

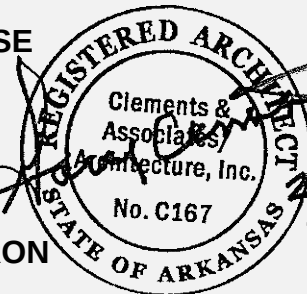
STATEMENT OF WORK FOR DESIGN-BUILD PROJECT
Repair (SUS) Airmen Dormitory
BLDG 854

NKAK 21-1034



Air Mobility Command
LITTLE ROCK AIR FORCE BASE
ARKANSAS

Prepared By
Christopher Stell, RA
19TH CIVIL ENGINEER SQUADRON



Clements & Associates Architecture, Inc.
29 February 2024

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I hereby certify that the Plumbing and Mechanical portion of the work indicated in Divisions 22 and 23 of these plans and specifications, except as otherwise indicated by other registered professionals, have been prepared by me or under my direct supervision.

Plumbing & Mechanical Engineer of Record:

Noah D. Kinder, P.E.
Energy Engineering Consultants, Inc.
10 Corporate Hill Dr. Suite 100
Little Rock, AR 72205



I hereby certify that the electrical portion of the work indicated in Divisions 26 and 27 of these plans and specifications, except as otherwise indicated by other registered professionals, have been prepared by me or under my direct supervision. I further certify that to the best of my knowledge this portion of the plans and specifications are as required by law and in compliance with the *Arkansas Fire Prevention Code* for the State of Arkansas and with the *Arkansas Code for Energy Conservation in New Building Construction*.

Electrical Engineer of Record:

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I hereby certify that the Structural and portion of the work indicated in of these plans and specifications, except as otherwise indicated by other registered professionals, have been prepared by me or under my direct supervision.

Structural Engineer of Record

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Little Rock, AR 72201-3401



I hereby certify that the Civil portion of the work indicated in Divisions 31 and 32 of these plans and specifications (prepared by the Architect of Record), except as otherwise indicated by other registered professionals, have been prepared by me or under my direct supervision.

Civil Engineer of Record:

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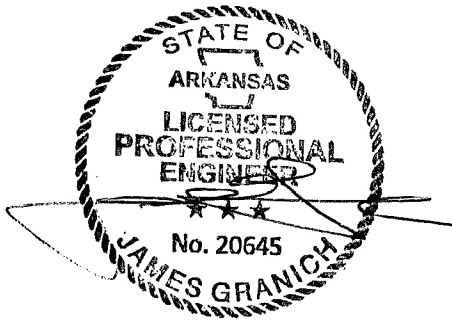
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I hereby certify that the Structural and portion of the work indicated in of these plans and specifications, except as otherwise indicated by other registered professionals, have been prepared by me or under my direct supervision.

Structural Engineer of Record

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Kansas City, Missouri 64108



02/29/2024

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CERTIFICATIONS

I hereby certify that the work included in these plans and specifications related to the fire alarm system and suppression systems except as otherwise indicated by other registered professionals, have been prepared by me or under my direct supervision and that I have coordinated with those portions sealed by other registered professionals.



February 29, 2024

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REVISIONS

Number	Date	Description (All revisions are highlighted YELLOW)
01	04-14-22	Part 2-TECHNICAL DESCRIPTION OF THE PROJECT 2.02 DESCRIPTION –A.-4. Revise the wording of “shared bathroom area between two units” to be “private bathroom per unit”.
02	04-14-22	Revise PART 2 - TECHNICAL DESCRIPTION OF PROJECT-2.05 ARCHITECTURAL- E. OPENINGS to delete the wording “1. Install fragmentation retention film and catch bars on all exterior windows to meet Anti-Terrorism and Force Protection requirements, UFC 4-010-01 Department of Defense Minimum Antiterrorism Standards for Buildings (current version).” And add “Install new windows that meet the UFC 4-010-01 Department of Defense Minimum Antiterrorism Standards for Buildings (current version).”
03	04-14-2022	Revised total number of sheets in CCR to “238” as appendices for progressive collapse were omitted.
04	04-14-2022	Added “USAF Unaccompanied Housing Design Guide” as a reference.
05	04-14-2022	Revise millwork to remove premium grade and now is (“custom” grade) and add this verbiage. “Typical millwork in a room consist of a vanity with drawers and cabinets below and a cabinet above the toilet. Millwork to be plywood veneer with hardwood face frames and hardwood lumber banded doors and drawer fronts (no veneer tape edges will be acceptable).”
06	04-14-2022	Remove the paragraph – “Card Key Access System that will work with the existing CAC Card system, with manual override on occupant rooms only.”
07	04-14-2022	Remove the paragraph – “The contractor shall provide a phasing plan to indicate how the existing electrical system shall be kept up and running, while installing the new electrical system.”

08 04-14-2022 Remove – “5.07 AUDIO-VISUAL SYSTEMS DESIGN PACKAGE

Audio-Visual Systems Design (AV) Package includes the complete design of A-V systems to be purchased and install separately from the construction contract. The design shall include specifications, drawings, schematic layouts, generic product data cut sheets and detailed unit price cost estimate.”

09 04-14-2022 Remove the line – “See attachment F – As-Built Drawings (in Project Information folder)”.

10 04-26-2022 Added the paragraph – “Use >5% of deck surface for replacement in base bid unless the Statement of Work explicitly lists otherwise. Provide the cost per square foot

to replace damaged deck surface with your proposal. The cost per square foot will be used for a modification if quantities of repair required go over 5%.

Wood deck damage is considered but not limited to: swelling, rot, detached fasteners, split-through solid boards, delaminated plywood panels, defection, sagging, and dips, and moisture laden boards. All repairs shall be made to ensure proper adhesion, application and drainage of roof system. Provide documentation of moisture content (by moisture meter). Document with photo verification.”

11 05-18-2022 Add paragraph to describe the Repair funding compared to the Construction funding.

DIVISION 01 – GENERAL REQUIREMENTS

SECTION 01 10 01 – STATEMENT OF WORK FOR DESIGN-BUILD

PART 1 - INTRODUCTION

1.01 SOLICITATION

The *19th Contracting Squadron* is soliciting a proposal for the design and construction of NKAK 21-1034 Repair (SUS) Airmen Dormitory Building 854 at Little Rock AFB, Arkansas.

1.02 DESIGN-BUILD FIRM SERVICES

The *Design-Build Firm* shall perform all necessary studies, meetings, analyses, design, coordination, Schematic Design, Design Development, Specifications, preparation of contract documents, and total construction for the project. The facility shall be sited in the general location as shown on the provided location map. The design shall include all related items as required to safely accomplish all necessary work.

(Note: Design Build Firm and Contractor are used interchangeably)

1.03 DESIGN-BUILD FIRM AE SERVICES

The *Design-Build Firm* shall have an architectural & engineering staff within the firm and/or shall partner with or have a direct relationship with a professional architect/engineer firm (AE) who shall furnish all services, materials, supplies, and supervision required to fully investigate and design this project. The survey and design of architectural and engineering features of the work shall be accomplished by the appropriate licensed design professional(s) who are experienced in the design of those systems. The final drawings and specifications shall be stamped and signed by the registered professional architect(s) and registered professional engineer(s) responsible for the design in their respective area of expertise and, if applicable, a principal of the firm registered in architecture and/or engineering as applicable.

1.04 ARCHITECT-ENGINEER SERVICES

The *Design-Build Firm* shall provide licensed design professional architectural and engineering services throughout the design and construction process. The *Design-Build Firm* shall provide all services, materials, supplies, and supervision required to prepare any change orders and provide office quality control inspection services for the duration of the construction phase of the project.

1.05 PERMITS

The *Design-Build Firm* and/or the licensed design professional architect/engineer of record shall be responsible for obtaining all necessary permits/approvals from the Arkansas Department of Health & Human Services (ADHHS), Arkansas Department of Environmental Quality (ADEQ) and the City of Jacksonville. As well as provide a Health & Safety Plan in accordance to ADEQ.

1.06 COMPLETE AND USABLE

- A. The *Design-Build Firm* shall provide a design for a complete and usable facility within the negotiated and accepted contract construction cost and meeting all requirements of this statement of work. The *Government* will not accept requests for additional funds except for changes in project scope, unforeseen site conditions (such as rock removal) or as directed

by the *Contracting Officer*. The Design-Build Firm shall be financially and technically responsible for resolving any design errors or omissions in its design products.

- B. Neither the *Government's* review, approval or acceptance of, nor payment for, the services required under this contract shall be construed to operate as a waiver of any rights under this contract or of any cause of action arising out of the performance of this contract, and the *Design-Build Firm* shall be and remain liable to the *Government* in accordance with applicable law for all damages to the *Government* caused by the *Design Build Firm's* negligent performance of any of the services furnished under this contract.

PART 2 - TECHNICAL DESCRIPTION OF PROJECT

2.01 GENERAL

- A. The Design-Build Firm is required to provide all services necessary for the design and construction of this project.
- B. The purpose of this project is to design, renovate, and construct additions to Building 854 (approx. 37120 square feet) to provide a renovated three story residential housing facility termed an Airmen Dormitory.
- C. The Design-Build Firm shall be responsible for any surveys, excavations, soil borings, soil analyses, chemical tests, laboratory tests, pressure tests, electrical tests, corrosion and cathodic protection tests, asbestos and lead-based paint surveys, and any other tests required for a complete design and construction of this project.
- D. The Design-Build Firm shall be responsible for locating all utilities in the area of construction, and for accommodating or modifying them, as required for the construction of this project.
- E. The Design-Build Firm shall verify all requirements during the pre-bid process. A Concept Charrette Report (CCR) showing conceptual design for this facility is also provided as Attachment 1 (238 sheets/pages). DWG and PDF files are available.
- F. Prior to bidding the project the Design-Build Firm should become familiar with pertinent UFGS specifications and the 19th CES ARCHITECTURAL/ CIVIL/ ELECTRICAL/ MECHANICAL/ STRUCTURAL DESIGN CRITERIA AND EXPECTATIONS and **USAF Unaccompanied Housing Design Guide**

2.02 DESCRIPTION

- A. The Design-Build Firm shall provide all plant, labor, material, equipment, general conditions, etc. as outlined in the Statement of Work and the Concept Charrette Report as follows:

NOTE: Anything designed and installed inside the existing footprint or that is related to the existing building systems (i.e. to include but not limited to the new sewer trunk line and new sewer main line to the existing manhole, and new electrical to the transformer, etc.) will be bid as repair and be shown in the bid schedule in the first entry as "Repair". Anything designed and installed outside the original footprint of the existing building that is related to new footprint (i.e. exterior corridors, foundations, steel structure, and that portion of lower sloped roof) will be bid as "Construction" and will be shown on the second line in the bid schedule. The Design fee for Repair will be a separate line item in the bid schedule. The Design fee for Construction will be a separate line item in the bid schedule.

1. Design services for all renovation and addition of the Airmen Dormitory.
2. Renovate the interior of the existing building to meet the required functions of the Airmen Dormitory according to the Concept Charrette Report and the SOW.

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3. Construct a new steel and concrete structure with merging overbuild roof to the existing roof structure as an exterior corridor system at each floor level. The new exterior corridors will connect to new egress stair towers. There will be new exterior block and brick wall infill, new interior slab infill at the first floor where the existing one story Mechanical and Laundry rooms (one story building projection) are to be removed. There will be new concrete walkways to connect to existing walks, and new concrete steps at each of the stair towers, a new concrete accessible ramp at the main entry, and site work on the north and west side of the building to prevent water ponding.
4. The interior remodel will consist of asbestos abatement, lead paint abatement, mold remediation, all new interior stud walls, finishes, fixtures, equipment, accessories, and furniture, to have 74 one bedroom units with a private bathroom shared bathroom area between two units. The private bathroom shared bathroom is in both the typical room type and the accessible room type according to the Unaccompanied Housing Guide and all related UFC's from the WBDG.
5. Install a new hipped and vented standing seam metal roof over existing building consisting of wood deck and existing wood trusses that will connect with a new lower slope vented standing seam metal roof overbuild system designed for the new exterior corridor system and egress stair towers.
6. Provide a unit price to provide rock removal.

B. See CCR attachment 1 for Building 854 Location on Base and for Underground Utilities.

2.03 DEMOLITION

A. GENERAL

1. Demolition shall be limited to that which is required to achieve the primary goal as specified in paragraph 2.01 and 2.02 and elsewhere in the 100% Submittal (CCR) Concept Charrette Report and remove required materials to renovate Building 854 to house the functions of the newly renovated Airmen Dormitory B-854.
2. The DESIGN-BUILD Firm shall contact LRAFB Recycling Center for list of items that can be recycled on LRAFB. The DESIGN-BUILD Firm shall recycle the remaining material off base and provide written certification that the recyclable products were not placed in a landfill. The DESIGN BUILD Firm shall provide certification shall indicate how the material was recycled and provide the address where it was delivered.

B. EXTERIOR

1. The DESIGN-BUILD Firm shall remove/demolish the following exterior items to include, but not limited to those shown on the CCR, but also verified by a pre-bid site visit for coordination purposes with the CCR.
2. The DESIGN-BUILD Firm shall demolish the existing concrete walk to the existing entries as shown in the CCR. Coordinate potentially affected existing underground utility

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locations with the proper utility owners. Call the utility owners to mark locations prior to commencing work. Protect and retain existing Storm Sewer.

3. The DESIGN-BUILD Firm shall entirely remove the existing one story spaces/building projection on the north side without disturbing the remaining building. Protect and retain the structural integrity of the existing building.

4. The DESIGN-BUILD Firm shall saw cut/ trench as required the existing concrete corridor and earth for a complete sanitary sewer main trunk line replacement with associated stacks and vents on the interior and from the exterior existing building face to the closest available existing manhole that has enough capacity and fall. See CCR Civil sheets for manhole locations with inverts. The DESIGN-BUILD Firm to verify all conditions and solutions.

1. The DESIGN-BUILD Firm shall demolish existing eave and rake structure, Dutch gable roof vents, shingles and roof penetrations, flues and stacks with roof cutouts, eave cutouts, and existing roof truss tails that project below the top of 1956 flat concrete roof deck. Retain existing wood roof deck, remove and replace all damaged wood deck and patch the holes in wood deck as needed with matching materials. Use >5% of deck surface for replacement in base bid unless the Statement of Work explicitly lists otherwise. Provide the cost per square foot to replace damaged deck surface with your proposal. The cost per square foot will be used for a modification if quantities of repair required go over 5%.

- a. Wood deck damage is considered but not limited to: swelling, rot, detached fasteners, split-through solid boards, delaminated plywood panels, defection, sagging, and dips, and moisture laden boards. All repairs shall be made to ensure proper adhesion, application and drainage of roof system. Provide documentation of moisture content (by moisture meter). Document with photo verification. Remove existing roof deck as required to vent new stair tower roofs with the existing roof/attic space to have consistent and continuous vented attic space, and add any draft stopping as required by code.

2. The DESIGN-BUILD Firm shall entirely remove existing 1 story recreational pavilion at the west of building and grade the earth as required to prevent ponding. The DESIGN-BUILD Firm shall remove concrete shades at window head of all floors (both sides) and make surface flush with the existing face of brick, patch as required to match leaving surface smooth and aesthetically similar to existing concrete surfaces. The DESIGN-BUILD Firm shall remove that trees as shown on the CCR, and fill and grade the ground as required.

C. INTERIOR

1. The DESIGN_BUILD Firm shall selectively demolish/recycle all that is required for the renovation of Building 854.

2. The DESIGN-BUILD Firm shall saw cut and demolish existing concrete slabs at first floor for interior sewer line and electrical conduit replacement. The DESIGN-BUILD Firm shall remove existing concrete stairs/rails, masonry walls and stud walls, ceilings, framing, windows, doors and frames, fixtures, finishes, millwork, furniture, appliances, etc. along with a full removal/recycle of all fire protection, mechanical, electrical and plumbing systems.

D. The DESIGN-BUILD Firm shall remove/abate all ACM and LBP in accordance with all federal, state and LRAFB regulations.

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- E. The DESIGN-BUILD Firm shall remove deleterious construction debris in concealed spaces in preparation for the renovation of the facility interior and clean all surfaces/substrates/slabs free of adhesive, caulk and dirt.
- F. The DESIGN-BUILD Firm shall dispose of all demolished and excess deleterious construction material to their respective proper locations according to all relevant AF regulations and documentation.
- G. See the Attachment 1- 100% Submittal (CCR) Concept Charrette Report for any additional demolition requirements.

2.04 CIVIL/STRUCTURAL

- A. Use of Little Rock AFB Civil Design Guide is mandatory.
- B. Use of 01 57 22 TREE PRESERVATION specification is mandatory.
- C. Protect all sidewalks, curbs, streets, and other site conditions designated to remain.
- D. The demolition and disposal of all materials shall be carried out in compliance with all applicable laws, regulations, and Division One.
- E. The general structural scope of this project is to provide investigation, evaluation, testing, engineering, design, construction, construction phase services as required to support the proposed repair as outlined in the Facility Sustainment, Restoration, and Modernization Concept Charrette Report (FSRM CCR) and these contract documents. -More specifically, but not all inclusively, the project consists of the following.
 - ~~a. Investigation, analysis, testing, design, construction, inspection, and other necessary efforts related to the following~~ Seismic evaluation and retrofit
 - ~~b.a. Progressive collapse analysis and mitigation~~
 - ~~c.a.~~
 - i. Seismic evaluation and retrofit
 - ii. Geotechnical investigation, testing, and report
 - iii. Roof over-build system
 - iv. New foundations
 - v. New balconies and stair towers
 - i-vi. Analysis and retrofit (as required) of existing structure to verify/ensure existing structure is suitable to support the scope of work related to this project.
- F. The FSRM CCR was prepared to define the scope of work for this project and for programming, planning, and funding purposes for by the Air Force. Note that the Design-Build Firm is responsible for all aspects of the design and construction of this project regardless of any apparent design and/or investigation presented in the FSRM CCR. For example any geotechnical investigation and reporting, seismic evaluation, and other structural plans or detailing prepared for the FSRM CCR is not intended to be used by the Design-Build Firm as part of their design. The Design-Build firm must provide their own geotechnical investigation, testing, and reporting and their own seismic evaluation, seismic retrofit, structural analysis, structural design, structural plans, etc. independent of the FSRM CCR. Any design or design calculations presented in the **FSRM CCR** are preliminary, incomplete, and are not to be used in the Design-Build Firm's design or design calculations as their own design.

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- G. Progressive Collapse analysis and mitigation: In accordance with guidance from subject matter experts of the Protective Design Center received via email on 11 February 2022 (email not included in these documents) and results of risk analysis (risk analysis not included in these documents) it has been determined that progressive collapse analysis and mitigation is not required on this project.
- H. See the 100% Submittal FSRM Conceptual Charrette Report (Attachment 1) for additional civil/ structural requirements.
- F. Design-Build Firm shall construct the new metal roof per requirements below. Installation of a metal roof over system, will be installed over existing facility in coordination with new building additions.
- G. The DESIGN-BUILD Firm shall verify existing insulation envelope at attic space to ensure it meets the energy code and fire code, and add Closed Cell Spray Insulation or Mineral Wool insulation as appropriate and required.
- H. The DESIGN-BUILD Firm shall install a new standing seam metal roof system consisting of light gauge metal roof trusses with wood decking, vented insulation stops at the perimeter of 1956 concrete roof deck, to be coordinated with the existing trusses, truss anchoring, blocking and mountings. Install new sloped wood deck with continuous waterproof overlaying peel and stick water barrier, with eave and rake structure, coordinated with sloped standing seam metal roof panels with coordinating fasteners, Dutch gable metal rain-proof/insect-proof vents, metal trims and fascia, with continuous and straight hemmed and sealed valley flashing as per the SMACNA manual. Install prefinished copings, vented ridge caps, gutters and downspouts. The metal panels shall be allowed to move with no fastener penetrations. Install lightning protection, snow and ice guards with non-penetrating fasteners. The new roof system will coordinate with all building systems.
- I. DESIGN-BUILD Firm shall install a lockable, fire rated, code compliant, roof hatch and wall mounted ladder in the top floor Janitor Room and a steel maintenance walkway above the third floor corridor with LED lighting throughout the entire remaining and connected new attic space.
- J. Structural Standing Seam Metal Roof (SSSMR) Requirements.
 - 1. The DESIGN-BUILD Firm shall provide Professional Engineer Stamped Design documents for the new roof system to include drawings, details, and specifications.
 - 2. The DESIGN-BUILD Firm shall accomplish a structural analysis to determine if the existing structure is structurally adequate to accommodate the increased loads due to a sloped roof and overbuild system. The DESIGN-BUILD Firm shall develop as-built drawings in adequate detail to bid, design and construct the project.
 - 3. The DESIGN-BUILD Firm shall follow requirements of UFC 3-110-03, Roofing.
 - 4. The DESIGN-BUILD Firm shall design the SSSMR to accommodate the kitchen vents, HVAC, exhaust systems, etc., that penetrate the existing building portions roof.
 - 5. The DESIGN-BUILD Firm shall incorporate design guidance of UFC 3-320-03a, Structural Considerations for Metal Roofing.
 - 6. The DESIGN-BUILD Firm shall ensure facility remains weatherproof during construction.
 - 7. The DESIGN-BUILD Firm shall include a minimum of a 3' overhang with a SSMRS at a lower slope as a new overbuild system onto existing wood roof deck (demolish all existing wood roof deck as required to allow for maximum venting between new and existing attic

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space. New overbuild connection at existing deck shall be outside the existing building wall line. Add insulation stops directly above outside face of brick. No SSSMR seams or splices that are a potential future leak shall be vertically located above or over the existing attic insulation space. (Note that differs from the FSRM CCR drawings that show the slope change of the two meeting roofs as incorrectly positioned inside the existing building line, that would allow a potential leak on the insulation.) Change that exterior corridor roof slope to be 2:12 (or greater, as required) to achieve the roof splice location as outside the wall line or outside of face of brick line.

8. The DESIGN-BUILD Firm shall provide permanent safety harness tie-offs meeting OSHA/ANSI in adequate quantity to allow for maintenance on the entire roof system.

9. The DESIGN-BUILD Firm shall ensure the SSSMR meets or exceeds the following definition of a "Green Roof": "A roofing system that through its design and construction garners one LEED point for reduction of heat island effect and substantially contributes to at least three more LEEDS points."

10. The DESIGN-BUILD Firm shall ensure the SSSMR meets or exceeds the requirements of Engineering Technical Letter (ETL) 08-13, Incorporating Sustainable Design and Development (SDD) and Facility Energy Attributes in the Air Force Construction Program, paragraph 13.11, Roofing, which states: In other than Northern Tier Installations, roofing shall meet or exceed Cool Roof Rating Council Solar Reflectance Index (RFI) of ≥ 78 for low slope roofs ($\leq 2:12$) and ≥ 29 for high-slope roofs ($> 2:12$). "Northern Tier" is defined as heating degree days (HDD) greater than 7,000 and cooling degree days (CDD) less than 2,000.

11. The DESIGN-BUILD Firm shall provide a roof slope no less than 2:12 as an overbuild system that engages and merges with standing seam metal roof at the existing sloped deck (5:12 existing), and a roof system compatible with other sloping metal roofs in the area. Ensure valley flashings with differing pitch are to be a straight line as viewed in "Plan" view at intersections of differing sloped roofs. Hem and seal valley flashing splices for 2 lineal inches minimum or per latest SMACNA Manual recommendations for a similar condition.

12. The DESIGN-BUILD Firm shall provide SSSMR metal roofing components that are Galvalume having a minimum of 0.55 ounces per square foot of aluminum-zinc alloy coating having a 0.9 mil thickness per side, meeting ASTM A 792/A 792M coating designation AZ55. The Galvalume SSSMR metal roofing components shall have a polyvinylidene fluoride (PVDF) protective coating with a 70% PVDF resin content having a 1.0 mil nominal thick coating meeting ASTM D 3222-05 requirements. SSSMR metal roofing components to include all soffit, fascia, downspouts, and counter-flashing shall be minimum 22 gauge. Residential style gutters and downspouts shall not be installed. Color to be selected by LRAFB Architect.

13. The DESIGN-BUILD Firm shall provide SSSMR Roofing Panels with 22 gauge (0.025 inch) minimum thickness.

14. The DESIGN-BUILD Firm shall provide all seams with butyl sealant. SSSMR seams shall have factory applied butyl sealant. SSSMR shall be mechanically seamed.

15. The DESIGN-BUILD Firm shall design the roof for expansion and contraction.

16. The DESIGN-BUILD Firm shall design all valleys, ridges, eaves, rakes, penetrations, flashings to resist blowing rain. No valley flashing breaks/splices that cause a change in flow direction due to differing roof planes at roof slope change as seen in plan view. All valley seams/splices to be hemmed seams with no penetrations according to the current edition of

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the SMACNA manual. Sealant shall not be the only reliable waterproofing method at all SSSMR and valley flashing seams.

17. The DESIGN-BUILD Firm shall provide a solid substrate over spaced structural support system for the substrate. The DESIGN-BUILD Firm shall provide an underlayment over wood deck. Underlayment shall be 55 mil, mineral surfaced, fiberglass reinforced, flexible SBS modified asphalt "Peel & Stick, Moisture Guard Plus" or equivalent on entire roof with 12" overlap at seam locations. Valley underlayment to be 24" wide and centered at each valley to overlap 12" on each roof plane.

18. The DESIGN-BUILD Firm shall provide snow guards at eaves positioned over pedestrian or vehicular traffic area. Snow guards shall be attached per manufacturer recommendations with mechanical non-penetrating fastenings at vertical ribs. Snow guards shall not be attached by penetrating the metal panel with exposed fasteners.

19. The DESIGN-BUILD Firm shall submit colors in full range of manufacturer's standard colors to be selected by LRAFB Architect. (The base standard color is Dark Bronze - US10B for all exposed metal)

20. The DESIGN-BUILD Firm shall extend all penetrations to remain above the roof line. Provide drawing details for each type of penetration to be used to show flashing and sealant. The designer is responsible for coordinating the penetration location in order to avoid an installation that would interrupt the panel seams. Weatherproof characteristics and independent movement must be accounted for by the designer at all penetrations. All penetration shall be installed per metal roofing system manufacturer's requirements for 20 year weather-tightness warranty. Water shall not be trapped at curbs. Provide crickets made of the same metal type and gauge as the metal panel or change the orientation of the roof curb so that it allows water to flow around it. Curb heights shall be a minimum of 8 inches. For small penetrations provide EPDM or Silicone pre-manufactured pipe collars; install per manufacturers recommendations.

21. The DESIGN-BUILD Firm shall design thermal insulation requirements, ventilation requirements, and alterations to mechanical systems meeting LRAFB Mechanical Engineering Design Criteria and Expectation Guide, UFC-3-410-01FA, and ASHRAE 62 & 90.1 current standards. Install dry-pipe fire protection and accessories as required in vented attic spaces and exterior corridors.

22. SSMR shall be mechanically seamed. Snap-loc system is not allowed.

23. The DESIGN-BUILD Firm shall provide thermal insulation at the proper location required. Provide a thermal resistance "R" value of 38 or more. Flexible blanket, rigid, or semi-rigid faced with a flexible vapor retarder. Vapor retarder shall be an ice/water guard membrane underlayment. Insulation and facing shall have a flame spread rating of 50 or less in accordance with ASTM E 84. Vapor retarder facing shall have a permeance rating of 0.05 perm or less.

24. Ventilation requirements: The DESIGN-BUILD Firm shall design to meet ventilation requirements. For Dutch gable, gabled and hipped roofs, ventilation shall be provided to furnish cross ventilation of each separate attic space with weather tight vents. Louvers shall be pre-manufactured minimum 4 inch deep, driven-rain tight. Provide drawing details and submittals for louvers. All vents shall be screened to protect the interior from intrusion of birds and insects. The ratio of total net free ventilating area to the area of the ceiling shall be not less than 1/150. That ratio may be reduced to 1/300 provided.

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25. At least 50% of the required ventilating area is provided by ventilators located in the upper portion of the space to be ventilated (at least 3 feet above eave or cornice vents) with the balance of the required ventilation provided by eave or cornice vents.

26. All calculations determining the appropriate ventilation requirements for proper air exchange shall be provided by the appropriate mechanical engineer, not by the manufacturer of the roof assembly.

27. The DESIGN-BUILD Firm shall provide new gutters, downspouts and splash blocks, soffit and fascia. Gutters and downspouts shall be 22 gauge box style. Residential style gutters and downspouts shall not be installed.

28. The DESIGN-BUILD Firm shall provide and install cast iron downspout boots/shoes to protect lower portions of each down spout from grounds maintenance high speed mower impacts.

29. The DESIGN-BUILD Firm shall provide and install a minimum of 185 pound, 5" x 12" x 60" concrete splash block at each downspout. Splash block may also be fiber reinforced 6" x 24" x 60" cast-in-place 3500 psi concrete pads.

30. Downspouts and gutters shall be 22 gauge.

31. The DESIGN-BUILD Firm shall provide lightning protection. Lightning protection shall be attached using non-penetrating seam clamps.

32. The DESIGN-BUILD Firm shall design and provide construction plans and specifications (including demolition plans) for relocation of all mechanical, electrical, and communication equipment that must be removed from the existing roof.

33. The Design-Build Firm shall provide an access hatch and permanent lighted catwalk and heat detectors in the design of the attic space. The roof design shall provide adequate access for maintenance and removal of all mechanical, electrical, and communication equipment designed to be left in place on the existing roof.

34. Roof Warranty: In addition to the standard 1 year warranty for the project, the DESIGN BUILD Firm shall furnish a 5 year Contractor's Weather-tightness Warranty and the Roofing System Manufacturer's 20 year, non-prorated, system Weather-tightness warranty with no-dollar-amount for the standing seam roof systems. At project conclusion, the DESIGN-BUILD Firm shall specify that the Contractor shall provide the fully executed warranty documents for the roof with the Operations and Maintenance manuals required in the Section 01 33 00 SUBMITTAL PROCEDURES.

K. Structural scope of work shall be as required to support the task outlined elsewhere in this Statement of Work, the Concept Charrette Report, and the following documents.

1. UFC 1-200-01 DoD Building Code, Change 1, 1 October 2020 (UFC 1-200-01)
2. UFC 3-301-01 Structural Engineering, 1 October 2019 (UFC 3-301-01)
3. UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings, Change 1, 19 August 2020 (UFC 4-010-01)
4. 2018 International Building Code (2018 IBC)
5. 2018 International Existing Building Code (2018 IEBC)
6. ICSSC RP 8/NIST GCR 11-917-12 Standard of Seismic Safety for Existing Federally Owned and Leased Buildings, December 2011 (RP 8)

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7. ASCE 41-17 Seismic Evaluation and Retrofit of Existing Buildings (ASCE 41)
8. Other referenced Codes, Standards, Unified Facilities Criteria, Air Force Manuals, etc.
9. This facility is to be considered Risk Category II
10. It shall be assumed that the cost of this project totals more than 50% of the replacement value of the building. (Reference UFC 3-301-01 and RP 8) (see page 9 and 10 of CCR)
11. It shall be assumed that the costs of this project exceeds 50% of the replacement cost of the existing building in accordance with UFC 3-701-01. (Reference UFC 4-010-01)
- L. A seismic evaluation in accordance with ASCE 41-17, applicable codes, standards, Unified Facility Criteria, Air Force Manuals, and other items by reference.
- M. Where seismic retrofit is required, it shall be in accordance with ASCE 41-17, applicable codes, standards, Unified Facility Criteria, Air Force Manuals, and other items by reference.
- N. The DESIGN-BUILD Firm shall appropriately analyze and evaluate the impacts of the new construction, exterior corridor addition, and metal roofing overbuild and design and construct necessary improvements or modifications to support the proposed construction.

2.05 ARCHITECTURAL

A. GENERAL

1. Use of Little_Rock_AFB_IFS_Pre-Final and LRAFB Arch Design Guide Supplement is mandatory.
2. The Design-Build Firm shall determine all needs during pre-bid and pre design site visits.
3. See the 100% Submittal Concept Charrette Report and SOW for additional architectural requirements.
4. The DESIGN_BUILD Firm shall ensure all renovation work shall conform to the USAF Whole Building Design Guide.
5. DESIGN BUILD-Firm to reference documents in SOW Attachments/Design Criteria.
6. DESIGN-BUILD Firm shall understand/use/reference all documents in the "100% Submittal (CCR) Conceptual Charrette Report", and this SOW, and all the SOW Attachments, (et.al.) as formally included as part of the Statement of Work by extension and reference.

B. EXTERIOR

1. Design-Build Firm shall clean all exterior brick, fill in windows, and openings in the exterior masonry as required with matching brick and tuck-point areas of missing or shallow mortar. Mortar color and strength shall match existing. Provide sample area in out of the way corner for approval prior to completing entire exterior. Seal masonry and exposed concrete with 100% acrylic waterproof coating product intended by the manufacturer as a brick sealer.
2. Design-Build Firm shall clean and repair, all exterior concrete. Patch all spalls and pock marks, and marks made from removal with saws and other tools. Coat exposed concrete, walks, steps, ramp, concrete floor slab edge left exposed after concrete window shade removal, overhead door aprons, et cetera, with a water-based, high-build, 100% acrylic waterproof coating product with perlite texture and algae resistance, similar to Thorocoat.

