controllers including via computer or keypad if required.

1.5 NOTIFICATION FOR TESTING & BALANCING WORK TO BEGIN:

- A. When the above conditions have been met, the Mechanical Contractor shall notify the TABA in writing that the system(s) are ready for Testing and Balancing.
- B. When the TABA has been notified that the systems are ready for testing and balancing, the TABA shall inspect the various systems involved and notify Mechanical Contractor of any condition which may impede the TAB work (missing dampers, valves, incomplete control or electrical work, etc.).
- C. When the deficiencies noted above have been corrected, Mechanical Contractor shall again notify TABA that the system(s) are ready for testing and balancing.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT

HVAC TESTING AND BALANCING

SECTION 23 7000 – Page 3 of 6

1.6 TESTING AND BALANCING PROCEDURES:

A. All testing and balancing work shall be done in accordance with the AABC National Standards.

B. Air Systems:

1. Fan Speed: Test and adjust fan RPM to achieve design CFM requirements.
2. Current and Voltage: Measure and record motor current and voltage of each fan.
3. Pitot-tube Traverse: Perform a Pitot-tube traverse of main supply and return ducts to obtain total CFM. If a Pitot-tube traverse is not practical, the summation of the outlets or inlets may be used. An explanation why a traverse was not made must appear on the appropriate data sheet.
4. Outside Air: Test and adjust system minimum outside air by Pitot-tube traverse. If a Pitot-tube traverse is not practical, the percentage of outside air may be determined by calculations from the return air, outside air, and discharge air temperatures with heating and cooling coil valves shut. Make allowances for heat of compression and motor heat where applicable.
5. Static Pressure: Test and record system static pressures, including suction and discharge static pressure of each fan.
6. Air Temperature: Take wet-bulb and dry-bulb air temperatures on the entering and leaving side of each cooling coil. Dry-bulb temperature shall be taken on the entering and leaving side of each heating coil.
7. Zone Ducts: Adjust zone ducts to within design CFM requirements. At least one zone balancing damper shall be completely open.
8. Main Ducts: Adjust main ducts to within design CFM requirements and traverse for total CFM quantities.
9. Branch Ducts: Adjust branch ducts to within design CFM requirements. Multi-diffuser branch ducts shall have at least one outlet or inlet volume damper completely open.
10. Tolerances: Test and balance each diffuser, grille and register to within -5% and +10% of design requirements.
11. Identification: Identify the location and area of each grille, diffuser, register, and terminal box. This information shall be recorded on air outlet data sheets.
12. Description: Record the size, type and manufacturer of each diffuser, grille and register on air outlet data sheets.
13. Terminal Boxes: Set volume regulators on all terminal boxes to meet design maximum and minimum CFM requirements. All associated temperature controls shall be checked for proper operation and calibration. If the terminal boxes have separate settings for heating and cooling CFM, the CFM quantities for each shall be recorded on air outlet data sheets. All diffusers connected to the terminal box shall be read in the heating and cooling modes and their readings recorded on air outlet data sheets.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT HVAC TESTING AND BALANCING

SECTION 23 7000 – Page 4 of 6

14. Minimizing Drafts: Set grille bars for throws, diffusers for patterns and adjust all diffusers, grilles, and registers to minimize drafts in all areas.

C. Verification of Temperature Control:

1. Verify that all control components are installed in accordance with project requirements and are functional, including all electrical interlocks, damper sequences, air and water reset, and fire and freeze stats.
2. Verify that all controlling instruments are calibrated and set for design operating conditions.

Verify the accuracy of the final settings by taking temperature readings. The readings shall be in a typical conditioned space for each separately controlled zone.

1.7 TEST AND BALANCE REPORT:

- A. The test and balance report shall be complete with logs, data, and records as required herein. All logs, data, and records shall be typed on white bond paper and bound. The report shall be certified accurate and complete by the balancing agency's certified test and balance engineer. Any drawings submitted must be to a scale of 1/8" per foot or larger.
- B. Six (6) copies or PDF electronic file of the test and balance report are required and shall be submitted to the Architect and Engineer.
- C. The report shall contain the following general data in a format selected by the balancing agency:
 1. Project Number
 2. Contract number
 3. Project title
 4. Project location
 5. Project architect
 6. Project mechanical engineer
 7. Test and balance agency
 8. Test and balance engineer
 9. General contractor
 10. Mechanical subcontractor
 11. Dates tests were performed
 12. Certification

SHELBY COUNTY WATER SERVICES BUILDING PROJECT HVAC TESTING AND BALANCING

SECTION 23 7000 – Page 5 of 6

- D. The test and balance report shall be recorded on report forms conforming to the recommended forms in the AABC or NEBB National Standards. At a minimum, the report shall include:
1. Preface: A general discussion of the system, any abnormalities and problems encountered.
 2. Instrumentation List: The list of instruments including type, model, manufacturer, serial number and calibration dates.
 3. System Identification: In each report, the VAV boxes, zones, supply, return, and exhaust openings, and traverse points shall be numbered and/or lettered to correspond to the numbers and letters used on the report data sheets.
 4. Air handling equipment test report forms: Record the following on each air-handling equipment test form:
 - a. Manufacturer, model number and serial number
 - b. All design and manufacturer-rated data
 - c. Total actual CFM by traverse if practical. If not practical, the sum of the outlets may be used, or a combination of these procedures. For specific systems, such as ones with diversity, see the AABC *National Standards*.
 - d. Suction and discharge static pressure of each fan, as applicable.
 - e. Outside air, return air and total CFM.
 - f. Actual operating current, voltage and brake horsepower of each fan motor.
 - g. Final RPM of each fan.
 - h. Fan and motor sheave manufacturer, model, size, number of grooves and center distance.
 - i. Belt size and quantity.
 - j. Static pressure controls' final operating set points.
 5. Heating and cooling-coil test forms: Record the following items on each test form:
 - a. Manufacturer.
 - b. All design and manufacturers' rated data.
 - c. Rated and actual water pressure drop through each coil and related GPM.
 - d. Rated and actual static pressure drop across each coil.
 - e. Entering and leaving water temperatures.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT HVAC TESTING AND BALANCING

SECTION 23 7000 – Page 6 of 6

- f. Wet-bulb and dry-bulb temperatures entering and leaving each cooling coil; dry-bulb temperatures entering and leaving each heating coil.
- 6. Electric Heating Coil/Duct Heater test forms: Test and record the following on each electric-heating-coil test form:
 - a. Manufacturer and model number.
 - b. All design and manufacturer rated data.
 - c. Actual operating current and voltage.
 - d. Coil location and identification number.
- 7. Test and balance drawings: Include the following:
 - a. All air devices: Indicate terminal unit as air handler served from design airflow, actual airflow, neck size and air device type.
 - b. Air Handlers: Indicate mark, design supply airflow, actual supply airflow, design return airflow, actual return airflow, outside air design airflow and outside air actual airflow.
 - c. Fans: Indicate mark, design airflow and actual airflow.

1.8 FINAL ACCEPTANCE:

- A. Before Certificate of Final Payment is issued the TABA shall recheck, in the presence of the Owner's representative, specific and random selections of data recorded in the certified test and balance report.
- B. Points and areas for recheck shall be selected by the Owner's representative.
- C. Measurements and test procedures shall be the same as the original test and balance.
- D. Selections for recheck, specific plus random, shall not normally exceed 15 percent of the total number tabulated in the report, except where special air systems require a complete recheck for safety reasons.
- E. If random tests demonstrate a measured flow deviation of 10 percent or more from that recorded in the certified test and balance report, the report shall automatically be rejected. In the event the report is rejected, all systems shall be readjusted and tested, new data recorded, a new certified test and balance report submitted, and a new inspection test made, all at no additional cost to the Owner.

1.9 OPPOSITE SEASON TEST:

- A. The TABA shall perform an inspection of the HVAC system during the opposite season from that in which the initial adjustments were made. The balancing agency shall make any necessary modifications to the initial adjustments to produce optimum system operation.

END OF SECTION

SHELBY COUNTY WATER SERVICES BUILDING PROJECT BUILDING AUTOMATION SYSTEMS (BAS)

SECTION 23 8100 – Page 1 of 9

PART 1 - GENERAL:

1.1 PROVISIONS OF DIVISION 23:

- A. Section 23 0500 - "General Provisions - HVAC" shall apply to and become part of this Section.

1.2 PROVISIONS OF DIVISION 26:

- A. "General Provisions, Electrical" shall apply to this Section.

1.3 SYSTEM DESCRIPTION:

- A. Provide a building automation system (BAS) consisting of a network of distributed direct digital control processors (DCP) bus connected to a central computer. DCP's shall be microprocessor based and strategically located at data concentration points or in close proximity to the end devices to be monitored and/or controlled. The DCP's shall include stand alone capability of direct digital control with integrated energy management programs including duty cycling, demand, optimum start and analog load reset.
- B. The central computer (CC) shall include an operator's console with display, keyboard and printer. Central software shall include historical data storage, logging and retrieval, upline and downline loading of stored DCP programs, CC and DCP programming software, data logging of analog and digital values and color dynamic graphic software (mouse driven). Alarms and logical groups shall have alphanumeric points and group descriptors.
- C. Provide all sensors, actuators, transducers, DCP's and central equipment to meet functional description.
- D. Products of a manufacturer maintaining complete service and parts facilities in Alabama continuously for the last three years: Shall be Honeywell – Southeastern Temperature Controls, Contact: Mike Enea (205) 296-2866. E-mail: menea@stcbas.com.
- E. Control equipment, except for items comprising an integral part of the water or refrigeration piping, shall be installed by trained mechanics employed by the BAS manufacturer.
- F. Use standard components, regularly manufactured and not custom designed for project. Use systems and components proven in use.
- G. System shall be modular, permitting expansion by adding hardware and software without changes in communication or processing equipment.

1.4 WORK REQUIRED:

- A. All engineering design, labor, materials, equipment and services necessary for and reasonably incidental to proper completion of BAS work as shown or herein specified (excepting only work or materials specified or noted as being done or furnished by others), consisting in general of the following, complete and ready for operation.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT BUILDING AUTOMATION SYSTEMS (BAS)

SECTION 23 8100 – Page 2 of 9

1. Central Control (CC)
2. Distributed Control Panels (DCP)
3. Software packages
4. Remote control, alarm and sensing devices
5. Fire alarm system interconnects
6. Complete wiring network interconnecting all parts of the system
7. Instruction of Owner's operating personnel

1.5 SUBMITTALS:

- A. Within 30 days of notice to proceed and prior to installation of any equipment, the BAS contractor shall provide 6 copies of submittals for approval. Submittals shall include:
 1. A complete system block diagram showing all computers, peripherals, power connections and source, plan of equipment in main control room, trunk wiring links, DCP's and location, and a listing of all points and systems connected to each DCP.
 2. Complete operating sequences for all programs provided for HVAC equipment.
 3. Specification data sheets for each piece of central and remote hardware, for software application package and for central programs and system services software.
 4. Proposed site-unique menu tree showing the full English descriptor proposed for each logical system and the full English description of each logical data point within each system.
 5. Menu map of all definition process menu paths showing all elements of menu prompts specified for system definition and user applications.
 6. Samples of all specified reports, logs, and printouts showing compliance with all requirements for English code-free outputs.
 7. Locations of all control panels by room name and number.
 8. Thirty days after approval of all above submittal data, submit typed copies of all system control sequences.

1.6 ACCEPTANCE PROCEDURES:

- A. Upon completion, the contractor shall conduct a complete functional test of the system for the owner, architect, and engineer. Contractor shall simulate power failure recovery, and stand alone operation capability on communication loss with Central Control.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT BUILDING AUTOMATION SYSTEMS (BAS)

SECTION 23 8100 – Page 3 of 9

- B. Provide 3 full sets of as-built drawings, complete operating manuals and hardware and software documentation.

1.7 WARRANTY SERVICE:

- A. All components, software, parts and assemblies supplied by the manufacturer shall be guaranteed against defects in materials and workmanship for one year from acceptance date.
- B. Labor to trouble shoot, repair or replace system components shall be furnished at no charge to the owner during the warranty period.

1.8 MAINTENANCE:

- A. The BAS manufacturer shall have a local branch office within 100 miles of the installation staffed with trained, full-time employees capable of performing testing, inspection, repair and maintenance services for the life of the system.
- B. The meantime to repair once the BAS manufacturer's service representative is at the job site with the required parts shall not exceed two hours.

1.9 SYSTEM COMMISSIONING:

- A. The Contractor shall completely checkout, calibrate and test all hardware and software to insure that the system performs in accordance with the approved sequences of operation submitted.
- B. Include the services of a full time control technician for calibrating and adjusting controls for the first 10 working days after Owner has occupied building.
- C. Provide assistance to the Test and Balance Contractor during his review and testing of the Control Systems.

1.10 OPERATOR TRAINING:

- A. Contractor shall provide a minimum of two full day's instruction for the owner's operating personnel on system operation and routine maintenance procedures. The BAS manufacturer shall also provide four additional days of on-site instruction and assistance to the owner during the warranty period on a call basis. The owner shall schedule these days at least one week in advance and for intervals of no less than eight hours at a time. The four days are exclusive of necessary travel time. These sessions shall encompass all areas of the system as requested by the owner including troubleshooting, diagnostics and all levels of operation and software definition.

PART 2 - EQUIPMENT:

2.1 GENERAL:

- A. System components requiring line voltage inputs shall be designed and tested to operate satisfactorily and without damage at 10% above and 15% below nominal rated input voltage.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT BUILDING AUTOMATION SYSTEMS (BAS)

SECTION 23 8100 – Page 4 of 9

- B. All transmission bus connected devices shall be such that loss of any single device shall not disrupt or interfere with communication to other devices on the bus. Loss of communication with the central control and command station shall not cause any DCP to halt operation or to cease to perform its intended function (i.e., each DCP shall continue to operate on a stand alone basis).
- C. After power failure and upon a power restoration, the system shall provide automatic sequential restart of equipment based on current program time and program requirements without operator intervention.

2.2 CENTRAL CONTROL:

- A. Central control shall include a computer, monitor, wireless keyboard and mouse, printer and software.
- B. Computer shall be PC compatible with not less than 512 gigabyte solid state hard drive, 48X 16XDVD+/-RW/48X CDROM, 12 GB RAM, 3.0 GHZ microprocessor, 1 GB HD Video Card, minimum two HDMI outputs.
- C. Monitor shall be 24" LED color monitor with minimum 1920 x 1080 resolution and HDMI input.
- D. Printer: 8-1/2" x 11" color laserjet.
- E. Central control equipment shall be equipped with a power supply with filtered AC input, surge protection, battery backup and shall be installed on-site at a location directed by Owner.

2.3 DISTRIBUTED DIRECT DIGITAL CONTROL PROCESSORS (DCP'S):

- A. To prevent a single-failure catastrophe, multiple direct digital controllers shall be provided. Failure of any single controller shall have no effect on other controllers.
- B. Direct digital controllers shall be microprocessor-based with all hardware, software, and communications interfaces. DCP's shall be capable of stand-alone operation, and incorporation into larger systems. The controllers shall be either 16 bit, or multiple 8 bit microprocessors configured so that input-output processing and operator command processing may be offloaded from the control processing. If the DCP's use digital communication to remote "slave" gathering panels, all such communication circuits extending outside the DCP shall utilize dual (redundant) bus cabling, be supervised, and provided with an auto-failover feature.
- C. The controller shall be factory mounted and wired in a steel enclosure complete with all relays, digital to analog converters, and terminal strips. Controllers shall be expandable to 15% points of each type (analog and digital input and output) in excess of those actually required for this project.
- D. The controller shall operate within the following limits:
 - 1. Temperature 33 to 122°F.
 - 2. Humidity 0 to 95% RH (non-condensing)

SHELBY COUNTY WATER SERVICES BUILDING PROJECT BUILDING AUTOMATION SYSTEMS (BAS)

SECTION 23 8100 – Page 5 of 9

3. Voltage 24 VAC + 10% to -15% 50 or 60 HZ.
- E. The controllers shall withstand storage conditions as follows:
1. Temperature -4 to 176°F.
 2. Humidity 0 to 95% RH (non-condensing)
- F. Local Diagnostics and Programming:
1. Each DCP shall be equipped to provide local diagnostics and adjustments either through a built-in digital display and keyboard to show such information as time and date, analog variables, binary conditions, system operation modes, critical alarms and operator definable functions to allow the operator to analyze and adjust the system being controlled or through a portable hand held operator's terminal. Provide one operator's terminal for job.
 2. Adjustments shall include but not be limited to proportional gain, integral rate, velocity and acceleration constants associated with incremental control and on/off values of two-position control.
 3. The DCP shall be fully field programmable with the following built-in functions:
 - a. All closed loop control functions (P, PI, PID, incremental, floating, two-position, etc.)
 - b. All energy management functions
- G. The system shall utilize PROM and RAM memory. All DDC algorithms and parameters shall be RAM based for ready access for modification and adjustment. RAM memory shall be provided with 100 hours battery backup minimum.
- H. The controller software shall include a complete operating system, standard energy management application packages, standard control algorithm application packages, and an owner/user custom control and calculation application package complete with interpreter. Complete user documentation modules shall be provided.
- I. DCP's shall be capable of being programmed to utilize stored default values for assured fail safe operation of critical processes. Default values shall be invoked upon sensor failure or, if the primary value is normally provided by the CC or another DCP, by loss of bus communication. Individual application software packages shall also be structured to assume a fail safe condition upon loss of input sensors. Loss of an input sensor shall result in output of a "sensor failed" message at the central control and command station.
- J. The operating system software shall be PROM resident and operate independently of any central computer. The operating system shall control communications between the central terminal and the controllers and I/O modules, provide alarm monitoring and reporting, provide control application packages, and contain built-in diagnostic routines.
- K. The controller shall have memory error checking. Upon detection of a memory error, the CPU shall correct the error or halt to prevent erroneous operation. All "halts" shall report as an alarm at the central control terminal.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT BUILDING AUTOMATION SYSTEMS (BAS)

SECTION 23 8100 – Page 6 of 9

- L. After a power failure and upon a power restoration, the system shall provide automatic sequential restart of equipment based on current program time and program requirements without operator invention.
- M. Controllers shall accept industrial platinum and resistance sensors. Each output point shall be provided with an L.E.D. which shall indicate status of digital outputs and value (via variable intensity) of analog outputs. Processor software shall allow for scaling and for calibration of sensor lead length variations to insure display accuracies.

SOFTWARE:

2.4

- A. Software shall include the following:
 - 1. System access limitation with 3 levels of access (operation only; operation plus programming; operation, operation plus programming; assigning individual passwords and authorization levels).
 - 2. Psychrometric routines.
 - 3. Alarm lockout.
 - 4. Floating alarm limits.
 - 5. Time delay start sequence.
 - 6. Time of day.
 - 7. Optimum start-stop.
 - 8. Smoke control.
 - 9. Air economizer initiation.
 - 10. Chiller plant optimization.
 - 11. Communication with chilled water system controller (see "Air Cooled Water Chiller Units" Section 235000).
 - 12. Air tracking.
 - 13. DDC programs as required.
 - 14. Event initiated programs.
 - 15. DCP programming (from CC and DCP).
 - 16. Data logging.
 - 17. Status logging (all points).

SHELBY COUNTY WATER SERVICES BUILDING PROJECT BUILDING AUTOMATION SYSTEMS (BAS)

SECTION 23 8100 – Page 7 of 9

2.5 TRANSMISSION NETWORK:

- A. Communications between controllers shall have a system line capability of at least 3300 feet, or systems shall be equipped with modems.
- B. Transmission line shall be electrically isolated from the DCP's and operator's terminal by optical couplers at each interface to prevent any voltages in the transmission lines from damaging any of the electronic circuits.

2.6 CONTROL WIRING:

- A. Include all control and interlock wiring and power wiring for DCP's and control panel in this Section. Install in conduit in accordance with provisions of Electrical Work.
- B. Waterproof and firestop all conduit floor penetrations. Firestop conduit penetrations of fire rated walls and partitions.
- C. Wire all devices individually to terminal strips in control panels.
- D. Furnish necessary relays and auxiliary contacts and other accessories required. Provide interlock relays per N.E.C. Coordinate start-stop stations, auxiliary contacts, etc., with supplier of Starters and Motor Control Centers specified in Electrical Work.

2.7 CONTROL DEVICES:

- A. Remote bulb thermostats and temperature transmitters:
 - 1. Unless otherwise shown use averaging elements not less than 8 feet long for duct or casing cross sections up to 24 square feet face area and elements not less than 17 feet long for sections over 24 square feet face area, accuracy: $\pm 0.3^{\circ}\text{F}$.
 - 2. At contractor's option, average temperature measurements for mixed air or coil discharge air may be made by an array of paralleled Type J or Type T thermocouples. Individual thermocouples shall be located not more than 12" apart with the bottom row 3" above the bottom of the coil. In no case shall less than 6 thermocouples be used. Thermocouples: solid 24 gauge wire, teflon insulated. Thermocouple extension wire 16 gauge, solid, twisted, shielded PVC or teflon insulated. Thermocouples shall be mounted using an EMT grid.
- B. Humidity Sensors: Accuracy $\pm 1\%$ over 30 to 80% RH range. Case to match case of pneumatic room thermostat.
- C. Outdoor and Duct Humidity Sensors: Accuracy $\pm 1\%$ over 30 to 80% RH range.
- D. Thermometers: Pipe line thermometers are specified in another section. Install dial thermometers in ducts where shown on control diagrams, providing averaging bulbs where shown.
- E. Valve & Damper Operators: Of sufficient power to close/open valves and dampers under operating conditions. Electric valve and damper motors shall have oil immersed gear trains and spring return to normal position.
- F. Static pressure measurement stations shall be bi-directional pressure transducers providing 0 to 5 VDC or 4-20 mA proportional output. Bi-directional range shall be 0 to ± 0.1 to 0 to ± 50 in. W.C. Minimum $\pm 0.5\%$ full scale accuracy. Setra DPT264 or equal.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT BUILDING AUTOMATION SYSTEMS (BAS)

SECTION 23 8100 – Page 8 of 9

- G. Current Transformers: Comply with ISA 50.00.01, current-sensing fixed or split-core transformers with self-powered transmitter, adjustable trip and suitable for 175 percent of rated motor current.
- H. Velocity Pressure Transducers 0 to 5 volts DC, accuracy $\pm 2\%$ full scale, return air range, (0 to 0.25" WG), supply air range (0 to 0.5") (0 to 1.0"), Setra or equal.
- I. Capillary Supports: securely support all duct-mounted and casing-mounted thermostat capillaries using factory fabricated copper bulb supports.
- J. Provide stand-offs for control devices mounted on externally insulated ducts and equipment.
- K. Anchor all items mounted on gypsum board (dry-wall) using toggle bolts or moly bolts, not expansion shields.
- L. Provide permanent nameplates for control switches and motor starters. Nameplates: engraved laminated plastic with letters legible under normal operating conditions. (White on black).
- M. Permanently identify control devices other than room thermostats, so they may be identified on control diagrams. Provide engraved plastic nameplates for items mounted outside of or on faces of panels. Mark other instruments with indelible ink. Mark room thermostats and room temperature sensors on inside of covers.
- N. Automatic Dampers:
 - 1. Provide and install automatic dampers as shown on plans, scheduled, or as required. Coordinate size, quantity and locations of automatic dampers with automatic control work as required. Dampers shall be factory fabricated with extruded aluminum blades and frames.
 - 2. Damper frames shall be 5" x 1" x .125" (minimum thickness) extruded aluminum hat channel with hat shaped mounting flanges on both sides of the frame. Each corner shall be reinforced with two die formed internal braces and machine staked for maximum rigidity or integral overlapping gusset reinforcements in each corner to assure square corners and provide maximum resistance to racking.
 - 3. Damper blades shall be airfoil type extruded aluminum with metal blade to metal blade overlap. Each blade shall be maximum 6" depth with integral structural reinforcing tube running full length. Minimum thickness of blade shall be 0.070". Each blade shall be symmetrical relative to its axle pivot point, presenting identical performance characteristics with air flowing in either direction through the damper. Provide symmetrical blades of varying size as required to completely fill the damper opening. Blade orientation is horizontal. Blade operation is parallel or opposed. Blades shall be contained within the damper frame.
 - 4. Blade edge seals shall be flexible and suitable for -72°F to +275°F mechanically locked in extruded blade slots yet easily replaceable in field. Jamb seals shall be flexible stainless steel, compression type to prevent leakage between the end of the blade and the damper frame. Use of blade end to overlap the frame for jamb seal is not acceptable. Adhesive or clip-on type blade or jamb seals are not acceptable.
 - 5. Bearings shall be non-corrosive molded synthetic. Axles shall be 1/2" plated steel hexagonal shaped and to provide positive locking connection to blade. Linkage shall be concealed out of airstream, within frame to reduce pressure drop, noise and maintenance.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT BUILDING AUTOMATION SYSTEMS (BAS)

SECTION 23 8100 – Page 9 of 9

6. Provide and install Electric, 24 or 120V AC, spring return, 2-position or modulating damper actuator(s) as specified in controls specification sections or as indicated on drawings. Actuator(s) shall be sized as required to sufficiently open/close dampers under operating conditions. Multiple actuators shall be provided as required.
7. Install dampers in accordance with manufacturer's installation instructions and requirements. Install dampers square and free from racking.
8. Dampers must be accessible to allow inspection, adjustment, and replacement of components. Provide and install access doors as specified and required.
9. Provide and install bracing for multiple section assemblies to support assembly weight and to hold against system pressure. Attach multiple damper section assemblies together in accordance with manufacturer's instructions. Install support mullions as reinforcement between assemblies as required.
10. Submittal shall include leakage, maximum airflow and maximum pressure ratings based on AMCA Publication 500. Damper shall be tested and licensed in accordance with AMCA 511 for Air Performance and Air Leakage. Damper shall meet the leakage requirements of the International Energy Conservation Code by leaking less than 3 cfm/sq. ft. at 1" of static pressure and shall be AMCA licensed as Class 1A.
11. Saw-mark ends of damper rods parallel to blades.
12. Rectangular dampers shall be Ruskin Model CD50, Greenheck VCD-43, or preapproved equivalent.
13. Round dampers shall be Ruskin Model CDRS25, Greenheck VCDR-53, or preapproved equivalent.

PART 3 - CONTROL SEQUENCES:

3.1 GENERAL:

- A. Control diagrams on drawings are intended to indicate, in general, control arrangements. Provide all instruments, relays, operators, switches, etc. required to accomplish control sequences whether or not such devices are actually shown on control diagrams.
- B. As shown on drawings.

END OF SECTION

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
BASIC ELECTRICAL MATERIALS AND METHODS**

SECTION 26 0500 – Page 1 of 9

PART 1 GENERAL

1.1 DESCRIPTION

A. General Conditions:

1. The accompanying General Conditions (front-end specifications) shall apply to and form a part of this section.

B. General Requirements:

1. Carefully examine General Conditions, other specification sections, and other drawings (in addition to Electrical) in order to be fully acquainted with their effect on electrical work.
2. Do all work in compliance with all applicable codes, laws, and ordinances, the National Electrical Safety Code, the National Electrical Code (hereinafter referred to as "Code"), applicable energy codes, and the regulations of the local utility companies. Obtain and pay for any and all required permits, inspections, certificates of inspections and approval, and the like.
3. Cooperate with other trades and contractors at job. Perform work in such manner and at such times as not to delay work of other trades. Complete all work as soon as the structure and installations of equipment will permit. Patch, in a satisfactory manner and by the proper craft, any work damaged by electrical workmen.
4. Electrical contracting firm shall be licensed as an electrical contractor in the state where work will be performed

1.2 General SCOPE OF Electrical WORK (Refer to drawings for other specific scope items)

- A. Furnish all labor and materials to complete electrical work as shown on drawings and/or herein specified.
- B. Remove all existing electrical equipment and wiring made obsolete by this project and remove or relocate all electrical services located on or crossing through the project property, either above or below grade, which would obstruct the construction of the project or conflict in any manner with the completed project or any code pertaining thereto. Dispose of salvageable materials as directed by the Architect. Contractor shall schedule meeting to review scope of electrical demolition and to confirm scope and phasing of proposed demolition with the owner in the presence of the prime consultant prior to start of any electrical demolition.
- C. Furnish and install complete power, telephone and other electrical services as shown on drawings and/or specified herein.
- D. Furnish and install complete power distribution system as shown on drawings and/or specified herein.
- E. Furnish and install disconnect switches for motors as shown on drawings and/or specified herein.
- F. Furnish and install complete electrical grounding systems as shown on drawings and/or specified herein.
- G. Install and connect electrical equipment mentioned in Division 26/27/28 Specifications or noted in drawings, whether furnished by electrical contractor or by others.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
BASIC ELECTRICAL MATERIALS AND METHODS**

SECTION 26 0500 – Page 2 of 9

- H. Furnish and install complete electrical lighting systems as shown on drawings and/or specified herein.
- I. Furnish and install all electrical items shown on drawings and/or herein specified, unless shown or specified otherwise.
- J. Furnish and install complete controls & auxiliary systems as shown on drawings and/or specified herein.
- K. Furnish and install complete telephone/data raceway (including all outlet boxes, face plates, conduit raceways, telephone backboards, terminal cabinets, etc.), wiring and devices system as shown on drawings and/or specified herein.
- L. Furnish and install a complete Surge Protection System as shown on drawings and/or specified herein.
- M. Procure and pay for permits and certificates as required by local and state ordinances and fire underwriter's certificate of inspection.
- N. Balance loads as equally as practicable on services, distribution feeders, circuits and buses. Provide typewritten directory for each panel.
- O. Unless specifically indicated or required otherwise, terminate all circuitry/cabling provided within this contract at associated equipment/devices/etc. in accordance with all applicable codes, standards and supplier requirements, whether associated equipment/device/etc. is furnished within this contract or by others.
- P. Complete field testing, adjustment & startup of all systems listed above as shown on drawings and/or specified herein.

PART 2 PRODUCTS

2.1 APPROVED MATERIALS AND DEVICES

- A. Where not otherwise specified, provide only new, standard, first-grade materials/systems throughout, conforming to standards established by Underwriter's Laboratories, Inc., and so marked or labeled, together with manufacturer's brand or trademark. All equipment/systems subject to approval of Architect before installation. All like items and associated equipment/systems shall be of one manufacturer.
- B. To ensure proper coordination, it is intended that all electrical equipment and materials specified in Division 26/27/28 of these specifications and shown on the electrical drawings be furnished and installed by the electrical sub-contractor. It will not be permissible for any of these items to be furnished directly by the general contractor without the electrical contractor's coordination.
- C. To ensure commonality of spare parts, it is required that the electrical contractor provide the same brand for all circuit breakers, starters, power equipment, etc. provided under the following divisions of these specifications:

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
BASIC ELECTRICAL MATERIALS AND METHODS**

SECTION 26 0500 – Page 3 of 9

1. SECTION 260573: POWER DISTRIBUTION SYSTEM ELECTRICAL STUDIES
2. SECTION 262416: POWER PANELBOARDS - CIRCUIT BREAKER TYPE
3. SECTION 262417: LIGHTING PANELBOARDS
4. SECTION 262816: SAFETY SWITCHES AND FUSES

2.2 SUBMITTALS

- A. All submittals to the design team shall be accompanied by a letter summarizing all proposed deviations from specified products or pre-approved substitutions. The absence of such a letter shall be understood to indicate that the contractor intends to meet all contract requirements, regardless of cut-sheets/data-sheets provided within the submittal.
- B. Submit to Architect ten (10) days prior to bid date three (3) copies of any items and/or manufacturers which are proposed as substitutes for those specified.
- C. Submit to Architect promptly after award of Contract and prior to purchasing, the number of copies required by the contract. All drawings of a specific item or system shall be made in one submittal, and within thirty (30) days after award of Contract. Shop drawings of all power equipment shall contain exact details of device placement, phasing and numbering, in form of elevations, for each major piece of equipment. Shop drawings shall be submitted on the following:
 1. SECTION 260573: POWER DISTRIBUTION SYSTEM ELECTRICAL STUDIES
 2. SECTION 260944: DISTRIBUTED DIGITAL LIGHTING MANAGEMENT SYSTEM
 3. SECTION 262416: POWER PANELBOARDS - CIRCUIT BREAKER TYPE
 4. SECTION 262417: LIGHTING PANELBOARDS
 5. SECTION 262816: SAFETY SWITCHES AND FUSES
 6. SECTION 264300: SURGE PROTECTIVE DEVICES
 7. SECTION 265000: LIGHTING MATERIALS AND METHODS
 8. SECTION 271000: STRUCTURED CABLING SYSTEM
 9. ALL POWER DISTRIBUTION EQUIPMENT (i.e. SWITCHBOARDS, PANELBOARDS, DRY TYPE TRANSFORMER, ETC.)
 10. ALL ELECTRICAL AND TELECOMMUNICATION EQUIPMENT LAYOUTS - Submittals shall include $\frac{1}{4}" = 1'-0"$ CAD drawings (hand drawn sketches will not be accepted) of each electrical room, IT room, electrical equipment stand, generator area, or any other similar area with electrical equipment. Drawings shall indicate all panelboards, transformers, switchboards, generators, equipment racks, control panels, HVAC equipment, etc. that are located in each electrical/IT area. Layouts shall show that each piece of electrical equipment has the clearances, working space and dedicated equipment space required by applicable codes. No conduits to equipment within these areas shall be installed until submittals have been provided and returned without exception by the design team.
- D. The contractor shall fully review, comment upon and correct all shop drawings as required to assure compliance with contract documents prior to submittal to Architect. The failure of the contractor to properly review and correct shop drawings prior to submittal will result in rejection of shop drawings by the engineer. Review by the Architect will be for general conformance with contract documents. The contractor shall be fully responsible for correctness of all submitted dimensions, details, quantities and locations.
- E. None of the above items shall be installed until shop drawings or catalog data have been reviewed by Architect without rejection or required resubmittal. Any listed item not submitted, even if specified, shall be considered not acceptable and shall be removed if directed.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT BASIC ELECTRICAL MATERIALS AND METHODS

SECTION 26 0500 – Page 4 of 9

- F. Any required resubmittal will be reviewed by the Architect for conformance with previously issued comments only. The contractor shall be responsible for verifying that all items not specifically requiring resubmittal have not been altered from the previously reviewed submittal.
- G. Material proposed for substitution shall be of the same quality, perform the same functions, conform to such physical dimensions and appearance as are required by the Architect. All material proposed for substitution is subject to the approval of the Architect and his authority for approval is final. No material proposed for substitution will be considered unless all submittal data complies with the drawings and specifications of Section 16 as to time of submission, number of copies of submittal, and detail requirements.
- H. Samples of material shall be furnished where required by drawings or Division 26/27/28 Specification, or as requested by the Architect on items proposed as substitutes.
- I. Submit to Architect a certificate of final inspection from local inspection department.

PART 3 EXECUTION

3.1 SITE VISIT

- A. The Contractor shall visit the site to determine existing dimensions and conditions affecting electrical work. Failure to do so in no way relieves Contractor of his responsibility under Contract.

3.2 CLEARANCE WITH UTILITIES

- A. It shall be the responsibility of this Contractor, prior to bid, to reaffirm with the utility companies involved, that the locations, arrangement (and with power company voltage, phase, and metering required) and connections to utility service are in accordance with their regulations and requirements. If their requirements are at variance with these drawings and specifications, the Contract price shall include any additional cost necessary to meet those requirements without extra cost to Owner after a contract is entered into.
- B. The Contractor shall be responsible for permanent meter deposit. The meter deposit will be refunded to the contractor at time of Owner's acceptance.
- C. Arrange with utility companies for such services as shown or herein specified and installation of meter where shown. Furnish with shop drawings a signed document from utility companies describing the location and type of services to be furnished and any requirements they may have. This document shall be signed for each utility company by a person responsible for granting such service.

3.3 WORKMANSHIP

- A. All work shall be in accordance with the latest editions of NFPA 70 (National Electrical Code), NFPA 101 (Life Safety Code), National Electric Safety Code, International Building Code, applicable NECA standards and the rules and regulations of State and Local Authorities Having Jurisdiction.
- B. All work shall be executed in a workmanlike manner and shall present a neat and mechanical appearance upon completion.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT BASIC ELECTRICAL MATERIALS AND METHODS

SECTION 26 0500 – Page 5 of 9

- C. All equipment, devices, etc. shall be installed in accordance with manufacturer's recommendations.
- D. All items shall be installed straight and plumb in a workmanlike manner and care shall be exercised so that like items are mounted the same position, heights and general location.
- E. Keep site clean of accumulation of cartons, trash and debris.

3.4 Safety

- A. The contractor is solely responsible for all job safety. Architect assumes no responsibility for job safety. Maximum consideration shall be given to job safety and only such methods as will reasonably insure the safety of all persons shall be employed. The codes and regulations of OSHA shall be given strict compliance as well as such other codes, laws, and regulations as may be applicable.

3.5 Contract DOCUMENTS

- A. Contract documents indicate diagrammatically, extent, general character and approximate location of work. Where work is indicated but minor details omitted, furnish and install it complete so as to perform its intended functions. For details and mechanical equipment, follow drawings provided by other disciplines (Architectural, Mechanical, Structural, Civil, etc.) and fit electrical work thereto.
- B. Contract documents consist only of the hardcopy documents issued by the Prime Architect. Electronic documents issued directly by the electrical engineer to the contractor and/or its sub-contractors/vendors are issued for convenience only (electronic documents are not formal contract documents).
- C. If the contractor and/or one of its suppliers require a one-time transfer of electronic files of the current electrical construction documents to prepare shop drawings (or for another similar purpose), it shall:
 - 1. Sign a waiver prepared by the electrical engineer prior to the transmittal of these files.
 - 2. Agree to pay the electrical engineer a fee of \$50.00 per drawing, up to a maximum of \$400 per transfer, payable upon receipt of the files.
 - 3. To the fullest extent permitted by law, indemnify, hold harmless, and defend JRA from all claims, damages, losses and expenses, including attorneys' fees arising out of or resulting from the use of the CAD files.
- D. Take finish dimensions at job in preference to scaled dimensions.
- E. Except as above noted, make no changes in or deviations from work as shown or specified except on written order of Architect.

3.6 Underground utility/equipment coordination

- A. Prior to commencement of work, verify exact locations of all existing or proposed underground utilities and/or underground equipment and verify that proposed electrical installation does not conflict with these items. Notify Architect immediately if any conflict is found.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
BASIC ELECTRICAL MATERIALS AND METHODS**

SECTION 26 0500 – Page 6 of 9

3.7 Equipment Storage

- A. Store all electrical equipment in dry, covered locations as directed by equipment manufacturers. Contractor shall be responsible for replacing or repairing improperly-stored equipment as directed by Architect.

3.8 EXCAVATION, CUTTING AND PATCHING

- A. Perform all cutting and excavating as necessary for installation of electrical systems, unless specifically covered under another section. After Architect's observation, complete all excavation, filling and backfilling as directed under specifications for preparation of site and earthwork. Foundations for equipment shall be as specified under concrete section. Concrete pads shall be minimum of 6" thick; unless greater thickness required by equipment manufacturer. Obtain specific approval of Architect before cutting into any structural members.
- B. For all such work employ competent workmen, and finish up in neat and workmanlike manner, equal to quality and appearance to adjacent work.

3.9 PENETRATIONS

- A. All penetrations in water tight barriers shall be made so that barrier rating is not compromised. Furnish roof flashing for all equipment installed under Division 26/27/28 that penetrates through the roof. Appropriate flashing is specified under roofing and sheet metal section. Supply these flashings for installation under roofing and sheet metal section.
- B. All fire/smoke barrier penetrations shall be made in accordance with a U.L. listed assembly to maintain the fire/smoke rating of the associated membrane.
- C. Where penetrations are required through structural elements, verify penetration locations and sizes with structural engineer. In no case shall the structural integrity be compromised without written approval from structural engineer.

3.10 INSTALLATION OF EQUIPMENT - GENERAL

- A. Care shall be exercised in exact routing and location of all items so as not to obstruct access to equipment, personnel walkways, or expose it to potential mechanical damage.
- B. Items shall be securely anchored and/or fastened. Provide proper support for all equipment, devices, conduits, boxes, panels, etc. as required by code and for a workmanlike installation. Provide guy wiring for wood poles where required to prevent leaning. All construction shall meet the seismic design requirements of the building code. Items (especially transformers, light fixtures, equipment racks, freestanding gear, etc.) installed in seismic zones C, D, E or F shall be supported and braced per applicable codes and standards.
- C. All wall, pole or frame-mounted electrical equipment shall be mounted to metal unistrut (or similar) frames of same material as electrical equipment. For example, pole-mounted painted or galvanized steel disconnect switches shall be mounted to galvanized steel unistrut frames.
- D. All electrical equipment, furnished by Contractor or by others shall be covered and protected during construction.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
BASIC ELECTRICAL MATERIALS AND METHODS**

SECTION 26 0500 – Page 7 of 9

- E. All control cabinets, panels, motor control centers and other electrical cabinets and enclosures shall have all trash removed and be vacuumed clean. All foreign paint, etc., shall be removed from exterior and all scratches in finish touched up with same color and material as original. Any rusted areas shall be sanded, primed and repainted.
- F. All relays, starters, push-button and other control devices shall be cleaned and if necessary, lubricated with CRC 2-26 to assure free operation.

3.11 MOTORS, STARTERS AND CONTROLS

- A. Unless otherwise specified or shown, all motors will be furnished and installed under other sections of this specification.
- B. Electrical Contractor shall install all starters and all electrical power wiring and connections to motors and starters.
- C. Unless otherwise specified or shown, all control items for motors shall be furnished, installed and wired in conduit under other divisions of this specification.

3.12 CIRCUITS AND BRANCH CIRCUITS

- A. Outlets shall be connected to branch circuits as indicated on drawings by circuit numbers. No more outlets than are indicated shall be connected to a circuit.
- B. Branch circuit homeruns shall be installed as shown on drawings. Multiple homerun conduits shall not be combined by contractor into larger, single homerun conduits unless specific permission is granted by the Engineer.

3.13 Lug/Terminal Ratings

- A. All lug/terminal ratings, sizes, locations, types, etc. shall be coordinated with the associated conductor sizes, types, routings, etc. by the contractor.
- B. All lugs/terminals/etc. shall be rated for 75 degree C terminations (minimum, unless specified otherwise).

3.14 Equipment Fault Current Ratings

- A. All equipment and breakers shall meet the minimum RMS symmetrical interrupting capacity ratings shown on plans for the associated distribution equipment. All interrupting ratings shall be full ratings. Where new devices or breakers are added to existing distribution equipment, the new devices/breakers shall have interrupting ratings matching or exceeding that of the existing distribution equipment.

3.15 OUTLET LOCATION

- A. Symbols shown on drawings and mounting heights indicated on drawings and in specifications are approximate only. The exact locations and mounting height must be determined on the job and it shall be the Contractor's responsibility to coordinate with other trades to insure correct installation.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
BASIC ELECTRICAL MATERIALS AND METHODS**

SECTION 26 0500 – Page 8 of 9

3.16 IDENTIFICATION

- A. Each panel shall have each circuit identified. Panels without branch circuit nameplates shall have typewritten directories.
- B. Each individually mounted switch, circuit breaker, starter and/or any other control or protective device shall identify equipment fed and fuse size, if any, by engraved plastic nameplate, white with black letters, screw attached.
- C. See Specification Section 260553 for additional requirements.

3.17 GROUNDING

- A. All equipment shall be grounded and bonded in accordance with all state/local regulations, The National Electrical Code and as specified herein.

3.18 TELEPHONE WORK

- A. Provide telephone raceways, outlets and backboards, as shown. Provide additional work as described in Specification Section 271000 and/or shown on drawings. Bond all raceways together at backboards and provide No. 6 ground wire extending from raceway bonds to cold water pipe, in 1/2 inch raceway. Carefully ream ends of all raceways.

3.19 PAINTING

- A. Refer to Painting/Finishing specifications for requirements regarding field painting of exposed conduit. Any scratches, dents or rust spots in conduit electrical enclosures, panels, motor control or any other electrical items shall have the dents removed, and they, along with any rust spots or scratches, sanded and touched up with the same exact color paint as original finish.

3.20 ACCEPTANCE TESTING

- A. Upon completion of work, the entire electrical system installed within this project shall be tested and shall be shown to be in perfect working condition, in accordance with the intent of the specifications and drawings. It shall be the responsibility of the Electrical Contractor to have all systems ready for operation and to have an electrician available to operate same in accordance with and under the supervision of the observation representative(s) of the Architect. The Electrician shall be available to assist in removal of panel fronts, etc., to permit inspection as required.
- B. The electrical sub-contractor shall include in bid price start-up assistance and training from a certified representative of the manufacturer for the following systems:
 - 1. SECTION 260944: DISTRIBUTED DIGITAL LIGHTING MANAGEMENT SYSTEM
 - 2. SECTION 271000: STRUCTURED CABLING SYSTEM

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
BASIC ELECTRICAL MATERIALS AND METHODS**

SECTION 26 0500 – Page 9 of 9

3.21 OPERATION AND MAINTENANCE DATA

- A. One set of marked "AS BUILT" drawings, three (3) sets of all equipment catalog and maintenance data and three (3) sets of all final shop drawings, on all equipment requiring same shall be turned over to owner. These items shall be bound in hard back book. Contractor shall explain and demonstrate all systems to Owner's representative.

3.22 GUARANTY-WARRANTY

- A. Furnish a written Guarantee-Warranty, countersigned and guaranteed by General Contractor, stating:
 - 1. That all work executed under this section will be free from defects of workmanship and materials for a period of one (1) year from date of final acceptance of this work.
 - 2. 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 becomes defective during the term of the Guaranty-Warranty.

END OF SECTION 260500

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
POWER CONDUCTORS AND CABLES 51V-600V**

SECTION 26 0519 – Page 1 of 6

PART 1 GENERAL

1.1 DESCRIPTION

- A. Power Wires and Cables
- B. Low Voltage Wires and Cables

PART 2 PRODUCTS

2.1 Power WIRES AND CABLES - 600 VOLT

- A. General: Conductors shall have current carrying capacities as per N.E.C. and with 600 volt insulation, #12 minimum except for controls and fixture wire. Conductors shall be copper.
- B. General Application (see below for exceptions):
 - 1. At or Below Grade (including within slab-on-grade):
 - a. #8 or larger conductors:
 - 1) XHHW or RHH/RHW/USE stranded (in conduit).
 - b. #10 or smaller conductors for circuits terminating at motors:
 - 1) THHN/THWN or XHHW stranded (in conduit).
 - c. #10 or smaller conductors (excluding circuits terminating at motors):
 - 1) THHN/THWN or XHHW solid (in conduit).
 - 2. Above Grade:
 - a. #8 or larger conductors:
 - 1) THHN/THWN, XHHW or RHH/RHW/USE stranded (in conduit).
 - b. #10 or smaller conductors for circuits terminating at motors:
 - 1) THHN/THWN, XHHW or RHH/RHW/USE stranded (in conduit).
 - c. #10 or smaller conductors (excluding circuits terminating at motors):
 - 1) THHN/THWN, XHHW or RHH/RHW/USE solid (in conduit).
 - 3. Power Wire and cable shall be as manufactured by Southwire, Rome, Encore Wire, American Insulated Wire, Okonite, Phelps-Dodge, Americable, Aetna or approved equal.
- C. Emergency Feeder Wiring
 - 1. Where specifically required by NEC articles 700, 701, or other similar sections, feeder-circuit wiring for emergency systems and legally-required standby systems shall be a listed electrical circuit protective system consisting of 2-hour fire-rated, mineral insulated, copper-sheathed wiring cable (Pyrotenax System 1850 or equal).

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
POWER CONDUCTORS AND CABLES 51V-600V**

SECTION 26 0519 – Page 2 of 6

D. Class 1 Control Cabling (120VAC Control Circuits, Etc.)

1. Unless specified otherwise, Class 1 control cabling shall:
 - a. Be rated for exposed cable tray installation.
 - b. Be plenum rated.
 - c. Be UL-rated for the proposed application.
 - d. Be multi-conductor with overall outer sheath as required by the application. The insulation of each conductor within the overall multi-conductor cable shall be uniquely color-coded. Ground conductors (when provided) within the multi-conductor cable shall have green insulation. Conductors with green insulation shall not be used for conductors other than ground.
 - e. Utilize copper conductors.
 - f. Have wire gauge as required to limit voltage drop to acceptable limits determined by the system supplier and to meet all applicable code requirements.
 - g. Where installed underground, within slab-on-grade or in exterior locations, be rated for wet locations.
 - h. Where required for specific systems, meet the specific requirements (conductor quantity, wire gauge, insulation type, shielding, etc.) of the system supplier.
 - i. Be rated for 600V.
 - j. Be industrial grade.
 - k. Have stranded conductors.
 - l. Have sunlight/oil-resistant PVC/Nylon insulation and jacket with ripcord.
2. Control cabling shall be as manufactured by Belden, AlphaWire or General Cable.

E. Fixture Wiring

1. Conductor Types:
 - a. Type TFFN or XFF.
2. Minimum Sizes:
 - a. For fixtures up to 300 watts: #16.
 - b. For fixtures over 300 watts up to 1500 watts: #14.
 - c. For fixtures over 1500 watts: as required.
 - d. Conductors to concrete pour fixtures: #12.
3. Fixture wire shall extend only from fixture to first junction, and not over 6 feet, except for concrete pour units.

2.2 Wire Connections:

- A. All connector types:**

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
POWER CONDUCTORS AND CABLES 51V-600V**

SECTION 26 0519 – Page 3 of 6

1. Shall be properly rated for the proposed application by UL and per the manufacturer.
- B. At Motor Connections (within motor terminal boxes):
1. On Unshielded Wire:
 - a. Single conductor per phase: shall be made with insulated set screw connectors or 3M 5300 Series 1kV Motor Lead Connections kits with mechanical lugs as required.
 - b. Multiple conductors per phase: shall be made with insulated mechanical lugs, rated for the associated motor cable types, by Polaris or Ilsco.
 2. On Shielded Power Wire:
 - a. The braided shields and internal grounding conductors of shielded power (not instrumentation) cables shall be grounded at BOTH ends (at VFD/starter and at motor) with a termination kit provided by the cable supplier. This termination kit shall include a connection ring that makes contact around the full circumference of the braided shield, and connects all internal grounds to a common external ground point.
- C. Other Dry locations:
1. On Wire larger than #10: shall be made with solderless, non-insulated compression-type connectors meeting requirements of Federal Specification WS-610e for Type II, Class 2 and shall be covered with Scotch #33 electrical tape so that insulation is equal to 150% of conductor insulation.
 2. On Wire #10 and smaller: shall be made with one of the following:
 - a. Ideal Wing Nuts or equal by 3M .
 - b. Ideal Push-In Wire Connectors (for #12 and smaller only).
- D. Other Wet/Damp locations:
1. On Wire larger than #10: shall be made with underground/direct-burial, waterproof rated EPDM or TPE-insulated connectors by Ilsco, Burndy or T&B.
 2. On Wire #10 and smaller: shall be made with one of the following:
 - a. Ideal Weatherproof or Underground Wire Connectors pre-filled with 100% silicone sealant as required by the application.