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C. WALLS AND CEILINGS

1. The DESIGN-BUILD Firm shall install new reinforced drilled piers, new reinforced concrete grade beams, new reinforced concrete footings, new reinforced concrete slabs, new reinforced insulated concrete block and brick veneer walls, new mineral wool insulated metal stud walls on the interior, new code and AF regulations compliant doors, hardware, wall sheathing, cement board and gypsum board as required for wall construction. Install Uni-strut in corridor ceiling, metal stud framing in other wall and ceiling locations, ceiling grid, and install ceiling finishes as required. Provide and install new wall insulation in all stud wall cavities at exterior walls. Cellulose/newspaper type insulation and loose fill type insulation is not acceptable.
2. Provide all necessary blocking & backing for window blinds, curtains (by-others), toilet accessories, towel bars, robe hooks, mirrors, etc.
3. Provide a GA-214 Level 4 finish on all gypsum board. Install corner guards at all exposed outside corners.
4. Provide and install knock down finish, primer coat and minimum of two paint coats for areas to receive painting.
5. The DESIGN-BUILD Firm shall install new exterior insulated entry doors, sidelights, and hollow metal interior doors and frames, new interior solid core stain grade birch wood doors and hollow metal frames, new code compliant and LRAFB approved door hardware, new access control door hardware, where required.
6. The DESIGN-BUILD Firm shall install new stain grade birch millwork (custom grade). Typical millwork in a room consist of a vanity with drawers and cabinets below and a cabinet above the toilet. Millwork to be plywood veneer with hardwood face frames and hardwood lumber banded doors and drawer fronts (no veneer tape edges will be acceptable). Install carpet and carpet base, porcelain floor and wall tile, carpet tile and carpet base, luxury vinyl tile and resilient base, tegular 2x2 lay in ceiling tile. See 100% Submittal CCR Charrette Report and the LRAFB Architectural Compatibility Guide and Supplement documents, and the Unaccompanied Housing Design Guide, WBDG Whole Building Design Guide for other mandatory architectural requirements.
7. The DESIGN_BUILD Firm shall provide and mechanically install the building signage system to include directional signage and directories as specified in Section 10 14 02 INTERIOR SIGNAGE as required for interior spaces.

D. FLOORING

1. Remove all existing flooring, thresholds and wall base, and repair existing substrates to receive new flooring, thresholds and wall base.
2. Remove clean slab, patch slab and replace carpet throughout the building. All carpeting shall meet or exceed the requirements of the USAF Unaccompanied Housing Design Guide, the Air Force Carpet Handbook, ETL 07-04 and UFC 3-120-10. Carpeting shall be a minimum heavy traffic/heavy wear rated carpeting. Carpeting shall also have a geometric pattern and shall be a branded fiber. Density shall be no less than 7000 average pile density. All areas with carpeting shall also have 4 inch high seamed edge carpeted wall base from matching roll stock.

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3. Provide and install approximately 5/16" thick, non-skid abrasive strips at all flooring type transitions. New wall base shall be matching carpet base and shall not be vinyl or rubber wall base in areas where wall base is not tile or carpet.
4. Provide and install thin set, 6" x 6" non-skid porcelain ceramic floor tile on floor of all bathrooms, in all laundry rooms, kitchen area, lobby area, vestibules, public restrooms, in color groups 2 & 3.
5. Provide and install 6" high matching porcelain ceramic tile wall base in all areas with floor tile.
6. Provide and install 6" x 6" or 6" x 8" glazed wall tile on concrete board on all wet walls from floor to ceiling, and water fountain walls to one foot above water fountain.
7. Provide and install 2" – 4" wide extruded aluminum transition thresholds at all changes in floor coverings. Transition thresholds shall be mechanically and adhesively attached. Vinyl and rubber transition strips will not be acceptable.

E. OPENINGS

1. ~~Install fragmentation retention film and catch bars on all exterior windows to meet Anti-Terrorism and Force Protection requirements, UFC 4-010-01 Department of Defense Minimum Antiterrorism Standards for Buildings (current version).~~

~~new windows that meet the UFC 4-010-01 Department of Defense Minimum Antiterrorism Standards for Buildings (current version).~~

2. Install 16 gauge welded corner steel door frames, grouted full with masonry or concrete and mechanically anchored to existing structure.
3. Install bonded staved solid core birch face stain grade doors, clear coated in new interior locations.
4. Install new 16 Gauge hot dipped galvanized and factory primed hollow metal doors. Paint as required for new finish. See Section 08 11 13 STEEL DOOR AND FRAMES.
5. Ensure all mechanical rooms, storage rooms, offices or other enclosed spaces with interior doors include the following hardware and are the same/matching throughout.
 - a. Insulated hollow metal or solid core wood doors as appropriate. Provide rating as required.
 - b. Welded corner steel frames with silencers.
 - c. Brushed aluminum or stainless steel kick plates.
 - d. Ball bearing hinges.
 - e. Curved return lever handle locksets.
 - f. Keyed Deadbolts.
 - ~~g. Card Key Access System that will work with the existing CAC Card system, with manual override on occupant rooms only.~~
 - h. Wall stops.
 - i. Adjustable force door closers.
 - j. Touch-Bar panic hardware on all egress doors at locations required by code.
 - k. See also Section 08 71 00 Door Hardware.

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6. Provide solid surface Corian type solid surface window sills and stools at all windows. Solid surface material shall be burn resistant, and shall have geometric and speckled patterns to choose from.
7. Provide Corian type solid surface counter tops at all millwork in kitchens, and bathrooms as per LRAFB Architectural Design IFS and LRAFB Architectural Guide Supplement.

2.06 MECHANICAL & PLUMBING

- A. Use of Little Rock AFB Mechanical Design Guide is mandatory.
- B. Systems shall be designed to attain the following objectives: provide occupant comfort, adequate indoor air quality, acceptable noise levels, energy efficiency, reliable operation, and ease of maintenance.
- C. The new HVAC unit shall be manufactured by TRANE only.
- D. The existing building mechanical and plumbing systems are in poor condition throughout. The major deficiencies associated with this building include:
 - Poor general condition of HVAC piping, equipment, and air distribution equipment. This includes rust and corrosion on piping and equipment, lack of maintenance of the systems, and general disrepair.
 - The building appears to have been previously equipped with an air-cooled chiller, which is missing from the building site.
 - The boilers are older style, water tube, lower efficiency units, and the firing control, heat exchanger, and safety related systems are of questionable status.
 - The building has inadequate systems for the treatment of outside air for ventilation or for handling of restroom exhaust. What ventilation systems are present appear to have been inoperative for a significant period of time along with the heating and cooling systems. The result of this is significant mold growth in portions of the building.
 - Plumbing piping and water heating systems are aged and operational status is unknown due to systems being shut-off for a significant period of time.

- The restroom fixtures are aged and do not meet current code and energy efficiency requirements for water use savings.

The primary focus of the mechanical and plumbing aspect of this renovation project is the complete replacement of the existing mechanical and plumbing systems in this facility. New mechanical and plumbing systems will provide increased comfort, functionality, control, and energy efficiency while also focusing on life-cycle cost.

For the new building HVAC systems, the following is a breakdown of the new system equipment and components:

- Installation of a new chilled water system, including high efficiency air cooled chiller, variable speed chilled water pumping system, and chilled water distribution piping throughout the facility.
- Installation of a new heating water system, including high efficiency condensing boilers, variable speed heating water pumping system, and heating water distribution piping throughout the facility.
- New chilled water cooling / hot water heating fan coils with year round (4-Pipe) for each living space and common area spaces to provide conditioned air for each space.

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- A new outside air pre-treatment system to provide restroom exhaust and pre-conditioned outside air directly to each living space. This system would use dessicant energy recovery wheel technology in combination with chilled water cooling and hot water reheat to provide room-neutral air for ventilation and humidity control throughout the building. Ventilation and exhaust rates for the building spaces should be provided based on the latest editions of ASHRAE 62.1 and ASHRAE 189, and locally applicable codes. All occupied spaces shall be provided with outside air ventilation.
- A new building-wide HVAC control system to provide temperature control, monitoring, and adjustment of the buildings HVAC system while also enhancing energy efficiency and utility tracking. This system would be made fully compatible for future interface with the base-wide energy monitoring system.
- All HVAC systems will be installed in accordance with the latest versions of the LRAFB 19th CES Mechanical Engineering Design Criteria and Expectations as well as all applicable local codes and UFCs.
- The drawings M-101 through M-104 in Appendix B demonstrate a concept layout of the mechanical equipment for the building that addresses some of the specific challenges of the installation of these systems in the building.

The main challenge for ventilation in this building is the quantity of restroom exhaust and make-up air required to meet code ventilation requirements for the large number of tenant restrooms. Pre-treatment of the outside air stream via energy recovery technology in the new makeup air units will address this problem directly and provide a cost and energy efficient solution. Each resident room will have individual control of its own heating and cooling unit to control the room environment. This will be accomplished through the use of wall mounted thermostats to monitor space temperature. Humidity will also be monitored at these locations, and control strategies for conditioned air reheating at a local level will provide control of space humidity. Introduction of room neutral dry preconditioned air from the make-up air system will also aid in control of space humidity that might be generated by showering activities, open exterior doors, etc.

As with the HVAC systems discussed above, this project will entail a complete replacement of the plumbing domestic water and sanitary sewer systems for the facility. Aspects of this replacement will include:

- New domestic water piping systems throughout the building, including domestic cold water and hot water piping.
- New domestic water heating equipment utilizing gas fired high-efficiency tank style water heaters, with adequate hot water storage capacity to satisfy high demand periods such as morning showering. New recirculating pumps will be provided to ensure quick arrival of hot water at all fixtures.
- New sanitary sewer and vent piping throughout the building.
- New fixtures throughout the building. This includes new lavatories, water closets, and showers for all occupant rooms, and new common area fixtures such as break room sinks, utility sinks, washer connections, and various hose bibs on the interior and exterior of the building.
- New domestic water backflow prevention for the entire building.
- New digital metering for the domestic water and natural gas systems, for monitoring and tracking via the new building control system. All Plumbing systems will be installed in accordance with the latest versions of the LRAFB 19th CES Mechanical Engineering Design Criteria and Expectations as well as all applicable local codes and UFCs.

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2.07 FIRE DETECTION & SUPPRESSION

A. Use of Little Rock AFB Mechanical Design Guide is mandatory.

This project includes replacement of the wet pipe fire sprinkler system throughout the building, including piping, heads, and a new sprinkler riser and alarm valve in the mechanical room. Also provide a new fire alarm/mass notification system throughout the facility. Also included in the scope of this project is the replacement of the existing dry-pipe fire protection system in the attic, including the replacement of all piping, heads, and equipment related to this system. All fire protection systems will be installed in accordance with the latest versions of the LRAFB 19th CES Mechanical Engineering Design Criteria, Expectations as well as all applicable local codes and UFCs. Remove existing detectors and fire suppression heads. Install all new lines tight to ceiling as necessary for hard ceiling and ceiling tile replacement and reinstall heads at appropriate height.

B. Provide and install Fire Extinguishers and cabinets as specified in Section 10 44 16 FIRE EXTINGUISHERS & CABINETS

C.

2.08 ELECTRICAL AND COMMUNICATIONS

A. Use of Little Rock AFB Electrical Design Standards dated March 17, 2021 is mandatory.

B. Use of Little Rock AFB 19th Communications Squadrons Design Standards is mandatory.

C. ELECTRICAL DEMOLITION

- a. The existing electrical service shall be demolished to relocate the new service entrance panelboard. The secondary feeder shall be removed, which includes, but not limited to the existing wire and conduit.
- b. Contractor shall backfill and compact the existing trench from the existing Entergy transformer to the entrance into the existing building.
- c. The existing service entrance disconnect and/or service entrance panelboard shall be removed. This includes, but is not limited to the following:
 - i. Existing service entrance panelboard, distribution panelboards, lighting, outlet boxes, conduit mounting accessories and power branch panelboards.
 - ii. Existing circuit breakers, disconnect switches, light switches, receptacles and fractional horsepower starters.
 - iii. Existing branch circuit to include existing wire and conduit and all existing mounting accessories to be able to remove conduit in it's entirety. If it is determined that branch circuits (conduit only), then the contractor shall coordinate with the base electrical engineer for agreement on abandoning the existing conduit. If the existing conduit is supposed to be abandoned in place it shall be cut at the floor, wall, ceiling, etc. and capped so that the conduit has no chance to allow foreign debris, rodents, insects and other items access to the abandoned conduit.

D. PHASING PLAN

a. The contractor shall provide a phasing plan to indicate how the existing electrical system shall be kept up and running, while installing the new electrical system.

E. INTERIOR AND EXTERIOR LIGHTING

- a. The interior and exterior lighting shall comply with Little Rock AFB Electrical Design Standards dated March 17, 2021. The lighting design shall include lighting calculations using the point-by-point method.
- b. The lighting controls shall be discussed at each review conference to ensure that the correct method is used in the design.

F. WIRING DEVICES

- a. The contractor shall provide general receptacles, dedicated, and/or special as recommended by the Little Rock AFB Electrical Design Standards dated March 17, 2021.

G. MECHANICAL AND PLUMBING LOADS

- a. The contractor shall provide dedicated electrical circuits as required by the mechanical and plumbing design

H. ELECTRICAL LOAD ANALYSIS

- a. The electrical engineer of record will provide an electrical load analysis at the 35% submittal. This shall be used as a starting point for the Contracting Officer Representative (COR) for Entergy to begin discussions with Entergy. This will determine if the existing transformer is of adequate size for the current design. The electrical engineer of record shall provide an updated version of the load calculations to ensure that the correct calculations are available for Entergy in a timely manner.

2.09 RECYCLING AND CONSTRUCTION DEBRIS DIVERSION

- A. See specifications for complete requirements.
- B. All removed carpet shall be recycled and the Design-Build firm shall provide written certification that the carpet was not placed in a landfill in accordance with ETL 07-4 Air Force Carpet Standard. Design-Build Firm certification shall indicate how the material was recycled and provide the address where it was delivered.
- C. All removed ceiling tile shall be recycled and the Design-Build firm shall provide written certification that the ceiling was not placed in a landfill. Design-Build Firm certification shall indicate how the material was recycled and provide the address where it was delivered.
- D. All vinyl wall covering, vinyl wall protection, vinyl corner guards and vinyl wall guards shall be recycled and the Design-Build firm shall provide written certification that the vinyl products were not placed in a landfill. Design-Build Firm certification shall indicate how the material was recycled and provide the address where it was delivered.

2.10 FACILITY SECURITY

N/A

2.11 ENERGY CONSERVATION

UFC 1-200-02 HIGH PERFORMANCE AND SUSTAINABLE BUILDING REQUIREMENTS implements the following public laws and industry standards for most design and construction:

- A. ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings, American Society of Heating Refrigeration and Air Conditioning Engineers, Inc., Atlanta Georgia

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- B. USC Title 10, Part 433, Energy Efficient Standards for the Design and Construction of New Federal and Commercial and Multi-Family High Rise Residential Buildings
- C. USC Title 10, Part 435, Energy Efficient Standards for New Federal Low Rise Residential Buildings
- D. Title 10 Code of Federal Regulations, Part 436 – Federal Energy Management and Planning Programs, Subpart A – Methodology and Procedures for Life Cycle Cost Analysis
- E. ICC International Energy Conservation Code 2006
- F. Executive Order 13221 - Energy Efficient Standby Power Devices
- G. Executive Order 13423 – Strengthening Federal Environmental, Energy, and Transportation Management
- H. Energy Independence and Security Act of 2007

2.12 REFERENCES AND STANDARDS

The Design-Build Firm shall design in adherence to the following documents, including all recommended practices documented in these standards. Although some publication dates are given, the design shall be by current references and standards. The Design-Build Firm shall determine through the pre-design meeting if other codes, standards or references not specifically cited also apply to the design of this project, and incorporate those requirements into this project. All work accomplished by the Design-Build Firm shall comply with this criteria unless a waiver is obtained from the Air Force when conditions warrant such consideration

- A. Air Force Instructions (AFI), Air Force Manuals (AFM), Air Force Pamphlets (AFPAM) plus Supplements, Unified Facilities Criteria (UFC), Military Handbooks, Engineering Technical Letters (ETL) and Operating Instructions that are applicable to the design of this project. This includes all Air Mobility Command and Little Rock AFB supplements to these references.
- B. Current state and national codes, regulations and specifications involving architectural, civil, structural, electrical, environmental and mechanical disciplines associated with the design and construction of this project.
- C. National Fire Codes published by the National Fire Protection Association.
- D. All other Air Force documents deemed applicable by the *Contracting Officer* for this project. These documents will be made available for review to the Design-Build Firm by the *Government*.
- E. Architectural Barriers Act (ABA)
- F. AFJMAN 32-1008, Installation Design
- G. MIL-HDBK-1190; "Military Handbook Facility Planning and Design Guide – Technical Guidance
- H. UFC 1-200-01 Design: General Building Requirements
- I. UFC 3-120-10 Interior Design
- J. UFC 3-301-01 Structural Engineering
- K. UFC 3-310-03A Seismic Design for Buildings. Note: this UFC is more stringent than the current State of Arkansas Building Code

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- L. UFC 4-010-01 DoD Minimum Antiterrorism Standards for Buildings.
- M. UFC 3-600-01 Design: Fire Protection Engineering for Facilities
- N. Air Force ETL 04-3 Design Criteria for Prevention of Mold in Air Force Facilities
- O. AFP 32-1097 Air Force Sign Standards Pamphlet
- P. AMC Commander's Guide to Facility Excellence
- Q. Little Rock AFB Architectural Compatibility Guide
- R. Little Rock Air Force Base Architectural Design Guide Supplement
- S. Little Rock AFB Electrical Design Standards
- T. 19th COMMUNICATIONS SQUADRON DESIGN STANDARDS
- U. 19th Civil Engineer Squadron Mechanical Engineering Design Criteria and Expectations
- V. National Electrical Contractors Association (NECA) 1, Standard Practices for Good Workmanship in Electrical Construction
- W. Air Force ETL 07-4: Air Force Carpet Standard
- X. Air Force Carpet Selection Handbook
- Y. UFC 3-400-01 Energy Conservation
- Z. ETL 08-13: Incorporating Sustainable Design and Development (SDD) and Facility Energy Attributes in the Air Force Construction Program

PART 3 - PROJECT MANAGEMENT

3.01 PRE-PROPOSAL SITE VISIT & MEETING

The *Government* will host an initial pre-proposal meeting and site visit. The purpose of the meeting will be to convey and clarify the project requirements to the Design-Build Firm. *Government* furnished items noted elsewhere in this Statement of Work (SOW) will be available at, or prior to the initial meeting. A project site visit will be accomplished after the meeting. The Design-Build Firm shall have appropriate representation present at this meeting, but no less than the proposed design team and project superintendent.

3.02 PRICE PROPOSAL

The Design-Build Firm shall submit a price proposal in accordance with the provided bid schedule.

3.03 PROJECT MANAGER

The Design-Build Firm shall appoint a project manager to serve as the single point of contact for this project and liaison between the Design-Build Firm's employees/subcontractors and the *Government*. A registered professional architect is preferred to serve as the project manager; however, if this is not possible, the design architect-in-charge of the design shall attend all design related meetings, sites visits, presentations, official construction inspections and review, initial and date all material submittals. Upon issuance of the Notice to Proceed for the design of this project, the Design-Build Firm shall advise the *Contracting Officer* in writing of the name of the individual so designated. The Design-Build Firm's project manager shall be responsible for the complete coordination of all work required for this project. The Project manager shall attend all formal and informal meetings related to the execution of the requirements of the contract. The Project manager shall ensure that quality control review of each submittal is performed

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prior to delivery of submittal to the *Government*. The Project manager shall complete the Reliability and Maintainability (R&M) Design Checklist and Design Review Checklist Including Constructability and include the completed forms in the Design Analysis.

3.04 CE PROJECT MANAGER

The CE Project Manager will provide technical support to the *Contracting Officer*, who is the official agent of the *United States Government* for this contract. The CE project manager will serve as the point of contact for the Design-Build Firm on all technical matters and, all work performed by the Design-Build Firm on base will be coordinated with the CE project manager. Contact information for both the *Contracting Officer* and the CE Project Manager is provided at the end of this Statement of Work. During both the design and build phases, the Design-Build Firm shall take direction only from the *Contracting Officer*.

3.05 PROJECT COST CONTROL

The Design-Build Firm shall be solely responsible for managing the costs of this contract during its design and construction. The *Government* will not accept requests for additional funds except for changes in project scope, unforeseen site conditions or as directed by the *Contracting Officer*.

3.06 MATERIAL SUBMITTALS

- A. During the design process, the Design-Build Firm shall ensure that the A-E coordinates material selection with the appropriate subcontractors such that the materials specified in the design documents are what will be purchased and installed.
- B. During the construction phase, the Design-Build firm shall submit material submittals on all products used in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

3.07 SECURITY REGULATIONS

- A. All members of the Design-Build Firm, including subcontractors, who are working on this contract, shall follow Air Force security regulations.
- B. The Design-Build Firm shall take precautions and make every effort to prevent public disclosure of any information made available to the Design-Build Firm during the performance of this contract. All data contained in the design documents for each project shall be treated as privileged information.

PART 4 - PROJECT SCHEDULE AND PRODUCT DISTRIBUTION:

4.01 SCHEDULE

The Design-Build Firm shall develop a schedule based on the performance period and other data below. The A-E shall submit this design schedule no later than 10 days after project award.

- A. Performance period: 525 Calendar Days
- B. The performance period includes both the design and construction phases of this contract. It is the *contractor's* responsibility to manage design and construction within the performance period for this project.
- C. *Government* Design Review Milestones: 35%, 65%, 95%, 100%
- D. Each *Government* design review lasts 14 calendar days, at the end of which the *Government* will submit its comments to the Design-Build Firm. The Design-Build Firm's schedule shall include a design review meeting, approximately 7 days after receipt of *Government* comments, to officially disposition all comments.

- E. Construction will begin following the approval of the final design plans which includes receipt of required approval(s) from ADH, ADEQ and City of Jacksonville. A preconstruction meeting will be set up no later than 2 weeks after approved design is submitted.

4.02 SUBMITTALS

The Design-Build Firm shall deliver all copies of all submittals to the *Contracting Officer*, except for those as identified in paragraph 4.09.

4.03 PRE DESIGN CONFERENCE

A Pre-Design Conference will be conducted for this project after this contract is awarded. The Design-Build Firm shall request this meeting within 10 business days of the issue of this contract, at a date and time agreeable to all parties. The *Government* will provide any additional details necessary to clarify the project scope or to indicate the *Government's* desires as to type of systems, controls, or architectural preference to ensure project compatibility with the base master plan or to simplify operation or maintenance procedures and costs.

4.04 CONCEPT DESIGN SUBMITTAL

- A. A 35% Concept Design Submittal is design from the Notice to Proceed to approximately 35% complete and should include a majority of the investigative work. It is recommended this submittal include a short, informal briefing (discussion) of the design concept to the *Government* project engineer and appropriate personnel early in the design/analysis process for inputs (potential problems) not readily apparent from field surveys and investigations. The submittal shall include the following:
- B. A Narrative/Design Analysis will be provided to indicate a description of the facility, design assumptions, design factors used, energy savings considerations, and any other data not otherwise indicated or needed for architectural/engineering analysis. All design calculations made to date shall be included. Narrative discussions of methods and procedures should be included. The Design-Build Firm shall address each item required from but not yet provided by the *Government* to conclude the design.
- C. Drawings. Preliminary drawings shall be provided as applicable to reflect progress to date. Typical are:
1. Vicinity map and location plan showing geographic location and access to the work site.
 2. Site plan, including location of all above and below grade utilities in the area.
 3. Code Review Sheet, indicating construction type, travel distances, egress, life safety, seismic, ATEP, et cetera, sufficient to indicate due diligence has been performed in review of applicable codes, laws and regulations to ensure completed project is designed and constructed in compliance with such codes, laws and regulations.
 4. Floor plan at a scale not less than 1/8" per foot, showing functional arrangement of all areas, including corridors, exits, and utility spaces. Major dimensions shall be shown.
 5. Elevations and sections will be developed to a point to indicate heights, fenestrations, ceilings, and partitions. Typical interior wall sections will be provided at a minimum scale of 1" = 1'-0", indicating materials, thicknesses, and relation of fenestration, if any.
 6. If required, a room finish schedule shall be included on a separate drawing and shall be in compliance with Section 09 06 89 TYPICAL FINISH SCHEDULE.

7. Generic furnishings plan, showing desks, chairs, conference tables, book cases, display cases, millwork, printers, copiers, shredders, recycling bins, appliances, et cetera. Plan will be used to confirm functionality of the space for the users and for verifying locations of phone, data, television, water, lighting and power outlets. Plan will also be used for furniture ordering under a separate contract.

8. Mechanical details will be sufficiently developed to clearly define changes to the existing heating, cooling, ventilation, and plumbing systems. Existing and replacement heating/cooling equipment will be located and fully described on a plan view of the project.

9. Electrical details will include lighting and power features. Lighting features will include proposed fixtures and arrangements. Design analysis will include lighting calculations, fire alarm system schematics, etc.

10. Exterior utilities (gas, water, sewer, electrical, etc) will be located in sufficient detail to clearly define sizes, routing, and avoidance of conflicts with existing systems.

11. Erosion Control plan, if applicable.

- D. Specifications: The Design-Build Firm shall submit outline specifications. Specifications shall follow the CSI Masterformat 2004. The Design-Build Firm shall submit all information in 8 1/2" x 11" booklet form.

4.05 PRELIMINARY DESIGN SUBMITTAL

- A. A 65% Preliminary design submittal is design from the concept design approval to approximately 65% completion.
- B. All elements of the 35% submittal should be continued to the point that a *Government* reviewer can verify scope and sufficiency of details on all drawings and specifications.
- C. The Design-Build Firm shall include all asbestos/lead-based paint test results in this submittal.
- D. The Design-Build Firm shall incorporate all approved comments from previous design reviews.

4.06 PRE-FINAL DESIGN SUBMITTAL

- A. 95% Pre-Final Design Submittal is design continuation through the 95% unchecked final submittal.
- B. Construction drawings and specifications shall be complete in all details to the extent that a construction *Design-Build Firm* can construct the facilities from the information, with a minimum of differences between the *Government* and the *Design-Build Firm*. The Design-Build Firm shall incorporate all approved comments from previous design reviews.
- C. Completed submittal schedules shall be furnished for review.
- D. The Design Analysis shall include the completed Reliability and Maintainability (R&M) Design Checklist and Design Review Checklist Including Constructability.
- E. NOTE: Equipment submittals are due no later than 10 business days after acceptance of the 100% design.

4.07 FINAL DESIGN SUBMITTAL

- A. A 100% Final Design Submittal is the corrected final submittal.
- B. All previous design comments shall be incorporated and/or addressed.

- C. The Design-Build Firm shall furnish two full size and two half size paper copies of the drawings; two paper copies of the specifications; and one paper copy of the material submittal schedule, design analysis and proposed construction schedule. The drawings and specifications shall bear the registration seal of the A-E firm member who is responsible for the design below the Air Force Insignia. If "Structural Interior Design", "Comprehensive Interior Design" or Audio-Visual Designs are required then 2 sets of each will be included in this submittal.
- D. The final electronic files shall be submitted at this time to include one AutoCAD and one Adobe Acrobat copy of drawings; one Adobe Acrobat copy of specifications, material submittal schedule, design analysis and proposed construction schedule; one Microsoft Word copy of specifications (all specification sections combined in one file); one Microsoft Excel copy of material submittal schedule.

4.08 GOVERNMENT REVIEW PERIOD & REVIEW CONFERENCE

A review of the Concept, Preliminary, and the Pre-Final Design Submittals will be conducted by the *Government*. At the conclusion of the review, the Design-Build Firm may be required to attend a Review Conference to discuss the technical review comments and general project progress. The Design-Build Firm will be furnished one set of comments to be annotated and returned to the *Government*. Comments shall be annotated with a C - concur, D - do not concur, E - exception or X - delete. Comments annotated with a D, E, or X shall have an explanatory note added to justify the noncompliance with the comment. The Design-Build Firm shall furnish these annotated comments to the *Contracting Officer* with the next scheduled submittal. The Design-Build Firm shall notify the *Government* immediately upon determining that there will be noncompliance with a comment to explain the reasoning. If the *Government* discovers comments annotated as 'concur'-or its equivalent and no change to plans and specifications have occurred, the *Government* will disapprove the submittal and require a full explanation.

4.09 DISTRIBUTION COPIES

At each *Government* review milestone, the Design-Build Firm shall deliver 2 CDS with the electronic design products as described in Part 5 of this statement of work. (See paragraph 4.07 for 100% final design deliverables.) In addition, the A-E will provide the following paper copies;

1. 2 - full-size copies of drawings
2. 2 - 11x17 copies of drawings
3. 2 - copies of specifications
4. 2 - copies of submittal schedules
5. 2 - copies of the Structural Interior Design (65% and 95% only)
6. 2 – copies of the Comprehensive Interior Design (65% and 95% only)
7. 2 – copies of the Audio-Visual Design (65% and 95% only)

PART 5 - DESIGN PRODUCT DETAILS

5.01 CONSTRUCTION DRAWINGS

- A. Drawings shall be 24" X 36" and shall be accomplished in AutoCAD (latest version) in Construction Specifications Institute (CSI) format.
- B. Drawings shall be in English units.

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- C. Drawings shall be accurate and in sufficient detail to enable proper and satisfactory construction of the entire project. Designs and construction drawings requiring *Design-Build Firm* site visits will not be acceptable. The quality and workmanship of the drawings shall permit clear and legible reproductions. Reference drawings may be used only with specific permission of the *Contracting Officer* (CO) and shall not be used as substitutes for demolition, plan, and detail drawings.
- D. The Design-Build Firm will be provided with a border and title block on CDROM. The border shall be inserted in paper space at a base point of 0,0 and with a scale of 1. This border shall not be modified except with specific permission of the *Contracting Officer*. The drawings shall be designed using model space at full scale. The Design-Build Firm shall use Roman Simplex as font style unless an alternate font is approved by the *Contracting Officer*. Text shall be in the same drawing space as the object the text is describing. For example, text describing an object that is drawn in model space shall also be placed in model space.
- E. The Design-Build Firm shall produce drawings that are capable of being opened and edited in the latest version of AutoCAD without damaging the information on them.
- F. The Design-Build Firm shall include all cross referenced drawings, fonts, shapes, linetypes, etc. with each submittal. AutoCAD's e-Transmit command may be used to gather all files necessary to open a drawing.
- G. The Design-Build Firm will be given a cover sheet to edit. The haul route and index of drawings shall be added to the cover sheet. This cover sheet contains a "10 signature block" which shall only appear on the cover sheet. The "revision/Issue" block is for subsequent changes made after the 100% design submittal is accepted; it shall not be use for submittal tracking or other reasons by the design team.
- H. The Design-Build Firm shall provide AutoCAD drawings on CD to the Base at each submittal, in both AutoCAD and Adobe Acrobat format, in addition to the requested paper copies. The A-E shall provide a graphic scale on each sheet.
- I. The Design-Build Firm shall begin drawing file names with the sheet number, i.e. 01,02,03 etc, with the remaining name describing what is on the sheet. See table II-1 for use of linetype colors.

SCREEN COLOR	PEN WEIGHT	PRINT COLOR	USED FOR:
gray (8)	.2286mm	252	existing conditions
white (7)	.2286mm	black	text
all others	.4572mm	black	normal lines
(10)	1.143mm	black	border

Table II-1

5.02 SPECIFICATIONS

- A. The specifications shall be complete, clear, and shall amplify all information shown on the drawings and shall include detail requirements for materials and equipment. Material items shall be specified using industry standards. The specifications shall be prepared using this document.

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- B. The Little Rock AFB Standard Division 01 GENERAL REQUIREMENTS specifications are included in this document and are mandatory for use on all projects. Division 01 GENERAL REQUIREMENTS specifications are updated a few times each year, Little Rock AFB will not accept use of an older project's Division 01 for use on this project. Current Division 01 GENERAL REQUIREMENTS shall be provided in Microsoft Office Word format on a CD to the A&E firm.
- C. The complete set of specifications shall be combined into one file and shall have the table of contents set up to automatically update when pages or sections are added or deleted. Paragraphs shall use the same style format as this document.
- D. The Design-Build Firm shall provide specifications on compact disk as well as the required hard copies at all submittals. The Design-Build Firm shall number the pages consecutively, with page numbers justified right and the section title justified left. The Design-Build Firm shall provide a minimum one inch margin on all sides is required.
- E. SEE SECTION 00 00 02 LRAFB SPECIFICATIONS FORMAT STANDARD for further clarification. Standard section 00 00 02 shall be included on reference disk provided to *contractor* at the pre-design meeting. This Statement of Work (SOW) incorporates all of the standard format requirements.

5.03 DESIGN AND ECONOMIC ANALYSIS

- A. The design calculations and analyses shall be prepared on the Design-Build Firm's standard form. Legible hand lettering, sketches, diagrams and calculations, will be accepted. The design shall be based on the criteria set forth in this Statement of Work and standard practices and methods used in modern engineering design. The design analysis shall incorporate all engineering computations necessary for the project and other information necessary to clearly express the designer's intentions and methods. HVAC loads shall be accomplished using the methods recommended in the ASHRAE Fundamentals handbook. The Design Analysis shall include the completed Reliability and Maintainability (R&M) Design Checklist and Design Review Checklist Including Constructability.
- B. The economic analysis shall include the estimated energy cost savings and amortization period for energy related construction. Standard computational forms shall be used when furnished by 19th Civil Engineering.
- C. At the final submittal, these analyses shall be given to the *Contracting Officer* in electronic format in one document. An Adobe Acrobat file is preferred. An alternate format may be used if approved by the *Contracting Officer*.

5.04 MATERIAL SUBMITTAL SCHEDULE

The Design-Build Firm will be provided a template form to use. The Design-Build Firm shall fill-in the appropriate information for materials that shall be submitted to the *Government* for approval. Template will be provided in Microsoft Office Excel format on a CD to the A&E firm.

5.05 STRUCTURAL INTERIOR DESIGN PACKAGE

Structural Interior Design (SID) Package includes the evaluation of any existing selections, selection of substitutions and coordination of interior materials and finishes that are part of the building or built-in items (such as cabinetry).

5.06 COMPREHENSIVE INTERIOR DESIGN PACKAGE

Comprehensive Interior Design (CID) Package includes the evaluation of any existing selections, selection of substitutions and coordination and development of special interior

elements and furnishings. The Design-Build Firm shall package the CID drawings, product specifications and cost estimate so that they can be contracted separately from the building construction project.

5.07 AUDIO-VISUAL SYSTEMS DESIGN PACKAGE

Audio-Visual Systems Design (AV) Package includes the complete design of A-V systems to be purchased and install separately from the construction contract. The design shall include specifications, drawings, schematic layouts, generic product data cut sheets and detailed unit price cost estimate.

5.08 COMPUTER FILES

The CAD and word processing files shall not be stored on disks using compression software. The media for delivery of computer data shall be by compact disk (CD) unless approved by the *Contracting Officer*. All media for computer data shall be certified by the Design-Build Firm to be free of known computer viruses. The name(s) and release date(s) of virus scanning software used to analyze the media shall be furnished at the time of delivery of the media. If analysis of the media by the *Government* finds evidence of a virus, the media will be returned to the Design-Build Firm. The Design-Build Firm shall resubmit the clean media at no cost to the *Government*.

PART 6 - GOVERNMENT FURNISHED ITEMS

6.01 GOVERNMENT FURNISHED ITEMS

The *Government* will provide copies of plans, studies, and/or services identified below and represent them to be the latest information available. Use of the *Government* provided information does not relieve the Design-Build Firm of the responsibility to verify the information with respect to the performance of the Design-Build Firm's scope of work.

A. PLANS (Electronic Copies)

1. Base Map
2. Little Rock AFB Title Page
3. AutoCAD border, title block and signature block.
4. Record drawings of existing facilities.
5. Record drawings of existing utility systems in the vicinity of the work.

B. DOCUMENTS (Electronic Copies)

1. LRAFB Design Specification Cover Page and Division 01 General Requirements
2. LRAFB CAD Operating Procedures
3. AF 3052 cost estimate form
4. Submittal Tracker form
5. Bid Schedule form
6. AMC Architectural Standards
7. Little Rock Air Force Base Architectural Compatibility Guide

6.02 ARCHITECT-ENGINEER FIRM RESPONSIBILITY

It is the Design-Build Firm and the A-E's responsibility to verify the validity of all material provided by Little Rock AFB and conduct all field investigations, including any survey work,

at the site as required to resolve design issues and to ensure that design submittals reflect and accommodate existing conditions. The A-E shall notify LRAFB a minimum of 14 days before any survey or geo-technical team arrives on the base to permit marking of underground utilities.

6.03 AS-BUILT INFORMATION/DETAILS

Applicable information/details found on the as-built drawings shall be transferred to the demolition sheets. Referenced as-built drawings shall not be utilized as a substitute for demolition sheets. The Design-Build Firm shall be responsible to verify all as-built information. ~~See attachment F—As-Built Drawings (in Project Information folder).~~

PART 7 - MISCELLANEOUS

7.01 MEETING MINUTES

The Design-Build Firm shall provide the *Contracting Officer*, in writing, his version of each design conference or meeting in which the technical design of the project was discussed. These meeting minutes shall be provided to the *Contracting Officer* a maximum of 5 business days after the date of the design conference or meeting. This written record will not be considered under the clause "Changes", FAR 52.243-4. Any such notification will be submitted separately.

7.02 BRIEFINGS

The Design-Build Firm may have to support briefings to the base's management, in addition to submittal briefings to the technical staff.

7.03 CLAIMS

The Design-Build Firm and all of its subcontractors shall relinquish all claims to additional monetary compensation for the whole or partial use by the *Government* of documents submitted under this contract in the modification, alteration, or construction of projects not included under this contract.

7.04 CORRECTIONS

- A. In the event corrections to design are required during construction, the Design-Build Firm shall provide the following to the *Contracting Officer* for *Government* review and concurrence prior to construction.
- B. Four full size paper (reproducible), one AutoCAD and one Adobe Acrobat copies of the revised drawings.
- C. One paper, one Microsoft Word and one Adobe Acrobat copy of the revised specifications.

PART 8 - GOVERNMENT POINTS OF CONTACT

- A. Rachel L. Italiano
Contracting Officer
19 CONS/LGCA
642 Thomas Avenue
Little Rock AFB, Arkansas 72099-5019
Phone # (501) 987-3853
E-mail address: rachel.italiano.1@us.af.mil

B. Christopher Stell, Base Architect

Project Manager

19 CES/CENMD

528 Thomas Avenue

Little Rock AFB, Arkansas 72099-4987

Phone (501) 987-7678

e-mail: christopher.stell.4@us.af.mil

END OF SECTION – STATEMENT OF WORK FOR DESIGN-BUILD

SECTION 01 11 00 – SUMMARY OF WORK

PART 1 - GENERAL

1.01 PROJECT SCOPE

Contractor shall provide all design, plant, labor, materials and equipment necessary to fully meet all requirements of this Summary of Work, Construction Specifications, Construction Drawings and all other Contract Documents related to and/or titled: Repair (SUS) Airmen Dormitory, Building 854, NKAK 21-1034 at Little Rock AFB, Arkansas.

1.02 PRINCIPAL FEATURES

- A. Principal features of the work are as described in Part 2 Technical Description of Project of Section 01 10 01 Statement of Work for Design-Build above.
- B. PHASING
To meet environmental requirements regarding the Least Terns (endangered bird species) no construction on building 450 (building 787) roof can be accomplished from 15 April to 31 August. If construction cannot be completed by 15 April then construction shall not start until after 31 August.
- C. The above general outline of the principal features does not in any way limit the responsibility of the *Contractor* to perform all work required by the plans and specifications.

1.03 PROJECT AREA LIMITATIONS

All work shall be performed in the immediate project area. Refer to the drawings.

1.04 DOCUMENTS

- A. The *Contractor* shall:
 - 1. Check any *Government* furnished construction drawings immediately upon receipt;
 - 2. Compare any *Government* furnished construction drawings and verify the figures before laying out the work;
 - 3. Promptly notify the *Contracting Officer* of any discrepancies
 - 4. Be responsible for any errors which might have been avoided by complying with this paragraph (1.04 A).
- B. Large scale drawings shall, in general, govern over small scale drawings. Figures marked on drawings shall, in general, be followed in preference to scale measurements.
- C. Omissions from the drawings or specifications or the misdescription of details of work which are manifestly necessary to carry out the intent of the drawings and specifications, or which are customarily performed, shall not relieve the *Contractor* from performing such omitted or misdescribed details of the work, but shall be performed as if fully and correctly set forth and described in the drawings and specifications.
- D. The *Contractor* shall maintain a complete set of construction drawings, construction specifications, project related sketches, pictures, approved Contract modifications (if any) and all approved submittals on the job site at all times. One set of such construction drawings shall be designated the "Record Drawings" upon which as-built data shall be neatly recorded and dated in red ink by the *Contractor*. Contemporaneous annotation of accurate As-Built data on the Record Drawings is to be verified by the *Contracting Officer*

and the *Contracting Officer's Representative*, as a prerequisite to the *Contractor* receiving progress payments. Upon completion of construction, the *Contractor* shall submit a copy of record drawings and update *Contractor* furnished AutoCAD drawing files (*.dwg) with As-Built information and digitally stamp these all of these drawings as "As-Built". The digital stamp shall include the wording "As Built," the name of the construction *Contractor* and the month and year of construction completion. These drawing files shall be turned over to the *Contracting Officer* on 3 compact disks (CD) prior to final payment. Each CD shall have one complete set of AutoCAD drawings and a complete set in Adobe Acrobat format.

- E. The *Contractor* shall perform an as-built geographic information survey (GIS) survey of all new or modified exterior construction and provide this information to the *Government* as specified in Section 01 33 00 SUBMITTAL PROCEDURES.
- F. Where conflicts between the drawings and specifications occur, specifications shall govern in accordance with FAR 52.236-21.

1.05 EXISTING WORK

- A. Remove or alter existing work in such a manner as to prevent injury or damage to any portions of the existing work, which remain.
- B. Repair or replace portions of existing work, which have been altered during construction operations to match existing or adjoining work, as approved by the *Contracting Officer*. At the completion of operations, existing work shall be in a condition equal to or better than that which existed before new work started.
- C. *Contractor* shall protect all *Government* property against damage, to include but not limited to dust, fumes, impact, scratching, water, paint, joint compound, power failure, power surges, weather, heavy equipment, et cetera. All damages caused by the *Contractor*, whether to equipment, furniture, roads, landscaping, building components or any other type of *Government* property encountered at or near the project site shall be repaired or replaced to match existing and to the satisfaction of the *Contracting Officer* at no cost to the *Government*.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – SUMMARY OF WORK

SECTION 01 14 16 – OCCUPANCY

PART 1 - GENERAL

1.01 OCCUPANCY

- A. The facility designated for work under this contract will be unoccupied during construction.
- B. The *Contractor* shall dispose of or recycle the remaining of the occupant's furniture and equipment prior to beginning work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – OCCUPANCY

SECTION 01 14 19 – COORDINATION

PART 1 - GENERAL

1.01 TERMS

The initials “CO” shall mean the *Contracting Officer*. The initials “COR” refer to the *Contracting Officer’s Representative*. The *Contracting Officer’s Representative* will be the Construction Manager assigned from the 19th Civil Engineer Squadron to monitor this contract during construction. This is applicable to all specification sections.

1.02 WORK SCHEDULE

- A. Little Rock Air Force Base work hours are 7:30 a.m. to 4:30 p.m. all days of the week except Saturday, Sunday, Federal Holidays and AMC Family Days (listing to be provided annually once received by the Government). *Contractor* shall not perform any work outside of these work hours without obtaining written approval from the *Contracting Officer*. If weekend or evening work is required due to utility outages or other requirements, such work shall not be performed without prior written approval of the *Contracting Officer* and such work shall be accomplished at no additional cost to the *Government*. The *Contracting Officer* requires at least three (3) business days’ notice, in writing, from the *Contractor* to provide written approval or disapproval.

1.03 UTILITIES

- A. Existing electrical service to the facility shall be maintained until new electrical service is in place and ready for operation.
- B. Utility interruptions shall be approved by the *Contracting Officer*. The *Contractor* shall submit to the *Contracting Officer* a written request for such work at least three (3) weeks prior to the desired date. The following shall apply:
1. Electrical primary power outages will be performed by Entergy Arkansas Inc. and shall be fully coordinated with the *Contracting Officer’s Representative*, LRAFB Utility Privatization Liaison and Entergy Arkansas Inc. The *Contractor* shall submit to the *Contracting Officer’s Representative* and LRAFB Utility Privatization Liaison a written request for such work at least three (3) weeks prior to the desired date. Electrical primary outages shall be limited to four (4) hours.
 2. Water outages will be performed by the 19th Civil Engineer Squadron and shall be fully coordinated with the *Contracting Officer’s Representative*.
 3. Communications Utilities.

The *Contractor* shall not disturb communication wiring to facilities. Where such facilities require removal of communication equipment and wiring to accomplish the work involved, the *Contractor* shall notify the *Contracting Officer* at least five (5) work days in advance of the requirement, for scheduling such removals by the *Government*. The *Contractor* shall allow for the accomplishment of such removals by the telephone company or communications personnel for the systems they service. If construction activities damage any communication equipment or wiring, the *Contractor* shall restore services as soon as possible, but no later than 24-hours, and at no cost to the *Government*.

4. Excavating Around or Locating Existing Utilities.

Prior to the start of work, the *Contractor* shall identify and locate all valve or utility shut-off locations for use in the event of accidental damage. To preclude accidental damage, the

Contractor shall locate all known utilities (i.e., communication, natural gas, fuel supply, etc.) by hand digging prior to any excavation with power equipment. The *Contractor* shall note any utilities discovered during excavations that are missing or incorrect on the contract drawings (including any erroneous dimensions on *Government* record drawings), or those utilities staked by the user, and clearly identify those discoveries on the as-built drawings.

5. Ground Penetrating Radar

On all projects where excavation is required Ground Penetrating Radar(GPR) shall be accomplished by the Contractor to locate all subsurface structures, utilities, etc. The GPR equipment shall identify all underground structures to a depth of 8 feet. Coordinates provided shall be within an accuracy of 4 inches. GPR equipment shall include GPR antenna, electromagnet pipe locator, Traceable Rodder and GPS as required to meet depth and accuracy described above. Deliverables shall include the following:

- a. Autocadd showing all utilities found using GPR.
- b. All information in GIS.
- c. See section 01 33 00 1.03 Geographic Information System (GIS) Service for detailed information regarding requirements for GPR deliverables.

1.04 PROTECTION OF EXISTING FACILITIES

- A. The *Contractor* shall conduct and schedule all work in a manner to cause as little disruption as possible to the existing facilities and operation. Phase work as may be required by this contract.
- B. The *Contractor* shall ensure that the existing building is maintained weatherproof at all times. The buildings HVAC system shall also be maintained in full operating order by the *Contractor*. The *Contractor* shall provide and install 40% efficient construction filters and shall maintain the filters throughout the construction timeframe in all return air, outside air and exhaust air inlets in the construction area or where dust and debris may enter the duct.

1.05 SITE VISITATION

- A. The *Contractor* shall be responsible to visit the project site prior to, and during, the course of construction to verify existing conditions, actual sizes, and other requirements outlined in the other sections of the specifications.
- B. Existing Facilities/Job Site Verification.

Record drawings, showing existing facilities and underground utilities, are available to the *Contractor* through the Base Civil Engineer office. The *Government* does not guarantee the accuracy, availability or adequacy of existing as-built/record drawings. The *Contractor* is responsible to verify all dimensions and actual conditions when developing their contract proposal. Failure to verify the dimensions and locations will be at the *Contractor's* risk and shall not relieve the *Contractor* from accomplishing the work required by the contract at the price awarded by the *Government*. The *Contractor* shall immediately repair any utility line shown on a record drawing (or made known to the *Contractor*) and damaged during construction work, at no cost to the *Government*.

1.06 BASE REGULATIONS

The *Contractor* shall conform to all base regulations and directives pertaining to security, safety, debris removal, fire, traffic and personnel clearances, insofar as they pertain to the *Contractor's* activities on Little Rock Air Force Base. *Contractor* shall ensure conformance by all employees and Sub-Contractors.

1.07 FIRE PROTECTION

The *Contractor* shall be responsible for conformance with base fire regulations and NFPA 241, including Appendix A. These regulations are available for review during duty hours at the Base Fire Station located in Building 239. Fire extinguishers required during the construction period shall be furnished and maintained by the *Contractor* and removed by the *Contractor* upon acceptance of the facility by the *Contracting Officer*. No welding/cutting and open flame operation shall be allowed in facilities when automatic fire detection and suppression systems are out of service unless the *Contractor* posts a fire guard for 24 hours after welding/cutting and open flame operation or certifies the facility fire safe.

1.08 WELDING PERMIT

- A. Prior to performing any welding, cutting or brazing, the *Contractor* shall obtain a properly completed AF Form 592 (Burning Permit) from the 19 CES Fire Department. A permit is required per job, per day. *Contractor* shall return all welding, cutting, or brazing permits to the 19 CES Fire Department at the end of each week, at a minimum. The *Contractor* shall maintain a fully charged fire extinguisher on site at all times regardless as to whether or not welding, cutting, or brazing is being performed.
- B. Hot Welding (delete paragraph if no JP8 pipeline welding, UST/AST work, or other fuels work is being done): A step by step plan shall be submitted 15 days prior to hot welding to the *Contracting Officer* and accepted by AMC. The plan shall cover the location of the weld, material to be used, size of the line, material in the line, safety precautions, welding procedures, etc. The *Contractor* shall comply with 29 CFR 1917.152 welding, cutting, heating (Hot work) and 29 CFR 1926 subpart J welding, cutting Fire prevention. The *Contractor* shall be responsible to verify a vapor free environment as defined by 29 CFR 1917 with a Backarach 514M meter. The *Government* will not supply the meter. The plan shall also contain the dates of the proposed welds and the estimated time the fuel lines will be down. A Command Certified Liquid Fuels Manager (LFM) shall be on site during all hot work. NO WORK SHALL PROCEED UNTIL THIS PLAN IS APPROVED.

1.09 CONSTRUCTION PERMIT (DIGGING PERMIT)

- A. A properly completed AF Form 103, Base Civil Engineering Work Clearance Request, shall be obtained by the *Contractor* prior to performing any excavation.
- B. A separate AF Form 103 is shall be obtained by the *Contractor* for each excavation to be accomplished.
- C. *Contractor* shall submit a request for AF Form 103 a minimum of 14 calendar days and a maximum of 28 days prior to desired start of excavation. The *Contractor* shall allow a minimum of 14 calendar days for processing.
- D. Each request shall be in writing and designate the location of the proposed excavation and the scheduled date.
- E. The completed AF Form 103 will contain information for locating existing utilities and telephone lines. The *Contractor* shall keep the AF Form 103 at the excavation site and shall comply with instructions for hand excavation and with other methods of safeguarding the buried utilities.
- F. In addition to the requirement to obtain a construction permit and prior to any excavation, the *Contractor* shall perform a pipe/cable location survey using a variety of modern locating equipment suitable for locating various types of pipe and cable. The *Contractor* shall use a signal generating locator such as a Goldak Gold Digger 4400 for metallic pipe and cable. For non-metallic pipe use a vibration generator such as a Fuji Tecom PL-130 or an RD-500.

For non-metallic sewer pipe use a snake with attached generator. The *Contractor* shall mark all locations on the ground. The *Contractor* shall submit a sketch showing the found locations of utilities to the *Contracting Officer's Representative* for approval prior to beginning excavation. The *Contracting Officer's Representative* will provide available information as to the existence and location of known utilities with the approved construction permit. The *Contractor* shall be responsible for repairing damage to utilities, whether known or unknown, due to any failure on the *Contractor's* part to perform a rigorous survey.

1.10 ASBESTOS

- B. Removal of Asbestos Containing Material (ACM) shall be accomplished by this contract per the requirements of Arkansas Department of Environmental Quality (ADEQ) Regulation 21. ACM shall be removed as a part of lump sum cost for this contract. The Contractor shall be responsible for notifying the Contracting Officer and Contracting Officer's Representative of any additional asbestos discovered during construction/demolition. The Contracting Officer will obtain testing of the material in question and instruct the Contractor accordingly.
- C. Abatement Contractor shall submit for approval a copy of the company's license to do abatement in the state of Arkansas and date of expiration. Insurance shall be in compliance with and as required by ADEQ for abatement in the state of Arkansas. All workers and supervisors shall have current certification issued by the state of Arkansas.
- D. LRAFB requires its contractors to comply with Arkansas Pollution Control and Ecology Commission (#014.00-021) Regulation No 21. Arkansas Asbestos Abatement Regulation. ACM surveys, removal, transportation and disposal shall be completed by an ADEQ approved/licensed abatement contractor. An ACM Abatement Contractor is responsible for providing ADEQ Notice of Intent (NOI) 10 days prior to starting removal. The Abatement Contractor shall provide clean air documentation that the facility is safe to return to normal activities upon completion of abatement. The Abatement Contractor shall provide a separate report including waste shipment records signed by the disposal facility showing all asbestos was removed and disposed of per regulatory requirements within 30 days of removal.
- E. See Attachment 1-CCR for the Asbestos Report Building.

1.11 CHLOROFLUOROCARBON (CFC) REFRIGERANTS: Restrictions, Precautions and Controls

- A. The *Contractor* shall not vent or cause to be vented chlorofluorocarbon (CFC) and hydrochlorofluorocarbon (HCFC) refrigerants (R-11, R-12, R-22, R-113, R-114, R-115, R-501, R-502, or any other mixtures containing CFCs) to the atmosphere during repair or maintenance work on the equipment covered by this Contract.
- B. The *Contractor* shall have available refrigerant recovery or reclaim equipment to perform the work. The *Contractor* shall submit to the *Contracting Officer* a copy of the EPA registration of the recovery equipment. This registration shall also be provided during warranty work, if the equipment used is different than that used during construction.
- C. *Contractor* personnel who operate refrigerant reclaim or recycling equipment shall possess the necessary state and local certificates for operating that equipment. The *Contractor* shall submit to the *Contracting Officer* a copy of the CFC certification for the personnel removing the refrigerant. This certification shall also be provided during warranty work, if the personnel involved are different than those who installed the equipment.
- D. *Contractor* shall be responsible for meeting all requirements, permitting the licensing and certification required by state or local ordinance to work on refrigeration systems.

- E. The *Contractor* shall provide containers for the reclaimed refrigerant and shall return all reclaimed refrigerant and containers to the *Government* and provide documentation of the quantity recovered.
- F. Replacement compressors and other replacement equipment used in repairing CFC-containing systems shall be compatible with CFC replacement refrigerants. If such would result in an increase in cost, the *Contractor* shall notify the *Contracting Officer* prior to the replacement.

1.12 LEAD BASED PAINT (LBP) AND COATINGS CONTAINING LEAD

- A. This Contract may involve disturbance or demolition of construction material coated with LBP and/or coatings that may contain some level of lead. The *Contractor* will test representative surfaces to be disturbed under this contract using an X-ray fluorescence (XRF) analyzer or Laboratory Analysis and results will be provided with each project. If a laboratory is used for lead analysis, the lab must be accredited by the National Lead Laboratory Accreditation Program (NLLAP). The *Government* will not be the removal agent for LBP or coatings containing lead.
- B. Results of the XRF analysis with readings from .0 mg/cm² up to .9 mg/cm² are considered inconclusive and indicate only that a trace amount of lead may be present, but still may easily present an exposure hazard to workers. Lead-based paint means paint or other surface coatings that contain lead equal to or greater than 1 mg/cm². The *Contractor* at no additional cost to the *Government* shall accomplish any further sampling or testing required to comply with any law, standard, or regulation. The *Contractor* shall provide a copy of all test results to the *Contracting Officer's Representative*.
- C. The *Contractor* shall submit a written plan prepared by a competent person detailing demolition, removal, disposal and clean-up processes and procedures to be followed when dealing with the items addressed in this section. Precautions to ensure *Government* or other personnel near the work are not exposed to lead above accepted levels shall be included in the plan.
- D. The *Contractor* shall handle and dispose of all construction materials coated with LBP and/or coatings containing lead in accordance with all federal, state, local, and base laws/regulations. The *Contractor* shall collect and analyze samples of demolition debris coated with LBP or coatings containing lead, including surface coatings that have been removed, to determine if the debris should be characterized as hazardous waste. All waste that has been deemed hazardous shall be disposed of through the base Defense Reutilization and Marketing Office (DRMO). *Contractor* shall adhere to the following requirements and procedures for disposal: Some waste may be recycled in accordance with Section 01 45 00 QUALITY CONTROL of this specification.
 - 1. Present HAZMO/CAP (Bldg. 1575, 987-5247) with analytical results and ORG shop code.
 - 2. Make appointment with DRMO, 987-3715. Waste must be to DRMO within 3 days after HAZMO/CAP has logged in the waste.
 - 3. Deliver waste (Properly containerized and labeled per DOT 49 CFR 173) along with analytical results sheet, and paperwork provided by HAZMO/CAP (DRMS Form 1930, DD Form 1348 and AF Form 2005) to DRMO per scheduled appointment.

1.13 FLUORESCENT BALLAST AND LAMP DISPOSAL

- A. All ballasts from demolished light fixtures shall be examined for markings, labels, etc. that identify the presence (or absence) of PCB's. If no identifying Non-PCB characteristics can

be determined, the ballast shall be considered as being PCB ballast. It shall be containerized, processed through the Hazardous Material Office (HAZMO), and then turned in to DRMO for PCB disposal. The ballasts that are clearly identifiable as Non-PCB may be recycled or disposed as solid wastes. The hours of the HAZMO office are 0700 to 1600, M-F, 987-5247. The *Contractor* shall call DRMO in advance for a turn-in appointment @ 987-3715. The *Contractor* shall not attempt to (1) turn-in PCB ballast without processing said items through the HAZMO and (2) deliver same to DRMO without an appointment.

- B. Container: *Contractor* shall store all PCB ballasts in either new UN approved steel or plastic open head drums as specified in 49 CFR 178.504 and 509. All used and/or reconditioned containers are unacceptable. The steel or plastic drums may not exceed 55 gallons in size. The total weight of container and PCB ballasts must not exceed the inscribed manufacturer container weight specifications. *Contractor* may store PCB containers on-site up to one week (five days), at which time the container shall be turned in to DRMO. The *Contractor* may turn in PCB containers at a more frequent rate, e.g., daily, etc., if so desired. PCB containers shall be stored within the confines of the immediate project site. The PCB containers shall not be exposed to the elements, placed in the open, nor allowed to collect rainwater. When not in use, each PCB container shall be covered with its appropriate lid. *Contractor* shall label each container as specified in 40 CFR 761 and 49 CFR 172.101. The number of PCB ballasts in each container shall be provided to the *Contracting Officer's Representative* prior to turn in to DRMO.
- C. Detached light fixtures that are clearly identified as having non-PCB ballasts shall be placed in *Government* supplied dumpsters which will be picked up, on site, by the Base Recycling Center.
- D. *Contractor* shall be responsible for all QA/QC functions required in segregating PCB ballasts from non-PCB ballasts. The HAZMO will not perform any inspection, segregation, or identification of said ballast for the *Contractor*. The *Contractor* is fiscally responsible for any improper disposal of PCB ballasts. The Arkansas Department of Environmental Quality shall be notified should any *Contractor* be found violating any State or Federal regulations on PCB ballast disposal.
- E. Fluorescent lamps shall be packaged, processed through the HAZMO, and then delivered to DRMO. *Contractor* may store fluorescent tubes in their original container or an appropriately sized cardboard box. In the event a cardboard box is used, each tube shall be protected from breakage by using appropriate egg crate or bubble-wrap packing.

1.14 OIL FILLED TRANSFORMER DISPOSAL

Any demolished transformer and medium voltage equipment that contains insulating liquid shall be tested for PCBs prior to turn in to DRMO. The turn in procedure is as follows:

- A. Oil filled transformers and other equipment containing insulating liquid must be tested for the presence of PCB's by the *Contractor* at the *Contractor's* expense.
- B. Equipment cannot be leaking. All caps/covers etc. must be tight.
- C. *Contractor* shall unload equipment themselves; there is no forklift support at DRMO on LRAFB.
- D. *Contractor* shall present HAZMO/CAP (Bldg. 1575, 501-987-5247) with analytical results, KVA rating, serial number, manufacturer, date equipment was taken out of service and an estimate of the original cost of the equipment. HAZMO will send proper forms to DRMO and inform *Contractor* to set up a turn-in appointment with DRMO.

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- E. The *Contractor* shall call DRMO in advance of delivering the equipment to DRMO for a turn-in appointment @ (501) 987-3715.
- F. *Contractor* shall deliver and unload equipment to DRMO site on base per scheduled appointment.
- G. The *Contractor* shall provide DRMO a copy of the complete analysis at the time of turn-in.
- H. The *Contractor* will affix a single page of the analysis that reflects the PCB results for that particular piece of equipment to the side of the equipment.
- I. Equipment must be secured to a pallet prior to transport to DRMO.

1.15 RADIOACTIVE MATERIALS

- A. A request to bring radioactive materials onto Little Rock AFB shall be provided to the government at least 30 days prior to bringing materials onto the base. A copy will be given to the Bioenvironmental Engineer by the *Contracting Officer's Representative*.
- B. Before bringing any radioactive materials onto Little Rock AFB, the *Contractor* shall first submit the following information on an AF Form 3000, for review and approval by the 19th AW Bioenvironmental Engineer. Examples of materials that may contain radioactive materials are soil moisture and soil density testing instruments. Additional information on this subject can be found in AF 40-201 *MANAGING RADIOACTIVE MATERIALS IN THE U.S. AIR FORCE*.

http://static.e-publishing.af.mil/production/1/af_sg/publication/afi40-201/afi40-201.pdf

- C. Proper Nuclear regulatory Committee (NRC) or Arkansas State license (Includes NRC Reciprocity Form 241 and Arkansas State License). For DoE organizations and DoE *Contractor's* written certification that they are exempt from NRC license requirements is required.
- D. Copies of training certification for instrument operators.
- E. Dates and location of use on Little Rock AFB.
- F. Acknowledgement that instrument is transported in compliance with 49 CFR requirements.
- G. All testing equipment, containing a radioactive source, shall be operated in accordance with an approved radioactive equipment plan. This plan shall be submitted to the *Contracting Officer* and approved by the 19th AW Bioenvironmental Engineer, prior to bringing the equipment on to Little Rock AFB.

This plan shall include:

- 1. The name and type of equipment.
 - 2. The type and size of radiation source.
 - 3. The dates and locations of the equipment's usage.
 - 4. The radiological controls that the *Contractor* will use while operating the equipment.
- H. A different radioactive equipment plan will be required for each different type of equipment, type of radioactive source, or size of radioactive source. A data sheet for each piece of radioactive equipment shall be submitted to the *Contracting Officer* to forward to the 19th AW Bioenvironmental Engineer. The data sheet shall contain the following information:
 - 1. Name of equipment.
 - 2. Name and address of equipment manufacturer.

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3. Type and size of radiation source.
4. The location of the radioactive equipment on LRAFB.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – COORDINATION

SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUBMITTALS

- A. Catalog cut sheets, brochures, shop drawings and/or samples shall be clearly marked/indicated by the *Contractor* and submitted to the *Contracting Officer* for the items on the schedule, drawings and other sections of the specifications. All salient features of materials required to be submitted shall be easily found in the submittal package for each item and not require research on the part of the *Government* to determine compliance with Contract requirements. Related items such as mechanical/electrical components shall be submitted at one time for coordination purposes. Color coordinated items such as paint, carpet, vinyl wall covering, vinyl composition tile, ceramic tile, toilet partitions, and so forth shall be submitted at one time to facilitate color comparison/selection by the *Contracting Officer*. An AF Form 3000 shall be utilized for each numbered submittal and named as per the table of contents of the Project Manual. Submit each section in its entirety. Different categories of submittal items are not to be grouped on the same AF Form 3000. Contractor shall submit equipment submittals for items being installed in the contract within 10 working days of acceptance of 100% design.
- B. All items shall be approved by the *Contracting Officer* prior to purchase, delivery or installation.
- C. All items shall be submitted electronically in pdf format not more than twenty (20) calendar days after *Contractor's* notification that they can proceed with construction. Samples of all items requiring color selection shall be submitted along with the electronic submittal. Operations and Maintenance (O&M) manuals shall be submitted for approval by the *Contracting Officer*, prior to final inspection.
- D. Not less than ten (10) business days shall be allowed for review of submittals by the *Government*.
- E. Submittals will be returned to the *Contractor* unless otherwise specified. A sample of all items requiring color selection will be retained by the *Contracting Officer's Representative* for reference.
- F. Refer to Section 01 63 00 – SUBSTITUTIONS AND PRODUCT OPTIONS.
- G. *Contractor* shall be responsible for complying with the EPA's buy recycled program. See Section 01 62 35 RECYCLED/RECOVERED MATERIALS.

1.02 OPERATION AND MAINTENANCE MANUALS

The *Contractor* shall furnish three (3) copies, one (1) hard copy and two (2) CD ROM, of all operation and maintenance (O&M) manuals. O&M manuals shall contain complete instructions for the operation, inspection, testing and maintenance of the system, and shall include complete parts breakdown diagrams. Manuals shall also contain complete wiring schematics and diagrams. Manuals shall be in booklet form with binder and shall be arranged in logical sections for easy reference.

1.03 GEOGRAPHIC INFORMATION SYSTEM (GIS) SERVICE

- A. The *Contractor* shall perform a geographic information system (GIS) survey of all exterior construction that is installed or modified in this contract. This includes changes to the building footprint, all at-grade or above-grade structures and pavements, all underground utilities and associated appurtenances, and newly planted trees.