PART 3 EXECUTION

3.1 General INSTALLATION

- A. All wires and cables shall be installed in conduit unless specifically noted otherwise.
- B. All joints and splices on wire shall be made with solderless connectors, and covered so that insulation is equal to conductor insulation.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
POWER CONDUCTORS AND CABLES 51V-600V**

SECTION 26 0519 – Page 4 of 6

- C. No splices shall be pulled into conduit.
- D. No conductor shall be pulled until conduit is cleaned of all foreign matter.
- E. Wire and cable shall be neatly formed, bundled and tied in all panelboards, wireways, disconnect switches, pullboxes, junction boxes, cabinets and other similar electrical enclosures.
- F. All wires and cables installed in underground or other wet locations shall be rated by the manufacturer for wet locations.
- G. Network cabling shall be continuous from endpoint to endpoint and shall not be spliced unless specifically noted otherwise.
- H. All conductors/cabling (including spare conductors) shall be properly terminated unless specifically directed otherwise. See above for general termination hardware requirements.

3.2 Power Wire and Cable Installation:

- A. No power conductor shall be smaller than #12 except where so designated on the drawings or hereinafter specified.
- B. Multi-wire lighting branches shall be used as indicated.
- C. Where more than three current-carrying conductors are installed in a single raceway or cable, conductors shall be derated as indicated in NEC Table 310.15(B)(3)(a).
- D. Raceways/cables shall generally not be installed exposed to sunlight on roofs unless specifically required. Where raceways or cables are installed exposed to sunlight on roofs, conductors shall be derated with ampacities adjusted per NEC Table 310.15(B)(3)(c).
- E. In installing parallel power conductors, it is mandatory that all conductors making up the feeder be exactly the same length, the same size, the same type of conductor with the same insulation. Each group of conductors making up a phase or neutral must be bonded at both ends in an approved manner.
- F. In installing overhead main power services, a minimum of 5'-0" of cable per run shall be extended beyond the weatherhead(s) for connection to service drop. Confirm exact requirements with local utility company.

3.3 WIRE CONNECTIONS

- A. See Part 2 above for material types.
- B. Aluminum Wire Connections:
 - 1. Where aluminum wiring is allowed, connections shall utilize compression fittings, no exceptions (Anderson Versa Crimp or equal).
- C. Any stranded wire connection to wiring devices shall be made with crimp type terminals.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
POWER CONDUCTORS AND CABLES 51V-600V**

SECTION 26 0519 – Page 5 of 6

- D. All electrical connections and terminals shall be tightened according to manufacturer's published torque-tightening values with calibrated torque wrenches as required to clearly indicate final torque value to the contractor. Where manufacturer's torque values are not provided, those specified in UL 486A & 486B shall be used.
- E. All connections and connector types shall be installed in strict compliance with all requirements of the connector manufacturer.
- F. Under no condition shall the specified conductors be connected to terminals rated less than 75°C. Where conductors sized #1 or smaller are shown to be terminated at equipment and the terminals of that equipment are rated for less than 75°C, contractor shall install junction box near equipment to capture the specified conductors, splice with compression connections (rated for a least 75°C) and extend conductors with ampacity rating as required by NEC (based on terminal temperature rating) to equipment terminals. The length of the conductors to be terminated shall be as directed by the AHJ but not less than 48 inches.

3.4 Low Voltage (Less Than 50V) Control and Network Cable Installation:

- A. All wires and cables shall be installed in conduit unless specifically noted otherwise. Low voltage control and/or network cabling located within concealed, accessible ceiling spaces (such as above lay-in ceilings) may be run without conduit if the following requirements are met:
 - 1. Cabling shall be plenum-rated, multi-conductor.
 - 2. Cabling shall be supported by cable tray or with J-hook supports on intervals not to exceed 5'-0" on center. Cabling shall be supported solely from the cable tray or j-hooks supported from the building structure, without using piping, ductwork, conduit or other items as supports.
 - 3. Cabling shall be properly bundled with plenum-rated Velcro straps on intervals not to exceed 30" on center.
 - 4. Properly-sized conduit(s) shall be provided wherever cabling enters an inaccessible or exposed area (such as above gyp board ceilings or through walls). End bushings shall be provided on both ends of all raceway terminations. All fire/smoke barrier penetrations shall be made in accordance with a U.L. listed assembly.

3.5 CIRCUITS AND BRANCH CIRCUITS

- A. Outlets shall be connected to branch circuits as indicated on drawings by circuit number adjacent to outlet symbols, and no more outlets than are indicated shall be connected to a circuit.

3.6 Labeling AND COLOR CODING of Wire and Cable

- A. Refer to Specification Section 260553 for all labeling requirements.
- B. A color coding system as listed below shall be followed throughout the network of branch power circuits as follows:

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
POWER CONDUCTORS AND CABLES 51V-600V**

SECTION 26 0519 – Page 6 of 6

PHASE	120/208/240/ COLOR	120/240 HIGH LEG DELTA COLOR	277/480 VOLT COLOR
A	BLACK	BLACK	BROWN
B	RED	ORANGE (FOR HI- LEG)	ORANGE
C	BLUE	BLUE	YELLOW
NEUTRAL	WHITE	WHITE	GRAY
GROUND	GREEN	GREEN	GREEN

- C. Where dedicated neutrals are installed for multi-wire branch circuits, the neutral conductors shall be color coded as follows:

PHASE	120/208/240/ COLOR	120/240 HIGH LEG DELTA COLOR	277/480 VOLT COLOR
NEUTRAL A	WHITE W/ BLACK TRACER	WHITE W/ BLACK TRACER	GRAY W/ BROWN TRACER
NEUTRAL B	WHITE W/ RED TRACER	WHITE W/ ORANGE TRACER (FOR HI-LEG NEUTRAL)	GRAY W/ ORANGE TRACER
NEUTRAL C	WHITE W/ BLUE TRACER	WHITE W/ BLUE TRACER	GRAY W/ YELLOW TRACER

- D. Control Conductors: Shall be color coded by use of colored "tracers". No control circuit shall contain two identical conductors. For example, a set of five (5) control conductors for a pushbutton station represents one (1) control circuit which would require five (5) uniquely-colored control conductors.

3.7 Testing

- A. The insulation resistance of all feeder conductors (feeding electrical distribution equipment such as switchboards, panelboards, transfer switches, transformers, etc.) shall be tested at the load side of the feeder breaker with a 1000-volt DC Megger Tester prior to energization or final termination. Any feeder conductor with an insulation resistance less than the recommended minimums in the latest version of NETA Acceptance Testing Specification ("ATS") standard shall be replaced by the contractor at the contractor's expense. All final test results shall be clearly documented (with date, time, feeder, results, test equipment, etc.), and the final test results shall be submitted to the design team for review.

END OF SECTION 260519

SHELBY COUNTY WATER SERVICES BUILDING PROJECT

GROUNDING

SECTION 26 0526 – Page 1 of 4

PART 1 GENERAL

1.1 GENERAL

- A. THE WORK UNDER THIS SECTION INCLUDES BUT IS NOT LIMITED TO GROUNDING OF THE FOLLOWING:

1. Service Equipment.
2. Transformers.
3. Non-current carrying conductive surfaces of equipment.
4. Metal Buildings.
5. Structures.
6. Other Equipment.

1.2 GENERAL REQUIREMENTS

- A. All equipment, building steel, and main service shall be effectively and permanently grounded with a conductor cross section as required by the National Electrical Code and of capacity sufficient to insure continued effectiveness of the ground connections for fault current. Ground conductors shall be as short and straight as possible, protected from mechanical injury and, if practicable, without splice or joint.
- B. All grounding connections shall be installed in accordance with the National Electrical Code and all local codes and requirements. Such codes shall be considered minimum requirements and the installation of the grounding system shall insure freedom from dangerous shock voltage exposure and provide a low impedance ground fault path to permit proper operation of overcurrent and ground fault protective devices.

PART 2 PRODUCTS

2.1 CONDUCTORS

- A. All grounding conductors shall be insulated with green colored, 600 volt insulation unless noted otherwise.
- B. Motors having power supplied by single conductor wire in conduit shall be grounded through the conduit system. Flexible conduit shall be "jumped" by an appropriate bonding conductor.

2.2 GROUNDING ELECTRODES

- A. Grounding electrodes shall be copper-clad steel rods 3/4 inch in diameter and ten feet long. Where longer electrodes are necessary to reduce the ground resistance, Contractor shall provide sectional rods, connectors, drive heads, etc.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT GROUNDING

SECTION 26 0526 – Page 2 of 4

2.3 CONNECTIONS

- A. All conductor-to-conductor, conductor-to-ground rod, conductor-to-structure, conductor-to-fence connections of #6 and larger sized conductors and underground ground connections shall be permanent exothermic welded connections (Cadweld or equal) unless otherwise noted on applicable drawings.
- B. Connections to equipment shall be by bolted compression type lugs (except for motors). When the conductor is #6 and larger, the lug shall be joined to the conductor by an exothermic weld (Cadweld or equal).
- C. Motors to be grounded by the grounding conductors run with the power conductors shall have a split-post grounding stud installed in the connection box.
- D. Each cast pull box or junction box shall have a ground lug, connected to largest ground conductor to enter box.
- E. Ground connections at conduit terminations shall be made by approved grounding bushings (see Raceways Specification Section for additional requirements).

2.4 MANUFACTURERS

- A. Conduit clamps and connectors shall be manufactured by Raco, OZ., or Ercon.
- B. Lugs shall be as manufactured by Square "D", Burndy, or T and B.
- C. Exothermic weld connections shall be as manufactured by Cadweld, or approved equal.
- D. Ground rods shall be as manufactured by Joslyn or McGraw Edison.
- E. Split post grounding shall be as manufactured by Burndy or T and B.

PART 3 EXECUTION

3.1 MAIN SERVICE GROUND

- A. The main service grounding electrode system shall consist of the following items bonded together by the grounding electrode conductor:
 - 1. The main underground cold water pipe (metal).
 - 2. The metal frame of the building.
 - 3. Driven ground rods. Ground rods shall be embedded at the lowest point in the building and below the permanent moisture level. Ground rods shall be spaced a minimum of ten (10) feet apart and connected in parallel until resistance to ground does not exceed five (5) ohms.
- B. The grounding electrode system shall be connected to the grounded conductor (neutral) on the supply side of the service disconnecting means by a grounding electrode conductor not smaller than that shown in Table 250.66 of the N.E.C. The main service equipment grounding conductor shall be connected to the grounding conductor on the supply side of the service disconnecting means in accordance with Table 250.122 of the N.E.C. for the ampere rating of the service entrance equipment.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT GROUNDING

SECTION 26 0526 – Page 3 of 4

- C. Where in a service entrance switchboard, the equipment grounding conductor shall not be less than 25% of the main bus rating. These connections shall be made inside the service entrance equipment enclosure.

3.2 TRANSFORMER GROUNDS

- A. Dry type insulation transformers with a grounded conductor in the secondary shall be grounded in accordance with N.E.C. Section 250-30.

3.3 EXPOSED NON-CURRENT-CARRYING METAL PARTS

- A. General: Ground connections to equipment or devices shall be made as close to the current carrying parts as possible, that is, to the main frame rather than supporting structures, bases or shields. Grounding connections shall be made only to dry surfaces that are clean and dry. Steel surfaces shall be ground or filed to remove all scales, rust, grease, and dirt. Copper and galvanized steel shall be cleaned to remove oxide before making welds or connections. Code size ground conductors shall be run in all power conduits and properly terminated at each end.
- B. Ground conductors shall be routed as straight as possible. Where possible, ground conductors shall be routed such as to avoid bends exceeding 90 degrees or with a radius of less than 8".
- C. Motors: Exposed non-current-carrying metal parts, shall be grounded by a grounding conductor either run with power conductors, and/or separate grounding conductors. Drawings will show method(s) to be used. The ground conductors with all motor conductors shall be connected to the ground buss in the motor connection box. Jumper connections shall be installed between frames and rigid conduit for equipment having flexible conduit connections (sealtight). All AC motor grounds shall provide a low impedance path to ground.
- D. Raceways & boxes: All raceways, conduits, armored or shielded cable and all exposed non-current carrying metal parts shall be grounded. Such items shall be bonded together and permanently grounded to the equipment ground buss. Metallic conduits shall be connected by grounding or clamps to ground buss. Flexible "jumpers" shall be provided around all raceway expansion joints. Bonding straps for steel conduit shall be copper. Jumper connections shall be provided to effectively ground all sections or rigid conduit connected into plastic pipe. No metallic conduit shall be left ungrounded. In conduit systems interrupted by junction or switch boxes where locknuts and bushings are used to secure the conduit in the box, the sections of conduit and box must be bonded together. If conduit, couplings or fittings have a protective coating or non-conductive material, such as enamel, such coating must be thoroughly removed from threads of both couplings and conduit and the surface of conduit or fitting where the ground clamp is secured.
- E. Enclosures: Metal conduits entering free standing motor control centers, switchboards or other free standing equipment shall be grounded by bare conductors and approved clamp. Any conduits entering low voltage (480 volts or below) equipment through sheet metal enclosure and effectively grounded to enclosure by double locknut or hub need not be otherwise bonded.
- F. Equipment: In addition to equipment grounding provisions mandated by code requirements, additional equipment grounding provisions (including local ground rods, connections, etc.) shall be provided by the contractor as directed by equipment suppliers.
- G. Both ends of ground busses in motor control centers, switchboards, etc., shall be separately connected to the main ground buss to form two separate paths to ground.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
GROUNDING**

SECTION 26 0526 – Page 4 of 4

- H. Fences and Grills: Fences and metal grills around equipment carrying voltage above 500 volts between phases shall be bonded together and to ground. Fences and grill work shall be grounded at every post, column, or support, and on each side of every gate.

3.4 ACCEPTANCE Documentation and TESTING

- A. Contractor shall take and store photographs of all underground grounding system connections prior to burial of connections, for review by Engineer.
- B. Upon completion of work, the entire ground system shall be shown to be in perfect working condition, in accordance with the intent of the Specifications.
- C. Contractor shall measure the resistance between the main ground bonding jumper to true earth ground using the Fall of Potential method as described by ANSI/IEEE Standard 81 ("Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of an Earth System"). If the measured value is greater than five ohms, additional grounding electrodes shall be installed as described in Part 3.1 above. The final ground resistance value shall be submitted in writing, and documented via picture of the meter reading from the Fall of Potential test, to the Architect prior to the final observation, and shall be included in final O&M documentation.

END OF SECTION 260526

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
RACEWAYS**

SECTION 26 0533 – Page 1 of 8

PART 1 GENERAL

1.1 DESCRIPTION

A. THE WORK UNDER THIS SECTION INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING:

1. Conduits
2. Conduit Fittings
3. Couplings & Connectors
4. Bushings
5. Raceway Hardware, Conduit Clamps & Supports
6. Watertight Entrance Seal Devices

PART 2 PRODUCTS

2.1 Conduits

A. Rigid Galvanized Steel and I.M.C.:

1. Shall be galvanized outside and inside by hot dipping.
2. Shall be as manufactured by Republic, Wheatland, Triangle, Pittsburg Standard, Youngstown, Allied or equal.

B. E.M.T.:

1. Shall be Electro-Galvanized.
2. Shall be as manufactured by Republic, Wheatland, Triangle, Pittsburg Standard, Youngstown, Allied or equal.

C. Rigid Aluminum:

1. Shall be manufactured of 6063 Alloy, T-1 temper.
2. Shall be as manufactured by Republic, Wheatland, Triangle, Pittsburg Standard, Youngstown, Allied or equal.

D. Schedule 40 and 80 PVC:

1. Shall be composed of polyvinyl chloride and shall be U.L. rated type 40 or 80 for use with 90 degree rated conductors. Conduit shall conform to NEMA Standards and applicable sections of N.E.C.
2. The conduit manufacturer shall have had a minimum of 5 years experience in the manufacture of the products. Non-metallic raceways shall be as manufactured by Carlon, Triangle, Can-Tex, Allied or equal.

E. HDPE Innerduct

1. Shall be composed high density polyethylene and shall be orange in color, unless noted otherwise.
2. Shall be corrugated unless noted otherwise.
3. Shall be manufactured by Carlon, Ipex or equal.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
RACEWAYS**

SECTION 26 0533 – Page 2 of 8

F. Flexible Metallic Conduit:

1. Shall be continuous spiral wound and interlocked galvanized material, code approved for grounding.

G. Liquidtight Flexible Metallic Conduit:

1. Shall be galvanized steel-core sealtite, code approved for grounding.
2. Shall have an outer liquidtight, nonmetallic, sunlight-resistant jacket over an inner flexible metal core.
3. Shall be as manufactured by Electric-Flex, Anaconda or equal.

2.2 Fittings, Couplings & connectors

- A. Rigid Galvanized Steel and I.M.C. couplings and connectors shall be standard threaded type, galvanized outside and inside by hot dipping. Threadless and clamp type are not acceptable. Couplings/connectors shall be as manufactured by Racor, Efcor, or Appleton or equal.
- B. All rain tight connectors shall be threaded Myers or approved equal, rated for outdoor application.
- C. E.M.T. couplings and connectors shall be set screw, or steel compression type. All couplings and connectors shall be 720B, 730, 750B, or 760 series of Efcor or equal series of Racor. Pressure indented type connectors or cast metal will not be approved for any location. E.M.T. couplings and connectors shall be as manufactured by O-Z/Gedney, T&B, Efcor, Racor, Midwest or equal. E.M.T. fittings, couplings and connectors located within concrete (where allowed) shall be compression type and shall be adequately sealed with tape to ensure a concrete-tight seal.
- D. Rigid Aluminum couplings and connectors shall be standard threaded type, of the same alloy as the associated conduit. Threadless and clamp type are not acceptable. Fittings shall be as manufactured by Thomas & Betts, Crouse-Hinds, Appleton, Pyle-National or equal.
- E. All PVC couplings, adapters, end bells, reducers, etc., shall be of same material as conduit.
- F. Liquidtight Flexible Metallic Conduit connectors shall be liquidtight with insulating throat or end bushing, designed for application with Liquidtight Flexible Metallic Conduit. Fittings shall be as manufactured by Efcor, Racor, Midwest or equal.
- G. All LB unilets sizes 1 1/4" or larger shall have rollers.
- H. Miscellaneous conduit fittings shall be as manufactured by Appleton, Crouse-Hinds, Pyle-National, Russell & Stoll or equal.

2.3 BUSHINGS

- A. All non-grounding rigid bushings 1-1/4" and larger shall be the insulating type (O-Z/Gedney type "BB" or equal by T&B, Midwest Electric or Penn Union).
- B. All non-grounding rigid bushings 1" and smaller shall be threaded malleable iron with integral noncombustible insulator rated for 150°C. Non-grounding rigid conduit bushings shall be O-Z/Gedney type "B" or equal by T&B, Midwest Electric or Penn Union.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT RACEWAYS

SECTION 26 0533 – Page 3 of 8

- C. All grounding rigid bushings shall be threaded malleable iron with integral noncombustible insulator rated for 150°C. All grounding rigid conduit bushings shall be O-Z/Gedney type "BLG" or equal by T&B, Midwest Electric or Penn Union.

2.4 Hardware, CONDUIT CLAMPS AND SUPPORTS

- A. All hardware such as expansion shields, machine screws, toggle bolts, "U" or "J" bolts, machine bolts, conduit clamps and supports shall be of corrosion resistant materials (stainless steel, aluminum, galvanized or plated steel, or other approved materials).
- B. Hardware in contact with aluminum handrails, plates or structural members and all hardware in exterior, wet or corrosive areas shall be type 316 stainless steel or aluminum (with bitumastic paint coating to isolate aluminum from contact with concrete where necessary) unless specifically noted otherwise.
- C. Supports in exterior, wet or corrosive locations shall be type 316 stainless steel or aluminum (with bitumastic paint coating to isolate aluminum from contact with concrete where necessary) unless specifically noted otherwise.
- D. Supports in extremely corrosive environments (such as chlorine or fluoride storage rooms) shall be PVC-Coated steel unless specifically noted otherwise.
- E. Hardware and conduit clamps shall be as manufactured by Efcor, Steel City, G.A., Tinnerman or equal.

2.5 Watertight Entrance Seal Devices

- A. For new construction, seal devices shall consist of oversized sleeve and malleable iron body with sealing rings, pressure rings, sealing grommets and pressure clamps as required (O-Z/Gedney type FSK/WSK or equal).
- B. For cored-hole applications, seal devices shall consist of assembled dual pressure disks with neoprene sealing rings and membrane clamps as required (O-Z/Gedney type CSM or equal).

PART 3 EXECUTION

3.1 Raceway Application

- A. Minimum Diameter: 1/2-inch.
- B. Raceway Type: Raceway types shall be as specified below, unless indicated otherwise on drawings:
 - 1. Exterior, Exposed: Rigid Galvanized Steel or I.M.C. unless otherwise noted.
 - 2. Other Exterior (Concrete-Encased or Direct Earth Buried): Schedule 40 PVC. PVC conduit shall convert to metallic conduit prior to exiting concrete-encasement or direct earth burial. See "transition" items below for additional requirements. Conduits shall be left exposed until after Architect's observation.
 - 3. Interior, Exposed:
 - a. Hazardous Locations: Rigid Galvanized Steel .
 - b. Wet Locations (including, but not limited to, Pump Rooms, Wet Wells, Underground Vaults, and other similar locations): Rigid Galvanized Steel or I.M.C.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT RACEWAYS

SECTION 26 0533 – Page 4 of 8

- c. Dry Locations Where Subject to Mechanical Damage (including, but not limited to, below 10'-0" A.F.F. in shop, storage, warehouse and other similar areas): Rigid Galvanized Steel or I.M.C..
 - d. Extremely Corrosive Locations (Chlorine Storage Rooms, Fluoride Storage Rooms and other similar areas): Schedule 80 PVC.
 - e. Other Dry Locations: E.M.T.
- 4. Interior, Concealed:
 - a. Embedded inside Poured Concrete Walls, Ceilings or Floors, with a minimum of 2" of concrete between finished surface and outer wall of conduit on all sides, where no anchor bolts, screws or other similar items will be installed: Schedule 40 PVC. PVC conduit shall convert to metallic conduit (exact type as specified elsewhere within this section) prior to exiting poured concrete-encasement of wall, ceiling, floor or ductbank. See "transition" items below for additional requirements.
 - b. Other Raceways Embedded inside Poured Concrete Walls, Ceilings or Floors (not meeting requirements above): Rigid Galvanized Steel or I.M.C. (coated with two (2) spiral-wrapped layers of 3M Scotchrap 50 PVC tape or two coats of asphaltum paint where below grade or within concrete).
 - c. Other Raceways: E.M.T.
- 5. Terminations at motors, transformers and other equipment which has moving or vibrating parts:
 - a. Exterior or Wet Locations (including, but not limited to, Pump Rooms, Wet Wells, Underground Vaults, and other similar locations): Liquidtight Flexible Metallic Conduit (shall generally not exceed 24 inches in length) with watertight fittings.
 - b. Dry, Interior Locations: Flexible Metallic Conduit (shall generally not exceed 24 inches in length).
- 6. Terminations at fixtures mounted in grid-type ceilings:
 - a. Flexible Metallic Conduit or MC cabling (shall generally not exceed 72 inches in length and shall run from junction box to fixture, not from fixture to fixture).
- 7. Transition from underground or concrete-encased to exposed:
 - a. Convert PVC to Rigid Galvanized Steel (coated with two (2) spiral-wrapped layers of 3M Scotchrap 50 PVC tape or two coats of asphaltum paint where below grade or within concrete) utilizing Rigid Galvanized Steel 90 degree bends (and vertical conduits as required by application) prior to exiting concrete/grade (except at outdoor pull boxes and under freestanding electrical equipment, where terminations shall be by PVC end bells installed flush with top of slab). Exposed portions of these coated conduits shall extend a minimum of 6" above floor level, and shall be installed at uniform heights.

3.2 Raceway installation

A. General:

- 1. Follow methods which are appropriate and approved for the location and conditions involved. Where not otherwise shown, specified, or approved in a particular case, run all wiring concealed.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT RACEWAYS

SECTION 26 0533 – Page 5 of 8

2. Where conduit crosses a structural expansion joint an approved conduit expansion fitting shall be installed.
3. A non-conductive polypropylene pull string, properly tied/secured at either end, shall be installed in all empty conduits.
4. Metal conduit field-cuts shall be cut square with a hacksaw and the ends reamed after threading.
5. PVC conduit field-cuts shall be made with hacksaw, and ends shall be deburred.
6. All PVC joints shall be made as follows:
 - a. Clean the outside of the conduit to depth of the socket, and the inside of socket with an approved cleaner.
 - b. Apply solvent cement as recommended by the conduit manufacturer to the interior of the socket and exterior of conduit, making sure to coat all surfaces to be joined.
 - c. Insert conduit into the socket and rotate 1/4 to 1/2 turn and allow to dry.
7. All metallic conduit installed below grade or within concrete shall be coated with two (2) spiral-wrapped layers of 3M Scotchrap 50 PVC tape or two coats of asphaltum paint prior to installation.
8. Install ground wire sized per N.E.C. Table 250.122 in all conduits.
9. Use of running threads is absolutely prohibited. Conduit shall be jointed with approved threaded conduit couplings. Threadless and clamp type not acceptable.
10. Conduits shall be sized in accordance with latest National Electrical Code except when size shown on drawings. 1/2-inch conduit shall not contain conductors larger than No. 12 or more than four (4) No. 12 conductors.
11. Exposed, field-cut threads on all metal conduits shall be painted with zinc primer (for Galvanized Rigid or I.M.C.) .

B. Routing/Locating:

1. Exposed conduit runs shall be run level and plumb and shall, on interior of buildings, be run parallel and/or at right angles to building walls and/or partitions.
2. Conduit with an external diameter larger than 1/3 the thickness of a concrete slab shall not be placed in the slab. Conduits in slab shall not be spaced closer than 3 diameters on center.
3. Conduit run in ceiling spaces shall be run as high as possible, all at same level, and shall be supported from building structure. Do not support conduit from any other installation.
4. Conduit run within exterior CMU, concrete or other similar walls shall be run within the CMU cells / concrete structure / etc. Conduits shall not be run on the outside surface of CMU cells / concrete structure / etc. underneath exterior veneers / etc., which could cause a thermal break in the wall insulation or a future water intrusion problem.
5. Install conduit runs to avoid proximity to steam or hot water pipes. In no place shall a conduit be run within 6" of such pipes except where crossing is unavoidable, then conduit shall be kept at least 3" from the covering of the pipe crossed.
6. Before installing raceways for motors, HVAC equipment and other fixed equipment, check location of all equipment connections/terminal boxes with equipment supplier and locate and arrange raceways appropriately.
7. A minimum of 12" of clearance (or more as required by associated utility companies) shall be provided between the finished lines of exterior, underground conduit runs and exterior, underground utilities (gas, water, sewer, etc.).
8. Where any portion of raceway is installed in a wet environment (such as below grade) and located at a higher elevation than the raceway termination point in a dry environment, install watertight compound inside raceway at termination around cabling to prevent transfer of water through conduit system. Watertight compound shall be rated for the potential water head pressure, based on the assumption that ground water level would be at grade level.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT RACEWAYS

SECTION 26 0533 – Page 6 of 8

C. Bends:

1. Do not make bends (in any raceway, including flexible conduits) that exceed allowable conductor bending radius of cable to be installed or that significantly restrict conductor flexibility.
2. All bends within concrete-encased ductbanks installed in exterior locations shall be long radius bends (24" minimum bending radius – varies with conduit diameter).
3. Where numerous exposed bends or grouped together, all bends shall be parallel, with same center and shall be similar in appearance
4. All PVC elbows, bends, etc., shall be either factory bends or made with an approved heat bender.

D. Support:

1. Anchor conduit securely in place by means of approved conduit clamps, hangers, supports and fastenings. Arrangement and methods of fastening all conduits shall be subject to Engineer's direction and approval. All conduits shall be rigidly supported (wire supports may not be used in any location). Use only approved clamps on exposed conduit.
2. Conduit in riser shafts shall be supported at each floor level by approved clamp hangers.
3. Right angle beam clamps and U bolts shall be specially formed and sized to snugly fit the outside diameters of conduits.
4. Where installed in seismic zones, suspended raceways shall be braced in two (2) directions as required to prevent swaying and excessive movement.
5. Raceways installed on top of flat roofing shall be supported a minimum of 3 ½" above roof with rubber block supports (Cooper B-Line Dura-Blok or equal). Installation shall be in strict accordance with support manufacturer's instructions and recommendations.

E. Terminations:

1. All conduit connections to sheet metal cabinets or enclosures located in exterior or wet locations shall terminate by use of rain tight (Meyers) hubs.
2. Where rigid or I.M.C. conduits enter sheet metal boxes, they shall be secured by approved lock nuts and bushings.
3. Where metal conduits enter outdoor pull boxes, manholes, under freestanding electrical equipment or other locations where direct metal-to-metal contact does not exist between enclosure and conduit, grounding bushings shall be installed. Each grounding bushing shall be connected to the enclosure ground and all other grounding bushings with properly sized grounding conductors.
4. Where E.M.T. enters sheet metal boxes they shall be secured in place with approved insulating fittings.
5. Where PVC enters outdoor pull boxes, manholes or under freestanding electrical equipment, PVC end bells shall be installed.
6. Contractor shall be responsible for coordinating required conduit sizes with equipment hubs/conduit entry provisions (such as at motor tap boxes) prior to installation of conduit systems. Contractor shall field adjust final conduit sizes at terminations where so required (only as allowed by code) from those indicated on plans to coordinate with equipment hubs/conduit entry provisions.
7. Where conduit terminates in free air such that associated cabling/circuitry becomes exposed (such as at cable trays, etc.), conduit shall generally terminate in a horizontal orientation (to prevent dust/debris/etc. from entering conduit system). Where vertical conduit termination is necessary, the termination shall be provided with cord-grip conduit terminations to seal the conduit system.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT RACEWAYS

SECTION 26 0533 – Page 7 of 8

8. Conduit ends shall be carefully plugged during construction.
9. Permanent, removable caps or plugs shall be installed on each end of all empty raceways with fittings listed to prevent water and other foreign matter from entering the conduit system.

F. Penetrations:

1. All fire/smoke barrier penetrations shall be made in accordance with a U.L. listed assembly. Refer to drawings and other specifications for additional requirements.
2. All penetrations shall be at right angles unless shown otherwise.
3. Structural members (including footings and beams) shall not be notched or penetrated for the installation of electrical raceways unless noted otherwise without specific approval of the structural engineer.
4. Dry-packed non-shrink grout or watertight seal devices shall be used to seal openings around conduits at all penetrations through concrete walls, ceilings or aboveground floors.
5. All raceways entering structures, or where water is otherwise capable of entering equipment/devices through the raceway system, shall be sealed (at the first box or outlet) with foam duct sealant to prevent the entrance of gases or liquids from one area to another or into equipment/devices, using Polywater FST sealant rated to hold back a minimum of 22' of continuous water head pressure (or equal).
6. Additionally, where necessary to ensure that water does not enter equipment/devices through the raceway system (where raceways extend to equipment/devices from wet areas), junction boxes with drain assemblies in bottom shall be located at low point of raceway system near equipment/devices (to drain water out of raceway system before it enters equipment/devices). Contractors shall provide drains in raceway systems where so necessary to prevent water entry into equipment/devices.
7. All raceways passing through concrete roofs or membrane-waterproofed walls or floors shall be provided with watertight seals as follows:
 - a. Where ducts are concrete encased on one side: Install watertight entrance seal device on the accessible side of roof/wall/floor as directed by equipment manufacturer.
 - b. Where ducts are accessible on both sides: Install watertight entrance seal device on each side of roof/wall/floor as directed by equipment manufacturer.
8. All raceways passing through walls of rooms containing/storing noxious chemicals (chlorine, ammonia, etc.) or through hazardous locations shall be sealed with conduit seals (Crouse-Hinds type EYS or equal).
9. All raceways terminating into electrical enclosures/devices/panels/etc. located in hazardous locations shall be sealed with conduit seals (Crouse-Hinds type EYS, EZS or equal) within 18" of the termination.

G. Exterior Electrical Ductbanks:

1. Where exterior electrical concrete-encased ductbanks are indicated on drawings, conduit runs between buildings or structures shall be grouped in concrete-encased ductbanks as follows:
 - a. A minimum of 3" of concrete shall encase each side of all ductbanks.
 - b. A minimum of 1 ½" of separation shall be provided between each conduit within ductbanks. PVC spacers shall be installed at the necessary intervals prior to placement of concrete to maintain the required spacing and to prevent bending or displacement of the conduits.
 - c. Top of concrete shall be a minimum of 30" below grade. A continuous magnetic marking tape shall be buried directly above each ductbank, 12" below grade.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
RACEWAYS**

SECTION 26 0533 – Page 8 of 8

- d. Exact routing of ductbanks shall be field verified and shall be modified as necessary to avoid obstruction or conflicts.
- e. Underground electrical raceways shall be installed to meet the minimum cover requirements listed in NEC Table 300.5. Refer to drawings for more stringent requirements.

END OF SECTION 260533

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
OUTLET BOXES, JUNCTION BOXES, WIREWAYS**

SECTION 26 0534 – Page 1 of 3

PART 1 GENERAL

1.1 DESCRIPTION

- A. Outlet and Junction Boxes
- B. Pull Boxes
- C. Wireways

PART 2 PRODUCTS

2.1 OUTLET Boxes & JUNCTION BOXES (through 4-11/16")

- A. Sheet Metal: Shall be standard type with knockouts made of hot dipped galvanized steel as manufactured by Steel City, Raco, Appleton, Bowers or equal.
- B. Cast: Shall be type FS, FD, JB, GS, or SEH as required for application as manufactured by O-Z/Gedney, Appleton, or equal.
- C. Nonmetallic: Shall be type Polycarbonate/ABS construction as required for application with non-metallic quick-release latches as manufactured by Hoffman, O-Z/Gedney, Appleton, or equal.

2.2 JUNCTION AND PULL BOXES (LARGER THAN 4-11/16")

- A. Oil-Tight JIC: Shall be Hoffman Type CH box or approved equal.
- B. Galvanized Cast Iron or Cast Aluminum: Shall be O-Z/Gedney or approved equal.
- C. Stainless Steel: Shall be as manufactured by O-Z/Gedney, Hoffman or approved equal. Boxes shall have continuous hinges, seamless foam-in-place gaskets and screw-down clamps.
- D. Nonmetallic: Shall be type Polycarbonate/ABS construction as required for application with non-metallic quick-release latches as manufactured by Hoffman, O-Z/Gedney, Appleton, or equal. Boxes shall have hinged covers and screw-down clamps.
- E. Wireways: Shall be standard manufacturer's item as manufactured by Hoffman, Square "D", Burns, B & C or equal. Wireways shall have hinged covers and screw-down clamps.
- F. Pre-cast Polymer Concrete Below-Grade Hand Holes & Pull Boxes:
 - 1. Enclosures, boxes and cover are required to be UL Listed and conform to all test provisions of ANSI/SCTE 77 "Specifications For Underground Enclosure Integrity" for Tier 15 applications (15,000lb design load and 22,500lb test load) unless noted otherwise.
 - 2. All covers shall have a minimum coefficient of friction of 0.05 in accordance with ASTM C1028 and the corresponding Tier level shall be embossed on the top surface.
 - 3. Cover shall be bolt-down include factory-labeling to read "Electric", "Communications" or other as directed.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
OUTLET BOXES, JUNCTION BOXES, WIREWAYS**

SECTION 26 0534 – Page 2 of 3

4. Hardware shall be stainless steel.
5. Shall be Quazite PG/LG Style or approved equal.

G. Galvanized Cast Iron Below-Grade Pull Boxes:

1. Enclosures, boxes and cover are required to conform to AASHTO H-20 requirements for deliberate vehicular traffic applications unless noted otherwise.
2. Cover shall be checkered, bolt-down include factory-labeling to read "Electric", "Communications" or other as directed.
3. Hardware shall be stainless steel.
4. Shall be furnished with grounding kit.
5. Shall be O-Z/Gedney Type YR or approved equal.
 - a. In areas not subject to vehicular traffic: shall be galvanized cast iron or pre-cast polymer concrete (rated for Tier 15 Loading unless noted otherwise).
6. All boxes installed exposed in exterior or wet areas shall be powder-coated galvanized steel (NEMA 3R).
7. All boxes installed exposed in corrosive areas shall be stainless steel (NEMA 4X).
8. All boxes installed in extremely corrosive areas (such as chlorine and fluoride storage rooms) where non-metallic raceways are used shall be non-metallic.
9. Boxes installed in hazardous locations shall be explosion-proof rated for the associated application, constructed of copper-free cast aluminum.
10. All others shall be oil tight JIC box not less than 16 gauge.

3.2 Installation

A. General

1. All boxes and wireways shall be securely anchored.
2. All boxes shall be properly sealed and protected during construction and shall be cleaned of all foreign matter before conductors are installed.
3. All boxes and wireways shall be readily accessible. Contractor shall be responsible for furnishing and installing access panels per architect's specifications. Locations shall be as directed by the architect as required to make boxes, wireways, electrical connections, etc. accessible where above gypsum board ceilings or in other similar locations.
4. All metallic boxes and wireways shall be properly grounded.
5. Refer to Specification Section 260553 for identification requirements.

B. Outlet Boxes & Junction Boxes (through 4-11/16")

1. Boxes shall be provided with approved 3/8" fixture studs were required.
2. Recessed boxes for wiring devices, surface fixtures, or connections, shall be set so that the edge of cover comes flush with finished surface.
3. There shall be no more knockouts opened in any sheet metal box than actually used.
4. Any unused opening in cast boxes shall be plugged.
5. Back to back boxes to be staggered at least 3 inches.
6. Under no circumstances shall through-the-wall boxes be used.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
OUTLET BOXES, JUNCTION BOXES, WIREWAYS**

SECTION 26 0534 – Page 3 of 3

C. Junction & Pull Boxes (larger than 4-11/16")

1. Pull boxes shall be installed as indicated on plans and/or as required due to number of bends, distance or pulling conditions.
2. Boxes to be imbedded in concrete shall be properly leveled and anchored in place before the concrete is poured.
3. All pull boxes and/or junction boxes installed exterior below grade, shall have their tops a minimum of 1-1/2 inches above surrounding grade and sloped so that water will not stand on lid. A positive drain shall be installed, to prevent water accumulation inside.
4. Above grade pull boxes shall be installed on concrete anchor bases as shown on Plans.

D. Wireways and/or wall-mounted equipment

1. Mount each wireway to channels of the same metal type as the wireway.
2. Conductors serving a wireway shall be extended without reduction in size, for the entire length of the wireway. Tap-offs to switches and other items served by the wireway shall be made with ILSCO type GTA with GTC cap.

END OF SECTION 260534

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
ELECTRICAL IDENTIFICATION**

SECTION 26 0553 – Page 1 of 5

PART 1 GENERAL

1.1 DESCRIPTION

- A. Wire and cable identification.
- B. Pullbox & Junction Box Identification
- C. Electrical distribution & utilization equipment identification.
- D. Emergency and Standby Power receptacle identification.

PART 2 PRODUCTS

2.1 WIRE AND CABLE Identification

- A. Intermediate Locations:
 - 1. Wires and cable labels shall be white, thermal transfer, halogen-free, flame-retardant marker plates (sized to accommodate three lines of text) permanently affixed to the associated cable with UV-resistant plastic wire ties. Labels shall be Panduit #M200X/300X series or equal.
- B. Circuit/Cable Termination Locations:
 - 1. Wires and cable labels shall be non-ferrous identifying tags or pressure sensitive labels unless noted otherwise.

2.2 Electrical distribution & Utilization equipment identification

- A. Labels on electrical distribution & utilization equipment shall be black-on-white engraved Bakelite nameplates permanently affixed to the equipment with rivets or silicone adhesive unless noted otherwise.
- B. Labels on electrical distribution equipment fed from emergency or legally-required standby sources (such as emergency generators) shall be white-on-red engraved Bakelite nameplates permanently affixed to the equipment with rivets or silicone adhesive.

2.3 Emergency and Standby Power Receptacle identification

- A. Receptacles fed from emergency or standby power sources (such as emergency generators) shall be provided with factory-marked engraved coverplates as follows:
 - 1. Emergency System source: Red engraved lettering to read "EMERGENCY".
 - 2. Legally-Required or Optional Standby Generator source:
 - a. If only part of facility is fed with generator backup: Black engraved lettering to read "FED FROM GENERATOR".

SHELBY COUNTY WATER SERVICES BUILDING PROJECT ELECTRICAL IDENTIFICATION

SECTION 26 0553 – Page 2 of 5

- b. If entire facility is fed with generator backup: No “...GENERATOR...” label required.

PART 3 EXECUTION

3.1 General

- A. Any proposed deviation in identification methods and materials from those described herein shall be submitted to Architect for review and comment prior to installation.
- B. Contractor shall provide all labeling or identification required by applicable local, state and national codes. These specifications do not intend to itemize all code-required labeling or identification requirements.
- C. All labels/identification shall be positioned such as to be readable from the normal perspective without adjusting wiring/cables/labels. For example, labels/identification of wires/cables within cable trays shall be positioned to point towards the viewer (typically downward for overhead cable trays, or upward for cable trays within trenches).
- D. All labels/identification (except for handwritten labels on concealed pullbox/junction box covers as noted below) shall be typewritten/printed/engraved in a neat, workmanlike, permanent, legible, consistent and meaningful manner. Labels shall not be handwritten unless specific approval is granted by engineer.

3.2 WIRE AND CABLE Identification

A. General:

- 1. Where cabling is exposed (such as within cable trays), provide two wire ties per cable (one on either end of marker plate to provide a flush installation). Where cabling is concealed (such as within pullboxes/wireways), one wire tie per cable will be acceptable.

B. Intermediate Locations:

- 1. Thermal transfer labels shall be securely fastened to all wiring and cabling in the following locations:
 - a. Wireways
 - b. Pullboxes/Junction boxes larger than 4-11/16"
 - c. Pullboxes/Junction boxes through 4-11/16" where wires and cables are not easily identifiable via the color coding and box labeling
 - d. Vaults & Manholes
 - e. Approximately every 50 feet within cable trays (especially at locations where cables exit or diverge). Labels within cable trays shall be grouped (rather than being pre-labeled on cables and pulled into cable trays).
 - f. Other similar intermediate locations.
- 2. Labels shall be stamped or printed with the following data so that the feeder or cable can be readily identified and traced:
 - a. From where the circuit originates (including panel designation and circuit number):

SHELBY COUNTY WATER SERVICES BUILDING PROJECT ELECTRICAL IDENTIFICATION

SECTION 26 0553 – Page 3 of 5

- 1) Ex: "FROM: PP-A CIR. 3 (IN MAIN ELEC ROOM)"
- b. To where the circuit extends (using the common name of the equipment):
 - 1) Ex: "TO: RTU-6 (ON ROOF)"
- c. The purpose of the circuit:
 - 1) Ex: "POWER"
- d. The set number (If parallel power feeds are used).
 - 1) Ex: "SET NO. 3 OF 4"
 - 2)

C. Circuit/Cable Termination Locations:

- 1. Where multiple termination points exist within a circuit origination point (panelboard, switchboard, MCC, starter, etc.) or other similar circuit endpoint (control panel, etc.), labels shall be securely fastened to all ungrounded and neutral conductors to clearly identify the terminal and/or circuit number associated with each conductor. For example, within lighting panels, each phase and neutral conductor shall be labeled near the terminals at a clearly visible location with the associated circuit number(s), so that if all conductors were unterminated, the labels would clearly indicate which conductor was associated with each circuit.

D. Refer to Specification Section 260519 for all color-coding requirements of wires and cables.

3.3 Pullbox & Junction Box Identification

A. Concealed pullboxes/junction boxes:

- 1. Front surface of all pullbox/junction box covers in concealed areas (such as above lay-in ceilings) or within mechanical/electrical rooms (and other similar areas where appearance of boxes is not an issue) shall be neatly marked with the ID of circuits/cables contained with permanent black marker on cover of box (Ex: "RP-1A Cir. 1, 2 & 3"). Additionally, front surface of box shall be painted red where box contains fire alarm system cabling.

B. Exposed pullboxes/junction boxes:

- 1. Interior surface of all pullbox/junction box covers in exposed areas shall be labeled "Power", "Telecommunications", "Fire Alarm" or with other similar general text neatly with permanent black marker to indicate function of box. Circuit/cable labeling within box (see above) shall identify specific cables contained. Additionally, interior surface of cover shall be painted red where box contains fire alarm system cabling.

C. Where pullboxes/junction boxes are named on contract documents (Ex: "PULLBOX #3"), an engraved nameplate shall be installed on the front surface of the box to identify the name.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
ELECTRICAL IDENTIFICATION**

SECTION 26 0553 – Page 4 of 5

3.4 Electrical distribution & Utilization equipment identification

A. General:

1. All new and existing equipment modified by this project shall include arc-flash warning labels in accordance with NEC article 110.16.

B. All Panels, Motor Control Centers, Switchboards, Switchgear, Transformers, Etc.:

1. Engraved nameplates identifying name of equipment, nominal voltage and phase of the equipment and where the equipment is fed from shall be installed on front surface of all panels, motor control centers, switchboards, switchgear, transformers, etc.:

- a. Ex: First Line: "NAME: RP-A", Second Line: "120/208V-3Ø-4W", Third Line: "FEDFROM: PP-A CIR. 4 (IN MAIN ELEC ROOM)"

2. Refer to Panelboard Specification Sections for additional labeling requirements (circuit directory cards, permanent circuit labels, permanent circuit numbers, etc.) required inside panelboards.

C. Safety/Disconnect Switches and Utilization Equipment (HVAC Equipment, Pumps, Powered Valves, Control Panels, Starters, Etc.):

1. Engraved nameplates identifying equipment being fed and where the equipment is fed from shall be installed on front surface of all disconnect switches (including both visible blade type switches and toggle-type switches) and on utilization equipment (where not clearly identified by immediately adjacent local disconnect switch):

- a. Ex: First Line: "RTU-6", Second Line: "FED FROM: PP-A CIR. 5"

2. Where safety/disconnect switches are installed on the load side of variable frequency drives, the safety/disconnect switch shall be furnished with an additional engraved nameplate to read: "WARNING: TURN OFF VFD PRIOR TO OPENING THIS SWITCH".
3. Safety/Disconnect switches feeding equipment that is fed from multiple sources (such as motors with integral overtemperature contacts that are monitored via a control system) and Utilization Equipment fed from multiple sources shall be furnished with an additional BLACK-ON-YELLOW engraved nameplate to read: "WARNING: ASSOCIATED EQUIPMENT FED FROM MULTIPLE SOURCES – DISCONNECT ALL SOURCES PRIOR TO OPENING COVER".

D. Emergency Systems:

1. A sign shall be placed at the service entrance equipment (and at any remote shunt trip operators, or similar, for service equipment) indicating the type and location of on-site emergency power sources (such as generators, central battery systems, etc.) per NEC requirements.
2. All boxes and enclosures (including transfer switches, generators, power panels, junction boxes, pullboxes, etc.) dedicated for emergency circuits shall be permanently marked with white-on-red engraved nameplates so they will be readily identified as a component of an emergency circuit or system.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
ELECTRICAL IDENTIFICATION**

SECTION 26 0553 – Page 5 of 5

3. Where an Essential Electrical System (EES) is installed, all enclosures, raceways and equipment that are components of the EES shall be readily identified as such. Raceway shall be identified at intervals not exceeding 25 ft.

E. Services:

1. All Service Equipment:
 - a. Engraved nameplates identifying maximum available fault current, including date the fault current calculation was performed, in accordance with NEC article 110.24.
 - 1) Ex: First Line: "AVAILABLE FAULT CURRENT: 16,154 AMPS", Second Line: "DATE CALCULATED: JULY 8, 2013"
 - b. All service entrance equipment shall be clearly labeled as being service entrance rated.
2. Where a building or structure is supplied by more than one service (or any combination of branch circuits, feeders and services), a permanent plaque or directory shall be installed at each service disconnect location denoting all other services, feeders & branch circuits supplying that building or structure and the area served by each, per NEC requirements.

F. Generators:

1. Generators shall be labeled with engraved nameplates identifying name of equipment.

3.5 Emergency and Standby Power Receptacle identification

- A. Receptacles fed from emergency or standby power sources (such as emergency generators) shall be provided with factory-marked engraved coverplates as described above.

3.6 Other Identification

- A. Factory-engraved coverplates identifying functions of light switches and other similar devices shall be installed where so required by plans/specifications.

END OF SECTION 260553

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
POWER DISTRIBUTION SYSTEM ELECTRICAL STUDIES**

SECTION 26 0573 – Page 1 of 5

PART 1 GENERAL

1.1 SCOPE OF WORK

A. THE WORK UNDER THIS SECTION INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING:

1. Power Distribution System Electrical Studies.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Short Circuit Studies, Protective Devices Evaluation Studies, Protective Device Coordination Studies and Arc Flash Hazard Studies shall be performed by the same entity, which shall be a Professional Engineer registered in the state where the equipment will be installed. The studies shall be per the requirements set forth in the latest edition of NFPA 70E-Standard for Electrical Safety in the Workplace. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E, Annex D.
- B. The studies shall be submitted to the Architect prior to shipment of any electrical distribution equipment.
- C. The studies shall include all portions of all electrical systems affected by the project (including any existing systems/equipment) from the utility service to any existing equipment at the facility (including all existing equipment fed from the same service point as any new equipment) and to all new equipment installed under this contract. All induction motors 50 HP or below and fed from the same bus may be grouped together. All induction motors greater than 50 HP shall be included individually with associated starters and feeder impedance. See individual study sections below for additional scope requirements.
- D. The studies shall be performed using the latest revision of the SKM Systems Analysis Power*Tools for Windows (PTW) or EasyPower software program.
- E. Normal system connections and those which result in maximum fault conditions shall be adequately covered in the study.
- F. The contractor shall be responsible for collecting data on any existing or proposed electrical equipment, devices, conductors, etc. as required to prepare the study, and shall supply pertinent electrical system conductor, circuit breaker, generator, and other component and system information in a timely manner to allow the studies to be completed prior to shipment of equipment.
- G. The Power Distribution System Electrical Studies shall be performed by Square 'D', G.E., Siemens or Cutler Hammer; or a third-party vendor if specifically approved by the engineer prior to preparation of the studies.
- H. The proposed vendor shall have completed a minimum of five (5) equivalent Arc-Flash Hazard Studies in the past three (3) years.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT POWER DISTRIBUTION SYSTEM ELECTRICAL STUDIES

SECTION 26 0573 – Page 2 of 5

2.2 Short Circuit Study

- A. The Short Circuit Study shall be performed with aid of a computer program. The study input data shall include the power company's short circuit contribution, resistance and reactive components of the branch impedances, X/R ratios, base quantities selected, and other source impedances.
- B. Short circuit momentary duty values and interrupting duty shall be calculated on each individual basis with the assumption that there is a three-phase bolted short circuit at the respective switchgear bus, switchboard, low voltage motor control center, distribution panelboard, and other significant locations throughout the system.
- C. The short circuit tabulation shall include symmetrical and asymmetrical fault currents, and X/R ratios. For each fault location, the total duty on the bus, as well as the individual contributions from each connected branch, including motor back EMF current contributions shall be listed with its respective X/R ratio.