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- B. The *Contractor* shall deliver all as-built survey data files in a format that is directly readable and compatible with the 19 CES Geospatial Data System (GDS). The database of the GIS shall include all files, both graphic and non graphic, required for the project that are not included in the GDS/CADD software (i.e., color tables, pen tables, font libraries, symbol libraries, user command files, plot configuration files, AML plot routines, etc.).
- C. Nongraphic data shall be developed and delivered to 19 CES in the format specified in the Spatial Data Standard for Facilities, Infrastructure, and Environment (SDSFIE) Standards. The *Contractor* will provide the nongraphic data in a format, which can be directly imported to, displayed and edited within, and output from the database software specified by the *Government*.
- D. All GIS development (including geospatial data acquisition and map development for use in a GIS) shall conform to the most current release of SDSFIE. The most current release of the SDSFIE is available for download from the CADD/GIS Technology Center's Internet Website (<http://tsc.wes.army.mil>). All delivered digital GIS data files shall also be submitted in strict compliance with the SDSFIE for the target GIS software system (i.e., the most current version of the Environmental Systems Research Institute Inc. (ESRI) ArcGIS). The *Contractor* shall submit a written request for approval of any deviations from the *Government's* established standards. No deviations from the *Government's* established standards will be permitted unless the *Contracting Officer* has issued prior written approval of such deviation.
- E. The *Contractor* shall be required to provide professional services specific to the use and application of ESRI ArcGIS, including all components and extensions. The ArcGIS components and extensions shall include, but not be limited to, ArcView, ArcEditor, ArcInfo, ArcReader, ArcPac, ArcScene, ArcObjects, ArcSDE, ArcIMS, and relational database management systems (RDMS) software (e.g., Microsoft Access and SQL Server). The *Contractor* will be required to provide digital products directly supported by ArcGIS with no intermediate file translation required.
- F. All surveying/mapping work performed as part of this contract shall conform to the Geospatial Positioning Accuracy Standards for Architecture, Engineering, Construction (A/E/C), and Facility Management. The most current standards of the Geospatial Positioning Accuracy Standards are available for download from the Federal Geographic Data Committee's Internet Website <http://www.fgdc.gov>.
- G. The *Contractor* shall provide metadata files for all geospatial data. Geospatial data are defined as information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth. The Metadata file shall conform to the Federal Geographic Data Committee Metadata Standards. The most current standards of the Federal Geographic Data Committee are available for download from the Federal Geographic Data Committee's Internet Website <http://www.fgdc.gov>. The digital metadata files shall be provided to the *Government* along with each final product deliverables.
- H. The *Contractor* shall have the capability to submit digital products or deliverables on read-only memory (CD-ROM).
- I. The *Contractor* shall be required to develop, deliver, install, and test the digital media containing the geospatial data at the *Government's* target GDS.
- J. The *Government* will only accept the final product for full operation, without conversion or reformatting, in the target software format for use on the target platform specified herein. The target platform is a Microsoft Windows Based, with a Microsoft Windows XP operating system.

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1.04 MATERIAL SAFETY DATA SHEET (MSDS)/SAFETY DATA SHEET (SDS) SUBMITTALS

- A. All submittals for products shall include the MSDS/SDS when an MSDS/SDS is required by law for that product.
- B. MSDS/SDS's shall also be submitted on AF Form 3000 for all products to be used during the course of the project, not otherwise requiring a submittal, but which may be of a toxic, hazardous, flammable or otherwise dangerous nature.
- C. Approval by the Hazardous Materials Office (HAZMO), Building 1575, 987-5247, is required before bringing the materials on base. Little Rock AFB AF-EMIS *Contractor* Worksheet and an MSDS/SDS must accompany the submitted material. This *Contractor* worksheet will be furnished by the *Government* along with an instruction guide. Additionally, the *Contractor* shall submit a *Government* supplied *Contractor* Hazardous Material Usage Data sheet to the *Government* once a month once the materials are brought on base and until the materials are used or removed from the base. The form shall list the amount of materials used and shall also list any materials which are considered a hazardous waste when the *Contractor* can no longer use the material for its intended form or reuse as a virgin product at a later date. All hazardous waste shall be turned in to the base Hazardous Material Office (HAZMO), 987-5247.
- D. All HAZMAT that is not used on the project but is still in usable condition must be removed from the base by the *Contractor* upon completion of the project. HAZMO will not accept unused HAZMAT such as paint, thinners etc. that are still usable as they belong to the *Contractor*.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – SUBMITTAL PROCEDURES

SECTION 01 45 00 – QUALITY CONTROL

PART 1 - GENERAL

1.01 WORKMANSHIP

All materials and equipment shall be installed in a manner accepted by standard trade practice. Workmen skilled in the type of work required shall accomplish the installation.

1.02 TRAFFIC SAFETY

Special efforts shall be made not to interfere with traffic flow or create safety hazards to traffic.

1.03 ENVIRONMENTAL MANAGEMENT SYSTEM

Environmental Management System (EMS) is an ISO 14,001 tool used by the USAF to identify and mitigate threats to our environment. LRAFB's ultimate goal is to protect our environment (work environment and the natural environment) while accomplishing our mission. All *Contractors* working on LRAFB are expected to acknowledge their role in EMS while completing their mission. Threats associated with construction sites include, but are not limited to: hazardous materials, spills, equipment leaks, air-born dust, soil erosion, track-out, and lack of recycling. This will be communicated and documented initially for each project with monthly updates provided to the government *Contracting Officer's Representative*. *Contractor* shall sign a LRAFB supplied form monthly acknowledging that they have kept subcontractor's aware of EMS.

1.04 DEBRIS DISPOSAL

- A. Debris shall be removed from the Base promptly, and as feasible, all equipment and materials shall be removed or secured at the end of each day. The *Contractor* is responsible for the daily cleanup of all construction areas and construction debris that has escaped from the construction site.
- B. Work located on or near the airfield: It is imperative to maintain all work areas in a clean and orderly condition, subject to the satisfaction of the *Contracting Officer* and the *Contracting Officer's Representative*, to prevent Foreign Object Damage (FOD) to aircraft. Equipment, materials, etc. that can be transported by high winds shall be tied down and secured at all times when not in use during the day and secured at the end of each day. *Contractor* equipment and materials shall not be permitted to blow outside the construction site and the surrounding FOD fence. The *Contractor* shall promptly clean up all items (dirt, debris, etc.) that he, his employees or Subcontractors, drop onto areas traversed by aircraft. The use of sweeping equipment with metal bristled brooms is prohibited along the flight-line and on all airfield pavements.
- C. The *Contractor* shall exercise caution in not disturbing adjacent facilities, finishes, materials, grounds and other items not a part of this project. The *Contractor* shall clean daily all areas outside the project area of dirt, dust, and debris generated by this contract.
- D. The *Contractor* shall use designated haul routes for both delivery and removals. DESIGN-BUILD Firm to establish the Haul Route during Pre Design Meetings and site visits.
- E. The *Contractor* shall direct all concrete washings, or slurries resulting from saw cutting activities that contain Portland cement, to areas on the construction site where the sediments will be filtered out into the soil and not directed towards trees. Do not allow washings to enter the storm drain system or any water course. The *Contractor* shall coordinate with the *Contracting Officer's Representative* prior to any concrete truck arriving

on base to determine an appropriate wash out area. If concrete wash water cannot be directed to a suitable area on the construction site, it must be properly contained, collected, and disposed of as construction debris. Excess concrete not used in construction activities shall not be dumped, and must be removed and disposed of off base. Spills of concrete, concrete wash water, or chemicals used with exposed aggregate, must be contained and cleaned up immediately to prevent the spill from entering any part of the storm sewer system.

- F. All debris generated by the contract shall be properly disposed of by the *Contractor* off the base. Removal of debris and other material shall be handled, transported, stored, and disposed of by the *Contractor* and his Subcontractors in accordance with all applicable federal, state or local laws, ordinances, regulations, court orders or other types of rules or rulings having the effect of laws. These restrictions shall apply both on and off base.
- G. The *Contractor* shall submit with the regular progress reports a *Government* supplied *Contractor* Construction and Demolition Debris Report. This form lists the amount of materials disposed at a landfill, recycled or otherwise reused. This submittal is required before progress payments can be made and also applies to any debris by subcontractors.
- H. The *Contractor* shall take all precautions to prevent spillage of materials from *Contractor* vehicles on base pavements. The *Contractor* shall provide adequate labor and equipment to keep paved areas free of debris, and to contain loose materials at all times.

I. RECYCLING MATERIALS

1. The *Contractor* shall notify the *Contracting Officer's Representative* a minimum of two weeks prior to removing recyclable materials identified to be turned in to the *Government*. The *Contracting Officer's Representative* will arrange with the Recycling Center for *Government* furnished dumpsters to be placed near the construction site. Each type of material will be placed in separate dumpsters. The following recyclable materials are to be turned in to the *Government*.

- a. Electrical wire, conduit, junction boxes, etc.
- b. Metal pipe and plumbing fixtures
- c. Sheet metal, such as in ductwork and flashing
- d. Metal HVAC equipment (air handlers, chillers, pumps, condensers, etc.)
- e. Metal components from roofs, framing, siding, doors and windows and ceiling grids
- f. Window glass, except for wire reinforced safety glass.
- g. Cardboard
- h. All plastic that has the recycle emblem arrows (1, 2, 3, 4, etc.). This includes empty plastic pails, drums and shrink wrap.

2. All removed carpet shall be recycled and the *Contractor* shall provide written certification that the carpet was not placed in a landfill. *Contractor* certification shall indicate how the material was recycled and provide the address where it was delivered.

3. All removed ceiling tile shall be recycled and the *Contractor* shall provide written certification that the ceiling was not placed in a landfill. *Contractor* certification shall indicate how the material was recycled and provide the address where it was delivered.

1.05 CULTURAL RESOURCE MANAGEMENT

For the protection of cultural, historic and prehistoric resources, the *Contractor* shall submit a signed certification that the selected land borrow area is free of all materials of this type. This includes anything of an archeological nature as well as any Native American sites to include tribal burial grounds.

1.06 TEMPORARY EROSION CONTROL MEASURES

GENERAL: All construction that disturbs the ground cover, either natural or manmade, shall be subject to erosion control measures. The *Contractor* shall evaluate the scope of work to determine the level of erosion control measures to be implemented. As a minimum, the requirements of Section 01 57 23 STORM WATER POLLUTION PREVENTION MEASURES and LRAFB standard details shall be adhered to when developing and implementing temporary measures.

1.07 GROUNDS MAINTENANCE

The *Contractor* shall be responsible for up keep of building appearance, grass cutting and trimming, shrub trimming, weeding, etc within project limits. Grass cutting shall be completed every week during growing season.

1.08 WARRANTY REQUIREMENTS

The Contractor shall provide a standard Warranty of Construction for all work associated with this contract in accordance with FAR Clause 52.246-21 and any other additional warranties outlined within this Statement of Work/Specifications.

1.09 FINAL INSPECTION AND ACCEPTANCE OF WORK

As construction nears completion, the *Contracting Officer's Representative* and the *Contractor's* Quality Control representative and Superintendent shall thoroughly inspect the work and generate a deficiency (punch) list. When this list has been cleared, the *Contractor* shall request a preliminary inspection through the *Contracting Officer*; then the *Contracting Officer's Representative* will schedule the preliminary inspection using *Government* specialists of the systems installed under the Contract. When all deficiencies are corrected, the *Contractor* shall request a final inspection through the *Contracting Officer*, to be conducted by the *Contracting Officer* and *Contracting Officer's Representative*. For phased work, this process may be repeated for each phase.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION – QUALITY CONTROL

SECTION 01 50 00 – CONSTRUCTION FACILITIES & TEMPORARY CONTROLS

PART 1 - GENERAL

1.01 GOVERNMENT FURNISHED UTILITIES

- A. All reasonable quantities of utilities required in performance of this contract will be furnished by the *Government* at no cost to the *Contractor*. The *Contractor* shall be responsible for all charges associated with temporary power connections via Entergy Arkansas. Entergy Arkansas shall make such temporary connections from existing points of supply as required. Such temporary connections shall be removed by Entergy Arkansas at the completion of work and prior to final inspection.
- B. USE OF POTABLE WATER.
1. The water distribution system located on LRAFB is owned, operated and maintained by the City of Jacksonville, AR. Therefore, all matters concerning potable water are directed to the City of Jacksonville. Contact Jacksonville Water Works (JWW) at 501-982-6563 for all related matters including obtaining water, line breaks, etc.
 2. All *Contractors* shall obtain water from a designated Base water fill stand(s). A fill stand is located on Contractor's Hill.
 3. **NO** contractor, contractor employees, or sub-contractor(s) shall obtain water by a direct connection between a potable water outlet and a water tank or vessel.
 - a. If the contractor, contractor employees, or sub-contractor is discovered obtaining water from a non-authorized source, the following actions will be taken:
 - i. The operation will immediately cease.
 - ii. Water samples will be taken from the water tank or vessel, the water main outlet, and from other related water sources as deemed necessary.
 - iii. All samples will be obtained and analyzed on an expedited schedule.
 - iv. If any samples are found to be contaminated, the system will be disinfected in accordance with the Arkansas Department of Health (ADH) standards.
 - v. The contractor will reimburse JWW for any costs associated with sampling, analysis, and disinfection incurred by this event.
 4. For projects where the contractor is permitted to obtain water on the job site, the contractor will contact JWW. JWW will approve the specific fire hydrant locations for use by the contractor. No other fire hydrant locations will be used without prior approval by JWW. JWW will conduct fire hydrant operation training for any contractor, contractor employees, or sub-contractors who will be using the fire hydrants. No one will operate a fire hydrant without prior training by JWW. Each contractor will provide the following at their own expense:
 - a. A Reduced Pressure Zone Valve Assembly (RPZA) on the water outlet, fire plug, etc. (see diagram)
 - b. Provide certified test results for the assembly prior to installation/use.
 - c. The certified tester must be licensed by the ADH.

- d. Contractor MUST install a vacuum breaker on outside faucet hose bibs prior to connecting to any garden hose or soaker hose for lawn irrigation. Contractor shall not install garden or soaker hoses to a bare outside faucet hose bib.
- e. If you have any questions, please contact JWW at 501-982-6563.

1.02 HEATING OF FACILITIES

The *Contractor* shall provide temporary heat at least 65 degrees F but not to exceed 70 degrees F between November 1st and April 1st, unless the heating system is fully operational. The proposed method and temporary heating appliances shall be submitted to, and approved by, the *Contracting Officer* prior to November 1st. Only UL Approved appliances will be considered.

1.03 STORAGE

- A. Enclosed storage space shall be provided by the *Contractor* at no cost to the *Government*. The *Contractor* shall remove all storage enclosures prior to the final inspection.
- B. As feasible, all equipment and materials shall be removed or secured at the end of each day. Storage, protection and security of material and equipment when not in use shall be the responsibility of the *Contractor*.
- C. A material storage/staging area will be made available to the *Contractor*, but close proximity to the project site may not be possible. All fenced areas, portable buildings, house trailers, semi-trailers, or other temporary constructions by the *Contractor* shall be in good condition and bear a sign showing the name and address of the *Contractor* and a day and night local telephone number where the *Contractor* can be reached. Construction debris, salvaged materials, and/or trash shall not be stored in staging area. Grass inside and adjacent to the fenced area shall be neatly mowed regularly by the *Contractor* during the period of usage by the *Contractor*.

1.04 CONSTRUCTION SIGN

A construction sign is required for each project unless otherwise noted. Sign shall be 4 foot by 8 foot, 15/32" plywood mounted on minimum 2 inch by 4 inch treated posts. Provide light at base of sign. Sign shall be as detailed on figure 1.04a.

Figure 1.04a



LEGEND

- AMC LOGO upper left corner
- 19 AW LOGO upper right corner
- PROJECT IS FOR lower left corner
- CE LOGO center
- CONTRACTING LOGO and/or USACE LOGO lower right corner

1.05 TEMPORARY AND PERMANENT TRAFFIC CONTROL

- A. *Contractor* shall provide and install all required temporary traffic control signs or device, as applicable for this contract. The traffic signs or devices shall conform with the Manual on Uniform Traffic Control Devices for streets and highways, U.S. Department of Transportation, Federal Highway Administration, latest edition. Provide amber flashing lights to protect the construction area from intrusion by traffic. Location of lights shall be approved by the *Contracting Officer*. Lights shall be weighted and made secure from possible movement until the area is open to traffic.
- B. Street closings will be limited to partial, one lane closings whenever possible. Any partial or full street closing shall be requested in writing at least two (2) weeks prior to the desired date. The *Contractor* shall provide Road Closed or Detour signs.

1.06 CONTRACTOR'S USAGE OF FACILITIES:

- A. The *Contractor* shall provide a properly and regularly maintained portable toilet for use by workers.
- B. *Contractor* shall not enter the occupied portion of the building to use restrooms, telephones, or other facilities.
- C. Tobacco use is prohibited in all *Government* facilities under this contract. Tobacco use is defined as smoking or chewing tobacco and using e-cigarettes. Tobacco use is only authorized in marked designated areas.

1.07 GRADE AND ALIGNMENT CONTROL:

The *Contractor* shall furnish a competent construction surveyor and survey party on the job site as needed to establish and maintain proposed grades and alignment for all increments of construction. The party shall be composed of skillful and competent personnel equipped with accurate and latest model equipment.

1.08 WINTER SHUTDOWN

Typically the *Contractor* shall stop construction for winter shutdown. Winter shutdown runs from 15 November through 15 March. The *Contractor* shall protect all construction from damage by adverse weather during the winter shutdown. The *Contractor* shall conduct work so that no area will have incomplete work at the beginning of the winter shutdown period. The *Contractor* shall turn over the entire area for use by the *Government* during the winter shutdown period. This period may be adjusted based on actual weather conditions and project type (i.e. not applicable to inside work).

1.09 WORK SEQUENCE

In addition to Progress Schedule, the *Contractor* shall submit for approval by the *Contracting Officer* four copies of a work sequence schedule showing the sequence of work by area including estimated dates for beginning work in each area. No work shall commence until approval of the work sequence schedule.

1.10 POLICE PROTECTION

19th Security Forces Squadron (SFS) is responsible for overall base security and traffic control of vehicles entering or leaving *Little Rock Air Force Base*. The *Contractor* is required to conform to all appropriate Air Force Security Regulations and shall not interfere with the performance of *Security Forces* duties and responsibilities. The *Contractor* shall be responsible for obtaining all necessary security passes for personnel, sub-contractor's personnel and all vehicles.

1.11 SAFETY

Contractor shall conform to all applicable portions of the latest Corps of Engineers Safety and Health Requirements Manual EM 385-1-1.

1.12 ROCK REMOVAL:

- A. Excavate and remove exposed rock where encountered. Do not use explosives. Excavate and remove by mechanical methods. The *Contracting Officer's Representative* will determine when rock is to be excavated. Measurement and agreement of rock removed shall be accomplished before rock is removed.
- B. Rock shall consist of boulders measuring 1/2 cubic yard or more and material that cannot be excavated without systematic drilling and blasting such as rock material in ledges,

bedded deposits, unstratified masses and conglomerate deposits, and below ground concrete or masonry structures exceeding 1/2 cubic yard in volume, except that pavements will not be considered as rock. Rock removal shall include all authorized overdepth rock excavation and include all necessary mechanical methods and all incidentals necessary to excavate and dispose the rock. Backfill replacing rock excavation shall not be paid separately, but shall be included in the Unit Price for rock excavation.

- C. Remove excavated materials to an off-base location secured by the *Contractor*.
- D. For measurement and payment, the *Contractor* shall survey and calculate the amount of rock removed. The *Contractor* is to provide certified survey notes and calculations to the *Contracting Officer* and the *Contracting Officer's Representative* for approval. Payment will be based upon the Contract Unit Prices per cubic yard.

1.13 CONTRACTOR FURNISHED COMMUNICATIONS

- A. *Contractor's* Superintendent shall be equipped with a cellular telephone and be reachable by telephone at any time during the normal workday. The cellular phone number shall be a local call from Little Rock AFB.
- B. *Contractor's* Superintendent shall be reachable, by telephone and/or cellular phone, 24 hours a day, seven days a week. (We need this for emergencies particularly on re-roofing of occupied buildings, airfield lighting work and airfield paving work.)

1.14 CLEANUP

Construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways shall be cleaned away. Materials resulting from demolition activities which are salvageable shall be stored within the fenced area described above or at the supplemental storage area. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

SECTION 01 57 22 – TREE PRESERVATION

PART 1 - GENERAL

1.01 TREE PRESERVATION

- A. Tree preservation is a proactive process that seeks to make as little impact as possible on existing trees and to mitigate the effects of construction.

1.02 REFERENCES

Tree City USA Bulletin # 24

Web Link: <http://www.arboday.org/programs/treecitybulletinsbrowse.cfm>

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 PROCEDURES TO PROTECT TREES

- A. *Contractor* shall protect as much of the root zones as possible. Establish and maintain a highly visible physical barrier five feet outside of the drip line to keep equipment and materials out. The most significant roots are in the top 18 to 24 inches of soil. Roots may extend two to three times the length of the branches. An orange mesh fencing barrier shall be used to separate construction activity from sensitive roots. Ensure these areas are respected by all parties working on the site.
- B. Use wood chips to mulch the root zones of existing trees to remain.
- C. Do not trench or change the existing grade in the root zone of an existing tree. If a utility must be routed beneath a tree then horizontal boring must be utilized.
- D. *Contractor* must plan access to the site that will be efficient and protect tree root zones.
- E. *Contractor* shall design parking lots and/or sidewalks to incorporate and protect existing and new trees. Do not use soil sterilants. See Tree City USA Bulletin # 24.
- F. *Contractor* shall prune existing trees as indicated in the drawings in accordance with ANSI A300 (Part 1)-2017 Pruning, as provided by LRAFB Environmental.
- G. *Contractor* shall not fertilize existing trees.
- H. Establish approved concrete truck washout areas on site away from protected tree root zones to prevent chemical contamination of soil and vegetation. Contain all run-off on site.
- I. Use signs to identify tree protection zones and alert workers to them. Do not use the trees themselves to support the signs. Do not drive nails or other objects into trees.
- J. Contact the Natural Resources Manager, Seth Fisher, at (501) 987-3681, when laying out root protection zones for assistance.

END OF SECTION – TREE PRESERVATION

SECTION 01 57 23 – STORM WATER POLLUTION PREVENTION MEASURES

PART 1 - GENERAL

1.01 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D 4439	(2004) Geosynthetics
ASTM D 4491	(1999; R 2004) Water Permeability of Geotextiles by Permittivity
ASTM D 4533	(2004) Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	(1991; R 2003) Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	(2004) Determining Apparent Opening Size of a Geotextile
ASTM D 4873	(2002) Identification, Storage, and Handling of Geosynthetic Rolls and Samples

1.02 GENERAL REQUIREMENTS

The *Contractor* shall implement the storm water pollution prevention measures specified in this section in a manner which will meet the requirements of the National Pollution Discharge Elimination System (NPDES) permit attached to that Section.

1.03 SUBMITTALS

- A. The *Contractor* shall prepare an Erosion Control Plan and Storm Water Pollution Prevention Plan for this project that meets the requirements of this section
- B. The *Contractor* shall submit an Erosion Control Plan and a Storm Water Pollution Prevention Plan for review and approval prior to being released to start construction activities.

1.04 EROSION AND SEDIMENT CONTROLS

The controls and measures required by the *Contractor* are described below.

A. Stabilization Practices

The stabilization practices to be implemented shall include, but not be limited to, temporary seeding, mulching, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation, silt fences, ditch checks, hay bale buffers, etc. On his daily CQC Report, the *Contractor* shall record the dates when the major grading activities occur, (e.g., clearing and grubbing, excavation, embankment, and grading); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated.

B. Structural Practices

- 1. Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Structural practices shall be implemented in a timely manner during the construction

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process to minimize erosion and sediment runoff. Structural practices may include some or all of the following devices:

- a. Silt fences
- b. Straw bales
- c. Diversion dikes
- d. Drainage swales
- e. Check dams
- f. Subsurface drains
- g. Pipe Slope drains
- h. Level spreaders
- i. Storm drain inlet protection
- j. Rock outlet protection
- k. Sediment traps
- l. Reinforced soil retaining systems
- m. Gabions
- n. Sediment basins
- o. Other devices are the job-site requires

2. The permanent stabilization practices which are to be installed under the contract may be specified in other section of the specifications. These are measures that shall be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed. Structural measures should be placed on upland soils to the degree attainable. The installation of these devices may be subject to Section 404 of the Clean Water Act.

3. A goal of 80 percent removal of total suspended solids from these flows which exceed predevelopment levels should be used in designing and installing storm water management controls (where practicable). Where this goal is not met, the *Contractor* shall provide justification for rejecting each practice listed above based on site conditions.

4. Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel as necessary to provide a non-erosive velocity flow from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected.

5. Silt Fences: The *Contractor* shall provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Silt fences shall be properly installed to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation, embankment, and grading). Silt fences shall be installed in the locations indicated on the drawings. Final removal of silt fence barriers shall be upon approval by the *Contracting Officer*.

6. Straw Bales: The *Contractor* shall provide bales of straw as a temporary structural practice to minimize erosion and sediment runoff. Bales shall be properly placed to effectively retain sediment immediately after completing each phase of work (e.g., clearing

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and grubbing, excavation, embankment, and grading) in each independent runoff area (e.g., after clearing and grubbing in a area between a ridge and drain, bales shall be placed as work progresses, bales shall be removed/replaced/relocated as needed for work to progress in the drainage area). Areas where straw bales are to be used are shown on the drawings. Final removal of straw bale barriers shall be upon approval by the *Contracting Officer*. Rows of bales of straw shall be provided as follows:

- a. Along the downhill perimeter edge of all areas disturbed.
- b. Along the top of the slope or top bank of drainage ditches, channels, swales, etc. that traverse disturbed areas.
- c. Along the toe of all cut slopes and fill slopes of the construction areas.
- d. Space rows a maximum of 200 feet apart in drains with slopes equal to or less than 5 percent and 100 feet apart in drains with slopes steeper than 5 percent. If drainage ditches have slopes above and below the 5 percent limit the spacing should be shown on the drawings.
- e. Perpendicular to the flow in the bottom of existing drainage ditches, channels, swales, etc. that traverse disturbed areas or carry runoff from disturbed areas. Rows shall be spaced as shown on the drawings.
- f. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Rows shall be spaced as shown on the drawings.
- g. At the entrance to culverts that receive runoff from disturbed areas.

7. Diversion Dikes: Diversion dikes shall have a maximum channel slope of 2 percent and shall be adequately compacted to prevent failure. The minimum height measured from the top of the dike to the bottom of the channel shall be 18 inches. The minimum base width shall be 6 feet and the minimum top width shall be 2 feet. The *Contractor* shall ensure that the diversion dikes are not damaged by construction operations or traffic. Diversion dikes shall be located as shown on the drawings.

1.05 TEMPORARY EROSION CONTROL MEASURES

A. GENERAL: All construction that disturbs the ground cover, either natural or manmade, shall be subject to erosion control measures. The *Contractor* shall evaluate the scope of work to determine the level of erosion control measures to be implemented. The goal of this work is to save valuable topsoil and prevent environmentally damaging non-point source pollution to waters of the U.S. from vegetation, soil, and construction debris released from construction sites. The *Contractor* shall be responsible for the design of site-specific temporary measures and implementation of work procedures, which ensure compliance with the storm water permits issued to Little Rock AFB. As a minimum, the requirements of this section shall be adhered to when developing and implementing temporary measures. This does not preclude the *Contractor* from proposing other methods on a site-specific basis. If the *Contractor* proposes other methods, typical installation details and specifications shall be provided by the *Contractor* for approval prior to implementation. Performance will be determined by the effectiveness of the program in preventing soil and other contaminants from leaving the construction site. Final stabilization will be achieved when a uniform perennial vegetative cover with a density of 80% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures.

1. CONSTRUCTION SITES LESS THAN ONE ACRE: *Contractor* shall adopt best management practices and prevent direct flow of storm water from construction sites or

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staging areas into the storm drainage system. The site shall be maintained visually free of gully erosion and runoff shall not be allowed to increase turbidity at the receiving streams immediately downstream of the construction site or the base boundary. The "storm water system" is defined as permanently maintained open channels, pipes, culverts, and combinations of these features that carry storm water across the base boundaries. Roadway culverts 18 inches or less in diameter, which drain into a grass roadway ditch or swale, are not considered part of the storm water system.

- B. CONSTRUCTION SITES WITHIN WATER COURSES AND FLOODPLAINS: The *Contractor* shall adopt a combination of management practices and control measures which maintain the stability of channels and slopes within the two-year storm flow cross section. In addition to performing all the requirements of item 1.05 A, for projects built within the 100 year floodplain, the *Contractor* shall submit engineering drawings showing the plan and profile of proposed construction work to the *Contracting Officer*. These drawings, along with plans for temporary erosion control measures, will be used by the base to obtain a dredging permit from the Little Rock District Army Corps of Engineers.
- C. STORM WATER PERMITS LIMITS: The storm water permit limits for all waters leaving Little Rock AFB are assumed to be the same as the four permitted outfalls. These perimeters will be satisfied by waters flowing in watercourses immediately below all construction sites. The limiting daily maximums are as follows:
- Chemical Oxygen Demand: 120 milligrams/liter
- Total Suspended Solids: 100 milligrams/liter
- Oil and Grease: 15 milligrams/liter
- pH: Range from 6.0 to 9.0
- D. MAINTENANCE AND RESTORATION: The *Contractor* shall repair and maintain all erosion control measures throughout the project area until permanent erosion control measures (seeding, sod, pavement, building construction, etc) that eliminate project generated non-point source pollution from entering the storm water system are established. Maintenance and repair of the temporary erosion control measures may extend into the warranty period until such time as the permanent measures are fully established. Upon completion of the permanent erosion control measures the *Contractor* shall remove and dispose or recycle all materials used for this work at no additional cost to the *Government*. When temporary erosion control requires the use of temporary settling basins (dry ponds), they shall be drained and the ground returned to its original or finished contour and ground cover at the completion of the contract.
- E. PREVENTION OF HAZARDOUS SUBSTANCE DISCHARGE: The *Contractor* shall prepare a pollution prevention plan and site specific spill prevention and countermeasures plan for all hazardous substances and petroleum products temporarily stored on site in excess of reportable quantities as defined in 40 CFR 302.
- F. SUBMITTALS:
1. For submittal requirements, go to Paragraph 1.05 A. Where required the *Contractor* shall supply three (3) copies of the NOI, certified receipt from ADEQ for the NOI and payment of the initial fee, and temporary storm water erosion control plans and specifications, affidavit or pollution prevention plan, and site specific spill prevention and countermeasures plan. These submittals shall be required before a notice to proceed is issued on projects in this category.

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2. For all projects requiring an NOI, the *Contractor* shall submit a termination notice to ADEQ upon completion of site stabilization with permanent measures and site restoration. This notice shall be mailed to the address given in Paragraph 1.05 A (3) and copied to the *Contracting Officer* along with a receipt from ADEQ as a condition of the final payment. Contractor shall provide 19CES/CEIEC written notification 5 days prior to submittal of Notice of Termination to ADEQ.

- G. It is the policy of the Air Force to minimize construction and maintenance activities in streams, wetlands and 100-year flood plains. Any temporary construction, such as falsework or coffer dams, constructed within these areas shall be approved by the Air Force at higher headquarters and by other Federal agencies before work is begun. When such activities are unavoidable, due to the nature of the work, the *Contractor* shall abide by all Federal, state and Air Force policy regarding streams, flood plains and wetlands. Detailed plans of proposed temporary construction shall be submitted to the *Contracting Officer* and approval received from all approval agencies and higher headquarters before work is begun. See FEMA Flood Plain Map for flood plain of project location.

PART 2 - PRODUCTS

2.01 COMPONENTS FOR SILT FENCES

- A. Filter Fabric: The geotextile shall comply with the requirements of ASTM D 4439, and shall consist of polymeric filaments, which are formed into a stable network such that filaments retain their relative positions. The filament shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of ester, propylene, or amide, and shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistance to deterioration due to ultraviolet and heat exposure. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F. The filter fabric shall meet the following requirements:

FILTER FABRIC FOR SILT SCREEN FENCE

PHYSICAL PROPERTY	TEST PROCEDURE	STRENGTH REQUIREMENT
Grab Tensile	ASTM D 4632	100 lbs. min.
Elongation (%)		30 % max.
Trapezoid Tear	ASTM D 4533	55 lbs. min.
Permittivity	ASTM D 4491	0.2 sec-1
AOS (U.S. Std Sieve)	ASTM D 4751	20-100

- B. Silt Fence Stakes and Posts

The *Contractor* may use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 2 inches by 2 inches when oak is used and 4 inches by 4 inches when pine is used, and shall have a minimum length of 5 feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 5 feet.

- C. Mill Certificate or Affidavit

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A mill certificate or affidavit shall be provided attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above. The mill certificate or affidavit shall specify the actual Minimum Average Roll Values and shall identify the fabric supplied by roll identification numbers. The *Contractor* shall submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric.

D. Identification Storage and Handling

Filter fabric shall be identified, stored and handled in accordance with ASTM D 4873.

2.02 COMPONENTS FOR STRAW BALES:

The straw in the bales shall be stalks from oats, wheat, rye, barley, rice, or from grasses such as byhalia, bermuda, etc., furnished in air dry condition. The bales shall have a standard cross section of 14 inches by 18 inches. All bales shall be either wire-bound or string-tied. The *Contractor* may use either wooden stakes or steel posts to secure the straw bales to the ground. Wooden stakes utilized for this purpose, shall have minimum dimensions of 2 inches x 2 inches in cross section and shall have a minimum length of 3 feet. Steel posts (standard "U" or "T" section) utilized for securing straw bales, shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 3 feet.