2.3 Protective Device Evaluation Study

- A. The Protective Device Evaluation Study shall be performed to determine the adequacy of circuit breakers, switches, transfer switches, and fuses by tabulating and comparing the short circuit rating of these devices with the calculated fault currents. Appropriate multiplying factors based on system X/R ratios and protective device rating standards shall be applied.
- B. Any problem areas or inadequacies in the equipment due to short circuit currents shall be promptly brought to the Architect's attention.

2.4 Protective Device Coordination Study

- A. The Protective Device Coordination Study shall be performed to provide the necessary calculation and logic decisions required to select or to check the selection of power fuse ratings, protective relay characteristics and settings, ratios and characteristics of associated current transformers, and low voltage breaker trip characteristics and settings. The objective of the study is to obtain optimum protective and coordination performance from these devices.
- B. The coordination study shall show the best coordination attainable for all breakers down through the largest breaker at each piece of distribution equipment. Coordination study shall demonstrate selective coordination where required by applicable codes or contract documents.
- C. Phase and ground overcurrent protection shall be included as well as settings of all other adjustable protective devices. Where ground fault protection is used, coordination of the ground fault protection with the first downstream overcurrent phase protection device shall be demonstrated.
- D. All restrictions of the National Electrical Code shall be adhered to and proper coordination intervals and separation of characteristic curves be maintained.

2.5 Arc-Flash Hazard Study

- A. The Arc-Flash Hazard Study shall be performed with the aid of computer software intended for this purpose in order to calculate Arc-Flash Incident Energy (AFIE) levels and flash protection boundary distances.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
POWER DISTRIBUTION SYSTEM ELECTRICAL STUDIES**

SECTION 26 0573 – Page 3 of 5

- B. The Arc-Flash Hazard Study shall be performed in conjunction with a short-circuit Study and a time-current coordination Study.
- C. The Arc-Flash Hazard Study shall be performed for the following equipment:
 - 1. All Distribution Equipment – This includes but is not limited to the following:
 - a. Switchgear
 - b. Switchboards
 - c. Motor Control Center
 - d. All Lighting and Power Panelboards
 - e. Fused Disconnect Switches rated greater than 100A
 - 2. Separately enclosed devices fed from protection device rated greater than 100A - This includes but is not limited to the following:
 - a. Control Panels
 - b. VFD's
 - c. RVSS
- D. A generic Arc-Flash label shall be applied to other electrical equipment that has not been included in the study. This includes but is not limited to the following equipment:
 - 1. Non-fused Disconnect Switches
 - 2. Fused Disconnect Switches rated 100A or less
 - 3. Transformers
 - 4. Control Panels, VFD's, RVSS, etc. rated 100A or less
- E. Where a main protective device is provided, the study shall be performed on the line side and load side of the main. The worst-case result shall be used for the study result and label.
- F. The Study shall be performed under worst-case Arc-Flash conditions, and the final report shall describe, when applicable, how these conditions differ from worst-case bolted fault conditions.
- G. Where incident energies are calculated to fall within the high marginal region of a given Hazard/Risk Category Level, the Hazard/Risk Category Level shall be increased one level.
- H. The Arc-Flash Hazard Study shall be performed in compliance with the latest IEEE Standard 1584, the IEEE Guide for Performing Arc-Flash Calculations. Where IEEE 1584 does not have a method for performing the required arc-flash calculations (such as for single phase equipment), calculations shall be performed and system shall be modeled using modules/methods as recommended by the arc flash software supplier (for example, using SKM Unbalanced/Single Phase Studies module for modeling single phase systems).
- I. Equipment labels to identify AFIE and appropriate Hazard/Risk Category in compliance with NFPA 70E and ANSI Z535.4 (latest version of these requirements) shall be provided to the Electrical Contractor. The Electrical Contractor shall affix the labels to the distribution equipment devices as directed by the equipment manufacturer. These labels shall, at a minimum, include the following:
 - 1. WARNING label.
 - 2. Hazard/Risk Category.
 - 3. Arc Flash Boundary Distance.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
POWER DISTRIBUTION SYSTEM ELECTRICAL STUDIES**

SECTION 26 0573 – Page 4 of 5

4. Incident Energy (in cal/cm²) at Working Distance.
5. Shock Hazard Voltage.
6. Limited Approach Boundary Distance.
7. Restricted Approach Boundary Distance.
8. Prohibited Approach Boundary Distance.
9. Equipment Name.
10. Name of Firm who prepared the Study.
11. Project Number of the Firm who prepared the Study.
12. Date that the Study was prepared.
13. Method for calculating analysis data.
14. Statement to read: "Any system modification, adjustment of protective device settings, or failure to properly maintain equipment will invalidate this label" (or equivalent).

PART 3 EXECUTION

3.1 SUBMITTAL REQUIREMENTS

- A. The results of the studies shall be summarized in a final report. The report shall include the following sections:
1. General:
 - a. Description, purpose, basis and scope of the studies
 - b. Single line diagram of the portion of the power system which is included within the scope of the work. The single line diagram shall fit on one sheet of paper (size as required) unless approved otherwise by engineer. The following information shall be shown on the single line diagram:
 - 1) Device Name
 - 2) Branch Fault Currents with directional indicators
 - 3) General Location (for busses only)
 - 4) Other basic component information such as cable type, cable length, breaker rating, buss short circuit rating, transformer voltages, transformer size, fuse size, etc..
 2. Short Circuit Study:
 - a. Tabulation of circuit breaker, fuse and other protective device ratings versus calculated short circuit duties, and commentary regarding same.
 3. Protective Device Evaluation/Coordination Study:
 - a. Protective devices time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary regarding same.
 - b. Fault current calculations including definitions of terms and a guide for interpretation of computer printout.
 - c. Documentation from utility company on their letterhead showing their anticipated values of available short circuit currents X/R ratios and protective devices with which the power distribution system will coordinate.
 - d. Time-current characteristics of the respective protective devices shall be plotted on log-log paper. Plots shall be printed in color with a dedicated color and pattern for each curve for clear identification.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
POWER DISTRIBUTION SYSTEM ELECTRICAL STUDIES**

SECTION 26 0573 – Page 5 of 5

- e. Plots shall include complete titles, respective single line diagrams and legends, and associated power company's relay or fuse characteristics, significant motor starting characteristics, complete parameters of transformers, complete operating bands of low voltage circuit breakers trip curves and fuses.
 - f. The coordination plots shall indicate the type of protective devices selected, proposed relay taps, time dial and instantaneous trip settings, transformer magnetizing inrush and ANSI transformer withstand parameters, cable thermal overcurrent withstand limits and significant symmetrical and asymmetrical fault currents.
 - g. The coordination plots for phase and ground protective devices shall be provided on a system basis.
 - h. A sufficient number of separate curves shall be used to clearly indicate the coordination achieved.
4. Arc-Flash Hazard Study:
- a. Tabulation of device or bus name, bolted fault and arcing fault current levels, flash protection boundary distances, personal-protective equipment classes and AFIE levels.
 - b. Recommendations for reducing AFIE levels and enhancing worker safety.
- B. Furnish all labor, materials, calculations, electrical equipment, technical data and incidentals required to provide a complete short circuit study, coordination study and arc flash hazard study of protective devices, busses, etc. from the utility service to any existing equipment at the facility and all new equipment installed under this contract.
- C. The study shall comply with the following applicable provisions and recommendations of the latest revisions of the following: ANSI C37.5, IEEE Standard No. 399, and IEEE Standard No. 141.
- D. Submit calculations and results of the short circuit, protective device evaluation and coordination and arc flash hazard studies prior to submitting shop drawings for new equipment. Contractor shall verify that all proposed equipment is properly rated per the short circuit and protective device evaluation portions of the study prior to releasing equipment for manufacturing.
- E. Submit a copy of a sample typical arc flash label layout (meeting requirements outlined above) that will be used for the project.
- F. Submit final electronic copies of all SKM program files/models/input data/etc. used to perform the study to the owner with final close-out documents. These files shall be complete as required to allow future users to recreate the study.

3.2 INSTALLATION

- A. Contractor shall adjust all breaker settings as recommended by the coordination study prior to energizing equipment.
- B. Contractor shall affix arc flash hazard notification labels (as determined by the results of this study) to each piece of distribution equipment prior to energization of equipment. A generic arc-flash warning label shall be affixed to any electrical equipment not included in the analysis as outlined above.
- C. Where short circuit rating of equipment is dependent on setting of upstream overcurrent device, provide and install label for equipment indicating the required settings of the associated device.

END OF SECTION 260573

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
DISTRIBUTED DIGITAL LIGHTING MANAGEMENT SYSTEM**

SECTION 26 0944 – Page 1 of 10

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Digital Occupancy and Daylighting Sensor Control
2. Emergency Lighting Control (if applicable)

B. Related Section

1. Section 260943 – Lighting Control System
2. Section 262726 - Wiring Devices
3. Section 270500 – Auxiliary System Cables, 0-50V
4. Section 265000 – Lighting Materials and Methods
5. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section
6. Electrical Sections, including wiring devices, apply to the work of this Section.

C. Control Intent – Control Intent includes, but is not limited to:

1. Defaults and initial calibration settings for such items as time delay, sensitivity, fade rates, etc.
2. Initial sensor and switching zones
3. Initial time switch settings
4. Task lighting and receptacle controls
5. Emergency Lighting control (if applicable)

1.2 REFERENCES

- A. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE)
- B. Underwriter Laboratories of Canada (ULC)
- C. International Electrotechnical Commission
- D. International Organization for Standardization (ISO)
- E. National Electrical Manufacturers Association (NEMA)
- F. WD1 (R2005) - General Color Requirements for Wiring Devices.
- G. Underwriters Laboratories, Inc. (UL):
 1. 916 – Energy Management Equipment.
 2. 924 – Emergency Lighting
 3. 2043 – Plenum Rating

1.3 SYSTEM DESCRIPTION & OPERATION

- A. The Lighting Control and Automation system as defined under this section covers the following equipment:

SHELBY COUNTY WATER SERVICES BUILDING PROJECT DISTRIBUTED DIGITAL LIGHTING MANAGEMENT SYSTEM

SECTION 26 0944 – Page 2 of 10

1. Digital Room Controllers – Self configuring, digitally addressable one, two or three relays controllers with 0-10v control for ballasts (if applicable) and single relay application specific plug load controllers.
2. Digital Occupancy Sensors connected to Digital Room Controllers – Self configuring, digitally addressable and calibrated occupancy sensors with LCD screens and two way active Infra-Red (IR) communications.
3. Digital Switches connected to Digital Room Controllers – Self configuring, digitally addressable push button switches, dimmers, and scene switches with two way active Infra-Red (IR) communications.
4. Analog and digital closed loop daylighting sensors connected to Digital Room Controllers - self-calibrating daylighting sensors that provide closed loop control to Room Controllers. Sensors and Room Controllers can provide single or multi-zone, on/off or dimming control for daylight harvesting.
5. Hand held remotes for room configuration – provides two way infrared communications to digital devices and allows complete configuration and reconfiguration of the device / room from 30 feet away. Unit to have Organic LED display, simple pushbutton interface, and allow send / receive / store of room variables.
6. Hand held remotes for personal control – One, two, or four (scene) button remotes provide Infrared communications to a room. Remote controls will support ON/OFF, dimming, scene control and may be configured in the field to provide specific occupant requirements without special tools.
7. Digital Lighting Management (DLM) local network – Free topology, plug in wiring system (Cat 5e) for power and data to room devices.
8. Network Bridge - provides BACnet MS/TP compliant digital networked communication between rooms, panels and the Segment Manager or BAS.
9. Segment Manager - provides web browser based user interface for system control, scheduling, power monitoring, room device parameter administration and reporting.
10. Emergency Lighting Control Unit (ELCU)- allows any standard lighting control device to control emergency lighting in conjunction with normal lighting in any area within a building

1.4 LIGHTING CONTROL APPLICATIONS

- A. Unless relevant provisions of the applicable local Energy Codes are more stringent, provide a minimum application of lighting controls as follows:

1. Space Control Requirements – Provide occupancy/vacancy sensors with manual-on functionality in all spaces except toilet rooms, storerooms, library stacks, or other applications where hands-free operation is desirable and automatic-on occupancy sensors are more appropriate. Provide manual ON occupancy/vacancy sensors for any enclosed office, conference room, meeting room, open plan system and training room. For spaces with multiple occupants or where line-of-sight may be obscured, provide ceiling- or corner-mounted sensors with manual-on switches.
2. Bi-Level Lighting – Provide multi –level switched dimming controls where indicated on plans.
3. Task Lighting / Plug Loads – Provide automatic shut off of non essential plug loads and task lighting where indicated on plans. Provide automatic ON of plug loads whenever spaces are occupied. For spaces with multiple occupants a single shut off consistent with the overhead lighting may be used for the area.
4. Daylighted Areas. Provide daylighting controls where indicated on plans. Daytime set points for total illumination (combined daylight and electric light) level that initiate dimming shall be programmed to be not less than 125% of the nighttime maintained designed illumination levels.
5. Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT DISTRIBUTED DIGITAL LIGHTING MANAGEMENT SYSTEM

SECTION 26 0944 – Page 3 of 10

6. Provide smooth and continuous daylight dimming for areas marked on drawings. Daylight system may be designed to turn off ambient lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.

1.5 SUBMITTALS

- A. Submittals Package: Submit the shop drawings, and the product data specified below at the same time as a package.
 1. Shop Drawings: Building floorplans showing all proposed devices and composite wiring and/or schematic diagram of each control circuit as proposed to be installed (standard diagrams will not be accepted).
 2. Product Data: Catalog sheets, specifications and installation instructions.

1.6 QUALITY ASSURANCE

- A. Manufacturer: Minimum [10] years experience in manufacture of lighting controls.

1.7 PROJECT CONDITIONS

- A. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
 1. Ambient temperature: 0° to 40° C (32° to 104° F).
 2. Relative humidity: Maximum 90 percent, non-condensing.

1.8 WARRANTY

- A. Provide a five year complete manufacturer's warranty on all products to be free of manufacturers' defects.

1.9 MAINTENANCE

- A. Spare Parts:
 1. Provide two (2) of each product to be used for maintenance.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer:
 1. Watt Stopper Digital Lighting Management (DLM)
 2. Equal by Acuity Lighting
- B. Basis of design product: Watt Stopper Digital Lighting Management (DLM) or subject to compliance and prior approval with specified requirements of this section, one of the following:

SHELBY COUNTY WATER SERVICES BUILDING PROJECT DISTRIBUTED DIGITAL LIGHTING MANAGEMENT SYSTEM

SECTION 26 0944 – Page 4 of 10

1. Watt Stopper Digital Lighting Management (DLM)
2. Acuity
3. Substitutions:
 - a. All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by the design professional a minimum of 10 working days prior to the bid date and must be made available to all bidders. Proposed substitutes must be accompanied by a review of the specification noting compliance on a line-by-line basis.
 - b. By using pre-approved substitutions, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring. The contractor shall provide complete engineered shop drawings (including power wiring) with deviations for the original design highlighted in an alternate color to the engineer for review and approval prior to rough-in.

2.2 SINGLE / DUAL RELAY WALL SWITCH VACANCY SENSORS

- A. Type PW: Manual ON, Automatic OFF Wall switch type passive infrared occupancy sensor with built-in override control (off-auto). Furnish the Company's model which suits the electrical system parameters, and accommodates the square footage coverage and wattage requirement for each area (and type of lighting) controlled; Watt Stopper PW-100, PW-200 .
- B. Type UW: Manual ON, Automatic OFF Wall switch type ultrasonic occupancy sensor with built-in override control (off-auto). Furnish the Company's model which suits the electrical system parameters, and accommodates the square footage coverage and wattage requirement for each area (and type of lighting) controlled; Watt Stopper UW-100, UW-200.
- C. Type DW: Manual ON, Automatic OFF Wall switch type dual technology, passive Infrared and ultrasonic occupancy sensor with built-in override control (off-auto). Furnish the Company's model which suits the electrical system parameters, and accommodates the square footage coverage and wattage requirement for each area (and type of lighting) controlled; Watt Stopper DW-100, DW-200.

2.3 DIGITAL WALL OR CEILING MOUNTED OCCUPANCY SENSOR SYSTEM

- A. Wall or ceiling mounted (to suit installation) passive infrared, ultrasonic or dual technology digital (passive infrared and ultrasonic) occupancy sensor. Furnish the Company's system which accommodates the square footage coverage requirements for each area controlled, utilizing Room Controller modules and accessories which suits the lighting and electrical system parameters.
- B. Digital Occupancy Sensors shall provide graphic LCD display for digital calibration and electronic documentation . Features include the following:
 1. Digital calibration and LCD entry for the following variables:
 - a. Sensitivity 0-100% in 10% increments
 - b. Time Delay – Fixed (1-30 minutes in 1 minute increments), and automatic
 - c. Test mode – Five second time delay
 - d. PIR, Ultrasonic or Dual Technology activation and/or re-activation.
 - e. Walk-through mode
 - f. Load parameters including auto/manual ON, blink warning, and daylight enable/disable.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT DISTRIBUTED DIGITAL LIGHTING MANAGEMENT SYSTEM

SECTION 26 0944 – Page 5 of 10

2. RJ-45 digital connections for DLM local network.
 3. Two-way infrared communications port to allow remote programming through hand held commissioning tool.
 4. Self contained push buttons for programming and control of room devices.
 5. Device Status LED's including:
 - a. PIR Detection
 - b. Ultrasonic detection
 - c. Configuration mode
 - d. Load binding
 6. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.
- C. Units will provide for digital calibration and commissioning and will not have any dip switches or potentiometers for field settings
- D. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required
- E. Watt Stopper product numbers: LMPX, LMDX, LMPC, LMUC, LMDC

2.4 DIGITAL WALL SWITCHES

- A. Low voltage (RJ-45) momentary push button switches in 1,2,3,4 and 8 button configuration, decorator opening. Wall switches will include the following features:
1. Two way infrared communications port for use with personal and configuration remote controls.
 2. Engraveable buttons
 3. Dimming switches shall include seven LED's to indicate load levels.
 4. Scene switches shall include pilot indication of scene selection.
 5. Device Status LED's including:
 - a. One pilot LED for each button.
 - b. Power Indication
 - c. One locator LED per switch
 - d. Network status LED to indicate data transmission
 - e. Power LED to indicate the device has power
 - f. Configuration mode
- B. Switches shall have two RJ-45 ports to allow connection to any other digital room device.
- C. Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required to achieve multi-way switching
- D. Watt Stopper product numbers: LMSW-101 / LMSW-102 / LMSW-103 / LMSW-104 / LMSW-108.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT DISTRIBUTED DIGITAL LIGHTING MANAGEMENT SYSTEM

SECTION 26 0944 – Page 6 of 10

2.5 ROOM CONTROLLERS

- A. Room Controllers automatically bind the room loads to the connected devices in the space without any tools or configuration requirements. Room Controllers shall be provided to match the room lighting load and control requirements and sequences. The controllers will be simple to install and will not have screw type connections, dip switches, potentiometers or require special mounting or configuration. The control units will include the following features:
1. Automatic room configuration to the most energy efficient sequence of operation based upon the devices in the room.
 2. One or two relay configuration
 3. Simple replacement – Using the default automatic configuration capabilities, a room controller may be replaced with an Off-the-Shelf unit without requiring any configuration or setup.
 4. Device Status LED's to indicate:
 - a. Data transmission
 - b. Device has power
 - c. Status for each load
 - d. Configuration status
 5. Quick installation features including:
 - a. Standard junction box mounting (inside or outside)
 - b. Quick low voltage connections using standard RJ-45 patch cable
 6. Plenum rated
 7. Manual override and LED indication for each load
 8. Universal voltage (120/230/277 VAC, 50-60 Hz)
 9. Zero cross circuitry for each load.
 10. Efficient 150 ma switching power supply
 11. Three RJ-45 DLM local network ports
 12. Watt Stopper product numbers: LMRC-101 / LMRC-102
- B. 0-10 Volt enhanced Room Controllers shall include all the features of the Room Controller plus the following enhancements:
1. One, two or three relay configuration
 2. Efficient 250 ma switching power supply
 3. Four RJ-45 DLM local network ports.
 4. One zero to 10 volt analog output per relay for control of dimmable ballasts.
 5. Optional BACnet MS/TP communications port.
 6. Current monitoring
 7. Watt Stopper product numbers: LMRC-301 / LMRC302 / LMRC303.
- C. Plug Load Room Controllers provide dedicated control of plug loads within the space. The controllers plug into the DLM local network using the RJ-45 free topology network. The room controllers include the following features
1. One relay configuration only
 2. Automatic ON/OFF configuration
 3. Default 30 minute (adjustable) time delay from lighting shut off to allow for electronic component use after an area is vacant

SHELBY COUNTY WATER SERVICES BUILDING PROJECT DISTRIBUTED DIGITAL LIGHTING MANAGEMENT SYSTEM

SECTION 26 0944 – Page 7 of 10

4. Watt Stopper product number: LMPL-101.

2.6 DIGITAL PHOTOSENSORS

- A. Provide automatic daylight harvesting capabilities to the Room Controllers. The photo sensor / room controller configuration automatically configures the daylighting set points for ON/OFF or Dimming control. Using the automatic configuration replacing a photo sensor or room controller can be done without any special tools, programming or configuration. Photosensors include the following features:
 1. The digital photosensor shall utilize an internal photodiode that measures light in a 100 degree angle cutting the unwanted light from bright sources outside of this cone
 2. The digital photosensor shall be capable of turning lighting on and off or Raise / Lower depending on the type of Room Controller (on/off or dimming). Sensor range shall be from 1 - 1400fc.
 3. For ON/OFF daylight harvesting the controller provides a “hold on while occupied” feature that prohibits high levels from turning OFF the controlled lights as long as the space remains occupied.
 4. The sensor has a threaded nipple that mounts on a ceiling tile and for more challenging applications such as a side wall or hard rock ceiling the nipple pops off and the unit can be screwed down
- B. Watt Stopper Product Numbers: LMLS-400 or equivalent.

2.7 ROOM NETWORK

- A. The DLM local network is a free topology lighting control network and protocol designed to control a small area of a building. Digital room devices connect to the network using RJ-45 patch cords which provide both data and power to room devices. Features of the DLM local network include
 1. Automatic configuration and binding of sensors, switches and lighting loads to the most energy efficient sequence of operation based upon the device attached.
 2. Simple replacement of any device in the network with a standard off the shelf unit without requiring commissioning, configuration or setup.
 3. Push and Learn configuration that can change the automatic binding process and load parameters by using only the digital devices in the room.
 4. Two way infrared communications that allow load parameters, sensor configuration and binding operations to be configured through a hand held configuration tool up to 30 feet from any device

2.8 NETWORK BRIDGE

- A. Each local network shall include a network bridge component to provide a connection between the room devices and the segment network. The network bridge shall use industry standard BACnet MS/TP network communication and allow direct connection to the Segment Manager or BAS where required.
- B. The network bridge may be incorporated directly into the room controller hardware or be provided as a separate module connected on the local network through an available RJ local network port
- C. Provide Plug and Go operation to automatically discover all room devices connected to the local network and make all device parameters visible to the segment manager via the segment network. No commissioning shall be required for set up of the network bridge on the local network.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT DISTRIBUTED DIGITAL LIGHTING MANAGEMENT SYSTEM

SECTION 26 0944 – Page 8 of 10

- D. The network bridge shall automatically create standard BACnet objects for selected room device parameters to allow any BACnet compliant BAS to include lighting control and power monitoring features as provided by the DLM room devices on each local network. Standard BACnet objects shall be provided .

2.9 SEGMENT MANAGER

- A. The Digital Lighting Management system shall include at least one segment manager to manage network communication. It shall be capable of serving up a graphical user interface via a standard web browser. Each segment manager shall have support for one, two or three segment networks as required and allow for control of a maximum of 127 local networks (rooms) and or lighting control panels per segment network.
- B. Operational features of the Segment Manager shall include the following:
 - 1. Connection to PC or LAN via standard Ethernet TCP/IP
 - 2. Easy to learn and use Adobe Flex based GUI compatible with Internet Explorer 8 or equal browser
 - 3. Log in security capable of restricting some users to view-only or other limited operations
 - 4. Automatic discovery of all DLM devices on the segment network(s). Commissioning beyond activation of the discovery function shall not be required.
 - 5. After discovery all rooms and panels shall be presented in a standard navigation tree format
 - 6. View and modify room device operational parameters. It shall be possible to set device parameters independently for normal hours and after hours operation.
 - 7. Set up schedules for rooms and panels. Schedules shall automatically set controlled zones or areas to either a normal hours or after hours mode of operation.
 - 8. Group rooms and loads for common control by schedules, switches or network commands. Monitor connected load current for rooms or zones equipped with room controllers incorporating the current monitoring feature
 - 9. Provide seamless integration with the BAS via BACnet IP

2.10 EMERGENCY LIGHTING

- A. Emergency Lighting Control Unit – A UL 924 listed device that monitors a switched circuit providing normal lighting to an area. The unit provides normal ON/OFF control of emergency lighting along with the normal lighting. Upon normal power failure the emergency lighting circuit will close, forcing the emergency lighting ON until normal power is restored. Features include
 - 1. 120 - 277 volts, 50/60 Hz., 20 amp ballast rating
 - 2. Push to test button
 - 3. Auxiliary contact for test / Fire Alarm system

2.11 WIRING

- A. Refer to Specification Section 270500 for additional requirements.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
DISTRIBUTED DIGITAL LIGHTING MANAGEMENT SYSTEM**

SECTION 26 0944 – Page 9 of 10

PART 3 EXECUTION

3.1 Pre-installation Coordination

- A. Exact occupancy sensor and daylight sensor types and locations shall be determined by the lighting control system supplier for a fully-functional system with adequate coverage throughout areas controlled by occupancy sensors. Exact locations shall be coordinated with actual HVAC register locations, furniture/casework/etc. locations, sensor coverage patterns, etc. for proper coverage in all areas. In no case may fewer devices or lower-quality devices be used in each area than indicated on contract documents.

3.2 INSTALLATION

- A. When using wire other than RJ-45 connections provide detailed point to point wiring diagrams for every termination. Provide wire specifications and wire colors to simplify contactor termination requirements
- B. Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated.
- C. Provide all connections between system components and network connections to building LAN (via Ethernet cabling) as directed by system supplier for a fully functional networked system.
- D. Calibrate all sensor time delays and sensitivity to guarantee proper coverage of occupants and energy savings.
- E. Provide written or computer generated documentation on the commissioning of the system including room by room description including:
 - 1. Sensor parameters, time delays, sensitivities, daylighting set points.
 - 2. Sequence of operation, manual ON, Auto OFF. Etc.
 - 3. Load Parameters - blink warning, etc.
- F. Refer to Specification Section 270500 for additional installation requirements.

3.3 SUPPORT SERVICES

A. System Start Up and Commissioning

- 1. The electrical contractor shall provide both the manufacturer and the electrical engineer with ten working days written notice of the system startup and adjustment date.
- 2. Manufacturer shall provide a factory authorized technician to confirm proper installation and operation of all lighting control system components. The startup requirement is intended to verify:
 - a. That all occupancy and daylighting sensors are located, installed, and adjusted as intended by the factory and the contract documents.
 - b. The occupancy sensors and daylighting sensors are operating within the manufacturers specifications.
 - c. The sensors and relay panels interact as a complete and operational system to meet the design intent.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
DISTRIBUTED DIGITAL LIGHTING MANAGEMENT SYSTEM**

SECTION 26 0944 – Page 10 of 10

3. Manufacturer to provide a written statement verifying that the system meets the above requirements.
- B. Re-commissioning – After 30 days from occupancy re-calibrate all preset times, sensor time delays and sensitivities to meet the Owner's Project Requirements. Provide a detailed report to the Design Team and Owner of re-commissioning activity.
- C. System Training
 1. Manufacturer shall provide factory authorized technician to train owner personnel in the operation, programming and maintenance of the lighting control system including all occupancy sensors and daylighting controls.
- D. System Programming
 1. Manufacturer shall provide system programming including:
 - a. Wiring documentation.
 - b. Switch operation.
 - c. Telephone overrides.
 - d. Operating schedules.

END OF SECTION 260944

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
POWER PANELBOARDS – CIRCUIT BREAKER TYPE**

SECTION 26 2416 – Page 1 of 3

PART 1 GENERAL

1.1 GENERAL

- A. The work under this section includes but is not limited to the following:
 - 1. Power Panelboards
 - 2. Power Circuit Breakers

PART 2 PRODUCTS

2.1 PANELBOARDS - GENERAL

- A. Panelboards shall be dead front type, having lugs only or circuit breaker in mains as shown in panelboard schedule with circuit breaker branches.
- B. Panelboard bus structure and main lugs or main breaker shall have current ratings as shown on plans. Such rating shall be established by heat rise test with Maximum hot spot temperature on any connector or bus bar not to exceed 50 degrees C rise above ambient at full rated load. Heat rise test shall be conducted in accordance with UL Standard UL67. Bus structure shall be tin-plated aluminum or tin-plated copper. All neutral busses shall be full size. All panelboards shall contain ground buss.
- C. Entire panelboard assembly, including all bussing, shall have SCCR ratings meeting or exceeding the minimum AIC ratings listed on the plans for the panel. All ratings shall be full ratings. Series ratings will not be allowed unless shown otherwise on drawings.
- D. Panelboards shall be listed by Underwriters Laboratories and shall bear the UL label. Panelboards shall be suitable for use as service equipment when required.
- E. Top/bottom feed arrangement and lug sizes/quantities shall be coordinated by the contractor.
- F. Service entrance panelboards shall be provided with barrier such that no uninsulated, ungrounded service busbar or service terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations.

2.2 CIRCUIT BREAKERS

- A. Where the highest continuous current trip setting for which the actual overcurrent device installed in a circuit breaker is rated (or can be adjusted to is 1200A or higher, breakers shall be electronic trip and shall be provided with arc energy-reducing maintenance switching (with local status indicator) to reduce arc flash energy per NEC 240.87 requirements.
- B. Circuit breakers shall be quick-make and quick-break, whether actuated automatically or manually. Circuit breakers shall have inverse time tripping characteristics with automatic release which shall trip free of the handle. Circuit breaker handles shall be three distinct positions—"OFF", "ON", and "TRIPPED". When a circuit breaker opens on overload or short circuit, the operating handle shall automatically assume the "TRIPPED" position.
- C. Multipole breakers shall be internal common trip with single operating handle. External handle ties are not acceptable, unless specifically noted otherwise (such as for multi-wire branch circuits described below).

SHELBY COUNTY WATER SERVICES BUILDING PROJECT POWER PANELBOARDS – CIRCUIT BREAKER TYPE

SECTION 26 2416 – Page 2 of 3

- D. Circuit breakers feeding multiwire branch circuits (as defined by NEC) consisting of separate single phase loads sharing a common neutral shall be provided with handle ties to simultaneously disconnect all ungrounded conductors per NEC Article 210.4(B). The necessary locations of these handle ties shall be coordinated by the contractor. Where necessary, the contractor may rearrange circuit breakers (as minimally as possible) as required to meet this requirement.
- E. Circuit breakers shall be of the bolt-on type.
- F. Circuit breakers shall be “FA” frame and larger.
- G. All breakers shall meet the minimum RMS symmetrical interrupting capacity ratings shown on plans for the associated panel. All interrupting ratings shall be full ratings. Series ratings will not be allowed unless shown otherwise on drawings.
- H. The front face of all circuit breakers shall be flush with each other. Breaker numbers shall be permanently attached to trim.
- I. All branch circuit breakers shall be listed to UL489 or shall be specially-tested to be HACR listed.

2.3 CABINETS, TRIM AND WIREWAY SPACE

- A. Clear space from bottom of lugs to bottom of wireway shall be not less than 6 inches for 400 amps and below, 10 inches for 600 amps, 12 inches for 800 amps and above.
- B. Panelboard interiors shall be fastened to cabinets by adjustable aligning supports.
- C. Panelboard assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets.
- D. Fronts of cabinets shall be made from a single sheet of full finished steel having the door cut out. Doors shall have flush hinges, and lock utilizing all metal construction (with all locks keyed alike). Front shall be attached to cabinets with hinged trim with piano-hinge down full length of one side to allow access to wiring without complete removal of outer trim. Front shall be provided with a metal directory and holder with clear plastic covering welded to the inside of the door. Fronts shall be code gauge full-finished steel with rust inhibiting primer and baked enamel finished in ASA #49 gray. Panelboards installed in exterior or wet locations shall have NEMA 3R enclosures.
- E. Each section of multi-section panelboards shall be of matching heights and depths.
- F. Panelboard enclosures shall be furnished as shown on panel schedule on plans for surface, flush or motor control center mounting.

2.4 MANUFACTURER

- A. Panelboards shall be as manufactured by Square 'D' or approved equal..

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
POWER PANELBOARDS – CIRCUIT BREAKER TYPE**

SECTION 26 2416 – Page 3 of 3

PART 3 EXECUTION

3.1 INSTALLATION

- A. All panelboard dimensions and clearances shall be carefully checked and coordinated with the proper trades to insure proper mounting space and support prior to roughing in equipment. In no case shall any circuit breaker be located above 6'-7" A.F.F..
- B. Wiring in panelboard gutters shall be done in a neat and workmanlike manner. Wiring shall be grouped into neat bundles and secured with approved tie wraps.

3.2 Panel Identification

- A. Refer to Specification Section 260553.

END OF SECTION 262416

SHELBY COUNTY WATER SERVICES BUILDING PROJECT LIGHTING PANELBOARDS

SECTION 26 2417 – Page 1 of 3

PART 1 GENERAL

1.1 GENERAL

A. The work under this section includes but is not limited to the following:

1. Lighting Panelboards
2. Circuit Breakers

PART 2 PRODUCT

2.1 PANELBOARDS

A. Enclosure:

1. Panelboards shall be dead front type and shall be in accordance with Underwriter's Laboratories, Inc., standard of panelboards and enclosing cabinets and so labeled.
2. Panelboards installed in dry locations shall have enclosures fabricated from sheet steel and shall be finished in ASA #49. Panelboards installed in exterior or wet locations shall have NEMA 3R enclosures.
3. The door shall have a cylinder type lock. Lock shall be held in place by concealed screw to a captive nut, welded to inside of door. All locks shall be keyed alike.
4. A metal framed circuit directory card holder with clear plastic covering shall be factory-mounted on the inside of door.
5. Panels for 20 or more circuits, including spares and spaces, shall be 20 inches wide.
6. Panelboards enclosures shall be as shown on panel schedule on plans for surface, flush or motor control center mounting.
7. Provide hinged trim with piano-hinge down full length of one side to allow access to wiring without complete removal of outer trim.
8. Each section of multi-section panelboards shall be of matching heights and depths.

B. Bussing/Lugs:

1. Ampacity and service voltage of main buss, lugs or main breakers and branch circuit breakers shall be as shown on drawings.
2. All bussing and associated connectors shall be tin-plated aluminum or tin-plated copper.
3. All panelboards shall contain ground buss.
4. Entire panelboard shall be capable of withstanding a short circuit not less than the interrupting capacity of any breaker in the panel. When a power distribution system electrical study (including short circuit stud, etc.) is a part of the project, contractor shall further verify that all proposed equipment is properly rated (per the results of the study) prior to submitting shop drawings. Interrupting ratings shall be full ratings. Series ratings will not be allowed unless shown otherwise on drawings.
5. Buss connectors shall be for distributed phase arrangement.
6. Top/bottom feed arrangement and lug sizes/quantities shall be coordinated by the contractor.
7. Entire panelboard assembly, including all bussing, shall have SCCR ratings meeting or exceeding the minimum AIC ratings listed on the plans for the panel. When a power distribution system electrical study (including short circuit stud, etc.) is a part of the project, contractor shall further verify that all proposed equipment is properly rated (per the results of the study) prior to submitting shop drawings. All ratings shall be full ratings. Series ratings will not be allowed unless shown otherwise on drawings.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT

LIGHTING PANELBOARDS

SECTION 26 2417 – Page 2 of 3

8. Service entrance panelboards shall be provided with barrier such that no uninsulated, ungrounded service busbar or service terminal is exposed to inadvertent contact by persons or maintenance equipment while servicing load terminations

C. Breaker arrangement and numbering:

1. Panelboards shall be factory assembled with branch breakers arranged exactly as indicated on plans.
2. Breakers shall be numbered vertically beginning top left. Multi-section panelboards shall be numbered consecutively through all sections.
3. Breaker numbers shall be permanently attached to trim.
4. Main breakers shall be vertically-mounted (branch-mounted or back-fed main breakers will not be acceptable unless specifically so shown on plans).

2.2 CIRCUIT BREAKERS

- A. Circuit breakers shall be quick break, quick make, thermal magnetic type, for alternating current. Breakers shall trip free for the handle and tripping shall be indicated by the handle assuming a position between OFF and ON.
- B. Circuit breakers shall be of the bolt-on type.
- C. Multi-pole breakers shall be internal common trip with single operating handle; external handle ties are not acceptable, unless specifically noted otherwise (such as for multi-wire branch circuits described below).
- D. Circuit breakers feeding multiwire branch circuits (as defined by NEC) consisting of separate single phase loads sharing a common neutral shall be provided with multi-pole breakers or handle ties to simultaneously disconnect all ungrounded conductors per NEC Article 210.4(B). The necessary locations of these multi-pole breakers or handle ties shall be coordinated by the contractor. Where necessary, the contractor may rearrange circuit breakers (as minimally as possible) as required to meet this requirement.
- E. All breakers shall meet the minimum RMS symmetrical interrupting capacity ratings shown on plans for the associated panel. All interrupting ratings shall be full ratings. Series ratings will not be allowed unless shown otherwise on drawings.
- F. All branch circuit breakers shall be listed to UL489 or shall be specially-tested to be HACR listed.

2.3 SPECIAL REQUIREMENTS

- A. Any special requirements on the drawings, such as for increased interrupting rating, ground fault protection, etc., shall supersede these specifications, but only insofar as that particular requirement is concerned.
- B. Lighting panels larger than 400A shall conform to the requirements for power panels.

2.4 MANUFACTURER

- A. Panelboards shall be as manufactured by Square 'D', G.E., Siemens or Cutler Hammer.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
LIGHTING PANELBOARDS**

SECTION 26 2417 – Page 3 of 3

PART 3 EXECUTION

3.1 INSTALLATION

- A. All panelboard dimensions and clearances shall be carefully checked and coordinated with the proper trades to insure proper mounting space and support prior to roughing in equipment. In no case shall any circuit breaker be located above 6'-7" A.F.F..
- B. Wiring in panelboard wireways shall be done in a neat and workmanlike manner. Wiring shall be grouped into neat bundles and secured with approved tie wraps.
- C. For all flush-mounted panelboards, a minimum of three (3) one-inch empty conduits shall be stubbed out above the nearest accessible ceiling space for future use.

3.2 Panel Identification

- A. Refer to Specification Section 260553.

END OF SECTION 262417

PART 1 GENERAL

1.1 DESCRIPTION

- A. Wiring Devices
- B. Plates
- C. Finishes

PART 2 PRODUCTS

2.1 WIRING DEVICES and Plates

- A. Switches shall be AC type, extra-heavy duty industrial grade (unless otherwise shown) of ratings shown on drawings. Switches shall be as manufactured by Hubbell, P & S, Sierra, Bryant, GE, Arrow Hart or equal.
- B. Receptacles shall have blade configuration and shall be heavy duty industrial grade (unless otherwise shown) of current and voltage rating as shown on drawings. Receptacles shall be as manufactured by Hubbell, P & S, Sierra, Bryant, GE, Arrow Hart or equal.
- C. All GFCI-type receptacles shall continuously self-test and shall trip/deny power if the receptacle does not provide proper GFCI protection or if the line/load terminations are miswired and shall provide visual indication of power status, trip conditions, ground fault conditions and end-of-life status.
- D. Each wiring device shall have a plate (see "Finishes" section below for specific requirements).

2.2 FINISHES

- A. All wiring devices (switches, receptacles, etc.) shall be colored to match the coverplates described below. For instance, all items covered by stainless steel, aluminum or malleable iron plates shall be gray in color.
 - 1. Exceptions:
 - a. Emergency wiring devices shall be red.
 - b. Isolated ground wiring devices shall be orange.
- B. Coverplates for recessed, wall-mounted electrical items (switches, receptacles, telephone outlets, etc.) shall be stainless steel unless shown otherwise.
- C. Coverplates, trim rings, etc. for recessed, floor-mounted electrical items (floor outlets, underfloor duct junctions, etc.) shall match finish of building hardware (302/304 stainless steel, brass, etc.) in area installed.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
WIRING DEVICES**

SECTION 26 2726 – Page 2 of 2

- D. Coverplates for exposed electrical items (switches, receptacles, telephone outlets, etc.) shall be of same material as exposed boxes (see Outlet Box Specification for required material type) and shall have beveled edges.
- E. Coverplates for receptacles in wet locations shall be metallic, in-use type, rated for wet locations per NEC requirements unless noted otherwise.
- F. See "Electrical Identification" specification section for coverplate labeling requirements.

PART 3 EXECUTION

3.1 GENERAL MOUNTING

- A. Symbols on drawings and mounting heights are approximate. The exact locations and mounting heights shall be determined on the job, and it shall be the Contractor's responsibility to coordinate with all trades to secure correct installation. For example, Contractor shall coordinate exact mounting heights over counters, in or above backsplashes, in block walls, and at other specific construction features.
- B. Verify all door swings with Architectural. Locate boxes for light switches within four inches of door trim on swing side (not hinge side) of door.
- C. Devices and associated plates shall not be used as support; outlet boxes shall be rigidly supported from structural members.
- D. Mount all straight-blade receptacles vertically with ground pole up, unless specifically noted otherwise.
- E. Unless otherwise shown or required by local handicap codes, outlet boxes shall be the following distances above the finished floor unless otherwise noted.
 - 1. Receptacles and telephone outlets in offices and other finished areas: 1'-6" to the center of the box.
 - 2. Receptacles and telephone outlets in equipment rooms and other unfinished areas: 4'-0" to the center of the box.
 - 3. Receptacles over counters: As Noted
 - 4. Switches, general: 4'-0" to the top of the box.
 - 5. Fire Alarm Pull Stations: 4'-0" to the top of the box.
 - 6. Fire Alarm Audio/Visual Devices: As shown on fire alarm shop drawings (Entire lens shall be above 80" and below 96" per NFPA 72).
 - 7. Push-button, etc., general: 4'-0" to the top of the box.
 - 8. Other device types: verify with engineer prior to rough-in.

END OF SECTION 262726

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SAFETY SWITCHES AND FUSES**

SECTION 26 2816 – Page 1 of 2

PART 1 GENERAL

1.1 DESCRIPTION

- A. Safety Switches
- B. Fuses
- C. Branch Feeders
- D. Feeders

PART 2 PRODUCTS

2.1 SAFETY SWITCHES

- A. Safety switches shall be quick-make, quick-break, NEMA heavy duty type HD, fused or nonfused as shown. Switch blades shall be fully visible in the off position.
- B. Safety switches shall be furnished with transparent internal barrier kits to prevent accidental contact with live parts. Barriers shall provide finger-safe protection when the switch door is open and shall allow use of test probes and removal of fuses without removing barrier.
- C. Fused switches shall have provisions for class R, rejection type fuses.

2.2 FUSES (600V)

- A. Fuses for all branch switches shall be Bussman Mfg. Co., Dual Element, Class "R" Fusetron.
- B. Fuses for main switch/switches shall be Bussman Mfg. Co. Hi-Cap.

2.3 MANUFACTURER

- A. Safety switches shall be as manufactured by Square 'D', G.E., Siemens or Cutler Hammer.
- B. Fuses shall be as manufactured by Bussman Mfg. Co. or equal.

PART 3 EXECUTION

3.1 SAFETY SWITCHES

- A. Safety switches shall be installed as shown on the plans and in accordance with N.E.C.
- B. Locations shown for safety switches on plans are diagrammatical only. Exact locations shall be field coordinated by contractor as required to provide code-required clearances.
- C. Switch enclosures shall be rated NEMA I indoors in dry locations and NEMA3R outdoors and in wet areas.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SAFETY SWITCHES AND FUSES**

SECTION 26 2816 – Page 2 of 2

- D. Adequate support shall be provided for mounting safety switches. Safety switches shall not be mounted to the associated equipment (unless the safety switch is furnished with the equipment).

3.2 FUSES

- A. Fuses shall be sized as shown on drawings, unless a smaller size is required by the associated equipment supplier, in which case the contractor shall provide fuses sized as directed by the associated equipment supplier at no additional cost.
- B. Provide not less than one spare set of fuses for each size used. Provide an additional spare set for each five sets of same size fuses used.

END OF SECTION 262816

SHELBY COUNTY WATER SERVICES BUILDING PROJECT SURGE PROTECTIVE DEVICES

SECTION 26 4300 – Page 1 of 5

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes field-mounted SPDs for low-voltage (<1000 V) power distribution and control equipment.
- B. The specified unit(s) shall provide effective high energy transient voltage surge suppression, surge current diversion and high frequency noise attenuation in all electrical modes for equipment connected downstream from the facility's meter or load side of the main overcurrent device. The unit(s) shall be connected in parallel with the facility's wiring system.
- C. The unit(s) shall be designed and manufactured in North America by a qualified manufacturer of suppression filter system equipment. The qualified manufacturer shall have been engaged in the commercial design and manufacture of such products for minimum of ten (10) years.
- D. All products that are submitted according to these specification will be required to meet this specification in its entirety for both service and distribution TVSS systems. Any product that is submitted and does not comply with all parts of this specification will be subject to rejection.

1.3 DEFINITIONS

- A. VPR: Voltage Protection Rating.
- B. SPD: Surge Protective Device(s)
- C. $I_{(n)}$: Nominal Discharge Current

1.4 SUBMITTALS

- A. See specification section 260500.
- B. Product Data: For each type of product indicated. Include:
 - 1. Maximum Single Impulse Surge Current Rating.
 - 2. Surge Life (Repetitive Surge) Rating.
 - 3. UL1449 (Latest Edition) Voltage Protection Ratings (VPR).
 - 4. UL1449 (Latest Edition) Nominal Discharge Current (I_n).
 - 5. Product dimensions and weights.
 - 6. Furnished specialties and accessories.
- C. Qualification Data:
- D. Safety Agency File Number.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT SURGE PROTECTIVE DEVICES

SECTION 26 4300 – Page 2 of 5

- E. ISO 9001-2008 Certification.
- F. ISO 1401-2001 Certification.
- G. Operation and Maintenance Data: For SPDs to include all submittal data and any applicable operation and maintenance manuals.
- H. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency, and marked for intended location and application.
- B. The unit shall be UL 1449 Listed and CUL Approved as a Surge Protective Device and UL 1283 Listed as an Electromagnetic Interference Filter
- C. Provide 2nd party certified data demonstrating SPD response to ANSI/IEEE C62.41.2-2002 standard waveforms when tested according to IEEE C62.45.
- D. Comply with NFPA 70.
- E. All SPDs provided within this project at the service entrance, distribution panels, and sub-panels shall be from the same manufacturer.

1.6 PROJECT CONDITIONS

- A. Service Conditions: Rate SPDs for continuous operation under the following conditions unless otherwise indicated:
 - 1. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.
 - 2. Operating Temperature: 30 to 150 deg F.
 - 3. Humidity: 0 to 95 percent, non-condensing.
 - 4. Altitude: Less than 13,000 feet above sea level.

1.7 COORDINATION

- A. Where field-mounted SPD's are specifically shown on plans, coordinate locations of field-mounted SPDs to allow adequate clearances for maintenance.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

1.9 EXTRA MATERIALS

SHELBY COUNTY WATER SERVICES BUILDING PROJECT SURGE PROTECTIVE DEVICES

SECTION 26 4300 – Page 3 of 5

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Replaceable Protection Modules: 1 of each size and type installed, where field-replaceable modular SPDs are provided.
 - 2. Fuses: 1 of each size and type installed, where field-replaceable fuses are provided.

PART 2 PRODUCTS

2.1 SURGE PROTECTIVE DEVICES

- A. Manufacturer:
 - 1. Integral Devices: Surge Protective Devices shall be as manufactured by the distribution equipment manufacturer (Square D, etc.), or approved equal if all of the performance of this specification are met and all UL listing of the equipment manufacturer are met.
 - 2. External Devices (where specifically specified on plans): Surge Protective Devices shall be as manufactured by the distribution equipment manufacturer (Square D, etc.) or Surge Suppression Inc.
- B. Each Surge Protective Device shall:
 - 1. Be internal to the associated distribution equipment (without violating any applicable UL listings) unless specifically shown otherwise on plans.
 - 2. Be UL 1449 (Latest Edition) listed.
 - 3. Have short-circuit current rating complying with UL 1449 (Latest Edition), that matches or exceeds the short-circuit rating of the associated distribution equipment.
 - 4. Be designed to withstand a maximum continuous operating voltage (MCOV) of not less than 115% of nominal RMS voltage.
 - 5. Have fuses, rated at 200-kA interrupting capacity.
 - 6. Have a minimum UL 1449 Nominal Discharge Current (I_n) Rating of 20kA.
 - 7. Be fabricated using bolted compression lugs.
 - 8. Provide suppression for all ten (10) modes of protection.
 - 9. Have LED indicator lights for power and protection status of each phase.
 - 10. Have audible alarm, with silencing switch, to indicate when protection has failed.
 - 11. Have form-C contacts rated at 2 A and 24-V ac minimum, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with facility monitoring and control system if monitoring by that system is required by plans or other specifications.
 - 12. Have six-digit transient-event counter, mounted to front of equipment door, set to totalize transient surges (externally mounted SPD's may have the transient –event counter monted on the visible face of the SPD).
 - 13. Meet all UL 96A requirements (for Lightning Protection Systems) where the device is installed at a service entrance of the facility. At a minimum, these devices shall:
 - a. Be marked as Type 1 or Type 2 SPDs with product Identity consisting of “Surge Protective Device” or “SPD”, and identifying all ratings so required by UL96A and the 4 digit alpha numeric Control Number.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
SURGE PROTECTIVE DEVICES**

SECTION 26 4300 – Page 4 of 5

- b. Have a minimum UL 1449 Nominal Discharge Current (I_n) Rating of 20kA.
 - c. Be UL listed and labeled with holographic label.
- C. Peak Single-Impulse Surge Current Rating shall be meet the following minimums unless specifically shown otherwise on plans:

Application	Per Phase	Per Mode
Service Entrance Devices	240 kA	120 kA
Downstream Devices	160 kA	80 kA

- D. The ANSI/UL 1449 voltage protection rating (VPR) in grounded wye circuits, the SPDs shall not exceed the following:

Modes	208Y/120V	480Y/277V	600Y/347V
L-N,L-G, N-G	800	1200	1500
L-L	1200	2000	2500

- E. The ANSI /UL 1449 VPR for 240/120 V, 3-wire or 4-wire circuits with high leg shall not exceed the following:

Modes	240/120V
L-N,L-G, N-G	1200/800

2.2 ENCLOSURES

- A. Where external units are specifically specified on plans, units not mounted within electrical distribution equipment (such as switchboards, MCC's, etc.) shall be provided in enclosures with NEMA enclosure ratings that match or exceed the NEMA enclosure ratings of the equipment from which the units are fed. For example, a unit fed from a NEMA 4X stainless steel panelboard shall also be mounted within a NEMA 4X stainless steel enclosure.