PART 3 - EXECUTION

3.01 INSTALLATION OF SILT FENCES

Silt fences shall extend a minimum of 16 inches above the ground surface and shall not exceed 34 inches above the ground surface. Filter fabric shall be from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter fabric shall be spliced together at a support post, with a minimum 6 inch overlap, and securely sealed. A trench shall be excavated approximately 4 inches wide and 4 inches deep on the upslope side of the location of the silt fence. The 4-inch by 4-inch trench shall be backfilled and the soil compacted over the filter fabric. Silt fences shall be removed upon approval by the *Contracting Officer*.

3.02 INSTALLATION OF STRAW BALES

Straw bales shall be placed in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. Straw bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. After the bales are staked and chinked (gaps filled by wedging with straw), the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 4 inches against the uphill side of the barrier. Loose straw shall be scattered over the area immediately uphill from a straw bale barrier to increase barrier efficiency. Each bale shall be securely anchored by at least two stakes driven through the bale. The first stake or steel post in each bale shall be driven toward the previously laid bale to force the bales together. Stakes or steel pickets shall be driven a minimum 18 inches deep into the ground to securely anchor the bales.

3.03 MAINTENANCE

- A. The *Contractor* shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control

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measures and other protective measures. The following procedures shall be followed to maintain the protective measures.

B. Silt Fence Maintenance

Silt fences shall be inspected in accordance with paragraph 3.04 INSPECTIONS. Any required repairs shall be made promptly. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach one-third of the height of the barrier. When a silt fence is no longer required, it shall be removed. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be sodded.

C. Straw Bale Maintenance

Straw bale barriers shall be inspected in accordance with paragraph 3.04 INSPECTIONS. Close attention shall be paid to the repair of damaged bales, end runs and undercutting beneath bales. Necessary repairs to barriers or replacement of bales shall be accomplished promptly. Sediment deposits shall be removed when deposits reach one-half of the height of the barrier. Bale rows used to retain sediment shall be turned uphill at each end of each row. When a straw bale barrier is no longer required, it shall be removed. The immediate area occupied by the bales and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall, be sodded.

D. Diversion Dike Maintenance

Diversion dikes shall be inspected in accordance with paragraph 3.04 INSPECTIONS. Close attention shall be paid to the repair of damaged diversion dikes and necessary repairs shall be accomplished promptly. When diversion dikes are no longer required, they shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be sodded.

3.04 INSPECTIONS

A. General

The *Contractor* shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every fourteen (14) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site. Where sites have been finally stabilized, such inspection shall be conducted at least once every month.

B. Inspections Details

Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the Storm Water Pollution Prevention Plan shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.

C. Inspection Reports

For each inspection conducted, the *Contractor* shall prepare a report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Storm Water

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Pollution Prevention Plan, maintenance performed, and actions taken. The report shall be furnished to the *Contracting Officer* within 24 hours of the inspection as a part of the *Contractor's* daily CQC REPORT. A copy of the inspection report shall be maintained on the job site.

END OF SECTION – STORM WATER POLLUTION PREVENTION MEASURES

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SECTION 01 62 35 – RECYCLED / RECOVERED MATERIALS

PART 1 - GENERAL

1.01 AFFIRMATIVE PROCUREMENT

Affirmative Procurement (Recycled/Recovered Materials) is a mandatory component of the Air Force pollution prevention program. The AF Installation Pollution Prevention Program Guide includes this goal for Affirmative Procurement: “100% of all products purchased each year in each year in each of U.S. EPA’s Guideline Item’ categories shall contain recycled materials meeting U.S. EPA’s Guideline Criteria.” Currently, reporting of affirmative procurement purchases is limited to contracts having a total value greater than \$100,000, which includes the purchase of any amount of U.S. EPA-designated items. This section contains guidelines for implementing the RCRA, EO, DOD, and Air Force requirements. This Section includes administrative and procedural requirements for submitting Product Data, Samples, and other miscellaneous submittals.

1.02 REFERENCES

The publications listed below form a part of this specification to the extent referenced.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 247 Comprehensive Procurement Guideline for Products Containing
Recovered Material

The Resource Conservation and Recovery Act (RCRA), Section 6002 (42 U.S.C. 6962)

Executive Order (EO) 13101, Greening the *Government* through Waste Prevention,
Recycling, and Federal Acquisition.

EO 12873

Federal Acquisition Regulations (FAR)

AF Engineering Technical Letter (ETL) 00-1

Air Force Instruction (AFI) 32-7080

24 July 1995 Air Force Pollution Prevention Strategy

Department of Defense (DOD) Instruction 4715.4, Pollution Prevention

1.03 OBJECTIVES

Government procurement policy is to acquire, in a cost effective manner, items containing the highest percentage of recycled and recovered materials practicable consistent with maintaining a satisfactory level of competition without adversely affecting performance requirements or exposing suppliers' employees to undue hazards from the recovered materials. The Environmental Protection Agency (EPA) has designated certain items which must contain a specified percent range of recovered or recycled materials. EPA designated products specified in this contract comply with the stated policy and with the EPA guidelines. The *Contractor* shall make all reasonable efforts to use recycled and recovered materials in providing the EPA designated products and in otherwise utilizing recycled and recovered materials in the execution of the work.

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1.04 EPA DESIGNATED ITEMS INCORPORATED IN THE WORK

Various sections of the specifications may contain requirements for materials that have been designated by EPA as being products, which are or can be made with recovered or recycled materials. These items, when incorporated into the work under this contract, shall contain at least the specified percentage of recycled or recovered materials unless adequate justification (non-availability) for non-use is provided. When a designated item is specified as an option to a non-designated item, the designated item requirements apply only if the designated item is used in the work.

1.05 EPA PROPOSED ITEMS INCORPORATED IN THE WORK

The items listed below have been identified by EPA as being products which are still being researched and are being considered for future Comprehensive Procurement Guideline (CPG) designation. It is recommended that these items, when incorporated in the work under this contract, contain the highest practicable percentage of recycled or recovered materials, provided specified requirements are also met.

1.06 EPA LISTED ITEMS USED IN CONDUCT OF THE WORK BUT NOT INCORPORATED IN THE WORK

There are many products listed in 40 CFR 247 which have been designated or proposed by EPA to include recycled or recovered materials that may be used by the *Contractor* in performing the work but will not be incorporated into the work. These products include office products, temporary traffic control products, and pallets. It is recommended that these non-construction products, when used in the conduct of the work, contain the highest practicable percentage of recycled or recovered materials and that these products be recycled when no longer needed.

1.07 DEFINITIONS

- A. **AFFIRMATIVE PROCUREMENT:** The purchase of environmentally preferable products manufactured from recycled and reclaimed materials.
- B. **ACQUISITION:** The acquiring by construction contract by and for the use of the Federal *Government* through purchase or lease, whether the supplies or services are already in existence or must be created, developed, demonstrated, and evaluated. Acquisition begins at the point when agency needs are established and includes the description of requirements to satisfy agency needs, solicitation and selection of sources, award of contracts, contract financing, contract performance, contract administration, and those technical and management functions directly related to the process of fulfilling agency needs by contract.
- C. **POSTCONSUMER MATERIAL:** A material or finished product that has served its intended use and has been discarded for disposal or recovery, having completed its life as a consumer item. "Postconsumer material" is a part of the broader category of "recovered material".
- D. **RECOVERED MATERIALS:** Waste materials and by-products which have been recovered or diverted from solid waste, but such term does not include those materials and by-products generated from, and commonly reused within, and original manufacturing process.
- E. **RECYCLABILITY:** The ability of a product or material to be recovered from or otherwise diverted from the solid waste stream for the purpose of recycling.
- F. **RECYCLING:** The series of activities, including collection, separation, and processing by which products or other materials are recovered from the solid waste stream for use in form

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of raw materials in the manufacture of new products other than fuel for producing heat or power by combustion.

- G. RECYCLED MATERIAL: A material utilized in place of raw or virgin material in product manufacturing consisting of materials derived from postconsumer waste, industrial scrap, material derived from agricultural wastes, and other items, all of which can be used in new product manufacturer.
- H. RECYCLED PRODUCT: A recycled product is one made completely or partially from waste materials or by-products recovered or diverted from the solid waste stream.
- I. WASTE REDUCTION: Preventing or decreasing the amount of waste being generated through waste prevention, recycling, or purchasing recycled and environmentally preferable products.
- J. PRODUCT: Materials and equipment that will be used in the construction of a project.
- K. PROCUREMENT: The purchase and providing of products to be used in the construction of a project.
- L. UNREASONABLE PRICE: If the cost of the recycled content product exceeds the cost of a non-recycled item, the Air Force considers the cost to be unreasonable. (Air Force Affirmative Procurement Plan)

1.08 DOD AND AIR FORCE REQUIREMENTS

Affirmative Procurement programs are required of all Air Force (USAF) installations. Department of Defense (DOD) Instruction 4715.4, Pollution Prevention, calls for program establishment in accordance with RCRA and EO 12873. Affirmative Procurement is also addressee in Air Force Instruction (AFI) 32-7080, Pollution Prevention Program, and the 24 July 1995 Air Force Pollution Prevention Strategy. The Strategy sets program goals, and the AFI provides program guidance.

1.09 EXEMPTIONS

- A. EPA Recommendations: The U.S. EPA recommends minimum content levels for those items listed in the AETC IMT 47, 20041101, V1, Recovered Materials Determination. These levels are mandatory for Air Force procurements unless one of the following exemptions applies. RCRA provides the following exemptions from the requirement to purchase EPA-designated items:

Web Link: <http://www.e-publishing.af.mil/contentmgmt/download.asp> (PureEdge Viewer)

1. The product is not available from a sufficient number of sources to maintain a satisfactory level of competition (i.e., available from two or more sources).
 2. The product is not available within a reasonable period of time.
 3. The product does not meet the performance standards in applicable specifications or fails to meet reasonable performance standards of the procuring agency.
 4. The product is not available at a reasonable price. For Air Force purposes, "unreasonable price" is defined as follows: If the price of the recycled-content product exceeds the cost of a non-recycled item, then the price is considered unreasonable.
- B. *Contractor* Responsibility: The *Contractor* is responsible for completion of the AETC IMT 51, 20010901, V1) Recovered Materials Exemption with respect to the work and products being provided. The *Contractor* is responsible for insuring that all sub-contractors comply with this order. The *Contractor* shall provide written documentation to support their decision not to

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acquire items meeting the minimum content levels. This documentation shall be forwarded to the *Contracting Officer* for review and findings; the *Contracting Officer's Representative* shall return the documentation to the *Contractor* citing the reason(s) for disapproval. The *Contractor* shall resubmit and address the deficiencies.

Web Link: <http://www.e-publishing.af.mil/contentmgmt/download.asp> (PureEdge Viewer)

1.10 U. S. EPA DESIGNATED & PROPOSED ITEMS (<http://www.epa.gov/cpg/products.htm>)

Construction Products: Building insulation products, structural fiberboard products for applications other than building insulation, laminated paperboard products for applications other than building insulation, cement and concrete containing fly ash, carpet made of polyester fiber for use in low-and medium-wear applications, carpet cushion, floor tiles containing recovered rubber or plastic, patio blocks containing recovered rubber or plastic, shower and restroom dividers/partitions containing recovered steel or plastic and reprocessed and consolidated latex paint for specific uses, flowable fill, patio blocks and railroad grade crossing surfaces.

1.11 INTENT

The intent of this section is to increase the awareness of all *Contractors* as to the availability of products manufactured from, or that contain recycled materials, thereby increasing the use of these products in the construction of a project.

1.12 QUALITY ASSURANCE

Companies specializing in the manufacture of products that comply with the requirements of this section shall have a minimum of three (3) years documented experience.

PART 2 - PRODUCTS

2.01 EPA LIST OF PRODUCT SOURCES & INFORMATION:

The following link is a current list of companies that manufacturer products using recycled materials. This list is presented to establish a standard of quality and does not infer that other manufacturers do not qualify. All products intended for use on this project, whether listed or not, shall be submitted to the *Contracting Officer* in accordance with specification Section 01 33 00 SUBMITTALS PROCEDURES.

EPA COMPREHENSIVE PROCUREMENT GUIDELINES PRODUCTS WEBSITE

Web Link: <http://www.epa.gov/cpg/products.htm>

PART 3 - EXECUTION

3.01 INSTALLATION:

All products used shall be installed per manufacturer's preferred instructions.

END OF SECTION – RECYCLED/RECOVERED MATERIALS

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SECTION 01 63 00 – SUBSTITUTIONS AND PRODUCT OPTIONS

PART 1 - GENERAL

1.01 BRAND NAMES

"Brand Names" are specified in several places throughout the specifications. The use of specific "names" is intended only to define type, quality, size, and other salient features required. Therefore, all brand name items listed are to be interpreted as "or approved equal" unless specifically noted otherwise.

1.02 PROPOSED SUBSTITUTIONS

The burden of ascertaining product/performance equality of proposed substitutions from those items specified is to be borne by the *Contractor*. Product substitutions will be accepted for review, and potential acceptance, by the *Contracting Officer*. If data provided by the *Contractor* is deemed inadequate to make a determination as to the equality of the proposed substitute, without additional research by the *Government*, it will be rejected. Approval by the *Contracting Officer* shall not relieve the *Contractor* from responsibility for any errors or omissions, nor from responsibility for complying with the requirements of this contract, except with respect to variations described and approved by the *Contracting Officer*.

1.03 EXACT PRODUCT SPECIFIED

If exact products are specified in the construction drawings or construction specifications, and the *Contractor* intends to use those same products in the construction work, submittal requirements in Schedule of Material Submittals and the technical specifications for catalog cuts, manufacturer's literature, and samples are waived. The *Contractor* shall provide a list of products that fall into this "intended use of exact product specified" category along with the manufacturer's installation/application instruction, for each product on the list. This list and manufacturer's installation application instructions shall be provided within twenty (20) days after the Notice-to-Proceed for review and approval by the *Contracting Officer*. Note that this will not take the place or affect the requirement for operations and maintenance (O&M) manuals.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – SUBSTITUTIONS AND PRODUCT OPTIONS

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SECTION 01 63 50 – MATERIAL SHIPMENTS

PART 1 - GENERAL

1.01 MATERIAL SHIPMENTS

The *Government* will not receive material shipments for construction projects and the *Contractor* shall not ship materials to himself addressed in care of 19th Civil Engineer, Squadron or the Base Contracting Office. Receiving and storage of all construction shipments is entirely the responsibility of the *Contractor*.

1.02 SHIPMENT AND PROTECTION OF MATERIAL AND EQUIPMENT

Shipments shall be addressed to the *Contractor* who shall be responsible for their receipt, unloading, handling, and storage at the site. *Government* will not accept deliveries on behalf of the *Contractor* or his sub-contractors or assume responsibility for security of materials, equipment, or supplies delivered to the site. *Contractor* shall protect and preserve materials, supplies, and equipment of every description (including property which may be *Government* furnished or owned) and work performed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION - MATERIAL SHIPMENTS

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SECTION 01 69 99 – REAL PROPERTY RECORDS

PART 1 - GENERAL

1.01 REAL PROPERTY CHECKLIST

- A. The *Contractor* shall complete and submit Real Property Checklist (DD Form 1354) 30 days before pre-final inspection for acceptance at the final inspection. The checklist will be provided to the *Contractor* prior to pre-final inspection and will be annotated as to what portions shall be required to be completed.
- B. The checklist contains items of construction for Real Property records. Examples are: square footage of facility/additions, linear feet of utility lines, sizes and cost of HVAC systems, etc.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – REAL PROPERTY RECORD

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DIVISION 02 – EXISTING CONDITIONS

SECTION 02 00 00 – EXISTING CONDITIONS

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Existing Conditions and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – EXISTING CONDITIONS

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SECTION 02 41 19 – SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of selected building elements.
 - 2. Salvage of existing items to be reused or recycled.
- B. Related sections include the following:
 - 1. Division 01 Section "Photographic Documentation" for documentation of existing conditions.
 - 2. Division 02 Section "Construction and Demolition Waste Management " for disposal of demolished materials.

1.02 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 User ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: 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.

1.03 SUBMITTALS

- A. Schedule of Selective Demolition Activities: Indicate detailed sequence of selective demolition and removal work, with starting and ending dates for each activity, interruption of utility services, use of elevator and stairs, and locations of temporary partitions and means of egress.
- B. Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Comply with Division 01 Section "Photographic Documentation." Submit before Work begins.
- C. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
 - 1. Comply with submittal requirements in Division 01 Section "Construction and Demolition Waste Management."

1.04 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.

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1.05 PROJECT CONDITIONS

- A. The User will occupy the remainder of the facility that is not under construction.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by the User as far as practical.
- C. Notify the Government 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. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Government. The Government will remove hazardous materials under a separate contract.
- 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.

1.06 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- B. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- C. 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 the Government.
- D. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
 - 1. Comply with requirements specified in Division 01 Section "Photographic Documentation."
- E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.02 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.
- 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.

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1. Arrange to shut off indicated utilities with the Government.
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.
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.

3.03 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.
- 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.
 2. Protect walls, ceilings, floors and other existing finish work that are to remain or that are exposed during selective demolition operations.
 3. Cover and protect equipment that has not been removed.

3.04 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 1. 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.
 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 3. 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.
 4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 5. Dispose of demolished items and materials promptly.
- B. Removed and Salvaged Items:
 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 the Government.
 4. Transport items to Government's storage area designated by Government.

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5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, 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.

3.05 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Government's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. Comply with requirements specified in Division 02 Section "Construction and Demolition Waste Management."

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off LRAFB property and legally/properly dispose of them.

3.06 CLEANING

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.

END OF SECTION 02 41 19

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SECTION 02 42 00 – CONSTRUCTION & DEMOLITION WASTE MANAGEMENT

PART 1 - GENERAL

1.01 GOVERNMENT POLICY

- A. Military installations are required to direct at least 40% of their non-hazardous solid wastes, including waste from construction and demolition operations, from the waste stream.
- B. *Government* policy is to apply sound environmental principles in the design, construction and use of facilities. As part of the implementation of that policy the *Contractor* shall: (1) practice efficient waste management when sizing, cutting, and installing products and materials and (2) use all reasonable means to divert construction and demolition waste from landfills and incinerators and to facilitate their recycling or reuse.

1.02 MANAGEMENT

The *Contractor* shall take a pro-active, responsible role in the management of construction and demolition waste and require all sub-contractors, vendors, and suppliers to participate in the effort. Construction and demolition waste includes products of demolition or removal, excess or unusable construction materials, packaging materials for construction products, and other materials generated during the construction process but not incorporated into the work. In the management of waste consideration shall be given to the availability of viable markets, the condition of the material, the ability to provide the material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates. The *Contractor* shall be responsible for implementation of any special programs involving rebates or similar incentives related to recycling of waste. Revenues or other savings obtained for salvage, or recycling shall accrue to the *Contractor*. Firms and facilities used for recycling, reuse, and disposal shall be appropriately permitted for the intended use to the extent required by federal, state, and local regulations.

1.03 DEBRIS DISPOSAL

See section 01 45 00 paragraph 1.04.

1.04 RECORDS

Records shall be maintained to document the quantity of waste generated; the quantity of waste diverted through sale, reuse, or recycling; and the quantity of waste disposed by landfill or incineration. The records shall be made available to the *Contracting Officer* during construction, and a copy of the records shall be delivered to the *Contracting Officer* upon completion of the construction.

1.05 COLLECTION

The necessary containers, bins and storage areas to facilitate effective waste management shall be provided and shall be clearly and appropriately identified. Recyclable materials shall be handled to prevent contamination of materials from incompatible products and materials and separated by one of the following methods:

- A. Source Separated Method.

Waste products and materials that are recyclable shall be separated from trash and sorted into appropriately marked separate containers and then transported to the respective recycling facility for further processing.

- B. Co-Mingled Method.

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Waste products and recyclable materials shall be placed into a single container and then transported to a recycling facility where the recyclable materials are sorted and processed.

C. Other Methods.

Other methods proposed by the *Contractor* may be used when approved by the *Contracting Officer*.

1.06 DISPOSAL

Except as otherwise specified in other sections of the specifications, disposal shall be in accordance with the following:

A. Reuse.

First consideration shall be given to salvage for reuse since little or no re-processing is necessary for this method, and less pollution is created when items are reused in their original form. Sale or donation of waste suitable for reuse shall be considered. Salvaged materials, other than those specified in other sections to be salvaged and reinstalled, shall not be used in this project.

B. Recycle.

Waste materials not suitable for reuse, but having value as being recyclable, shall be made available for recycling whenever economically feasible.

C. Waste.

Materials with no practical use or economic benefit shall be disposed at a landfill or incinerator.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

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DIVISION 03 – CONCRETE

SECTION 03 00 00 – CONCRETE

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Concrete and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – CONCRETE

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SECTION 03 01 30.72 – STRENGTHENING OF CONCRETE WITH FIBER REINFORCED POLYMER REINFORCEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

1.02 WORK INCLUDED

- A. The Work of this Section shall include furnishing all labor, materials, equipment, and supervision to prepare the surface of the structural concrete members and to install the FRP Reinforcement as indicated on the Drawings.

1.03 REFERENCE STANDARDS

- A. A. Comply with the following reference standards, except where more stringent requirements are indicated on the Drawings or specified herein:
 - 1. American Concrete Institute (ACI)
 - a. ACI 440.2R, Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures
 - b. ACI 440R-07, Report on Fiber-Reinforced Polymer (FRP) Reinforcement for Concrete Structures
 - c. ACI 440 R-96, State-of-the-Art Report on Fiber Reinforced Plastic (FRP) Reinforcement for Concrete Structures.
 - d. ACI 503 R, Pull-off test to determine FRP adhesion to concrete substrate.
 - e. ACI 562, Code Requirements for Assessment, Repair and Rehabilitation of Existing Concrete Structures.
 - 2. International Concrete Repair Institute (ICRI)
 - a. ICRI Guideline No. 330.1, Guide for the Selection of Strengthening Systems for Concrete Structures
 - b. ICRI Guideline No. 210.3, Guide to Using In-Situ Tensile Pull-Off Tests to Evaluate Bond of Concrete Surface Materials
 - 3. American Society of Testing and Materials (ASTM)
 - a. ASTM D4541, Standard Test Method for Pull-Off Strength of Coating using Portable Adhesion Testers

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel and a Project Supervisor qualified as noted below.
 - 1. The Contractor shall be trained by the Manufacturer and shall have completed a program of instruction in the use of FRP Reinforcement. Provide certification that the Contractor's project supervisor has completed training and that the contractor is approved

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by the supplier of the FRP system to install its product. Trained project supervisor shall be present at the work site to instruct the work crew and direct the CFRP field installation work.

2. The Contractor shall have a minimum of two years of experience in FRP Reinforcement confirmed by actual field tests of at least 5 successful installations.

3. The Engineer of Record may request the presence of a manufacturer's representative on site during the field installation work or to inspect the installation at no additional cost to the Government.

B. Manufacturer Qualifications:

1. Manufacturer shall have a nationally recognized program of contractor training, certification and technical support.

2. The Manufacturer shall have minimum ten years of experience in FRP Reinforcement confirmed by actual field tests of minimum of 500 successful installations.

3. The Manufacturer shall be able to supply testing data to demonstrate system properties and durability of the actual FRP Reinforcement to be used.

C. Source Limitations: Obtain materials of the same brand from one source from a single manufacturer.

D. Concrete Testing Service: Engage a qualified independent testing agency trained in FRP installation and inspection or a professional engineer licensed in the state where the project is located.

E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1. Require representatives of each entity directly concerned with reinforcement of concrete to attend, including the following:

- a. Contractor's superintendent.
- b. Installer superintendent.
- c. Independent Testing Agency Representative

2. Review inspection and testing required during installation.

F. Quality Control procedures performed by the Contractor shall include, but not be limited to the following:

1. The Contractor shall inspect all materials prior to application to assure that they meet specifications and have arrived to the job-site undamaged.

2. The FRP Reinforcement shall be completely inspected by the contractor during and immediately following application of the composite materials. Conformance with the design drawings, proper alignment of fibers and quality workmanship shall be assured. Entrapped air shall be released or rolled out before the epoxy sets. Defects shall be noted in the Daily Construction Log.

3. After FRP Reinforcement has cured, the contractor shall inspect all of the work to check for voids and or debonding. Repairs shall be made as per Par. 3.7 Repair of Defects, and noted in the Daily Construction Log.

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- G. Special inspections shall include, but not be limited to the following:
1. Inspect all materials prior to application to assure that they meet specifications and approved submittals, and have arrived to the job-site undamaged
 2. Verify correct preparation of test samples, field testing and results of specified field tests for compliance.
 3. Visually inspect and document concrete surface preparation prior to installation of FRP Reinforcement for correct locations, ambient temperature, surface temperature and dryness, surface profile of concrete surface, surface cleanliness, and rounding of sharp corners. Defects in concrete surfaces including cracks and voids shall be repaired,
 4. Verify correct preparation of test samples, completion of required field tests and results of field tests for compliance.
 5. Inspect the FRP Reinforcement during and immediately following application of the composite materials for conformance with the design drawings, proper alignment of fibers, installation procedures, saturation of strips, number of plies, location and dimensions of reinforcing strips, proper curing and quality workmanship. Entrapped air shall be released or rolled out before the epoxy sets. Defects shall be noted in the Daily Inspection Reports.
 6. After FRP Reinforcement has cured, inspect all work for conformance with the design drawings, proper alignment of fibers, saturation of strips, number of plies, location and dimensions of reinforcing strips, and identify and document any defects, delaminations, air voids and substandard areas. Defects shall be noted in the Daily Inspection Reports.
 7. Inspect repair of all defects and additional defects or required repairs in Daily Inspection Reports.

1.05 SUBMITTALS

- A. Submit for record Material Safety Data Sheets (MSDS) of each product, used on site.
- B. Submit product data indicating product standards, physical and chemical characteristics, environmental durability, technical specifications, limitations, installation instructions, and general recommendations regarding each material.
- C. Submit for record, a qualification statement by the Contractor listing their completed FRP Reinforcement projects, including size, location, owner, engineer/architect and contact numbers.
- D. Submit for record a complete description of the FRP Reinforcing system materials, surface preparation, application procedures, application rates, and cure times.
- E. Submit for record copies of purchase order and packaging slips showing quantities and dates of primer and resin purchased.
- F. Submit for review and approval shop drawings including, the following:
 1. Plan and Details that represent the location, lengths, and required dimensions for installation of FRP Reinforcing.
 2. Details of epoxy injection crack repair and epoxy resin patching.
 3. Complete system details including, but not limited to, FRP Reinforcement, primer, resin, and protective coating.

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- G. Submit for record test results of the Pull-off test to determine FRP adhesion to concrete substrate.
- H. Submit for record Daily Construction Logs kept by the Contractor. These logs shall include the following information: Weather and temperature at application times; Amount of product used and square footage/linear footage of substrate covered; Batch numbers of all products used; Names of all crew members; Any bond-strength tests, noting location, quantity and who performed these tests.
- I. Submit an approved ICC Evaluation Report in the name of the proposed FRP system to be used on this project.

1.06 JOB-SITE CONDITIONS

- A. Do not apply FRP Reinforcement materials if raining, snowing, or dew condensation is expected or existing concrete surface is wet or if the ambient or surface temperature are below 40° F (4°C).
- B. The ambient temperature and temperature of the epoxy components shall be between 50° F (10°C) and 80° F (27°C) at the time of mixing. See appropriate technical data sheets for more specific instructions.
- C. Precautions should be taken to avoid damage to any surface near the work zone due to mixing and handling of the specified material.
- D. The Contractor is solely responsible for fume control and shall take necessary precautions against injury to Installer personnel or adjacent building occupants during application of primer and resin, etc. Contractor personnel shall use protective equipment and area shall be well vented to the outside. As a minimum, Installer must take the following precautions:
 - 1. Contractor to locate and protect building air intake during application.
 - 2. Contractor to follow all state, federal, and local safety regulations.
 - 3. Contractor to follow all Manufacturers' safety requirements as indicated on appropriate SDS sheets.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver primer, saturant and protective coating in original, unopened containers with the Manufacturer's name, labels, product identification, and batch numbers.
- B. FRP Reinforcement shall be stored in a cool dry area away from direct sunlight, flame, moisture, or other hazards.
- C. Store primer, saturant and protective coating under conditions as recommended by the Manufacturer in a cool dry place out of direct sunlight. Products that have exceeded their shelf life shall not be used.
- D. Contractor is required to confirm that all materials used in accordance with this Section conform to local, state, and federal environmental and worker's safety laws and regulations
- E. During operations Contractor shall maintain barricades.
- F. The Contractor shall properly dispose of empty containers in accordance with local regulations.

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PART 2 - PRODUCTS

2.01 FRP REINFORCEMENT FABRIC AND/OR LAMINATE

- A. FRP Reinforcement fabric shall be high strength, high modulus, fiber fabric that may be unidirectional or woven (in various fiber architectures) to suit specific repair needs.
 - 1. FRP Reinforcement fabric shall be of the type, size, layer and location as indicated on the Drawings.
 - 2. FRP Reinforcement fabric shall meet the minimum laminate design property requirements as specified on the contract documents. Submit the following data:
 - a. Laminate Tensile Strength, ASTM D3039
 - b. Laminate Tensile Strength, for 1 layer, per inch width, ASTM D7565.
 - c. Laminate Tensile Modulus, ASTM D3039.
 - d. Laminate Elongation, ASTM D3039.
- B. Approved products are:
 - 1. SikaWrap Hex Fabrics (103C, 113C, 117C), Sika Corp, Lyndhurst, NJ.
 - 2. Alternate products must be submitted **and** approved by the Engineer of Record a minimum of two weeks prior to installation.

2.02 CONCRETE SURFACE PRIMER

- A. Surface Primer shall be a two component, 100% solids, moisture/tolerant, high modulus, high strength epoxy.
- B. Surface Primer shall meet the following minimum requirements:
 - 1. 1. Tensile Strength, 4900 psi per ASTM D638
 - 2. 2. Elongation at Break, 1.2% per ASTM D638.
 - 3. 3. Flexural Strength, 8800 psi per ASTM D790
 - 4. 4. Flexural Modulus, 506,000 psi per ASTM D790
- C. Approved products are:
 - 1. Sikadur 330, Sika Corp., Lyndhurst, NJ.
 - 2. Alternate products must be submitted **and** approved by the Engineer of Record a minimum of two weeks prior to installation.

2.03 FABRIC SATURANT

- A. Saturant resin shall be two component, 100% solids, moisture tolerant, high strength, high modulus epoxy.
- B. Saturants shall be compatible with the reinforcement fabric to provide the minimum laminate design property requirements as specified on the contract documents.
- C. Submit the following data:
 - 1. Tensile Strength, ASTM D638

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2. Tensile Modulus, ASTM D638.
3. Elongation at Break, ASTM D638.
4. Flexural Strength, ASTM D790
5. Flexural Modulus, ASTM D790

D. Approved products are:

1. Sikadur 300, Sika Corp, Lyndhurst, NJ.
2. Alternate products must be submitted **and** approved by the Engineer of Record a minimum of two weeks prior to the installation.

2.04 EPOXY REPAIR MORTAR

A. Repair mortar shall be 100% solids, non-sag paste epoxy.

B. Approved products are:

1. Sikadur 30, Sika Corp., Lyndhurst, NJ.
2. Sikadur 31, Sika Corp., Lyndhurst, NJ
3. Alternate products must be submitted **and** approved by the Engineer of record a minimum of two weeks prior to the installation.

2.05 PROTECTIVE COATING

A. Protective coating shall be polymer or acrylic based and shall be UV resistant.

B. Approved products are:

1. Sikagard 550W, Sika Corp., Lyndhurst, NJ.
2. Sikagard 670W, Sika Corp., Lyndhurst, NJ.
3. Alternate products must be submitted **and** approved by the Engineer of Record a minimum of two weeks prior to the installation.

PART 3 - EXECUTION

3.01 GENERAL

- A. A. Inspect surfaces to receive the work and report immediately in writing to the Engineer as required in the General Conditions and deficiencies in the surface that render it unsuitable for proper execution of this work.
- B. B. Protect furniture, interior surfaces, concrete, and other items surrounding work area from dust or damage due to Work of this Section.

3.02 SURFACE PREPARATION

- A. All concrete surfaces shall be dry and free of surface moisture and frost, and tested by the Contractor to evaluate moisture transmission in accordance with ASTM D4263 "Indicating Moisture in Concrete by the Plastic Sheet Method."
- B. All concrete surfaces shall be sound. Remove deteriorated concrete, dust, laitance, grease, paint, curing compounds, waxes, impregnations, foreign particles, and other bond inhibiting materials from the surface by blast cleaning or equivalent mechanical means.
- C. All concrete surfaces shall be air blasted and vacuumed clean to a dust free condition.