PART 3 EXECUTION

3.1 INSTALLATION

- A. All SPD's shall be integrally-mounted within the associated distribution equipment unless specifically shown otherwise on plans.
- B. Install SPDs at service entrance on load side, with ground lead bonded to service entrance ground.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT SURGE PROTECTIVE DEVICES

SECTION 26 4300 – Page 5 of 5

- C. Install SPDs downstream of the service entrance with conductors or buses between suppressor and points of attachment as short and straight as possible. The lead lengths between the TVSS unit and the equipment being protected shall not exceed fourteen (14) inches without approval from the engineer. Do not bond neutral and ground. Leads shall be as straight as possible with no sharp bends.
- D. Where externally-mounted SPD's are specifically shown on plans, provide circuit breaker as directed by the SPD supplier as a dedicated disconnecting means for SPD unless otherwise indicated.

3.2 FIELD QUALITY CONTROL

- A. Ensure that interiors are free of foreign materials and dirt.
- B. Check and test switches, pushbuttons, meters for proper operation.
- C. Check and test indicating lights for proper operation and color.
- D. Perform manufacturer's on site field test procedures.

3.3 STARTUP SERVICE

- A. Do not perform insulation resistance (MEGGER) tests of the distribution wiring equipment with the SPDs installed. Disconnect all wires, including neutral, before conducting insulation resistance tests, and reconnect immediately after the testing is over.

3.4 SYSTEM WARRANTY

- A. The SPD system manufacturer shall warranty the entire SPD system against defective materials and workmanship for a period of ten (10) years from the date of substantial completion. This warranty is in effect as long as the unit is installed in compliance with the manufacturer's installation, operation, and maintenance manual, UL Listing requirements, and any applicable national or local electrical codes.
- B. Any SPD device which shows evidence of failure or incorrect operation, including damage as the result of lightning strikes, during the warranty period shall be replaced by the manufacturer at no charge to the owner. Warranty will provide for multiple exchanges of any inoperable devices at any time during the warranty period which starts at the date of substantial completion of the system to which the surge suppressor is installed.
- C. The manufacturer is required to have a nationwide network of factory-authorized local service representatives for repair and service of this product. The manufacturer shall have a dedicated 1-800 telephone number for service problems and questions. This number shall be manned by a knowledgeable factory employee to ensure prompt response to any emergency situation that may arise.

END OF SECTION 264300

SHELBY COUNTY WATER SERVICES BUILDING PROJECT LIGHTING MATERIALS AND METHODS

SECTION 26 5000 – Page 1 of 3

PART 1 GENERAL

1.1 DESCRIPTION

- A. Lighting Fixtures
- B. Drivers

1.2 Submittals

- A. Complete submittals shall be provided identifying all lighting fixture types and options, all lamp types (where applicable) and compliance with all contract requirements. The absence of clear submittal information specifically listing exceptions/deviations from detailed contract requirements will be understood to indicate that the contractor/supplier intends to meet all contract requirements. Refer to specification section 260500 for additional requirements.

PART 2 PRODUCTS

2.1 GENERAL

- A. Lighting fixtures shall be furnished as shown on plans and specified herein. It shall specifically be the responsibility of Contractor to verify exact types ceilings, walls, etc. and recessing depth of all recessed fixtures and furnish the specific mounting trims and accessories of the specified and/or accepted fixture specifically for the ceiling, wall etc. in which each fixture is to be installed.
- B. Base bid manufacturers are listed on the lighting fixture schedule. Manufacturers listed without accompanying catalog numbers are responsible for meeting the quality standards, efficiency, maximum wattages and photometric distributions set by the specified product.
- C. All lighting fixtures shall be so designed and shall have drivers and other similar items so installed as to function without interruptions or failures when operating in the environment in which they are proposed to be installed. Special attention shall be given to environments with potentially high ambient temperatures such as attic spaces, exterior soffits, confined interior soffits, coves, unconditioned spaces, etc. and shall be addressed by providing fixtures with suitable high ambient temperature ratings, remote mounting of drivers/ballasts, providing approved ventilation, etc. as directed by fixture manufacturer and approved by engineer, at contractor's expense.
- D. All fixtures installed such as to create penetrations through fire rated ceiling or wall assemblies shall be labeled as suitable for that purpose or installed with covers, tenting or other means as required to maintain the fire rating of the assembly.

2.2 LED Luminaires

- A. For the purpose of these specifications, LED Luminaires shall be defined as the entire LED fixture assembly including LED array, drivers, housing, electronics, etc. that compose the lighting fixture.
- B. Furnish and install LED Luminaire of proper size, type, efficacy, delivered lumen output, color temperature, distribution pattern, operational life, and CRI as shown on drawings.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT LIGHTING MATERIALS AND METHODS

SECTION 26 5000 – Page 2 of 3

- C. LED Luminaires shall be tested in accordance with LM-79 and LM-80 standards.
- D. LED drivers shall comply with NEMA 410 standards for inrush current, etc.
- E. Exterior, pole mounted LED Luminaires shall be provided with an easily-serviceable, UL recognized surge protection device that meets a minimum 10kA Category C Low operation (IECC C62.41.2-2002). Device shall be wired in front of light engine(s) and driver(s) and shall fail “open” such as to prevent fixture operation after a surge protection failure.
- F. LED Luminaires shall have a guarantee-warranty of at least five years unless specifically noted otherwise on contract documents.
- G. LED Luminaire assembly shall comply with ambient temperature requirements specified in General section above.

2.3 STEMS/Pendants

- A. Hangers shall be approved ball aligner type swivel, 30 degrees from vertical with swivel below canopy.
- B. Stems/Pendants shall be rigid or IMC conduit unless specified otherwise on plans. Proposed stem/pendant types shall be submitted for review prior to shipment of light fixtures from factory.
- C. Stems/Pendants shall be provided as required to prevent swaying of fixtures due to HVAC system airflow or other similar occurrences.
- D. Shall be painted the same color as the fixture trim unless noted otherwise.

2.4 MANUFACTURER

- A. Fixtures and stems shall be manufactured as shown in fixture schedule or approved equals.
- B. Drivers shall be as manufactured by Philips/Advance, GE, Lutron, Magnatec, Motorola, EldoLED or approved equal.

PART 3 EXECUTION

3.1 INSTALLATION OF LIGHTING FIXTURES

- A. Support:
 - 1. Support of all lighting fixtures shall be responsibility of electrical contractor. All lighting fixture supports shall be installed in accordance with lighting fixture supplier's recommendations.
 - 2. Contractor shall coordinate installation requirements for all wall-mounted fixtures (especially for wall-mounted fixtures on uneven wall surfaces, etc.) as required to assure a level/flat mounting surface and level/plumb/secure finished installation. Contractor shall provide flat mounting plates or other mounting provisions where necessary. Any proposed mounting plates, etc. shall be submitted to and approved by project architect prior to ordering materials.
 - 3. Fixtures shall be supported independent of ceiling from structural members of building.
 - 4. Lay-in fixtures shall be supported by four (4) taut 12 gauge hanger wires connected from each corner of the fixture to the structure above so that fixture is supported independent of the ceiling.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
LIGHTING MATERIALS AND METHODS**

SECTION 26 5000 – Page 3 of 3

5. Other recessed light fixtures (including recessed downlights) shall be supported with two (2) taut 12 gauge hanger wires connected from opposing corners of the light fixture to the structure above so that fixture is supported independent of the ceiling.
6. Pendant mounted fixtures shall be directly supported from the structure above using a 9 gauge hanger wire or an approved alternate support without using the ceiling suspension system for direct support.
7. Tandem fixtures may utilize common hanger wires.
8. All lay-in fixtures shall be attached to ceiling grid by means of approved clips and in accordance with the N.E.C.
9. Contractor shall submit typical hanging detail to Engineer before installing any fixtures.

B. Connections:

1. All grid fixtures shall be wired by flex individually to junction and not wired fixture to fixture.
2. All flex shall contain 3 conductors (3rd wire ground). Ground wire shall be securely grounded at each end. Other conductors shall be connected by approved connectors.

C. Row-Mounted fixtures:

1. All stems on row-mounted fluorescent fixtures shall be installed as follows (except fixtures with slide grip hangers):
 - a. One stem shall be installed in the first fixture knockout from end of row (on the first and last fixture of the row).
 - b. One stem shall be installed between each two fixtures. Stem shall center joint where fixtures join and shall attach by use of "joining plates".
2. All fixtures in continuous rows other than recessed grid type shall be connected by nipples with locknuts bushings.

D. Coordination:

1. Contractor shall coordinate all dimensions & locations of light fixtures prior to rough-in to insure proper fit and coordination with other trades.
2. Contractor shall verify exact ceiling types being installed and shall adjust fixture trim types accordingly (prior to submitting light fixture shop drawings).

END OF SECTION 265000

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
AUXILIARY SYSTEMS CABLES, 0-50V**

SECTION 27 0500 – Page 1 of 4

PART 1 GENERAL

1.1 DESCRIPTION

- A. Cables rated for 0V-50V application

PART 2 PRODUCTS

2.1 General

- A. Unless specified otherwise, all cables within the scope of this specification section shall:

1. Be rated for exposed cable tray installation.
2. Be plenum rated.
3. Be UL-rated for the proposed application.
4. Be multi-conductor with overall outer sheath as required by the application. The insulation of each conductor within the overall multi-conductor cable shall be uniquely color-coded. Ground conductors (when provided) within the multi-conductor cable shall have green insulation. Conductors with green insulation shall not be used for conductors other than ground.
5. Utilize copper conductors.
6. Have wire gauge as required to limit voltage drop to acceptable limits determined by the system supplier and to meet all applicable code requirements.
7. Where installed underground, within slab-on-grade or in exterior locations, be rated for wet locations.
8. Where required for specific systems, meet the specific requirements (conductor quantity, wire gauge, insulation type, shielding, etc.) of the system supplier.

2.2 Class 1 Control cabling (120VAC Control Circuits, Etc.)

- A. In addition to above requirements, and unless specified otherwise, Class 1 control cabling shall:

1. Be rated for 600V.
2. Be industrial grade.
3. Have stranded conductors.
4. Have sunlight/oil-resistant PVC/Nylon insulation and jacket with ripcord.
5. Be manufactured by Belden, AlphaWire or General Cable.

2.3 Class 2 & 3 Control cabling (fed From Class 2 or 3 Power Supplies)

- A. In addition to above requirements, and unless specified otherwise, Class 2 & 3 control cabling shall:

1. Be rated for 300V.
2. Be shielded if so recommended by the system supplier/integrator.
3. Have twisted conductors.
4. Have plenum-rated insulation/jacket with ripcord.
5. Be manufactured by AlphaWire, Belden, General Cable, Superior Essex or West Penn.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
AUXILIARY SYSTEMS CABLES, 0-50V**

SECTION 27 0500 – Page 2 of 4

2.4 Network cabling

- A. Furnish and install all Ethernet, Fiber Optic and Backbone Copper Telephone cabling in accordance with all BICSI requirements and in accordance with other applicable specification sections.

PART 3 EXECUTION

3.1 General INSTALLATION

A. Routing:

1. All wires and cables shall be installed in conduit unless specifically noted otherwise. Where conduit is not otherwise required by contract documents, 0-50V Cabling located within concealed, accessible ceiling spaces (such as above lay-in ceilings) may be run without conduit if the following requirements are met:
 - a. Cabling is plenum-rated, multi-conductor.
 - b. Cabling is supported by cable tray or with J-hook supports on intervals not to exceed 5'-0" on center. Cabling shall be supported solely from the cable tray or j-hooks supported from the building structure, without using piping, ductwork, conduit or other items as supports.
 - c. Cabling is neatly formed, bundled and tied with plenum-rated Velcro straps on intervals not to exceed 30" on center.
 - d. Properly-sized conduit(s) are provided wherever cabling enters an inaccessible or exposed area (such as above gyp board ceilings, within walls or through walls).
 - e. Cabling is not a part of a Fire Alarm System, Smoke Control System, Emergency Generator Control System or other life-safety related system.
2. End bushings shall be provided on both ends of all raceway terminations.
3. No splices shall be pulled into conduit.
4. No cabling shall be pulled until conduit is cleaned of all foreign matter.

B. Penetrations:

1. All fire/smoke barrier penetrations shall be made in accordance with a U.L. listed assembly.
2. For cabling not installed in conduit:
 - a. Fire/smoke barrier penetrations shall be sealed utilizing an enclosed fire-rated pathway device (STI EZ Path or equal) containing a built-in fire sealing system sufficient to maintain the hourly fire rating of the barrier being penetrated. The self-contained sealing system shall automatically adjust to the installed cable loading and shall permit cables to be installed, removed or retrofitted without the need to remove or reinstall firestop materials. The pathway shall be UL Classified and tested to the requirements of applicable ASTM/UL1479 standards.
3. For cabling installed within conduit from endpoint to endpoint:
 - a. Fire/smoke barrier penetrations shall be sealed utilizing fire caulk or other equivalent firestop systems around perimeters of conduits per UL requirements.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
AUXILIARY SYSTEMS CABLES, 0-50V**

SECTION 27 0500 – Page 3 of 4

4. For cabling installed within cable trays:

a. Fire/smoke barrier penetrations shall be sealed with one of the following methods:

- 1) Continuous cable tray through the penetration, with a combination of large firestop pillows and small firestop pillows contained, supported and secured (to prevent unauthorized removal) on both sides by aluminum wire mesh and firestop putty. Firestop pillows shall be STI Series SSB or equal and Firestop putty shall be STI Spec Seal or equal.
- 2) Cable tray broken at the penetration, with fire/smoke barrier penetrations sealed utilizing an enclosed fire-rated pathway device (STI EZ Path or equal) containing a built-in fire sealing system sufficient to maintain the hourly fire rating of the barrier being penetrated. The self-contained sealing system shall automatically adjust to the installed cable loading and shall permit cables to be installed, removed or retrofitted without the need to remove or reinstall firestop materials. The pathway shall be UL Classified and tested to the requirements of applicable ASTM/UL1479 standards.

C. Excess Cabling:

1. Excess cabling shall be neatly coiled within all junction boxes, pullboxes, wireways, etc. and at all terminations as required to allow future re-termination of cabling.

D. Terminations:

1. All conductors/cabling (including spare conductors) shall be properly terminated unless specifically directed otherwise. See below for general termination hardware requirements.
2. Cabling shall be neatly formed, bundled and tied at all terminations.

3.2 Splices/Connections/Terminations:

A. Network Cabling:

1. Network and fiber optic cabling shall be continuous from endpoint to endpoint and shall not be spliced unless specifically noted otherwise.

B. Control Cabling:

1. Connections shall be made with T & B Sta-Kon wire joints EPT66M, complete with insulating caps. To be installed with WT161 Tool or C nest of WT11M Tool, Ideal Super - Nuts (not wire nuts), Ideal Wing Nuts, or Buchanan Elec. Products B Cap or Series 2000 Pressure connectors complete with nylon snap on insulators to be installed with C24 pressure tool.

C. Shielded cabling:

1. Unless directed otherwise by the system supplier, 0-50V cable shielding shall be grounded at the PLC/control panel end only (not at the field device end) with a termination kit as directed by the PLC/control panel supplier.
2. Shielded cabling shall be continuous from endpoint to endpoint and shall not be spliced without prior written approval from the Engineer.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
AUXILIARY SYSTEMS CABLES, 0-50V**

SECTION 27 0500 – Page 4 of 4

3.3 Labeling

- A. Refer to Specification Section 260553 for all labeling requirements.

END OF SECTION 270500

SHELBY COUNTY WATER SERVICES BUILDING PROJECT STRUCTURED CABLING SYSTEM

SECTION 27 1000 – Page 1 of 18

PART 1 GENERAL

1.1 SCOPE:

- A. This document describes the products and execution requirements relating to furnishing and installing Telecommunications Cabling. Backbone and Horizontal cabling comprised of copper and fiber cabling, and support systems are covered under this document.
- B. All cables and related terminations, support and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the structured cabling contractor as detailed in this document.
- C. Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of telecommunications outlets, typical installation details, cable routing and outlet types are indicated on the plans. If the bid documents are in conflict, this specification shall take precedence.
- D. Refer to Specification Section 260553 (Electrical Identification) for additional identification requirements.
- E. Refer to Specification Section 270500 (Auxiliary System Cables, 0-50V) for additional material and installation requirements.

1.2 REGULATORY REFERENCES:

- A. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the National Electrical Code, local ordinances and present manufacturing standards.
- B. All materials shall be UL Listed and shall be marked as such. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.
- C. All modular jacks, patch cords, consolidation point, and patch cords shall be ETL Verified (not just tested) to be category 6 component and channel compliant.
- D. The cabling system described in this specification is derived from the recommendations made in recognized telecommunications industry standards. The following documents are incorporated by reference:
 - 1. ANSI/TIA/EIA - 568-B.1, Commercial Building Telecommunications Cabling Standard Part 1: General Requirements, April, 2001
 - 2. ANSI/TIA/EIA - 568-B.2, Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components, April, 2001
 - 3. ANSI/TIA/EIA - 568-B.2-1, Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted Pair Cabling Components, Addendum 1 – Transmission Performance Specifications for 4-pair 100 Ω Category 6 Cabling
 - 4. ANSI/TIA/EIA - 568-B.3, Commercial Building Telecommunications Cabling Standard Part 3: Optical Fiber Cabling Components, March, 2000
 - 5. ANSI/TIA/EIA – 569-A, Commercial Building Standard for Telecommunications Pathways and Spaces, February, 1998
 - 6. ANSI/TIA/EIA – 606-A, Administration Standard for Telecommunications Infrastructure of Commercial Buildings, February, 2002

SHELBY COUNTY WATER SERVICES BUILDING PROJECT STRUCTURED CABLING SYSTEM

SECTION 27 1000 – Page 2 of 18

7. ANSI/TIA/EIA – 607-AJ, Commercial Building Grounding and Bonding Requirements for Telecommunications, August 1994
8. ANSI/ TIA/EIA – 758, Customer-Owned Outside Plant Telecommunications Cabling Standard, April 1999
9. BICSI - TDMM, Building Industries Consulting Services International, Telecommunications Distribution Methods Manual (TDMM) 10TH edition.
10. National Fire Protection Agency (NFPA – 70), National Electrical Code (NEC) –2002
11. ANSI/TIA/EIA – 45-B, Test Procedures for Fiber Optic Connections.
12. ANSI/TIA/EIA – 526-14, Power Test for Fiber Runs.
13. FCC 47 CFR 68
14. NEMA 250
15. NEC Articles 770 and 800
16. ADA, Americans with Disabilities Act

- E. If this document and any of the documents listed above are in conflict, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Contractor has the responsibility to determine and adhere to the most recent release.
- F. This document does not replace any code, either partially or wholly. The contractor must be aware of local codes that may impact this project. All local State and federal codes are to be followed.

1.3 Approved Contractor:

A. The Structured Cabling Contractor must meet the following requirements:

1. Contractor must have a certified RCDD on staff. The project manager for this project shall have an RCDD certification, and RCDD shall be responsible for reviewing all aspects of the design, submittals and installation of all products.
2. All required submittal information shall be stamped by the RCDD.
3. Contractor must have a minimum of 3 years experience with projects of similar size and scope to this project.
4. The company performing the work must have been in business for a minimum of 3 years.
5. The company must have an office within 75 miles of the job site. The contractor's installation crew shall consist of at least 30 percent BICSI certified technicians, as well as certification in the approved manufacturer's solutions to extend all performance warranties at no additional cost to the owner.

- B. The Structured cabling contractor is responsible for workmanship and installation practices in accordance with the requirements of the standards described in these specifications and manufacturer's requirements.

1.4 WORK INCLUDED:

- A. The work included under this specification consists of furnishing all labor, equipment, materials, and supplies and performing all operations necessary to complete the installation of this structured cabling system in compliance with the specifications and drawings. The structured cabling contractor will provide and install all of the required material to form a complete system whether specifically addressed in the technical specifications or not.
- B. The work shall include, but not be limited to the following:

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
STRUCTURED CABLING SYSTEM**

SECTION 27 1000 – Page 3 of 18

1. Furnish and install a complete telecommunications wiring infrastructure.
2. Furnish, install, and terminate all UTP and Optical Fiber cable
3. Furnish and install all wall plates, jacks, patch panels, and patch cords at equipment racks and at work outlets (unless shown otherwise on plans).
4. Furnish and install all required cabinets and/or racks as required and as indicated.
5. Furnish any other material required to form a complete system.
6. Perform channel testing (100% of horizontal and/or backbone links/channels) and certification of all components.
7. Furnish test results of all cabling to the owner on disk and paper format, listed by each closet, then by workstation ID.
8. Provide owner test results and documentation. (Testing documentation and As-built drawings)

1.5 SUBMITTALS:

- A. Within thirty (30) days of notice to proceed the structured cabling contractor shall submit the following items:
 1. Submit copies of the certification of the company and names of staff that will be performing the installation and termination of the installation to provide proof of compliance of this spec.
 2. Submit proof from manufacturer of contractor's good standing in manufacturer's certification program.
 3. Submit copy of contractor's RCDD certification.
 4. Submit listing of five (5) projects of similar size and scope to this project that have been completed within the last five years. Include in this submittal owner's contact information for each project.
 5. Submit letter from the manufacturer stating that the manufacturer will provide a twenty-five year (25) warranty in accordance with the requirements paragraph 1.03 (B) of these specifications.
 6. Submit appropriate cut sheets and samples for all products, hardware and cabling.
 7. Submit 1/8" = 1'-0" drawings of floor plans indicating all work outlets and the labeling designation for each jack.
 8. Submit 1/2" = 1'-0" drawings of each MDF and each IDF showing all racks, patch panels, 110 blocks, etc.
- B. Work shall not proceed without the engineer's approval of the submitted items.
- C. The structured cabling contractor shall receive approval from the engineer on all substitutions of material. No substituted materials shall be installed except by written approval from the engineer.

1.6 DRAWINGS:

- A. It shall be understood that the electrical details and drawings provided with the specification package are diagrammatic. They are included to show the intent of the specifications and to aid the structured cabling contractor in bidding the job. The structured cabling contractor shall make allowance in the bid proposal to cover whatever work is required to comply with the intent of the plans and specifications.
- B. The structured cabling contractor shall verify all dimensions at the site and be responsible for their accuracy.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT STRUCTURED CABLING SYSTEM

SECTION 27 1000 – Page 4 of 18

1.7 COORDINATION

- A. Coordinate layout and installation of voice and data communication cabling with Owner's telecommunications and LAN equipment suppliers.
 - 1. Meet jointly with telecommunications and LAN equipment suppliers.
 - 2. Record agreements reached in meetings and distribute to other participants.
 - 3. Adjust arrangements and locations of distribution frames and cross-connect and patch panels in equipment rooms and wiring closets to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.

PART 2 PRODUCTS

2.1 EQUIVALENT PRODUCTS:

- A. Due to the nature and type of communications all products, including but not limited to faceplates, jacks, patch panels, racks, 110 blocks, and patch cords, for the purpose of this document, shall be manufactured by a single manufacturer.
- B. Leviton is an approved manufacturer and the basis of design. Alternate manufacturers are subject to owner approval prior to bid. See below for acceptable cable manufacturers.

2.2 WORK AREA OUTLETS:

- A. Work area cables shall each be terminated at their designated work area location in the connector types described in the subsections below. Included are modular telecommunication jacks. These connector assemblies shall snap into a faceplate.
- B. The Telecommunications Outlet Assembly shall accommodate:
 - 1. A minimum of two (2) modular jacks
 - 2. Additional accommodations for specific locations as noted in the plans for optical fiber and/or additional copper cables as necessary
 - 3. A blank filler will be installed when extra ports are not used.
 - 4. A dust cap shall be provided on all modular jacks with the circuit number on the identifier strip.
 - 5. Multiple jacks will be placed as documented on the plans.
 - 6. The same orientation and positioning of jacks and connectors shall be utilized throughout the installation. Prior to installation, the structured cabling contractor shall submit the proposed configuration for each outlet assembly for review by the architect.
 - 7. The modular jack shall incorporate printed label strip on the dust cap module for identifying the outlet. Printed labels shall be permanent and compliant with ANSI/TIA/EIA-606-A standard specifications. Labels shall be printed using a printer such as a Brady hand held printer. Hand printed labels shall not be accepted.
 - 8. Wireless Access Port Surface Mount Box: Leviton QuickPort, 1 port surface mount box white 41089-1 WP
- C. Faceplates: The faceplates shall:
 - 1. Leviton QuickPort w/ID Window 43080-1L1 thru 6
 - 2. be UL listed and CSA certified.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT STRUCTURED CABLING SYSTEM

SECTION 27 1000 – Page 5 of 18

3. be constructed of stainless steel (except where noted otherwise). All faceplate colors/materials in public areas shall be approved by the architect. In all cases the material and color of the faceplate shall match the adjacent electrical faceplate.
4. (where plastic faceplates are specifically allowed by the architect/engineer) shall match the faceplate color used for other utilities in the building or match the color of the raceway if installed in surface raceway.
5. be compliant with the above requirements along with the following when incorporating optical fiber:
 - a. be a low profile assembly,
 - b. incorporate a mechanism for storage of cable and fiber slack needed for termination,
 - c. position the fiber optic couplings to face downward or at a downward angle to prevent contamination and,
 - d. incorporate a shroud that protects the optical couplings from impact damage.
6. be available as single-gang or dual-gang.
7. possess recessed designation windows to facilitate labeling and identification.
8. shall include a clear plastic cover to protect labels in the designation window.
9. have mounting screws located under recessed designation windows.
10. comply with ANSI/TIA/EIA-606-A work area labeling standard.
11. allow for the UTP modules to be inverted in place for termination purposes.
12. be manufactured by an ISO 9001 registered company.