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- D. Concrete surface irregularities less than one inch shall be ground and smoothed and/or filled with an approved repair mortar (e.g., Sikadur 30) with the addition of 1 part oven dried sand to make an epoxy mortar. Surface irregularities shall be limited to less than 0.04 inches (1 mm). Surface irregularities greater than one inch shall be repaired using an approved cementitious repair mortar (e.g. SikaTop 123). Any sharp edges (e.g. fins, form lines, etc.) must be ground smooth and flush.
- E. Surface levelness— maximum allowable deviation in 6 ft. shall be limited to ¼ in. (6 mm), but no greater than 1/8 in. (3 mm) per linear ft. (305 mm).
- F. External concrete corners shall be rounded to at least a 1/2" radius when perpendicular to fiber orientation and internal corners shall be smoothed by trowelling epoxy mortar into the corners.
- G. The concrete surface should be prepared to a minimum concrete surface profile (CSP) 3 as defined by the ICRI surface profile chips.
- H. The adhesive strength of the concrete shall be verified after preparation by random pull-off testing (ACI 503R or ASTM D4541) at the direction of the Engineer. Minimum tensile strength is 200 psi with concrete substrate failure, or as approved by the Engineer.

3.03 MIXING PRIMER AND SATURANT

- A. Mix components in accordance with Manufacturer's recommendations.
- B. Diluting is not permitted. Pre-condition materials as indicated on technical data sheet.
- C. Mix only that quantity which can be used within its pot life.

3.04 PRIMER APPLICATION

- A. Apply primer in accordance with Manufacturer's recommendations.
- B. Primer may be applied with a brush or roller. Apply second coat as necessary after first coat has penetrated into concrete.
- C. Surface depressions shall be filled with epoxy filler per manufacturers' instructions.
- D. Primer must be covered with fiber within 24 hours of application, depending on temperature conditions. If 24-hour window is exceeded, the primed surfaces must be solvent wiped with a fast flashing solvent (e.g. MEK) or roughened with sandpaper to break the amine blush.

3.05 FRP REINFORCEMENT APPLICATION

- A. Method 1: Wet Lay-Up
 - 1. Apply FRP Reinforcement in accordance with Manufacturer's recommendations.
 - 2. When using saturator equipment, follow Manufacturer's procedures for proper machine set-up and calibration. Rollers shall be calibrated to saturate the fabric with the proper resin-to-fabric ratio. The roller gap shall be checked daily by a qualified technician for accuracy. The resin-to-fabric ratio shall also be verified by resin usage and documented on the daily project logs.
 - 3. Once the fabric is saturated, it may then either be spooled for easy handling, or cut to specified lengths and booked for handling. Care must be taken not to damage the fibers.

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REINFORCED POLYMER REINFORCEMENT

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4. The fabric may then be applied to the surface with no delay. Work from one end to the other, taking care to orient the fibers as specified. Remove any air entrapped in the fabric with a ribbed roller or squeegee.
5. Sheets shall be lapped in the longitudinal direction 6 inches minimum or as indicated on the Drawings. Note: no lapping is required of the sheets parallel to the direction of fiber orientation.

B. Method 2: Dry Lay-Up

1. Apply FRP Reinforcement in accordance with Manufacturer's recommendations.
2. FRP Reinforcement sheets shall be cut beforehand into prescribed lengths. Sheets shall be lapped in the longitudinal direction 6 inches minimum or as indicated on the Drawings. Note: no lapping is required of the sheets parallel to the direction of fiber orientation.
3. Follow Manufacturer's recommendations regarding primer open times.
4. Apply a primary saturant coat uniformly by roller brush.
5. Apply FRP Reinforcement sheets fiber side down to the concrete over the fresh saturant using a ribbed roller to remove any air bubbles.
6. FRP Reinforcement sheets shall be left alone for about 30 minutes allowing for the primary saturant to soak through the fabric. Correct any dislocation on lifting.
7. Apply secondary saturant coat with roller over installed sheets in order to impregnate and replenish primary saturant.
8. If succeeding FRP Reinforcement sheets are specified on the Drawings repeat application procedures.

3.06 CURING

- A. Protect finished installation of FRP Reinforcement from rain, sand, dust, etc. using protective sheeting or other barriers. Do not allow protective sheeting to come in contact with finished application.
- B. Curing of finished application shall be a minimum of 24 hours and in order to achieve full strength curing shall be extended for a period of two weeks at an average ambient temperature of 68°F.

3.07 REPAIR OF DEFECTS

- A. Upon completion of the curing process, the installed system shall be checked for areas where saturant has not penetrated or where saturant has not completely cured. Such areas shall be epoxy injected to re-establish bond subject to the approval of the Project Engineer.
- B. Repair procedures shall be performed in accordance with guidelines established by ACI 440.2R and approved by the Project Engineer. All repairs shall be subject to the same application, curing and quality control specifications as the original work.
 1. Small delaminations and voids less than 2 in² each are permissible as long as the delaminated area is less than 5% of the total laminate area and there are no more than 10 such delaminations per 10 ft².
 2. Medium sized delaminations and voids greater than 2 in² but less than 25 in² may be repaired by epoxy resin injection or ply replacement, depending on the size and number of

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delaminations and their location. The repair procedure should be determined by the Project Engineer.

3. Larger size delaminations and voids greater than 25 in² should be repaired by selectively cutting away the affected sheet and applying an overlapping sheet patch of equivalent plies. The overlap should extend a minimum of 6 in. in all directions.

3.08 PROTECTIVE COATING

A. Apply protective coating in accordance with Manufacturer's recommendations.

3.09 CLEANING

A. Uncured saturants may be cleaned from tools with an approved solvent and properly disposed.

B. Cured saturants shall be removed by mechanical means and properly disposed.

END OF SECTION 03 01 30.72

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SECTION 03 10 00 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Form-facing material for cast-in-place concrete.
 - 2. Shoring, bracing, and anchoring.

1.03 DEFINITIONS

- A. Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.
- B. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

1.04 SUBMITTALS

- A. Product Data: For each of the following:
 - 1. Exposed surface form-facing material.
 - 2. Concealed surface form-facing material.
 - 3. Form ties.
 - 4. Form-release agent.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, in accordance with **ACI 301**, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.
 - 1. Design forms in accordance with APA's "Concrete Forming Design/Construction Guide."
 - 2. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.

2.02 FORM-FACING MATERIALS

- A. As-Cast Surface Form-Facing Material:
 - 1. Provide continuous, true, and smooth concrete surfaces.
 - 2. Furnish in largest practicable sizes to minimize number of joints.
 - 3. Acceptable Materials: As required to comply with Section 03 30 00 "Cast-In-Place Concrete, and as follows:
 - a. Plywood, metal, or other approved panel materials.

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- B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.

- 1. Provide lumber dressed on at least two edges and one side for tight fit.

2.03 RELATED MATERIALS

- A. Chamfer Strips: Wood, metal, PVC, or rubber strips, **3/4 by 3/4 inch**, minimum.
- B. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- C. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that leave no corrodible metal closer than **1 inch** to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, leave holes no larger than **1 inch** in diameter in concrete surface.

PART 3 - EXECUTION

3.01 INSTALLATION OF FORMWORK

- A. Comply with **ACI 301**.
- B. Limit concrete surface irregularities as follows:
 - 1. Surface Finish-3.0: ACI 117 Class A, **1/8 inch**.
- C. Construct forms tight enough to prevent loss of concrete mortar.
 - 1. Minimize joints.
 - 2. Exposed Concrete: Symmetrically align joints in forms.
- D. Construct removable forms for easy removal without hammering or prying against concrete surfaces.
 - 1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
 - 2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
- E. Do not use rust-stained, steel, form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.
 - 1. Provide and secure units to support screed strips
 - 2. Use strike-off templates or compacting-type screeds.
- G. Chamfer exterior corners and edges of permanently exposed concrete.
- H. At construction joints, overlap forms onto previously placed concrete not less than **12 inches**.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.

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1. Determine sizes and locations from trades providing such items.
- J. Construction and Movement Joints:
 1. Construct joints true to line with faces perpendicular to surface plane of concrete.
 2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by the Government.
 3. Place joints perpendicular to main reinforcement.
- K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.
 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Clean embedded items immediately prior to concrete placement.

3.03 REMOVING AND REUSING FORMS

- A. Formwork for sides of foundation walls, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than **50 deg F** for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
 1. Leave formwork slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work.
 1. Split, frayed, delaminated, or otherwise damaged form-facing material are unacceptable for exposed surfaces.
 2. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.
 1. Align and secure joints to avoid offsets.
 2. Do not use patched forms for exposed concrete surfaces unless approved by Contracting Officer.

3.04 SHORING AND RESHORING INSTALLATION

- A. Comply with **ACI 318** and **ACI 301** for design, installation, and removal of shoring and reshoring.

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- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

END OF SECTION 03 10 00

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SECTION 03 20 00 - CONCRETE REINFORCING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Steel reinforcement bars.
 - 2. Welded-wire reinforcement.

1.03 SUBMITTALS

- A. Product Data: For the following:
 - 1. Each type of steel reinforcement.
 - 2. Bar supports.
- B. Shop Drawings: Comply with ACI SP-066:
 - 1. Include placing drawings that detail fabrication, bending, and placement. Reinforcement schedules alone are not acceptable. The reinforcement shop drawings shall also include sections and details showing reinforcement placement.
 - 2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
 - 3. Reproduction of Contract Drawings shall not be used for shop drawings.
 - 4. Shop drawings shall be coordinated with other trades, construction fit up and project site conditions. The General Contractor shall coordinate this prior to submission of the Shop Drawings.
 - 5. Design Team Review of Shop Drawings:
 - a. Shop drawing review is for bar size, spacing, details and general conformation of the Contract Drawings only.
 - b. Shop drawings will only be reviewed if transmitted in their entirety, unless previously approved to submit in phases. Incomplete shop drawings will be marked revise and resubmit.
 - c. Fabrication of materials prior to review of the shop drawings is at the Contractor's risk.
- C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1.04 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

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1.05 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Store reinforcement to avoid contact with earth.

PART 2 - PRODUCTS

2.01 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615/A615M, **Grade 60**, deformed.
- B. Low-Alloy Steel Reinforcing Bars: ASTM A706/A706M, deformed.
- C. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.02 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A615/A615M, **Grade 60**, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
 - 1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
- C. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than **0.0508 inch** in diameter.
 - 1. Finish: Plain.

2.03 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.02 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement.
 - 1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
 - 2. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than **1 inch**, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with **ACI 318 or as specified on the Drawings**.

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- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
 - 1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, **24 inches**, or as specified on Drawings, whichever is greater.
 - 2. Stagger splices in accordance with **ACI 318**.
- G. Install welded-wire reinforcement in longest practicable lengths.
 - 1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
 - 2. Lap edges and ends of adjoining sheets at least one wire spacing plus **2 inches** for plain wire and **8 inches** for deformed wire.
 - 3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
 - 4. Lace overlaps with wire.

3.03 JOINTS

- A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by the Government.
 - 1. Place joints perpendicular to main reinforcement.
 - 2. Continue reinforcement across construction joints unless otherwise indicated.
 - 3. Do not continue reinforcement through sides of strip placements of floors and slabs.
- B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.04 INSTALLATION TOLERANCES

- A. Comply with **ACI 117**.

3.05 FIELD QUALITY CONTROL

- A. Special Inspections: The Contractor will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports, including:
 - 1. Steel-reinforcement placement.

END OF SECTION 03 20 00

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SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.
- B. Related Requirements:
 - 1. Division 03 Section "Concrete Forming and Accessories" for form-facing materials.
 - 2. Division 03 Section "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
 - 3. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.
 - 4. Division 32 Section "Concrete Paving" for concrete pavement and walks.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture.
 - 1. Include intended use and or location of installation for each mixture.
- C. Shop Drawings: For steel reinforcement.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301-16, "Specification for Structural Concrete,"
 - 2. ACI 318-11, Section 5.3 "Proportions of Concrete Design Mix".
 - 3. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and **ACI 301**.
- B. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.01 CONCRETE, GENERAL

- A. ACI Publications: Comply with **ACI 301** unless modified by requirements in the Contract Documents.

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2.02 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures, cement, and aggregate from a single ready-mixed concrete manufacturer for entire Project.

2. Portland Cement: ASTM C 150, Type I/II. Supplement with the following:

a. Fly Ash: ASTM C 618 Class C. Provide maximum of 25% fly ash to cement ratio.

B. Normal-Weight Aggregates: ASTM C 33, graded, **3/4-inch** nominal maximum coarse-aggregate size for pumped concrete 1 1/2" inch elsewhere.

1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M and potable.

2.03 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately **9 oz./sq. yd.** when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

D. Water: Potable or complying with ASTM C1602/C1602M.

2.04 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: Contractor shall have the option to provide one of the following product type for joint fillers at expansion and isolation joints (where indicated) for cast-in-place concrete:

1. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751

2. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 in accordance with ASTM D2240.

B. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

C. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.05 CONCRETE MIXTURES, GENERAL

A. Provide design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with **ACI 301**.

1. The concrete provider shall provide proposed mixture designs, prepared by a qualified testing company.

2. Required Average Strength for each type of concrete.

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- i. Where suitable test records for the concrete production facility are available, design strength may be tested on the standard deviation in accordance with ACI 318.
 - ii. Where strength test records are not available, design strength and documentation of average strength as noted in ACI 318, Chapter 5.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows, unless noted otherwise in specific concrete mix design specification:

2.06 CONCRETE MIXTURES

- A. Normal-weight concrete used for footings.
 - 1. Cementitious Materials: Use 25% maximum Type C fly ash.
 - 2. Proportion normal-weight concrete mixture as follows:
 - a. Minimum Compressive Strength: **4000 psi** at 28 days.
 - b. Maximum w/cm: 0.50.
 - c. Maximum Coarse-Aggregate Size: **3/4 inch nominal**.
 - d. Slump Limit: **4 inches**.
- B. Normal-weight concrete used for interior slabs-on-ground.
 - 1. Cementitious Materials: Use 25% maximum Type C fly ash.
 - 2. Proportion normal-weight concrete mixture as follows:
 - a. Minimum Compressive Strength: **4000 psi** at 28 days.
 - b. Maximum w/cm: 0.50.
 - c. Maximum Coarse-Aggregate Size: **3/4 inch nominal**.
 - d. Slump Limit: **4 inches**.
- C. Normal-weight concrete used for interior suspended slabs.
 - 1. Cementitious Materials: Use 25% maximum Type C fly ash.
 - 2. Proportion normal-weight concrete mixture as follows:
 - a. Minimum Compressive Strength: **4500 psi** at 28 days.
 - b. Maximum w/cm: 0.45.
 - c. Maximum Coarse-Aggregate Size: **3/4 inch nominal**.
 - d. Slump Limit: **4 inches**.

2.07 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M.
 - 1. When air temperature is between **85 and 90 deg F**, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above **90 deg F**, reduce mixing and delivery time to 60 minutes.

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PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.

3.03 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by the Government.

1. Place joints perpendicular to main reinforcement.
 - a. Continue reinforcement across construction joints unless otherwise indicated.
2. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut ~~1/8-inch-~~ (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. Fill with sealant following curing
2. Spacing: Provide joints at locations as noted on the Drawings.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as, foundation walls and existing perimeter, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
2. Terminate full-width joint-filler strips not less than **1/2 inch** or more than **1 inch** below finished concrete surface, where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

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E. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

3.04 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints. Deposit concrete to avoid segregation.
1. Consolidate placed concrete with mechanical vibrating equipment in accordance with **ACI 301**.
- C. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
- D. Cold-Weather Placement: Comply with **ACI 301** and ACI 306.1.
- E. Hot-Weather Placement: Comply with **ACI 301** and **ACI 305.1**.

3.05 FINISHING FORMED SURFACES

- A. **Chamfer** exterior corners and edges of permanently exposed concrete.
- B. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.
- C. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete.
- D. Related Unformed Surfaces:
1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
 2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.06 FINISHING FLOORS AND SLABS

- A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

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- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces to be given a fine-broom finish. [or to be covered with resilient flooring, carpet, ceramic tile, paint, or another thin-film-finish coating system]
 - 2. Finish surfaces to the following tolerances, according to **ASTM E 1155 (ASTM E 1155M)**, for a randomly trafficked floor surface.
 - 3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, **10-foot-** long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed **1/8 inch**.
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic tile is to be installed by either thickset or thin-set method and interior slab surfaces to receive concrete sealer as a final finish. While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- E. Broom Finish: Apply a broom finish to exterior concrete walks (including exterior walkways), steps, ramps, maintenance pads, and elsewhere as indicated.

3.07 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

Filling In: Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

- A. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, trowel, and broom finish concrete surfaces.

3.08 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
 - 1. Comply with **ACI 301** and ACI 306.1 for cold weather protection during curing.
 - 2. Comply with **ACI 301** and **ACI 305.1** for hot-weather protection during curing.
- B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, and other surfaces.

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3.09 LIQUID FLOOR TREATMENTS

- A. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.10 JOINT FILLING

- A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month(s).
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least **2 inches** deep in formed joints.
- D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.11 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas. Remove and replace concrete that cannot be repaired and patched.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a **No. 16** sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than **1/2 inch** in any dimension to solid concrete.
 - a. Limit cut depth to **3/4 inch**.
 - b. Make edges of cuts perpendicular to concrete surface.
 - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
 - d. Fill and compact with patching mortar before bonding agent has dried.
 - e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
 - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
 - b. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces:
 - 1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.

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- a. Correct low and high areas.
 - b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of **0.01 inch** wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.
 - a. Finish repaired areas to blend into adjacent concrete.
5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
 - a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - b. Feather edges to match adjacent floor elevations.
6. Correct other low areas scheduled to remain exposed with repair topping.
 - a. Cut out low areas to ensure a minimum repair topping depth of **1/4 inch** to match adjacent floor elevations.
 - b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
7. Repair defective areas, except random cracks and single holes **1 inch** or less in diameter, by cutting out and replacing with fresh concrete.
 - a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a **3/4-inch** clearance all around.
 - b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
 - c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
 - d. Place, compact, and finish to blend with adjacent finished concrete.
 - e. Cure in same manner as adjacent concrete.
8. Repair random cracks and single holes **1 inch** or less in diameter with patching mortar.
 - a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
 - b. Dampen cleaned concrete surfaces and apply bonding agent.
 - c. Place patching mortar before bonding agent has dried.
 - d. Compact patching mortar and finish to match adjacent concrete.
 - e. Keep patched area continuously moist for at least 72 hours.

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- E. Perform structural repairs of concrete, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.12 FIELD QUALITY CONTROL

- A. Special Inspections: Contractor will engage a materials tester to perform field tests and inspections and prepare testing and inspection reports.
 - 1. Testing Services: Tests shall include concrete testing for compliance with requirements for concrete requirements for concrete mixture components and compressive strength at 7 days and 28 days.

END OF SECTION 03 30 00

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 04 – MASONRY

SECTION 04 00 00 – MASONRY

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Masonry and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – MASONRY

CLASSIFICATION: **UNCLASSIFIED**

SECTION 04 21 13 - BRICK MASONRY

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Face brick.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.03 QUALITY ASSURANCE

- A. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602.

1.04 PROJECT CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.01 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.02 BRICK

- A. Face Brick: Facing brick complying with ASTM C 216 or hollow brick complying with ASTM C 652, Class H40V (void areas between 25 and 40 percent of gross cross-sectional area).
 - 1. Products: Acme "Garnet" Velour Finish. Grade: SW.
 - 2. Type: FBX.
 - 3. Size (Actual Dimensions): 3-5/8 inches (92 mm) wide by 2-1/4 inches (57 mm) high by 7-5/8 inches (194 mm) long.

2.03 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II. Provide natural color or white cement as required to produce mortar color to match existing mortar.

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- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91.
 - 1. Type N above grade; Type S below grade.
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Lafarge North America Inc.; Lafarge Masonry Cement.
 - b. Lehigh Cement Company; Lehigh Masonry Cement.
 - c. National Cement Company, Inc.; Coosa Masonry Cement.
 - d. Or approved equal.
- E. Aggregate for Mortar: ASTM C 144.
 - 1. White-Mortar Aggregates: Natural white sand or crushed white stone.
- F. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Euclid Chemical Company (The); Accelguard 80.
 - b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.
 - c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.
 - d. Or approved equal.

2.04 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
 - 1. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
- B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least **5/8-inch (16-mm)** cover on outside face. Outer ends of wires are bent 90 degrees and extend **2 inches (50 mm)** parallel to face of veneer.
- C. Adjustable Masonry-Veneer Anchors:
 - 1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to metal studs.
 - 2. Contractor's Option: Unless otherwise indicated, provide any of the following types of anchors:
 - 3. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.

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- a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Heckmann Building Products Inc.; 315-D with 316.
 - 2) Hohmann & Barnard, Inc.; DW-10HS.
 - 3) Or approved equal.
- b. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, having slotted holes for inserting wire tie.
- c. Fabricate sheet metal anchor sections and other sheet metal parts from 12 gauge thick, steel sheet, galvanized after fabrication.

2.05 EMBEDDED FLASHING MATERIALS

A. Flexible Flashing: Use one of the following unless otherwise indicated:

- 1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch (1.02 mm).
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Advanced Building Products Inc.; Peel-N-Seal.
 - 2) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
 - 3) Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier Thru-Wall Flashing.
 - 4) Grace Construction Products, W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
 - 5) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
 - 6) Hohmann & Barnard, Inc.; Textroflash.
 - 7) W. R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.
 - 8) Polyguard Products, Inc.; Polyguard 400.
 - 9) Or approved equal.
- 2. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) DuPont; Thru-Wall Flashing.
 - 2) Hohmann & Barnard, Inc.; Flex-Flash.
 - 3) Hyload, Inc.; Hyload Cloaked Flashing System.
 - 4) Or approved equal.
- 3. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637, 0.040 inch (1.0 mm) thick.

CLASSIFICATION: **UNCLASSIFIED**

- a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Carlisle Coatings & Waterproofing; Pre-Kleened EPDM Thru-Wall Flashing.
 - 2) Firestone Specialty Products; FlashGuard.
 - 3) Heckmann Building Products Inc.; No. 81 EPDM Thru-Wall Flashing.
 - 4) Hohmann & Barnard, Inc.; Epra-Max EPDM Thru-Wall Flashing.
 - 5) Or approved equal.
- B. Sealants for Sheet Metal Flashings: As specified in Division 07 Section "Sheet Metal Flashing and Trim."
- C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.06 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from [neoprene] [urethane] [or] [PVC].
- B. Weep/Vent Products: Use one of the following unless otherwise indicated:
 - 1. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth **1/8 inch (3 mm)** less than depth of outer wythe; in color selected from manufacturer's standard.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Mortar Net USA, Ltd.; Mortar Net Weep Vents.
 - 2) Or approved equal.
- C. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
 - b. Mortar Net USA, Ltd.; Mortar Net.
 - c. Or approved equal.
 - 2. Provide one of the following configurations:
 - a. Strips, full-depth of cavity and **10 inches (250 mm)** high, with dovetail shaped notches **7 inches (175 mm)** deep.

2.07 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly

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approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem, Inc.
 - c. ProSoCo, Inc.
 - d. Or approved equal.

2.08 MORTAR MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 1. Do not use calcium chloride in mortar.
 2. Use masonry cement mortar unless otherwise indicated.
 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide Type N unless another type is indicated.
- D. Mortar Color: Match existing mortar color.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
- C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.02 TOLERANCES

- A. Dimensions and Locations of Elements:

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1. For dimensions in cross section or elevation do not vary by more than plus **1/2 inch** or minus **1/4 inch**.
2. For location of elements in plan do not vary from that indicated by more than plus or minus **1/2 inch (12 mm)**.
3. For location of elements in elevation do not vary from that indicated by more than plus or minus **1/4 inch (6 mm)** in a story height or **1/2 inch (12 mm)** total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than **1/4 inch in 10 feet** maximum.
2. For vertical lines and surfaces do not vary from plumb by more than **1/4 inch in 10 feet (6 mm in 3 m)**, **3/8 inch in 20 feet (9 mm in 6 m)**, or **1/2 inch (12 mm)** maximum.
3. For conspicuous vertical lines, such as external corners, and control joints, do not vary from plumb by more than **1/4 inch in 20 feet** maximum.
4. For lines and surfaces do not vary from straight by more than **1/4 inch in 10 feet** maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus **1/8 inch (3 mm)**, with a maximum thickness limited to **1/2 inch (12 mm)**; do not vary from bed-joint thickness of adjacent courses by more than **1/8 inch (3 mm)**.
2. For exposed head joints, do not vary from thickness indicated by more than plus or minus **1/8 inch (3 mm)**.

3.03 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal **4-inch (100-mm)** horizontal face dimensions at corners or jambs.
- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

3.04 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick as follows:
1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 2. With entire units, including areas under cells, fully bedded in mortar at starting course on footings.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

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3.05 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
 - 1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
 - 2. Embed [tie sections] [connector sections and continuous wire] in masonry joints. Provide not less than 2 inches (50 mm) of air space between back of masonry veneer and face of sheathing.
 - 3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 - 4. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 24 inches (610 mm) o.c. horizontally with not less than 1 anchor for each 2.67 sq. ft. (0.25 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 36 inches (914 mm), around perimeter.

3.06 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry where indicated
- B. Install flashing as follows unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 - 2. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal drip edge.
- C. Install weep holes in head joints in exterior wythes of first course of masonry immediately above grade and embedded flashing and as follows:
 - 1. Use specified weep/vent products to form weep holes.
 - 2. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.
- D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

3.07 CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Protect adjacent surfaces from contact with cleaner.

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2. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
3. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.08 MASONRY WASTE DISPOSAL

- A. Excess Masonry Waste: Remove masonry waste and legally dispose of off Government's property.

END OF SECTION 04 21 13

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DIVISION 05 – METALS

SECTION 05 00 00 – METALS

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Metals and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – METALS

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SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Structural steel.
 - 2. Grout.
- B. Related Sections:
 - 1. Division 05 Section "Steel Decking" for field installation of shear connectors through deck.
 - 2. Division 05 Section "Metal Stairs"
 - 3. Division 05 Section "Metal Fabrications for steel lintels and shelf angles not attached to structural-steel frame and other metal items not defined as structural steel.
 - 4. Division 09 Section "Painting" for surface preparation, priming, and painting requirements for structural steel.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
 - 5. For structural-steel connections, include structural design data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding certificates.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
- B. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

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1.05 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.01 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992.
- B. Channels, Angles shall be ASTM A 36, yield strength 50 ksi unless otherwise noted.
- C. Plates shall be ASTM A 36, yield strength 50 ksi unless otherwise noted.
- D. Cold-Formed Hollow Structural Sections (Square or Rectangular): ASTM A 500, Grade C, structural tubing, 50 ksi unless otherwise noted.
- E. Steel Pipe: ASTM A 53, Grade B, yield strength 36 ksi.
- F. Welding Electrodes: Comply with AWS requirements.

2.02 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM F 3125
 - 1. Grade 325-N, heavy-hex steel structural bolts with threads in the shear plane.
 - 2. Or Grade A 490-N, alloy steel heavy-hex structural bolts with threads in the shear plane.
- B. High-Strength Bolts, Nuts, and Washers in contact with Treated wood: ASTM A307
 - 1. Grade 316L, stainless steel
 - 2. Or Hot-Dipped zinc coating, ASTM 153
- C. Anchor Rods: ASTM F 1554, Grade 36 or ASTM F 1554, Grade 55, S1 weldable.
 - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 2. Plate Washers: ASTM A 36A carbon steel.
 - 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 4. Finish: Plain
- D. Post installed Adhesive Anchors in Concrete, Threaded Rods: ASTM A 36, yield strength 36 ksi or ASTM F 593 Stainless Steel anchors, yield strength 45ksi unless otherwise indicated.
 - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
 - 2. Plate Washers: ASTM A 36A carbon steel.
 - 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
 - 4. Finish: Plain
 - 5. Adhesives as indicated on the drawings.
- E. Post-Installed Expansion Anchors in Concrete:

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1. Hilti, "Kwik Bolt TZ"
2. Simpson Strong-Tie, "Strong Bolt 2"
3. Dewalt, "Power Stud+ SD1+"
4. Or approved equal.

F. Post-Installed Screw Anchors:

1. Hilti, "Kwik HUS EZ"
2. Simpson Strong-Tie, "Titen HD"
3. Dewalt, "Screw Bolt"
4. Or approved equal.

2.03 GALVANIZING

- A. All exterior structural steel is to be galvanized.

2.04 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79.

2.05 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.06 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning."
- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- G. Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than **10 inches** o.c. unless otherwise indicated.
- H. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.

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2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.07 SHOP CONNECTIONS

- A. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.08 SHOP PRIMING

- A. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 1. SSPC-SP 2, "Hand Tool Cleaning."
 2. SSPC-SP 3, "Power Tool Cleaning."
- B. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of **1.5 mils (0.038 mm)**. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- C. Painting: As specified in Division 09 Section "Painting"

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.03 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Bearing and Leveling Plates: Clean concrete-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 2. Weld plate washers to top of baseplate.
 3. Pretension anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.

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4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 1. Level and plumb individual members of structure.
- E. Splice members only where indicated.

3.04 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 1. Joint Type: Pretensioned.
 - a. Snug tight bolting not permitted unless indicated on Contract Drawings.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

3.05 REPAIRS AND PROTECTION

- A. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION 05 12 00

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SECTION 05 31 00 - STEEL DECKING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:

1. Composite floor deck
2. Steel roof deck

1.02 SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

1.03 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- B. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Nucor Corporation; Vulcraft Division.
 2. United Steel Deck, Inc.
 3. Valley Joist; Division of EBSCO Industries, Inc.
 4. Verco Manufacturing Co.
 5. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.
 6. Or Approved Equal

2.02 COMPOSITE FLOOR DECK

- A. Composite Steel Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 30, with the minimum section properties indicated, and with the following:
1. Galvanized Steel Sheet: ASTM A 653/A653M, structural steel (SS) Grade 80, G90 zinc coating.

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- a. Deck Profile: Type VL.
- b. Profile Depth: 1-1/2 inches.
- c. Design Uncoated-Steel Thickness: 22 Gauge.

2.03 STEEL ROOF DECK

- A. Steel Roof Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 30, with the minimum section properties indicated, and with the following:
 - 1. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 80, G90 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard.

2.04 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, requirements in this Section, and as indicated.
- B. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- C. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- D. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- E. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- F. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

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- G. Mechanical fasteners may be used in lieu of welding to fasten deck except areas indicated in the drawings to be welded. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
- H. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm) and a minimum interior bearing of 3 inches.

END OF SECTION 05 31 00

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SECTION 05 44 00 - PRE-ENGINEERED PRE-FABRICATED COLD-FORMED STEEL TRUSSES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Pre-engineered cold-formed steel trusses.
- B. Cold-formed steel framing accessories.

1.02 RELATED SECTIONS

- A. Division 05, Section "Structural Steel Framing".
- B. Division 05, Section "Metal Roof Panels" for roof system supported by trusses.

1.03 DEFINITIONS

- A. Truss Component Manufacturer: The maker of the components that will be assembled into trusses by the Truss Manufacturer.
- B. Truss Manufacturer: An individual or organization engaged in the manufacturing of trusses.
- C. Truss Design Drawing: Written, graphic and pictorial depiction of an individual truss.
- D. Truss Design Engineer: Person who is licensed to practice engineering as defined by the legal requirements of the jurisdiction in which the building is to be constructed and who supervises the preparation of the truss design drawings.
- E. Truss Placement Diagram: Illustration identifying the location of each Truss.

1.04 REFERENCES

- A. ANSI/AISI/COS/S100-07/S2-10: North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2007 edition including the 2010 Supplement.
- B. ANSI/AISI/COFS/S200-07: North American Standard for Cold-Formed Steel Framing - General Provisions; 2007.
- C. ANSI/AISI/COFS/S214-07/S2-08: North American Standard for Cold-Formed Steel Framing - Truss Design; 2007 edition including the 2008 Supplement.
- D. AISI/COFS - Practice Guide - CF06-1: Code of Standard Practice for Cold-Formed Steel Structural Framing; 2006.
- E. ASTM A 653-09 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2009.
- F. CFSBCSI - Cold-Formed Steel Building Components Safety Information; Cold-Formed Steel Council (CFSC); 2008 edition with CFSB3 summary sheet insert.
- G. CFSEI Technical Note 551d - Design Guide for Construction Bracing of Cold-Formed Steel Trusses; Cold-Formed Steel Engineers Institute; February 1997.
- H. CFSEI Technical Note 551e - Design Guide for Permanent Bracing of Cold-Formed Steel Trusses; Cold-Formed Steel Engineers Institute; February 1998.

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1.05 SUBMITTALS

- A. Submit under provisions of Section 01 30 00.
- B. Product Data: Truss Component Manufacturer's descriptive literature for each item of cold-formed metal framing and each accessory specified in this section.
- C. Truss Design Drawings: Detailed drawings prepared by Truss Manufacturer under the supervision of the Truss Design Engineer that are in accordance with AISI references. These drawings may also include referenced detail drawings germane to the trusses.
- D. Truss Placement Diagram: Diagram that identifies the assumed location of each individually designated truss and references the corresponding Truss Design Drawing.
- E. Installation Instructions: Truss Component Manufacturer's printed instructions for handling, storage, and installation of each item of cold-formed metal framing and each accessory specified in this section.

1.06 QUALITY ASSURANCE

- A. Provide design of trusses by Truss Component Manufacturer, using design methodologies recommended in AISI references.
 - 1. Determine mechanical properties of load bearing components by testing in accordance with ASTM A 370-09.
 - 2. Provide drawings by a design professional registered in the State in which project is to be constructed.
 - 3. Provide Truss Manufacturer's Truss Design Drawings.