D. Voice / Data Jacks

1. Voice/Data jacks shall be 8-position modular jacks and shall be Category 6 performance as defined by the references in this document including ANSI/TIA/EIA-568-B.2-1. All pair combinations must be considered, with the worst-case measurement being the basis for compliance. Modular jack performance shall be third-party verified by a nationally recognized independent testing laboratory including, but not limited to, ETL.
2. The wiring scheme shall be T568A or T568B as directed by the owner.
3. The modular jack shall use dual reactance modular contact array.
4. The modular jack shall have low emission IDC contacts.
5. The modular jack shall use standard termination practice using 110 impact tool
6. The modular jack shall be backwards compatible to Category 3 and 5.
7. The modular jack shall be center tuned to category 6 test specifications.
8. Dust cover shall be used on each termination.

2.3 110 COPPER TERMINATION BLOCK:

- A. The voice cross connect shall be a passive connection between the horizontal termination blocks and the backbone termination blocks. The wall mount frames shall be field terminated kits including all blocks, connecting blocks, and designation strips. Management rings shall be mounted between vertical columns of blocks to provide management of cross-connect wire. Backbone and horizontal blocks shall use 4-pair connecting blocks. Blocks shall be oriented so that backbone terminations are located on the left and horizontal frames are located on the right of the termination field when facing the frame assembly.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT STRUCTURED CABLING SYSTEM

SECTION 27 1000 – Page 6 of 18

B. 110 Block Kits shall

1. include both the wiring block and connecting block in a 50, 100 and 300 pair footprint as required
2. be manufactured using fire retardant molded plastic.
3. include 4-pair 110C connecting blocks for field termination.
4. support termination of 22-24 AWG solid conductor
5. wiring blocks shall contain back openings for the feed through of cable
6. meet category 6 component compliance and be verified by a third-party nationally recognized independent testing laboratory
7. have color-coded tips on the wiring block and color coding on the connector blocks for installation identification.
8. shall use standard termination practice requiring a single conductor 110 impact tool
9. Termination hardware shall maintain the paired construction of the cable to facilitate minimum untwisting of the wires.
10. be backwards compatible to category 3 and 5.
11. be labeled in compliance with ANSI/TIA/EIA-606-A labeling specifications using permanent labels and label printer.
12. be manufactured by an ISO 9001 registered company.

2.4 MODULAR PATCH PANELS:

A. The Modular Patch Panels shall

1. Leviton 24 Port QuickPort Field Configurable #49255 H24
2. be modular design.
3. meet category 6 component compliance and be verified by a third-party nationally recognized independent testing laboratory
4. use low emission IDC contacts
5. use dual reactance technology to enhance the signal-to-noise ratio
6. require standard termination practices using a 110 impact tool
7. use a single piece IDC housing designed to accept larger Category 6 conductors
8. support both T568B and T568A wiring
9. include easy to follow wiring labels
10. include label fields
11. allow for the use of icons
12. include full length metal rear cable management
13. be available in standard or high density
14. be backward compatible to category 3 and 5.
15. be center tuned to category 6 test specifications
16. be sized to accommodate number of data or data and phone cables (where phone cables are terminated on patch panels in lieu of 110 blocks) served by each equipment room plus 30% spare capacity.
17. be separated by horizontal cable management sections.
18. be a maximum of 24 ports

SHELBY COUNTY WATER SERVICES BUILDING PROJECT STRUCTURED CABLING SYSTEM

SECTION 27 1000 – Page 7 of 18

2.5 Racks:

- A. The equipment rack shall provide vertical cable management and support for the patch cords at the front of the rack and wire management, support, and protection for the horizontal cables inside the legs of the rack.
- B. Waterfall cable management shall be provided at the top of the rack for patch cords and for horizontal cables entering the rack channels for protection and to maintain proper bend radius and cable support. Double-sided wire management shall also be mounted above each patch panel and/or piece of equipment on the rack. The rack shall include mounting brackets for cable tray ladder rack to mount to the top of the rack. Velcro cable ties shall be provided inside the rack channels to support the horizontal cable. Rack shall be black in color to match the patch panels and cable management.

- 1. Horizontal Cable Management: Leviton Versi-Duct Horizontal Front only #292RU-HFO
 - 2. Vertical Cable Management: Leviton Vertical Front/Rear #4980-VFR

C. Free-Standing Racks shall:

- 1. Eaton B-Line 2 Post 45 RU
 - 2. have the necessary strain relief, bend radius and cable routing for proper installation of high performance cross connect products, meeting all specifications of ANSI/TIA/EIA-568-B.
 - 3. have top cable trough with waterfall and built in patch/horizontal cable distribution separator.
 - 4. have horizontal front and rear cable management above, below and between each patch panel.
 - 5. have a rack-mounted power strip.
 - 6. have EIA hole pattern on front and rear.
 - 7. be available with a 6.0" channel depth.
 - 8. be available with hook and loop straps for securing bulk cables inside the vertical U-channels.
 - 9. assemble as 19" (483 mm) or 23" (584 mm) with no additional hardware.
 - 10. be available with three styles of vertical patch cord management: interbay with latches, cable management rings, or fingerduct with covers.
 - 11. provide floor and ceiling access for cable management and distribution.
 - 12. provide pre-drilled base for floor attachment of rack.
 - 13. be available in standard color of black.
 - 14. be manufactured by an ISO 9001 registered company.

2.6 Horizontal Distribution Cable:

A. Horizontal Distribution Cabling shall meet the following requirements:

- 1. Shall be 100 Ohm Enhanced Category 6 Unshielded Twisted Pair (UTP) Cable.
 - 2. Physical Characteristics:
 - a. Berk-Tek Category 6 Plenum #10136226
 - b. Unless directed otherwise by owner (contractor shall verify with owner), Cat6 cable coloring shall be based on system type as follows, unless specifically approved otherwise:
 - 1) Data (or IP Voice): Blue
 - 2) Analog Voice: Grey
 - 3) Lighting Control System: White
 - 4) Fire Alarm or other Life-Safety System: Red
 - 5) CCTV Surveillance Cameras: Yellow

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
STRUCTURED CABLING SYSTEM**

SECTION 27 1000 – Page 8 of 18

6) Other: As directed by owner

- c. Shall be plenum-rated.
- d. Shall meet applicable requirements of ANSI/ICEA S-80-576.
- e. The diameter of the insulated conductor shall be .023 in. maximum.
- f. Shall consist of (4) 22-26 AWG twisted pairs.
- g. The overall diameter of the cable shall be no larger than 0.240 inches.
- h. The ultimate breaking strength measured in accordance with ASTM D 4565 shall be 400 N minimum.
- i. Cable shall withstand a bend radius of 1 inch at -20 degrees Celsius without jacket or insulation cracking.
- j. Cable shall be third party verified to meet ANSI/TIA/EIA-568-B.2-1.
- k. Where installed underground, within slab-on-grade or in exterior locations, be gel-filled and rated for wet locations.

3. Transmission Characteristics:

- a. DC resistance of any conductor shall not exceed 9.38 Ohms per 100m max. at 20° C. Measured in accordance with ASTM D 4566.
- b. The mutual capacitance of any pair at 1 kHz for 100m of cable shall not exceed 4.4 nF nominal.
- c. DC resistance unbalance any two conductors of any pair shall not exceed 5% when measured at or corrected to 20° C in accordance with ASTM D 4566.
- d. Structural return loss swept measurement for 100m or longer shall meet or exceed Category 6 requirements.

4. Shall be manufactured by Leviton. Alternate manufacturers are subject to owner approval prior to bid.

2.7 Copper Cable Surge Protection Devices:

- A. All copper circuits routed between or outside of buildings shall be provided with a surge protection device at each end. The surge protection device shall be labeled as meeting the requirements of the latest edition of UL 96A (exact requirements shall be coordinated with the lightning protection system supplier, where applicable).
- B. The surge protection device shall be connected with a #6 AWG copper bonding conductor between the protector ground lug and the TC ground point.

2.8 Patch Cords:

- A. The structured cabling contractor shall provide factory terminated and tested UTP and optical fiber patch cords and equipment cords for the complete cabling system. Patch cords shall be provided by the structured cabling contractor to connect patch panels to owner furnished electronics. The UTP patch cables shall meet the requirements of ANSI/TIA/EIA-568-B.2 and ANSI/TIA/EIA-568-B.2-1 for patch cord testing. Provide one set of optical fiber patch cables per fiber run that terminates on fiber patch panel and provide one category 6 patch cord for each category 6 work outlet that terminates on patch panel.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
STRUCTURED CABLING SYSTEM**

SECTION 27 1000 – Page 9 of 18

B. Copper (UTP) patch cords shall:

1. Leviton Category 6 UTP 10 Foot Blue 62460-IOL
2. Be furnished to connect each patch panel jack to owner supplied electronics.
3. Be furnished for each work outlet jack.
4. Be a Category 6 patch cord manufactured by Panduit, Amp or Systimax.
5. Use 8 position connector with impedance matched contacts and designed using dual reactance.
6. Be constructed of 100 ohm, 4 pair, 24 AWG, stranded conductor, unshielded twisted pair copper per the requirements of the ANSI/TIA/EIA-568-B.2 and ANSI/TIA/EIA-568-B.2-1 standard.
7. Meet TIA category 6 component specifications in ANSI/TIA/EIA-568-B.2-1 100% factory tested to meet category 6 performance and ETL or any other nationally recognized 3rd party verification
8. Be capable of universal T568A or T568B wiring schemes.
9. Have modular connector that shall maintain the paired construction of the cable to facilitate minimum untwisting of the wires.
10. Have a performance marking indelibly labeled on the jacket (by the manufacturer).
11. Have the ability to accept color-coded labels and icons to comply with ANSI/TIA/EIA-606-A labeling specifications.
12. Have “snagless” protection for the locking tab to prevent snagging and to protect locking tab in tight locations and provide bend relief
13. Be available in three standard colors
14. Be available in 3 foot, 5 foot, 7 foot, 10 foot, and 14 foot standard lengths
15. Be backwards compatible to Category 3, 5 and 5e

C. Fiber Optic patch cords shall:

1. Be furnished in the quantity of two (2) per IDF in each IDF and two (2) per IDF in each MDF.
2. Be manufactured by Panduit, Amp or Systimax.
3. Be multimode OM4 type.
4. Have connector type as directed by owner.
5. Have a performance marking indelibly labeled on the jacket (by the manufacturer).
6. Have the ability to accept color-coded labels and icons to comply with ANSI/TIA/EIA-606-A labeling specifications.
7. Be available in three standard colors
8. Be available in 3 foot, 5 foot, 7 foot, 10 foot, and 14 foot standard lengths

2.9 Grounding and Bonding:

- A. The facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential to act as a current carrying conductor. The TBB shall be installed independent of the building's electrical and building ground and shall be designed in accordance with the recommendations contained in the ANSI/TIA/EIA-607 Telecommunications Bonding and Grounding Standard.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT STRUCTURED CABLING SYSTEM

SECTION 27 1000 – Page 10 of 18

- B. The main entrance facility/equipment room in each building shall be equipped with a telecommunications main grounding bus bar (TMGB). Each telecommunications room shall be provided with a telecommunications ground bus bar (TGB). Each grounding bus shall be 12"W x 4"H x ¼"THK and be mounted to the backboard with porcelain isolators.
- C. All wires used for telecommunications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape. All cables and bus bars shall be identified and labeled in accordance with the System Documentation Section of this specification.

2.10 Firestop:

- A. A firestop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure. Firestop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.
- B. All penetrations through fire-rated building structures (walls and floors) shall be sealed with an UL listed firestop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly firestopped.

2.11 Innerduct:

- A. Innerduct, shall be:
 - 1. Non-metallic, corrugated with pre-installed pull tape.
 - 2. Plenum-rated, where installed within buildings.
 - 3. UL listed for the application.
 - 4. Size as required by the application.
 - 5. Orange in color in concealed areas or within telecommunications or electrical rooms. Color shall be custom as selected by owner in exposed areas (such as within cable trays overhead in areas without ceilings outside telecommunications/electrical rooms).

PART 3 EXECUTION

3.1 Pre-installation site survey:

- A. Prior to start of work, meet at the project site with the owner's representative and representatives of trades performing related work to coordinate efforts. Review areas of potential interference and resolve conflicts before proceeding with the work. Facilitation with the General Contractor will be necessary to plan the crucial schedule completions of the equipment rooms and telecommunication closets.
- B. Examine areas and conditions under which the system is to be installed. Do not proceed with work until satisfactory conditions have been achieved.

3.2 Work Area Outlets:

- A. Cables shall be coiled in the in-wall or surface-mount boxes if adequate space is present to house the cable coil without exceeding the manufacturer's bend radius. In hollow wall installations where box-eliminators are used, excess wire can be stored in the wall. No more than 12" of UTP and 36" of fiber

SHELBY COUNTY WATER SERVICES BUILDING PROJECT STRUCTURED CABLING SYSTEM

SECTION 27 1000 – Page 11 of 18

slack shall be stored in an in-wall box, modular furniture raceway, or insulated walls. Excess slack shall be loosely coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.

- B. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-B.1 document, manufacturer's recommendations and best industry practices.
- C. Pair untwist at the termination shall not exceed 12 mm (one-half inch).
- D. Bend radius of the horizontal cable shall not be less than 4 times the outside diameter of the cable.
- E. The cable jacket shall be maintained to within 25mm (one inch) of the termination point.
- F. Data jacks, unless otherwise noted in drawings, shall be located in the bottom position(s) of each faceplate. Data jacks in horizontally oriented faceplates shall occupy the right-most position(s).
- G. Voice jacks shall occupy the top position(s) on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the left-most position(s).
- H. Wireless access points shall be terminated in a surface mount QuickPort box at access point location. Verify locations with owner prior to installation.

3.3 Horizontal Distribution Cable Installation:

- A. All horizontal voice and data cabling shall be terminated on modular patch panels except for horizontal voice cables serving life safety related functions (fire alarm systems, security systems, elevator communications, etc.). All horizontal voice cabling serving life safety related functions shall be terminated on 110 blocks.
- B. The voice and data cables shall be installed in separate patch panels.
- C. All wiring above ceilings shall be installed in cable tray or open top cable hangers or in provided conduit.
- D. Cable above accessible ceilings shall be supported 30" on center from cable support attached to building structure.
- E. Do not untwist cable pairs more than 0.5 in. when terminating.
- F. The Contractor shall be responsible for replacing all cables that do not pass Category 6 requirements for data and 5e for the voice applications.
- G. Maximum horizontal cable length shall be 90 meters.
- H. Route cables above corridor ceilings after leaving associated space. Cables shall be routed parallel/perpendicular to structure. Do not route at angles.
- I. Cable shall have no physical defects such as cuts, tears or bulges in the outer jacket. Cables with defects shall be replaced.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT STRUCTURED CABLING SYSTEM

SECTION 27 1000 – Page 12 of 18

- J. Install cable in neat and workmanlike manner. Neatly bundle and tie all cable in closets. Leave sufficient cable for 90° sweeps at all vertical drops.
- K. Do not install Category 6 cable with more than 110N (25 lbs) pull force, as specified in ANSI/TIA/EIA and BICSI TDDM practices. Utilize appropriate cable lubricant in sufficient quantity to reduce pulling friction to acceptable levels on long pulls inside conduit, pulls of multiple cables into a single small bore conduit, on conduit runs greater than 100 lineal feet with bends of opposing directions, and in conduit runs that exceed 180 degrees of accumulated bends. Use of tensile rated cords (i.e. fishing line) should be used for difficult or questionable pulls - to judge to go/no-go condition of the conduit and pulling setup.
- L. Cables jackets that are chaffed or burned exposing internal conductor insulation or have any bare copper ("shiners") shall be replaced.
- M. Test, label and document as called for in contract documents.
- N. Firestop all openings where cable is installed through a fire barrier.

3.4 Horizontal Cross connect Installation:

- A. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-B standard, manufacturer's recommendations and best industry practices.
- B. Pair untwist at the termination shall not exceed 13 mm (0.5 inch).
- C. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.
- D. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.
- E. The cable jacket shall be maintained as close as possible to the termination point.
- F. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.5 Optical fiber termination hardware:

- A. Fiber slack shall be neatly coiled within the fiber splice tray or enclosure. No slack loops shall be allowed external to the fiber panel.
- B. Each cable shall be individually attached to the respective splice enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.
- C. Each fiber bundle shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.
- D. Each cable shall be clearly labeled at the entrance to the splice enclosure. Cables labeled within the bundle shall not be acceptable.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
STRUCTURED CABLING SYSTEM**

SECTION 27 1000 – Page 13 of 18

- E. A maximum of 12 strands of fiber shall be spliced in each tray
- F. All spare strands shall be installed into spare splice trays.

3.6 Backbone Cable Installation:

A. Raceways:

- 1. All backbone cables shall be installed inside innerducts (see specification above) within conduits meeting specification requirements unless specifically noted otherwise.
- 2. Backbone cables shall be installed separately (in separate innerducts/conduits) from horizontal distribution cables.
- 3. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.
- 4. Where backbone cables and distribution cables are specifically specified to be installed in a cable tray or wireway, backbone cables shall be installed first, within innerducts meeting specifications above, bundled separately from the horizontal distribution cables.

B. Support:

- 1. Within Telecommunications Rooms or at Telecommunications Backboards, all backbone cables shall be securely fastened to the backboards on the walls.
- 2. Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.
- 3. Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.
- 4. Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.

3.7 Copper Termination Hardware:

- A. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-A/B standard, manufacturer's recommendations and best industry practice.
- B. Pair untwist at the termination shall not exceed 12 mm (one-half inch).
- C. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.
- D. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.
- E. The cable jacket shall be maintained to within 25 mm (one inch) of the termination point.
- F. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
STRUCTURED CABLING SYSTEM**

SECTION 27 1000 – Page 14 of 18

3.8 Racks:

- A. Floor-mount racks shall be used unless specifically shown otherwise.
- B. Floor-mount racks shall be securely attached to the concrete floor using a minimum 3/8" hardware or as required by local codes.
- C. Racks shall be placed with a minimum of 36 inches clearance from the walls on all sides of the rack. When mounted in a row, maintain a minimum of 36 inches from the wall behind and in front of the row of racks and from the wall at each end of the row.
- D. All racks shall be grounded to the telecommunications ground bus bar in accordance with Section 3.11 of this document.
- E. Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with the rack upon completion of the installation.
- F. Wall mounted termination block fields shall be mounted on 4' x 8' x .75" void free plywood. The plywood shall be mounted vertically 12" above the finished floor. The plywood shall be painted with two coats of grey fire retardant paint.
- G. Wall mounted termination block fields shall be installed with the lowest edge of the mounting frame 18" from the finished floor.
- H. Rack-mounted patch panels (and the associated horizontal cable management sections) furnished within the contract shall occupy no more than 40% of the available space within the associated racks (also furnished within the contract) unless specifically shown or specified otherwise. A minimum of 60% of available rack space shall be reserved for owner-furnished equipment. Where the number of patch panels and horizontal cable management sections would exceed 40% of the available rack space, an additional rack shall be installed.

3.9 EQUIPMENT TRAY FOR TELECOMMUNICATION ROOMS:

- A. All equipment trays shall be 12" in width.
- B. Furnish and install 12" equipment tray from each floor mount rack/server cabinet to wall. Furnish 12" equipment tray around wall as required to support cables. A minimum of two (2) walls shall be completely covered by equipment tray.
- C. Furnish and install cable retaining posts on each side of tray every 4 feet as required to support cables.
- D. Hoffman 12" ladder rack #LSS12BLK

3.10 Firestop System:

- A. All firestop systems shall be installed in accordance with the manufacturer's recommendations and shall be completely installed and available for inspection by the local inspection authorities prior to cable system acceptance.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT STRUCTURED CABLING SYSTEM

SECTION 27 1000 – Page 15 of 18

3.11 Grounding System:

- A. The TMGB in the MDF shall be connected to the building electrical entrance grounding facility with a #6 AWG ground. Each TBB in each IDF shall be connected to a ground bus in the MDF with #4/0 AWG minimum ground. The intent of this system is to provide a grounding system that is equal in potential to the building electrical ground system. Therefore, ground loop current potential is minimized between telecommunications equipment and the electrical system to which it is attached.
- B. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in the TR or ER shall be grounded to the respective TGB or TMGB using a minimum #6 AWG stranded copper bonding conductor and compression connectors.
- C. The TBB shall adhere to the recommendations of the ANSI/TIA/EIA-607 standard, and shall be installed in accordance with best industry practice.
- D. Installation and termination of the main bonding conductor to the building service entrance ground shall be performed by the electrical contractor.

3.12 Identification and Labeling:

- A. The contractor shall develop and submit for approval a labeling system for the cable installation. The Owner will negotiate an appropriate labeling scheme with the successful structured cabling contractor. At a minimum, the labeling system shall clearly identify all components of the system: racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme. Labeling shall follow the guidelines of ANSI/TIA/EIA-606-A.
- B. All label printing will be machine generated by Panduit software (or other) using indelible ink ribbons or cartridges. Self-laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end. Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.

3.13 Testing and Acceptance:

A. General

- 1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-B. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.
- 2. All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards, the Panduit Certification Program Information Manual and best industry practice. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.

SHELBY COUNTY WATER SERVICES BUILDING PROJECT STRUCTURED CABLING SYSTEM

SECTION 27 1000 – Page 16 of 18

B. Copper Channel Testing

1. All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below. Additional testing is required to verify Category 6 performance. Horizontal cabling shall be tested using a Level III test unit for category 6 performance compliance, respectively.
2. Continuity - Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test unit in accordance with the manufacturers' recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.
3. Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA/EIA-568-B.1 Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.
4. Category 6 Performance:
 - a. Follow the Standards requirements established in:
 - 1) ANSI/TIA/EIA-568-B .1, B.2 and B.2-1
 - b. A Level III test unit is required to verify category 6 performance. The basic tests required are:
 - 1) Wire Map
 - 2) Length
 - 3) Attenuation
 - 4) NEXT (Near end crosstalk)
 - 5) Return Loss
 - 6) ELFEXT Loss
 - 7) Propagation Delay
 - 8) Delay skew
 - 9) PSNEXT (Power sum near-end crosstalk loss)
 - 10) PSELFEXT (Power sum equal level far-end crosstalk loss)
- C. Contractor shall provide on-site training to Project Management personnel prior to soft opening under the guidance of Bret Tucker. Training shall include all aspects of daily operation, equipment limitations, emergency operation and repair of all system components.

3.14 System Documentation:

- A. Upon completion of the installation, the structured cabling contractor shall provide three (3) full documentation sets to the owners for approval. Documentation shall include the items detailed in the sub-sections below.
- B. Documentation shall be submitted within ten (10) working days of the completion of each testing phase (e.g. subsystem, cable type, area, floor, etc.). This is inclusive of all test result and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase. At the

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
STRUCTURED CABLING SYSTEM**

SECTION 27 1000 – Page 17 of 18

- C. request of the Engineer, the structured cabling contractor shall provide copies of the original test results.
- D. The Engineer may request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the structured cabling contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

3.15 Test Results:

- A. Test documentation shall be provided on disk within three weeks after the completion of the project. The disk shall be clearly marked on the outside front cover with the words "Project Test Documentation", the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.
- B. The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-A/B including applicable TSB's and amendments. The appropriate Level III tester shall be used to verify Category 6 cabling systems.
- C. Test results generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. The structured cabling contractor must furnish this information in electronic form (CD-ROM).
- D. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

3.16 As-Built Drawings:

- A. The drawings are to include cable routes and outlet locations. Outlet locations shall be identified by their sequential number as defined elsewhere in this document. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Owner will provide floor plans in paper and electronic (DWG, AutoCAD rel. 2002) formats on which as-built construction information can be added. These documents will be modified accordingly by the structured cabling contractor to denote as-built information as defined above and returned to the Owner.
- B. The Contractors shall annotate the base drawings and return a hard copy (same plot size as originals) and electronic (AutoCAD DWG) form.

3.17 WARRANTY:

- A. The manufacturer shall provide a 25 year extended product warranty with a 25 year applications assurance warranty. Manufacturer shall provide the warranty directly to the end user.

**SHELBY COUNTY WATER SERVICES BUILDING PROJECT
STRUCTURED CABLING SYSTEM**

SECTION 27 1000 – Page 18 of 18

- B. An Extended Product Warranty shall be provided which warrants functionality of all components used in the system for 25 years from the date of registration. The Extended Product Warranty shall warrant the installed horizontal copper and the backbone optical fiber portions of the cabling system.
- C. The Application Assurance Warranty shall cover the failure of the wiring system to support current or future applications that are designed for the link/channel specifications of ANSI/TIA/EIA-568-B.1. These applications include, but are not limited to, 10BASE-T, 100BASE-T, 1000BASE-T, and 155 Mb/s ATM.
- D. The contractor shall provide a warranty on the physical installation.

3.18 FINAL ACCEPTANCE & SYSTEM CERTIFICATION:

- A. Completion of the installation, in-progress and final inspections, receipt of the test and as-built documentation, and successful performance of the cabling system for a two week period will constitute acceptance of the system. Upon successful completion of the installation and subsequent inspection, the end user shall be provided with a numbered certificate, from the manufacturer, registering the installation.

END OF SECTION 271000