1.07 DELIVERY, STORAGE, AND HANDLING OF STEEL TRUSSES

- A. Pack, ship, handle, unload, and lift shop products in accordance with Truss Component Manufacturer's recommendations and in manner necessary to prevent damage or distortion.
- B. Store and protect products in accordance with Truss Component Manufacturer's recommendations and in manner necessary to prevent damage, distortion, and moisture buildup.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Truss Component Manufacturer: TrusSteel Products from TrusSteel, An ITW Company; 3208 Fisher Court, Arlington, TX 76001. Tel: (888) 565-9181.
www.TrusSteel.com or approved equal.
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 63 00.
 - 1. All substitutions must be approved in writing by the Government.
 - 2. All applications for substitution must include comparable technical data.

2.02 COMPONENTS

- A. Pre-Engineered Pre-Fabricated Cold-Formed Steel Trusses: TrusSteel truss components by TrusSteel, An ITW Company, meeting specified requirements.
 - 1. Truss Type, Span, and Height: As indicated on drawings.

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2. Comply with requirements of 2018 IBC code.
 3. Deflection Under All Loads: $L/240$ th of span, maximum.
 4. Deflection Under Live Loads: $L/360$ th of span, maximum.
 5. Shop fabricate in accordance with Truss Design Drawings, using jiggling systems to ensure consistent component placement and alignment of components, and to maintain specified tolerances; field fabrication is strictly prohibited unless performed by authorized Truss Manufacturer using Truss Manufacturer's shop assemblers and proper jiggling systems.
 6. Shop fabrication of other cold-formed steel framing components into assemblies prior to erection is permitted; fabricate assemblies in accordance with shop drawings.
 7. Fasten connections within truss assembly with Truss Component Manufacturer's screws only and as shown on the Truss Design Drawings; welding and other fasteners are prohibited.
 8. Fabricate straight, level, and true, without rack, and to the tolerances specified in ANSI/AISI/COFS/S214-07/S2-08:
- B. Truss Chord and Web Components: TrusSteel components, with rolled or closed edges to minimize the danger of cutting during handling; chord and web components without rolled edges are prohibited.
1. Shapes, Sizes, and Thicknesses: As required to suit design and as indicated on shop drawings.
 2. Chords: Cold-formed from ASTM A 653/A 653M galvanized steel sheet, minimum G60 coating; minimum yield strength of 55,000 psi (380 MPa) for 22, 20, 18 and 16 GA components or 50,000 psi (345 MPa) for 14 GA and 12 GA components; minimum tensile strength of 65,000 psi (448 MPa) for 22, 20, 18, 16, 14, and 12 GA components.
 - a. Nominal 28 mil (22 GA) members:
 - i. Minimum bare metal thickness: 0.0284 inch (0.72 mm).
 - ii. Maximum design thickness: 0.0299 inch (0.76 mm).
 - b. Nominal 33 mil (20 GA) members:
 - i. Minimum bare metal thickness: 0.0329 inch (0.84 mm).
 - ii. Maximum design thickness: 0.0346 inch (0.88 mm).
 - c. Nominal 43 mil (18 GA) members:
 - i. Minimum bare metal thickness: 0.0428 inch (1.09 mm).
 - ii. Maximum design thickness: 0.0451 inch (1.15 mm).
 - d. Nominal 54 mil (16 GA) members:
 - i. Minimum bare metal thickness: 0.0538 inch (1.37 mm).
 - ii. Maximum design thickness: 0.0566 inch (1.44 mm).
 - e. Nominal 68 mil (14 GA) members:
 - i. Minimum bare metal thickness: 0.0677 inch (1.72 mm).

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- ii. Maximum design thickness: 0.0713 inch (1.81 mm).
- f. Nominal 97 mil (12 GA) members:
 - i. Minimum bare metal thickness: 0.0966 inch (2.46 mm).
 - ii. Maximum design thickness: 0.1017 inch (2.58 mm).
- 3. Tube Webs: Cold-formed ASTM A500 steel structural tubing; minimum yield strength of 45,000 psi (310 MPa); minimum tensile strength of 55,000 psi (380 MPa).
 - a. Nominal 33 mil (20 GA) members:
 - i. Minimum bare metal thickness: 0.033 inch (0.84 mm).
 - ii. Maximum design thickness: 0.035 inch (0.89 mm).
 - b. Nominal 47 mil (18 GA) members:
 - i. Minimum bare metal thickness: 0.047 inch (1.19 mm).
 - ii. Maximum design thickness: 0.049 inch (1.24 mm).
 - c. Nominal 63 mil (16 GA) members:
 - i. Minimum bare metal thickness: 0.063 inch (1.6 mm).
 - ii. Maximum design thickness: 0.065 inch (1.65 mm).
- 4. Rolled formed Webs: Cold-formed from ASTM A 653/A 653M galvanized steel sheet, minimum G60 coating; minimum yield strength of 40,000 psi (276 MPa) for 20 and 18 GA components or 50,000 psi (345 MPa) for 16 GA components; minimum tensile strength of 55,000 psi (379 MPa) for 20 and 18 GA components or 65,000 psi (448 MPa) for 16 GA components.
 - a. Nominal 33 mil (20 GA) members:
 - i. Minimum bare metal thickness: 0.0329 inch (0.84 mm).
 - ii. Maximum design thickness: 0.0346 inch (0.88 mm).
 - b. Nominal 43 mil (18 GA) members:
 - i. Minimum bare metal thickness: 0.0428 inch (1.09 mm).
 - ii. Maximum design thickness: 0.0451 inch (1.15 mm).
 - c. Nominal 54 mil (16 GA) members:
 - i. Minimum bare metal thickness: 0.0538 inch (1.37 mm).
 - ii. Maximum design thickness: 0.0566 inch (1.44 mm).
- C. Fasteners Used in Fabricating Trusses: Fasteners as recommended by Truss Component Manufacturer, bearing stamp of Truss Component Manufacturer for ready identification.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that bearing surfaces and substrates are ready to receive steel trusses.
- B. Verify that truss bearing surfaces are within the following tolerances:
 - 1. Variation from Level or Specified Plane: Maximum 1/8 inch in 10 feet (6 mm in 3 m).

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2. Variation from Specified Position: Maximum 1/4 inch (6 mm).
- C. Verify that rough-in utilities and chases that will penetrate plane of trusses are in correct locations and do not interfere with truss, bracing, or bridging placement.
- D. Inspect conditions under which installation is to be performed and submit written notification if such conditions are unacceptable to installer.
 1. Notify Contractor within 24 hours of inspection.
 2. Beginning construction activities of this section before unacceptable conditions have been corrected is prohibited.
 3. Beginning construction activities of this section indicates installer's acceptance of conditions.

3.02 INSTALLATION

- A. Install trusses in accordance with Truss Component Manufacturer's instructions and Truss Manufacturer's Truss Design Drawings and Truss Placement Diagram. Use correct fasteners as previously described.
- B. Place components at spacings indicated on the Truss Design Drawings.
- C. Install all erection (temporary installation) bracing and permanent bracing and bridging before application of any loads; follow recommendations of the CFSBCSI - Cold-Formed Steel Building Components Safety Information.
- D. Install erection bracing - follow recommendations of the CFSBCSI - Cold-Formed Steel Building Components Safety Information.
 1. Provide bracing that holds trusses straight and plumb and in safe condition until decking and permanent truss bracing has been fastened to form a structurally sound framing system.
 2. All sub-contractors shall employ proper construction procedures to ensure adequate distribution of temporary construction loads so that the carrying capacity of any single truss or group of trusses is not exceeded.
- E. Install permanent bracing and bridging in the locations shown on the Truss Manufacturer's Truss Design Drawings.
- F. Removal, cutting, or alteration of any truss chord, web or bracing member in the field is prohibited, unless approved in advance in writing by the Truss Design Engineer.
- G. Repair or replace damaged chords, webs, and complete trusses as directed and approved in writing in advance by the Truss Component Manufacturer.

END OF SECTION

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SECTION 05 51 00 - METAL PAN STAIRS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Preassembled metal pan stairs with concrete treads and platforms.
 - 2. Steel tube railings attached to metal stairs.
 - 3. Steel tube handrails attached to walls adjacent to metal stairs.
- B. Related Sections:
 - 1. Division 03 Section "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.
 - 2. Division 05 Section "Pipe and Tube Railings" for pipe and tube railings attached to metal stairs or to walls adjacent to metal stairs.
 - 3. Division 05 Section "Structural Steel Framing".
 - 4. Division 09 Section "Painting" for field painting of all metal stair components.

1.03 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design metal pan stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
 - 1. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
 - 2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.
 - 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 - 5. Limit deflection of treads, platforms, and framing members to L/240, L/360, or 1/4 inch (6.4 mm), whichever is less.
- C. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:

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- a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
- b. Infill load and other loads need not be assumed to act concurrently.

1.04 SUBMITTALS

- A. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
 - 1. Preassembled Stairs: Commercial class.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.06 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.01 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.02 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A.
- B. Steel Tubing: ASTM A 500 (cold formed).
- C. Uncoated, Cold-Rolled Steel Sheet, (galvanized): ASTM A 1008/A, either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.
- D. Uncoated, Hot-Rolled Steel Sheet (galvanized): ASTM A 1011/A 1011M, either commercial steel, Type B, or structural steel, Grade 30, unless another grade is required by design loads.

2.03 ABRASIVE NOSINGS

- A. Extruded Units: Aluminum units with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.

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

- a. American Safety Tread Co., Inc.
- b. Amstep Products.
- c. Armstrong Products, Inc.
- d. Wooster Products Inc.
- e. Or approved equal.

B. Provide ribbed units, with abrasive filler strips projecting **1/16 inch (1.5 mm)** above aluminum extrusion.

- 1. Nosings: 3 inch wide for sloped pan riser with lip and integral anchor.
- 2. Rib color: Brown

C. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

2.04 FASTENERS

A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

- 1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for stairs indicated to be shop primed with zinc-rich primer.

D. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).

E. Lag Screws: ASME B18.2.1 (ASME B18.2.3.8M).

F. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).

G. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).

H. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

- 1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy (Group 1) stainless-steel bolts, **ASTM F 593**, and nuts, **ASTM F 594**.

2.05 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Primers: Provide field primers that comply with Division 09 Section "Painting".

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- C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- D. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of **3000 psi** unless otherwise indicated.

2.06 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
 - 3. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.
- B. Preassembled Stairs: Shop fabricate and assemble stairs to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Weld exposed corners and seams continuously unless otherwise indicated.
 - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.
- H. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.07 STEEL-FRAMED STAIRS

- A. Stair Framing:
 - 1. Fabricate stringers of steel tube shapes as indicated on the drawings.
 - a. Provide closures for exposed ends of tube stringers.

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2. Construct platforms of steel tube headers, tube steel framing, steel decking and miscellaneous steel members as indicate on the drawings.
 3. Weld stringers to headers; weld framing members to stringers and headers.
- B. Metal Pan Stairs: Form risers and subread pans to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 inch (1.7 mm).
1. Steel Sheet: cold rolled steel sheet (galvanized) unless otherwise indicated.
 2. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
 3. Shape metal pans to include nosing integral with sloped riser as indicated on Drawings.
 4. Provide subplatforms of configuration indicated. Weld subplatforms to platform framing.

2.08 STAIR RAILINGS

- A. Comply with applicable requirements in Division 05 Section "Pipe and Tube Railings".

2.09 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal stairs after assembly. Grind all welds smooth and prepare for paint.
- C. All steel stairs to be hot dipped galvanized and field primed and painted per Division 09 Painting.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- B. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
- E. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
- F. Place and finish concrete fill for treads and platforms to comply with Division 03 Section "Cast-in-Place Concrete."
1. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.

3.02 INSTALLING METAL STAIRS WITH GROUTED BASE PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of base plates.

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- B. Set steel stair base plates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 - 1. Use nonmetallic, nonshrink grout unless otherwise indicated.
 - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.03 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas.
- B. END OF SECTION 05 51 00

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SECTION 05 52 13 – PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Steel pipe railings.
- B. Related Sections
 - 1. Division 09 Section “Painting” for painting steel pipe railings.

1.02 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.03 SUBMITTALS

- A. Product Data: For the following:
 - 1. Grout and anchoring cement
 - 2. Railing brackets
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.05 PROJECT CONDITIONS

- A. Field Measurements: Where railings are indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

PART 2 - PRODUCTS

2.01 METALS, GENERAL

- A. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

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2.02 STEEL

- A. Pipe: ASTM A 53/A 53M, (Hot-Dip Galvanized) Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
- B. Plates, Shapes, and Bars: ASTM A 36/A 36M (Hot-Dip Galvanized).

2.03 MISCELLANEOUS MATERIALS

- A. Fasteners: Provide the following:
 - 1. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.
- B. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete.
- C. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- D. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
- E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.04 FABRICATION

- A. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately **1/32 inch (1 mm)** unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- B. Form work true to line and level with accurate angles and surfaces.
- C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- D. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
- E. Form changes in direction by inserting prefabricated elbow fittings.
- F. Close exposed ends of railing members with prefabricated end fittings.
- G. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.
- H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

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2.05 STEEL FINISHES

- A. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
- B. Primer Application: Apply shop primer to prepared galvanized surfaces of railings.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of **1/16 inch in 3 feet (2 mm in 1 m)**.
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed **1/4 inch in 12 feet (5 mm in 3 m)**.
- B. Anchor posts in concrete by inserting into formed or cove-drilled holes and grouting annular space. Provide round metal escutcheon at connection.

3.02 ADJUSTING AND CLEANING

- A. Shop Primed Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair shop primer as required.
- B. Paint as specified in Division 09 "Painting."

END OF SECTION 05 52 13

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 06 – WOOD, PLASTICS AND COMPOSITES

SECTION 06 00 00 – WOOD, PLASTICS AND COMPOSITES

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Wood, Plastics and Composites and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – WOOD, PLASTICS AND COMPOSITES

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SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Framing with dimension lumber.
 - 2. Wood blocking and nailers.
 - 3. Rooftop equipment bases and support curbs.

1.02 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Provide dressed lumber, S4S, unless otherwise indicated.

2.02 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPAC2
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings and the following:
 - 1. Wood nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.

2.03 FIRE-RETARDANT-TREATED MATERIALS.

- A. General: Comply with performance requirements in AWPAC20 (lumber)] and AWPAC27 (plywood).
 - 1. Use Interior Type A, unless otherwise indicated.
 - 2. Concealed blocking.

2.04 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.

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- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content of any species.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
 - 1. Mixed southern pine, No. 2 grade; SPIB.

2.05 FASTENERS

- A. Power-Driven Fasteners: NES NER-272.
- B. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

2.06 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Self-adhesive, rubberized-asphalt compound, bonded to a high-density, polyethylene film to produce an overall thickness of not less than **0.025 inch** where indicated in the Drawings

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate blocking to comply with requirements for attaching other construction.
- B. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

END OF SECTION 06 10 53

CLASSIFICATION: **UNCLASSIFIED**

SECTION 06 16 00 - SHEATHING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Exterior roof and wall sheathing.
 - 2. Weather resistant sheathing paper over all wall sheathing.

1.03 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.04 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Stack sheathing and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.01 EXTERIOR ROOF AND WALL SHEATHING

- A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177.
- B. 1/2" inch thick.
- C. Equal to Securock Brand Ultralight Glass-Mat Sheathing by United States Gypsum Company

2.02 FASTENERS

- A. General: Provide fasteners of size and type indicated.
 - 1. For wall and roof sheathing panels, provide fasteners with corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

2.03 WEATHER-RESISTANT SHEATHING PAPER (EXTERIOR WALLS)

- A. Building Wrap: ASTM E 1677, Type I air retarder; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. DuPont (E. I. Du Pont de Nemours and Company); Tyvek CommercialWrap.

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b. Or approved equal.

3. Water-Vapor Permeance: Not less than 163 g through 1 sq. m of surface in 24 hours per ASTM E 96, Desiccant Method (Procedure A).

B. Building-Wrap Tape: Tape recommended by building-wrap manufacturer.

2.04 WATERPROOFING UNDERLAYMENT FOR ROOF SHEATHING

A. Refer to Division 07 "Self-Adhering Sheet Waterproofing" for weather resistant barriers for roof sheathing.

2.05 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Self-adhesive, rubberized-asphalt compound, bonded to a high-density, polyethylene film to produce an overall thickness of not less than 0.025 inch (0.6 mm).

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."

B. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that exclude exterior moisture.

C. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.02 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to cold-formed metal framing with screws.

2. Install boards with a 3/8" inch gap where non-load-bearing construction abuts structural elements.

3.03 WEATHER-RESISTANT SHEATHING-PAPER INSTALLATION (EXTERIOR WALLS)

A. General: Cover sheathing with weather-resistant sheathing paper as follows:

1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.

2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap, unless otherwise indicated.

B. Building Wrap: Comply with manufacturer's written instructions.

1. Seal seams, edges, fasteners, and penetrations with tape.

2. Extend into jambs of openings and seal corners with tape.

3.04 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.

1. Lap seams and junctures with other materials at least 4 inches (100 mm), except that at flashing flanges of other construction, laps need not exceed flange width.

2. Lap flashing over weather-resistant building paper at bottom and sides of openings.

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3. Lap weather-resistant building paper over flashing at heads of openings.
4. After flashing has been applied, roll surfaces with a hard rubber or metal roller.

3.05 PROTECTION

- A. Paper-Surfaced Gypsum Sheathing: Protect sheathing by covering exposed exterior surface of sheathing with weather resistant sheathing paper securely fastened to framing. Apply covering immediately after sheathing is installed.

END OF SECTION 06 16 00

CLASSIFICATION: **UNCLASSIFIED**

SECTION 06 40 23 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Wood cabinets.
 - 2. Cabinet hardware
 - 3. Solid-surfacing-material countertops and windowsills.
 - 4. Shelving and clothes rods
- B. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips unless concealed within other construction before woodwork installation.

1.02 SUBMITTALS

- A. Product Data: For solid-surface materials, cabinet hardware and accessories, and finish materials and processes.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- C. Samples for Verification:
 - 1. Lumber and panel products for transparent finish, for each species and cut, finished on one side and one edge.
 - 2. Solid-surfacing materials.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of woodwork.
- B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork

1.04 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Wood Species and Cut for Transparent Finish: White Birch, plain sliced, Premium; Graded in accordance with Architectural Woodwork Institute (AWI) Quality Standards.
- B. Wood Species for Opaque Finish: Any closed grain hardwood, Premium or 2 Common
- C. Wood Products:
 - 1. Softwood Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by ALSC's Board of Review.
 - 2. Hardwood Lumber: Premium; Graded in accordance with Architectural Woodwork Institute (AWI) Quality Standards

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3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.
- D. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Corian Solid Surfaces, Dupont USA.
 - b. Durasein
 - c. Wilsonart International; Div. of Premark International, Inc.
 - d. Meganite Acrylic Solid Surface, Div. of Maxstone International, LLC
 - e. Or approved equal.

2.02 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural woodwork, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."
- B. Hinges, Concealed (European Type): BHMA A156.9, B01602, self-closing.
 1. Equal to Blum® CLIP Top BLUMotion Hinges.
 - a. Two (2) per door minimum.
- C. Drawer & Door Pulls:
 1. Equal to "U" shaped wire pull, 4 inch Center to Center, steel with satin finish.
- D. Catches: Magnetic catches, BHMA A156.9, B03141.
 1. Equal to Ives #325
- E. Drawer Slides: BHMA A156.9, B05091. Medium duty, steel ball bearing with telescoping slides & lever release.
 1. Equal to Knappe & Vogt 4500 Ball-Bearing Drawer Slide.
- F. Adjustable Shelf Standard Supports:
 1. Equal to standard side-mounted system using recessed metal shelf standards and coordinated shelf rests. Satin chrome finish for nominal 1 inch spacing adjustments.

2.03 CLOSET SHELF AND ROD HARDWARE

- A. General: Provide closet hardware associated with wood shelving.
- B. Exposed Closet Shelving:
 1. Veneer plywood with solid wood edge, paint grade.
 2. Wood board as specified above, paint grade.
- C. Shelf Bracket:
 1. Equal to Knappe & Voygt 1196 Series Heavy-Duty Rod & Shelf Brackets. 12-inch bracket, 14 GA, up to 500lbs./ pair. Chrome finish.

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- a. Minimum per closet shelf: as per manufacturer's recommendation at 16-inches o.c. Provide blocking for brackets.

D. Closet Rod Flanges:

- 1. Equal to Knap & Vogt Commercial Closet Rod Flanges, Chrome. Two per rod minimum.

E. Closet Rod:

- 1. Equal to Knap & Vogt 660 Series Heavy-Duty Round Closet Rod, Stainless Steel.

2.04 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 19 percent moisture content.

- B. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

2.05 FABRICATION, GENERAL

- A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

- 1. Interior Woodwork Grade: Custom.

2.06 Wood Cabinets for Transparent Finish:

- 1. AWI Type of Cabinet Construction: Flush overlay frameless construction.
- 2. Grain Direction: Vertically for drawer fronts, doors, and fixed panels.
- 3. Veneer Matching within Panel Face: book match
- 4. Semiexposed Surfaces:
 - a. Surfaces Other Than Drawer Bodies (shelves):
 - i. Compatible species and cut indicated for exposed surfaces.
 - ii. Fabricator's standard.
 - iii. or approved equal.
 - b. Drawer Sides and Backs: Solid-hardwood lumber, same species indicated for exposed surfaces.
 - c. Drawer Bottoms: Hardwood plywood.

- 5. Concealed Surfaces: Manufacturer's option.

B. Solid-Surfacing-Material Countertops:

- 1. Solid-Surfacing-Material Thickness: **1/2 inch thickness**.
- 2. Colors, Patterns, and Finishes: selected from manufacturer's full range.
- 3. Fabricate tops in one piece with loose backsplashes for field application. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

2.07 SHOP FINISHING

- A. Finish architectural woodwork at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.

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B. Transparent Finish:

1. Grade: Custom.
2. AWI Finish System: Acrylic lacquer.
3. Staining: To be selected from complete range.
4. Wash Coat for Stained Finish: Apply a wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
5. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Examine shop-fabricated work for completion and complete work as required, including removal of packing.
- B. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- C. Install woodwork level, plumb, true, and straight to a tolerance of **1/8 inch in 96 inches**. Shim as required with concealed shims.
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk, and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Use stainless steel screws for exposed fastening of access panels.
- G. Cabinets: Install without distortion so access panels fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.
 1. Fasten wall cabinets through back, near top and bottom, at ends and not more than **16 inches** o.c. with toggle bolts through metal backing or metal framing behind wall finish.
- H. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Caulk space between backsplash and wall with color match sealant recommended by solid surface manufacturer.
- I. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 40 23

CLASSIFICATION: **UNCLASSIFIED**

SECTION 06 64 00 - PLASTIC PANELING

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes glass-fiber reinforced plastic (FRP) wall paneling and trim accessories.
- B. Related Sections:
 - 1. Division 09 Section "Gypsum Board" for substrates panels adhere to.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For plastic paneling and trim accessories.

1.03 QUALITY ASSURANCE

- A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.
 - 3. Surface Burn Test: Class A

1.04 DELIVERY, STORAGE, & HANDLING

- A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
 - 1. Store panels indoors.
 - 2. Lay panels flat. Do not stand panels on edge.
 - 3. Protect panels from moisture.
 - 4. Do not store panels in contact with the floor or against an outside wall.
 - 5. Do not remove protective film from panel surface until after installation (if applicable).
 - 6. Maintain optimum storage conditions of 60-75 degrees F at 35 - 55% relative humidity. Avoid extremes in temperature and humidity.

PART 2 - PRODUCTS

2.01 PLASTIC SHEET PANELING

- A. General: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
 - 2. Basis-of-Design Product: Subject to compliance with requirements, Nudo Products Fiberlite FRP or comparable product by one of the following:

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- a. Kemlite Company Inc.
 - b. Nudo Products, Inc.
 - c. Or approved equal.
- 3. Nominal Thickness: Not less than 0.09 inch.
- 4. Surface Finish: Molded pebble texture.
- 5. Color: As selected by Government from manufacturer's full range.

2.02 ACCESSORIES

- A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
 - 1. Color: Match panel color.
- B. Adhesive: As recommended by plastic paneling manufacturer.
- C. Sealant: sealant recommended by plastic paneling manufacturer and complying with requirements in Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.01 PREPARATION

- A. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations, 48 hours minimum.
- B. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust. Painted walls must be prepared to adhesive manufacturer specifications for proper adhesion.
- C. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels.

3.02 INSTALLATION

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive.
- C. Install trim accessories with adhesive.
- D. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.
- E. Maintain uniform space between panels and wall fixtures. Fill space with sealant. Immediately remove all adhesive residue as paneling is installed. To remove, clean with nonabrasive cotton cloth and warm water. If necessary, use a mild nonabrasive detergent. For cleanup with solvent based adhesives, use mineral spirits or acetone to remove residue.
- F. Clean panel surfaces in compliance with manufacturer's recommendations.

3.03 PROTECTION

- A. A. Protect installed work from damage due to subsequent construction activity on the site.

END OF SECTION 06 64 00

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

SECTION 07 00 00 – THERMAL AND MOISTURE PROTECTION

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Thermal and Moisture Protection and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – THERMAL AND MOISTURE PROTECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes fiberglass reinforced, self-adhering SBS modified asphalt sheet membrane with a polymer surface film and a treated release film on the adhesive side.
- B. Related sections:
 - 1. Division 06 Section "Sheathing."
 - 2. Division 07 Section "Joint Sealants."
 - 3. Division 07 Section "Sheet Metal Flashing and Trim."
 - 4. Division 07 Section "Metal Roof Panels."

1.02 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

1.03 QUALITY ASSURANCE

- A. Provide all primary membrane products, including sheet waterproofing membrane, primers and mastics offered by a single manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver product and other materials to site in manufacturer's unopened labeled packaging. Promptly verify quantities and conditions. Immediately remove damaged products from site.
- B. Store all products in manufacturer's unopened, labeled packaging until they are ready for installation.
- C. Store rolls on a flat surface. Maximum stacking height shall not exceed Manufacturer's recommendations. Store all rolls on end and do not double stack pallets.
- D. Store products in weather protected environment out of direct sunlight, below 90 F, above 40 F clear of ground and moisture. All waterproof tarps shall be opaque.

1.05 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
- B. Membrane must not be left exposed to sunlight for more than 30 days after installation.

1.06 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace waterproofing material that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

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PART 2 - PRODUCTS

2.01 MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Modified Bituminous Sheet: Not less than **40-mil-** thick, self-adhering sheet consisting of fiberglass reinforced, modified asphalt sheet membrane on polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Tamko Roofing Products, Inc.; TW Metal and Tile Underlayment.
 - b. Or approved equal.
 - 2. Physical Properties:
 - a. Thickness: 40 mil.
 - b. Low-Temperature Flexibility: Pass at **minus 20 deg F**; ASTM D 1970.
 - c. Vapor Permeance: **0.1 perms**; ASTM E 96, Water Method.
 - d. Maximum Load: 25lbf/in min.; ASTM D1970.

2.02 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
- B. Primer: Liquid, water-based primer recommended for substrate by manufacturer of sheet waterproofing material.
- C. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
- E. Treatment at expansion joints, isolation joints, and other discontinuous joints varies. Verify recommendations of sheet waterproofing manufacturers.
- F. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.02 APPLICATION

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and according to recommendations in ASTM D 6135.

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- B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform **2-1/2-inch** minimum lap widths and 5-inch minimum end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
- D. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic.
- E. Delete first paragraph below if not terminating into other waterproofing.
- F. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.
- G. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending **6 inches** beyond repaired areas in all directions.
- H. Install protection course with butted joints over waterproofing membrane immediately.
- I. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

3.03 PROTECTION AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 13 26

CLASSIFICATION: **UNCLASSIFIED**

SECTION 07 21 00 – MINERAL WOOL INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Mineral wool insulation blankets for attic floor.
- B. Related Sections include the following:
 - 1. Division 07 Section "Penetration Firestopping" for penetrations in fire rated assemblies.
 - 2. Division 09 Section "Acoustic Blanket Insulation" for sound attenuation batt insulation at sound rated partitions.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Combustion Characteristics: ASTM E 136.

1.05 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.01 UNFACED MINERAL WOOL FIBER BLANKET INSULATION

- A. Manufacturers:
 - 1. Owens Corning, Thermafiber Division.
 - 2. Rockwool Group.
 - 3. Or approved equal.
- B. Basis of Design: Owens Corning Thermafiber Fire & Sound Guard Plus Mineral Wool Insulation
 - 1. Corrosivity: Non-corrosive, ASTM C 665, Type I (blankets without membrane facing).

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2. Non-Combustible, ASTM E136
3. Surface Burning Characteristics: Tested in accordance with ASTM E84. Unfaced, Flame Spread 0 and Smoke Developed 0.
4. Thickness: 12 inch minimum.

2.02 AUXILIARY INSULATING MATERIALS

- A. Mechanical fasteners in accordance with insulation manufacturer's written recommendations.
- B. Firestopping sealant: As specified in "Penetration Firestopping" or insulation manufacturer's recommended firestopping sealant.
- C. Additional metal framing as required to secure insulation.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrates of substances harmful to insulation, including removing projection interfering with insulation attachment.

3.03 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- C. Install insulation to maintain continuity of thermal protection to building elements and spaces.
- D. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.04 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method recommended by the manufacturer. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

3.05 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

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END OF SECTION 07 21 00

CLASSIFICATION: **UNCLASSIFIED**

MINERAL WOOL INSULATION

07 21 00 - 149

SECTION 07 21 29 - SPRAYED INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Contractual Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes: Closed-cell, spray applied, polyurethane spray foam insulation.
- B. Coordinate mechanical ventilation and fresh air supply with Mechanical sections and ASHRAE Guidelines for optimum indoor air quality.

1.03 REFERENCES

- A. American Society for Testing and Materials International (ASTM)
 - 1. ASTM C 518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
 - 2. ASTM E 84: Test Method for Surface Burning Characteristics of Building Materials
 - 3. ASTM E 96: Standard Test Methods for Water Vapor Transmission of Materials

1.04 SUBMITTALS

- A. Product Data for each type of insulation product specified.
- B. Product test reports performed by a qualified third-party testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water-vapor transmission, and other properties, based on comprehensive testing of current products.
- C. Installer's certificate showing the Icynene installation certification.

1.05 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Product to be produced in an ISO 9001 registered factory.
- B. Single Source Responsibility: Single source product from one manufacturer.
- C. Installer Qualifications: Engage an Icynene Licensed installer who has been trained and certified by Icynene.
- D. Fire-Test-Response Characteristics: Provide materials specified as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturers written instructions for handling and protection prior to and during installation.
- B. Store materials in a temperature-controlled area between 70 and 80 degrees F. Do not allow product to freeze.

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- C. Use only those components that are supplied or approved by the Manufacturer.

1.07 PROJECT CONDITIONS

- A. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
- B. Ambient and Substrate Temperatures: As recommended by Manufacturer.
- C. Moisture: Do not apply polyurethane foam insulation when moisture in form of rain, snow, ice, fog, frost, or dew is expected during application.
- D. Relative Humidity: Do not apply polyurethane foam insulation when relative humidity over 85 percent is expected during application.
- E. Wind: Do not apply polyurethane foam insulation with wind speed above 12 mph (19 kmh).
- F. Do not apply polyurethane foam insulation under ambient conditions outside manufacturer's limits.

1.08 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's standard limited warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 - 1. SealTite Pro Closed Cell, by Carlisle Spray Foam Insulation
 - 2. Or approved equal.

2.02 MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
- B. SealTite Pro Closed Cell Spray Foam Insulation: Closed-cell, spray applied polyurethane foam insulation, conforming to the following:
 - 1. Thermal Resistance: ASTM C-518.
 - a. Thickness, 1 inch: R-Value 6.9
 - b. Thickness, 3 inch: R-Value 21
 - 2. Air Permeance: ASTM E-2178.
 - a. < 0.02 L/S m² for 1 inch of material.
 - 3. Water Vapor Transmission: ASTM E-96
 - a. Thickness, 1 inch: 0.8 perms
 - b. Thickness, 3.5 inch: 0.23 perms
 - 4. Surface burning Characteristics: ASTM E 84
 - a. Flame Spread: Class I < 25
 - b. Smoke Development: Class I < 450

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- C. Description: Two-component, HFO blown, Closed-Cell Spray Polyurethane Foam: ASTM C1029, Type II

2.03 ACCESSORIES (THERMAL BARRIER)

- A. Class II Water Vapor Retarder Coating: SealTite PRO VRC-2 as manufactured by Carlisle Spray Foam Insulation
- B. In accordance with the current International Building Code (IBC), the spray polyurethane foam should be separated from the building interior by a Code prescribed 15-minute thermal barrier or a code approved alternative. The installation of an approved Intumescent coatings is required.
1. Acceptable Intumescent coatings include the following:
 - a. DC315 manufactured by International Fireproof Technology, Inc. (Application Rate: 15 wet mils – 9 dry mils).
 - b. Fireshell TB manufactured by TPR2 Corporation. (Application Rate: 20 wet mils – 12 dry mils).
 - c. Plus ThB manufactured by No Burn, Inc. (Application Rate: 14 wet mils – 9 dry mils).

2.04 SOURCE QUALITY CONTROL

- A. Product to be produced in an ISO 9001 registered factory.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.
1. Review placement area to determine final location will not be within 3 inches of any heat source where the temperature will exceed 180 deg F per ASTM C 411 or in accordance with authorities having jurisdiction.

3.02 PREPARATION

- A. Clean substrates and cavities of loose materials capable of interfering with insulation placement.

3.03 APPLICATION

- A. Apply insulation to substrates in compliance with manufacturer's written instructions.
- B. Apply insulation to produce thickness required for indicated R-Value.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated.

3.04 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse.

END OF SECTION 07 21 29

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SECTION 07 22 70 – FALL PROTECTION DEVICES

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes: Fall arrest and restraint anchor system for worker fall protection.
- B. Relation Sections:
 - 1. Section 07 41 13 – Metal Roof Panels.

1.02 REFERENCES

- A. (ASTM) American Society for Testing and Materials.
- B. (ANSI) American National Standard Institute.
 - 1. ANSI Z359.1-2007 – Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components.
- C. (OSHA) Occupational Health and Safety Administration.
 - 1. OSHA 1926.502 – Fall Prevention Systems Criteria and Practices.

1.03 SYSTEM DESCRIPTION

- A. General: Provide fall protection anchoring point capable of withstanding loads as provided under OSHA and ANSI provisions as well as other applicable safety codes. Provide removable standing seam anchor point without penetrating the seams.
- B. Design Requirements: Standing seam anchor point of following types:
 - 1. Standing Seam Roof Anchor for individual worker, capable of withstanding load as allowed by OSHA/ANSI 5,000 lbs. standard with a safety factor of 2.
- C. Performance Requirements: Anchor and components tested for the following loads:
 - 1. Fall Restraint: 1 User.
 - 2. Fall Arrest: 1 User.
 - 3. Design standing seam anchor to resist a 5,000 lbs. load from any direction.

1.04 SUBMITTALS

- A. Product Specifications: Specify fabrication details and installation instructions for each device.
- B. Shop Drawings.
- C. Maintenance Data: Instructions for use and care of devices should be included in the User Manual with each device.
- D. Product Data.

1.05 CONTRACTOR COORDINATION

- A. Contractor to coordinate selection and installation of standing seam roof system to be structurally sound and compatible with Standing Seam Roof Anchor fall protection anchors. Panel selection can be matched with Panel Compatibility Chart.
- B. Qualified Person to make ultimate decision on the structural integrity and compatibility of the standing seam roof anchor and the standing seam roof system. Selected panels must be

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compatibility with standing seam roof anchor and must be capable of withstanding maximum loads as allowed under the OSHA and ANSI standards.

1.06 WARRANTY

- A. Provide lifetime manufacturer's warranty against defects under normal working conditions and proper care.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Provide standing seam anchor fall protection system manufactured by:
 - 1. Fall Protection Distributors, LLC. 7436 Evesborough Lane New Port Richey, FL 34655; 1-863-703-4522.
 - 2. Or Approved Equal.

2.02 MATERIALS

- A. Anchor Body: 6061-T6 Aluminum.
- B. Top Bolts: Type 316 Stainless Steel.
- C. Lock Washers: Type 316 Stainless Steel.
- D. Set Screws: Stainless Steel (Cupped Tip or Nylon Tip May Be Used).
- E. D-Ring: Plated, non-corrosive steel.

2.03 MANUFACTURED ASSEMBLIES

- A. Standing Seam Roof Anchor.

2.04 FABRICATION

- A. Manufacture to precise dimensions and free of defects to assure proper performance and appearance.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Determine that the Standing Seam Roof System is structurally sound and capable of withstanding full loading of the anchor system. Determine proper location of each anchor paying special attention to avoid swing falls.
- B. Install anchors according to the Manufacturer's recommendations and follow all safety guidelines included in the Owner's Manual. The torque of the set screws is of utmost importance. All cupped tip screws are to be torqued to 90 in/lbs. and all nylon tipped set screws are to be torqued to 180 in/lbs.

END OF SECTION 07 22 70

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SECTION 07 41 13 - METAL ROOF PANELS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes the standing seam metal roof panels and accessories.
- B. Concealed fastener Metal Soffit Panels.

1.02 RELATED SECTIONS

- A. Division 05 "Cold-Formed Metal Framing" for cold-formed metal framing supporting metal panels.
- B. Division 05 "Steel Decking" for support between metal framing and sheathing.
- C. Division 06 "Sheathing" for substrate between steel decking and metal panels.
- D. Division 07 "Self-Adhering Sheet Waterproofing" for underlayment for metal roof panels.
- E. Division 07 "Fall Protection Devices" for safety tie-off points to be installed on new roof.
- F. Division 07 "Sheet Metal Flashing and Trim" for drainage and roof accessories.
- G. Division 07 "Joint Sealants" for field-applied joint sealants"

1.03 PERFORMANCE REQUIREMENTS

- A. Performance Requirements: Provide sheet metal roofing which has been manufactured, fabricated and installed to withstand structural and thermal movement, wind loading and weather exposure to maintain manufacturer's performance criteria without defects, damage, failure or infiltration of water.
 - 1. Air infiltration: Maximum 0.06 cfm per lineal foot (0.33 m³/hr per linear meter) of seam at static pressure of 6.24 psf (3.0 kPa) when tested per ASTM E1680.
 - 2. Water penetration:
 - a. No uncontrolled water penetration through the joints at a static pressure of 6.24 psf (3.0 kPa) when tested in accordance with ASTM E1646.
 - 3. 3. Fire rating: Class A
 - 4. 4. Uplift Tests:
 - a. UL 580 Class 90
 - b. ASTM E 1592 (1.5", 2" & 3")
 - 5. 7. Fire Resistance: UL 263

1.04 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.
- C. Samples: For each type of exposed finish required.

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- D. Coordination Drawings: Roof plans, drawn to scale, based on input from installers of the items involved.
- E. Maintenance data.
- F. Warranties: Samples of special warranties.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Fire-Resistance Ratings: Where indicated, provide metal roof panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Combustion Characteristics: ASTM E 136.
- C. Obtain metal panel products from a single manufacturer.

1.06 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Finish Warranty: Manufacturer's standard
- C. Weather Tightness Warranty Period: 20 years from date of Substantial Completion.
- D. Warranty Value Limits: \$14.00/sq. ft.

PART 2 - PRODUCTS

2.01 PANEL MATERIALS

- A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, **Class AZ50 coating designation, Grade 50**; structural quality.
 - 2. Surface: Smooth, flat finish.
 - 3. Exposed Coil-Coated Finish:
 - a. 2-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVF2 resin by weight in color coat.
 - 4. Concealed Finish: Manufacturer's standard white or light-colored acrylic or polyester backer finish.

2.02 STANDING-SEAM METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips inside laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

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1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. McElroy Metal "Medallion-Lok Panel".
 - b. Or approved equal.
3. Profile: Vertical leg standing seam panel with male/female seam to be mechanically interlocked at jobsite with mechanical seamer specifically designed for profile.
4. Material: Aluminum-zinc alloy-coated steel sheet, 22 gauge. nominal thickness.
 - a. Exterior Finish: 2-coat fluoropolymer.
5. Clips: Fixed, UL 90 compliant.
 - a. Material: Metallic coated steel.
6. Panel Size: 1.75 high" by 16" width, or width approved by Government.
7. Panel Surface: Flat pan

2.03 METAL ROOF PANEL ACCESSORIES

- A. General: Provide complete metal roof panel assembly incorporating trim, copings, fasciae, gutters and downspouts, and miscellaneous flashings, in manufacturer's standard profiles. Provide required fasteners, closure strips, splice plates, support plates, thermal spacers, and sealants as indicated in manufacturer's written instructions.
- B. Flashing and Trim: Match material, thickness, and finish of metal panel face sheet.
- C. Panel Clips: ASTM A 653/A 653M, **G90 (Z180)** hot-dip galvanized zinc coating, configured for concealment in panel joints, and identical to clips utilized in tests demonstrating compliance with performance requirements.
- D. Panel Fasteners: Self-tapping screws and other acceptable corrosion-resistant fasteners recommended by roof panel manufacturer. Where exposed fasteners cannot be avoided, supply fasteners with EPDM or neoprene gaskets, with heads matching color of metal panels by means of factory-applied coating.
- E. Joint Sealers: Manufacturer's standard or recommended liquid and preformed sealers and tapes, and as follows:
 1. Factory-Applied Seam Sealant: Manufacturer's standard hot-melt type.
 2. Tape Sealers: Manufacturer's standard non-curing butyl tape, AAMA 809.2.
 3. Concealed Joint Sealant: Non-curing butyl, AAMA 809.2.
- F. Steel Sheet Miscellaneous Framing Components: ASTM C 645, with ASTM A 653/A 653M, **G60 (Z180)** hot-dip galvanized zinc coating.
- G. Roof Accessories: Approved by metal roof panel manufacturer.
- H. Snow Guards: Approved by metal roof panel manufacturer.

2.04 METAL SOFFIT PANELS

- A. General: Provide factory-formed perforated metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching

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through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

- B. Metal Soffit Panels: McElroy Metals, Inc., "Marquee-Lok Soffit Panel", or approved equal.
 - 1. Finish: Match finish and color of metal roof panels.
 - 2. Material: Same material, finish, and color as metal roof panels.
- C. Material: Aluminum-zinc alloy-coated steel sheet, 22-gauge nominal thickness.
 - a. Exterior Finish: 2-coat fluoropolymer.
 - b. Color: Match finish and color of metal roof panels.
- 2. Panel Coverage: 12 inch wide
- 3. Panel Profile: 1 inch deep flat pan
- 4. Panel Venting: Provide vented panels.

2.05 ACCESSORIES

- A. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

2.06 FABRICATION

- A. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.
- D. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.

PART 3 - EXECUTION

3.01 FABRICATION

- A. General: Provide factory fabricated and finished metal panels and accessories meeting performance requirements, indicated profiles, and structural requirements.
- B. Fabricate metal panel joints configured to accept factory-applied sealant providing weathertight seal and preventing metal-to-metal contact and minimizing noise resulting from thermal movement.

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- C. Form panels in continuous lengths for full length of detailed runs, except where otherwise indicated on approved shop drawings.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions, approved shop drawings, and project drawings. Form from materials matching metal panel substrate.

3.02 METAL ROOF PANEL INSTALLATION

- A. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
 - 1. Install clips to supports with self-tapping fasteners.
 - 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 - 3. Allow for required panel clearance at supporting structure for thermal movement.
 - 4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
- B. Metal Soffit Panels: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing. Install as per manufacturer's recommendations.
 - 1. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.
 - 2. Allow for required panel clearance at supporting structure for thermal movement.

3.03 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 - 2. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - 3. Provide elbows at base of downspouts to direct water away from building.

3.04 CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 07 41 13

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SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Manufactured counterflashing.
 2. Formed roof drainage sheet metal fabrications.
 3. Formed steep-slope fascia and ridge flashing.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
- C. Samples: For each exposed product and for each finish specified.
- D. Warranty: Sample of special warranty.

1.03 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.04 WARRANTY

- A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within **10** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, **Class AZ50 coating designation, Grade 40** (Class AZM150 coating designation, Grade 275); structural quality.
 2. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 3. Color: Sheet metal, gutters, and downspouts shall match the color of the metal roofing exactly, unless otherwise noted.

2.02 UNDERLAYMENT MATERIALS

- A. Self-Adhering, high temperature sheet as specified in Section 07 41 13.

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2.03 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape **1/2 inch (13 mm)** wide and **1/8 inch (3 mm)** thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

2.04 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
 - 1. Obtain field measurements for accurate fit before shop fabrication.
 - 2. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- C. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, filled with butyl sealant concealed within joints.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- E. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. **Rivet joints where necessary for strength.**

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2.05 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to match original profile, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum **96-inch- (2400-mm-)** long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.
- B. Downspouts: Fabricate **rectangular** downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
 - 1. Hanger Style: Bracket.
 - 2. Fabricate from the following materials:
 - a. Match the material and color of the roof panels, 22 gauge thickness.
- C. Splash Blocks: Cast-in-place as indicated in the Drawings.
- D. Downspout Boots: Neenah Foundry R-4929 or approved equal. Powdercoat finish to match roof color.

2.06 SHEET METAL FABRICATIONS

- A. Base Flashing: Fabricate from the following materials:
 - 1. Aluminum-Zinc Alloy-Coated Steel: **0.028 inch (0.71 mm)** thick.
- B. Counterflashing **and Flashing Receivers**: Fabricate from the following materials:
 - 1. Aluminum-Zinc Alloy-Coated Steel: **0.022 inch (0.56 mm)** thick.
- C. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Aluminum-Zinc Alloy-Coated Steel: **0.028 inch (0.71 mm)** thick.

2.07 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Fascia, Eave, **Ridge**, Flashing: Fabricate from the following materials:
 - 1. Aluminum-Zinc Alloy-Coated Steel: **0.022 inch (0.56 mm)** thick.

PART 3 - EXECUTION

3.01 UNDERLAYMENT INSTALLATION

- A. Self-adhering, high temperature sheets: Install underlayment as needed between sheet metal to isolate products.

3.02 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement so that completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

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2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 3. Space cleats not more than **12 inches (300 mm)** apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 5. Install sealant tape where indicated.
 6. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of **10 feet (3 m)** with no joints allowed within **24 inches (600 mm)** of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal joints as shown and as required for watertight construction.
- F. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

3.03 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated.
- B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored **gutter brackets** spaced not more than **36 inches (900 mm)** apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
1. Install gutter with expansion joints at locations indicated, but not exceeding, **50 feet (15.24 m)** apart. Install expansion-joint caps.
- C. Downspouts: Join sections with **1-1/2-inch (38-mm)** telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately **60 inches (1500 mm)** o.c. in between.
- D. Splash Blocks: Construct where downspouts discharge on soil or planter surfaces.

3.04 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, **sheet metal manufacturer's written installation instructions**, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where

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possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

- B. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing **4 inches (100 mm)** over base flashing. Lap counterflashing joints a minimum of **4 inches (100 mm)** and bed with sealant.
- C. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric or **butyl** sealant as recommended by roof manufacturer and clamp flashing to pipes that penetrate roof.

3.05 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 07 62 00

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SECTION 07 84 13 – PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Penetrations in fire-resistance-rated walls.
 - 2. Penetrations in smoke barriers.
- B. Contractor Performance. Penetrations in fire rated walls and ceilings, shall be firestopped by the trade creating the penetration (fire protection, mechanical, electrical, and plumbing).

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.
 - 1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
- C. Qualification Data: For qualified Installer.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

1.05 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping per manufacturer's written instructions.

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1.06 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, **provide products by one of the following:**
 - 1. Grace Construction Products.
 - 2. Johns Manville.
 - 3. 3M Fire Protection Products.
 - 4. Tremco, Inc.; Tremco Fire Protection Systems Group.
 - 5. USG Corporation.
 - 6. Or approved equal.

2.02 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of **0.01-inch wg (2.49 Pa)**.
- C. Options in first subparagraph below correspond to the 2006 IBC. Retain types of constructions included in Project and indicate locations on Drawings. Coordinate with the Penetration Firestopping Schedule.
- D. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of **0.01-inch wg (2.49 Pa)**.
- E. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- F. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
- G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
 - 1. Permanent forming/damming/backing materials, including the following:

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- a. Slag-wool-fiber or rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
- 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.

2.03 FILL MATERIALS

- A. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- B. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- C. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- D. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- E. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- F. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- G. Firestop Devices: Factory assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

2.04 MIXING

- A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.02 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.03 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings of one hour. See drawings for wall requiring a two our fire-resistance rating.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

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END OF SECTION 07 84 13

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SECTION 07 92 00 – JOINT SEALANTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Latex joint sealants
 - 4. Acoustical Sealants
- B. Related Sections:
 - 1. Division 08 Section "Hollow Metal Frames"
 - 2. Division 03 Section "Cast In-Place Concrete"
 - 3. Division 09 Section "Gypsum Board" for sealing perimeter joints.

1.03 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.
- D. Qualification Data: For qualified Installer.
- E. Warranties: Sample of special warranties.

1.04 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

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1.05 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.02 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
- a. Tremco Incorporated; Tremsil 200
 - b. Or approved equal.

2.03 URETHANE JOINT SEALANTS (POLYURETHANE)

- A. Use a exterior masonry and door frame perimeters general purposes.
- B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
- 1. Tremco Incorporated; Dymonic 100, Vulkem 116.
 - 2. Or approved equal.

2.04 LATEX JOINT SEALANTS (INTERIOR ONLY)

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
- a. Tremco Incorporated; Tremflex 834.
 - b. Or approved equal.
- B. Apply where needed, including around interior door and window frames.

2.05 ACOUSTICAL SEALANT

- A. Coordinate paragraphs in this article with Joint-Sealant Schedule in Part 3.

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- B. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- C. Products:
 - 1. Sheetrock Brand Acoustical Sealant, USG.
 - 2. Acoustical Sealant, Tremco.
 - 3. Or approved equal.
- D. Apply on both sides of acoustically rated walls.

2.06 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

2.07 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing

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optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.

3. Remove laitance and form-release agents from concrete.
 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.03 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

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3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.04 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.05 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 92 00

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DIVISION 08 – OPENINGS

SECTION 08 00 00 – OPENINGS

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Openings and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – OPENINGS

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SECTION 08 11 13 – HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Standard hollow metal **doors and frames**.

B. Related Sections:

1. Division 07 Section "Joint Sealant" for sealing perimeter of door frames.
2. Division 08 Section "Door Hardware" for door hardware for hollow metal doors
3. Division 08 Section "Flush Wood Doors" for interior wood doors.
4. Division 08 Section "Glazing" for glazing in door assemblies.
5. Division 09 Section "Painting" for field painting hollow metal doors and frames.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

1.03 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure.

C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated. Label each individual glazed lite.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

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

1. Amweld Building Products, LLC.
2. Ceco Door Products; an Assa Abloy Group company.
3. Curries Company; an Assa Abloy Group company.
4. Steelcraft; an Ingersoll-Rand company.
5. Or equal.

2.02 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS, Type B; suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum **G60 or A60** metallic coating.

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- C. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.
 - 1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
- D. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Mineral-Fiber Insulation: ASTM C 665, Type I.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.
- H. Glazing: Division 08 Section "Glazing" in locations as indicated in the Drawings.
- I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat.

2.03 STANDARD HOLLOW METAL DOORS

- A. General: Comply with ANSI/SDI A250.8.
 - 1. Design: Flush Panel, 16 gauge.
 - 2. Core Construction: Manufacturer's standard.
 - a. Fire Door Core: As required to provide fire-protection ratings indicated.
 - b. Provide doors fabricated with thermal-resistance value (R-value) of not less than 6.0 deg F x h x sq. ft./Btu (1.057 K x sq. m/W) when tested according to ASTM C 1363.
 - c. Locations: as indicated in the drawings.
 - 3. Vertical Edges for Single-Acting Doors: Square, welded seamless.
 - 4. Top and Bottom Edges: Closed with flush or inverted end closures or channels of same material as face sheets.
 - 5. Tolerances: SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Comply with ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Level 3 and Physical Performance Level B Extra (Heavy Duty), **Model 2 (Seamless)**.
 - a. Width: 1-3/4 inches.
 - b. 16 gauge thick steel sheet
 - 2. STC Rated Doors: Exterior Doors at dorm rooms are to have an STC rating of 48.
- C. Interior Doors: Face sheets fabricated from cold rolled steel sheet. Comply with ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Level 3 and Physical Performance Level B Extra (Heavy Duty), **Model 2 (Seamless)**.
 - a. Width: 1-3/4 inches.
 - b. 16 gauge thick steel sheet
- D. Hardware Reinforcement: ANSI/SDI A250.6.

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2.04 STANDARD & CUSTOM HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8.
- B. Exterior Frames: Fabricated from metallic-coated steel sheet.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as **full profile welded** unless otherwise indicated.
 - 3. Frames for Level 3 Steel Doors: **16 Gauge** thick steel sheet.
 - 4. Frames for Borrowed Lights: **016 Gauge** thick steel sheet.
- C. Interior Frames: Fabricated from cold rolled steel sheet.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as **full profile welded** unless otherwise indicated.
 - 3. Frames for Level 3 Steel Doors: **16 Gauge** thick steel sheet.
 - 4. Frames for Borrowed Lights: **16 Gauge** thick steel sheet.
 - 5. Frames for Flush Wood Doors: **16 Gauge** thick steel sheet.
- D. Hardware Reinforcement: ANSI/SDI A250.6.

2.05 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than **0.042 inch (1.0 mm)** thick, with corrugated or perforated straps not less than **2 inches (50 mm)** wide by **10 inches (250 mm)** long; or wire anchors not less than **0.177 inch (4.5 mm)** thick
 - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than **0.042 inch (1.0 mm)** thick.
 - 3. Postinstalled Expansion Type for In-Place Concrete Masonry Unit: Minimum **3/8-inch- (9.5-mm-)** diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.06 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum **0.032 inch (0.8 mm)** thick, same material as door face sheet.
- B. Loose Stops for Glazed Lites in Frames: Minimum **0.032 inch (0.8 mm)** thick, same material as frames.

2.07 ACCESSORIES

- A. Mullions: Join to adjacent members by welding.
- B. Grout Guards: Formed from same material as frames, not less than **0.016 inch (0.4 mm)** thick.

2.08 FABRICATION

- A. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
- B. Hollow Metal Doors.

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1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.
- C. Hollow Metal Frames: Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 2. Sidelight Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 6. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than **18 inches** from top and bottom of frame. Space anchors not more than **32 inches** o.c. and as follows:
 - i. Three anchors per jamb from **60 to 90 inches** high.
 - b. Stud-Wall Type: Locate anchors not more than **18 inches** from top and bottom of frame. Space anchors not more than **32 inches** o.c. and as follows:
 - i. Four anchors per jamb from **60 to 90 inches** high.
 - c. Postinstalled Expansion Type: Locate anchors not more than **6 inches** from top and bottom of frame. Space anchors not more than **26 inches** o.c.
 7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
- D. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- E. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
- F. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.

CLASSIFICATION: **UNCLASSIFIED**

2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
3. Provide loose stops and moldings on inside of hollow metal work.
4. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.09 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
1. Shop Primer: ANSI/SDI A250.10.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Hollow Metal Frames: Comply with ANSI/SDI A250.11.
1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.
 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 4. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus **1/16 inch**, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus **1/16 inch**, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus **1/16 inch**, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus **1/16 inch**, measured at jambs at floor.

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- B. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 - 2. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: **1/8 inch** plus or minus **1/16 inch**.
 - b. Between Bottom of Door and Top of Threshold: Maximum **3/8 inch (9.5 mm)**.
 - c. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum **3/4 inch (19 mm)**.
- C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.
 - 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than **9 inches (230 mm)** o.c. and not more than **2 inches (50 mm)** o.c. from each corner.

3.02 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 11 13

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SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Solid-core doors with stain grade faces.
 - 2. Factory fitting flush wood doors to frames and factory machining for hardware.
- B. Related Sections:
 - 1. Division 09 Sections "Painting" for field finishing doors.
 - 2. Division 08 Section "Hollow Metal Doors and Frames" for metal frames.
 - 3. Division 09 Section "Door Hardware" for preparation requirements to accommodate the door hardware prior to installation.

1.03 SUBMITTALS

- A. Product Data: For each type of door indicated. Include details of core and edge construction and trim for openings.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
 - 1. Indicate dimensions and locations of mortises and holes for hardware.
 - 2. Indicate dimensions and locations of cutouts.
 - 3. Indicate doors to be factory finished and finish requirements.
- C. Warranty: Sample of special warranty.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors from single manufacturer.
- B. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at **positive pressure** according to **NFPA 252**.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in cardboard cartons and wrap bundles of doors in plastic sheeting.
- C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

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1.07 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than **1/4 inch** in a **42-by-84-inch** section.
 - b. Telegraphing of core construction in face veneers exceeding **0.01 inch in a 3-inch** span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Interior Doors: Ten (10) years

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Algoma Hardwoods, Inc.
 - 2. Mohawk Flush Doors, Inc.; a Masonite company.
 - 3. VT Industries Inc.
 - 4. Or approved equal.

2.02 DOOR CONSTRUCTION, GENERAL

- A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
- B. WDMA I.S.1-A Performance Grade: Heavy Duty.
- C. Particleboard-Core Doors (Non-Rated Doors):
 - 1. Particleboard: ANSI A208.1, made with binder containing no urea-formaldehyde resin.
 - 2. Blocking: Provide wood blocking in particleboard-core doors as follows:
 - a. **5-inch** top-rail blocking, in doors indicated to have closers.
 - b. **5-inch** bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
 - 3. Provide doors with either glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.
- D. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 - 1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.

2.03 VENEERED-FACED DOORS FOR TRANSLUCENT FINISH

- A. Interior Solid-Core Doors:
 - 1. Grade: Custom (Grade A faces).
 - 2. Species: Select white Birch.

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3. Cut: Plain sliced
4. Match between Veneer Leaves: Book
5. Option for rift cut in first subparagraph below applies only to oak.
6. Exposed Vertical and Top Edges: Same species as faces or a compatible species.
7. Core: Particle board or Mineral fiber as rating is indicated in the drawings.
8. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press.
9. WDMA I.S.1-A Performance Grade: Heavy Duty.

2.04 LIGHT FRAMES

- A. Metal Frames for Light Openings in Doors: Manufacturer's standard frame formed of **0.048-inch- (1.2-mm-)** thick, cold-rolled steel sheet; **factory primed for paint finish**; and approved for use in doors of fire-protection rating indicated.

2.05 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- C. Openings: Cut and trim openings through doors in factory.
 1. Light Openings: Trim openings with moldings of material and profile indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
- C. doors is preferred to job fitting because of limitations on trimming narrower stiles and rails.
- D. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 1. Clearances: Provide **1/8 inch** at heads, jambs, and between pairs of doors. Provide **1/8 inch** from bottom of door to top of decorative floor finish or covering unless otherwise indicated.

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Where threshold is shown or scheduled, provide **1/4 inch** from bottom of door to top of threshold unless otherwise indicated.

2. Bevel non-fire-rated doors **1/8 inch in 2 inches** at lock and hinge edges.

E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

3.03 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

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SECTION 08 51 13 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes Single Hung Aluminum Windows including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of window units.
- B. Related Sections:
 - 1. Division 07 Section "Joint Sealants"

1.03 PERFORMANCE REQUIREMENTS

- A. General Performance: Aluminum-framed window system shall withstand the effects of the following performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Window Performance Requirements:
 - 1. Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS)
 - a. Performance Class and Grade: AW-PG70 - 60" x 99" (1524 x 2515 mm) -H.
 - 2. Air Leakage: The test specimen shall be tested in accordance with ASTM E 283. The air leakage rate shall not exceed 0.30 cfm/ft² (1.5 L/s·m²) at a static air pressure differential of 6.2 psf (300 Pa).
 - 2. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331 and ASTM E 547. There shall be no leakage as defined in the test method at a static air pressure differential of 10 psf (479 Pa).
 - 3. Uniform Load Deflection: A minimum static air pressure difference of 70 psf (3352 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member.
 - 4. Uniform Load Structural Test: A minimum static air pressure difference of 105 psf (5027 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330. The unit shall be evaluated after each load.
 - 5. Component Testing: Window components shall be tested in accordance with procedures described in AAMA/WDMA/CSA 101/I.S.2/A440 (NAFS).
 - 6. Blast Mitigation Performance: Shall be tested or proven through analysis to meet ASTM F1642, GSA-TS01, and UFC 04-010.01 performance criteria.
 - 7. Thermal Barrier Tests: Testing shall be in general accordance with AAMA 505 Dry Shrinkage and Composite Thermal Cycling test procedure, AAMA TIR-A8, Structural Performance of Composite Thermal Barrier systems.
 - 8. Sound:
 - a. Testing per AAMA 1801; With 1" (25.4 mm) insulating glass made with (1/4" [6.35 mm] exterior with 1/2" [12.7 mm] air space, 1/4" laminated interior): minimum (34 STC) and (29 OITC).

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1.04 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances and installation details.
- C. Samples for Verification: For aluminum windows and components required.
- D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: An installer which has had successful experiences with installation of the same or similar units required for this project and other projects of similar size and scope.
- B. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements." Do not modify size and dimensional requirements.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.07 WARRANTY

- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty.
 - 1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by manufacturer.
- B. Insulating Glass: Warranted to be free from defects (excluding breakage) for a period of five (5) years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide a comparable product by the following:
 - 1. Kawneer Company Inc.
 - a. Series 8400TL Thermal Windows
 - b. Model 06B9100 Twin Single Hung Window
 - c. 3 1/4" (101.6 mm) frame depth
 - 2. Or approved equal.

2.02 MATERIALS

- A. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" (1.78 mm) wall thickness at any location for the main frame and sash members.
- B. Thermal Barrier:

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1. Thermal Barrier: The thermal barrier shall be Kawneer IsoLock™ with a nominal 1/4" (6.35 mm) separation consisting of a two-part, chemically curing high density polyurethane which is mechanically and adhesively bonded to the aluminum.
- C. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.
- D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- E. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- F. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

2.03 WINDOW SYSTEM

- A. Series 8400TL Thermal Windows – Twin single hung, 06B9100

2.04 GLAZING

- A. Glass and Glazing Materials: Refer to Division 08 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.
- B. Glazing System: Glazing method shall be a wet/dry type in accordance with manufacturer's standards. Exterior glazing shall be silicone back bedding sealant. Interior glazing shall be snap-in type glazing beads with an interior gasket in accordance with AAMA 702 or ASTM C864.

2.05 HARDWARE

- A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum; designed to smoothly operate, tightly close, and securely lock aluminum windows, and sized to accommodate sash weight and dimensions.
- B. Single Hung Window Typical Hardware:
 1. Sash Balances: A Class 1 or Optional Class 5; spring balance with stainless steel or other corrosion-resistant components.
 2. Handle: Continuous, integral, bottom sash lift handle.
 3. Sash Lock: Zinc die cast cam-action sweep lock and keeper on meeting rails. One or two per sash as required by size. Powder coating finish.
 4. Optional Lower Sash Lock: Spring-loaded, snap-type lock on bottom rail of lower sash.
 5. Limit Device: Sash stop limit device; for bottom sash located at jamb; two per sash.
- C. Optional Exterior Panning and Interior Trims: Extruded aluminum, 6063-T6 alloy and temper, extruded to profiles and details indicated. Seal exterior joints with manufacturer's standard sealant to assure water-tight joints.
 1. Exterior Panning and Trims: All panning profiles shall be a minimum thickness of 0.062" (1.57 mm) to match the profiles as shown the drawings. Any profile variations shall be submitted to the architect and/or owner for approval 10 days prior to bid date. All panning shall be factory fabricated for field assembly. All corner joinery shall be factory cut. Joinery at the sill shall be

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coped and butt-type construction. All preparations for assembly shall be completed by the window manufacturer. Upon assembly, panning frame joints shall be back-sealed to prevent moisture penetration.

2. Interior Trims: The interior face trim minimum wall thickness shall be 0.062" (1.57 mm). The face trim shall snap-fit onto concealed mounting clip. Exposed fasteners shall not be accepted. The mounting clip shall be extruded aluminum of 6063-T6 alloy and temper. The minimum wall thickness shall be 0.062" (1.57 mm). The trim clips shall be provided in 4" (101.6 mm) lengths and spaced a maximum of 18" (457.2 mm) center to center.

2.06 ACCESSORIES

- A. Insect Screens: Extruded aluminum frames, 6063-T6 alloy and temper, joined at corners: 18 x 16 mesh aluminum screen cloth; frames finished to match aluminum windows; splines shall be extruded vinyl, removable to permit rescreening.

2.07 FABRICATION

- A. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fit joints; make joints flush, hairline and weatherproof.
 - 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 6. Provisions for field replacement of glazing.
 - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- B. Window Frame Joinery: Screw-spline, factory sealed frame and vent corner joints
- C. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- D. Fabricate aluminum windows that are re-glazable without dismantling sash or framing.
- E. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.
- F. Sub frames: Provide sub frames with anchors for window units as shown, of profile and dimensions indicated but not less than 0.093-inch (2.4-mm) thick extruded aluminum. Miter or cope corners, and join with concealed mechanical joint fasteners. Finish to match window units. Provide sub frames capable of withstanding design loads of window units.
- G. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA/CSA 101/I.S.2/A440-08 (NAFS).
- H. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match frame.

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2.08 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Factory Finishing:
 - 1. Kawneer Permanodic™ AA-M10C21A44 / AA-M45C22A44, AAMA 611, Architectural Class I Color Anodic Coating, Color: #40 Dark Bronze.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather tight window installation.
 - 1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
 - 2. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches (76.2 mm) of opening.
 - 3. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
- B. Install aluminum-framed window system level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weather tight construction.
- D. Install aluminum-framed window system and components to drain condensation, water penetrating joints, and moisture migrating within system to the exterior.
- E. Separate aluminum from dissimilar materials to prevent corrosion or electrolytic action at points of contact.
- F. Install sealant at the perimeter of all windows to seal the window unit to the adjacent materials at the completion of the installation.

3.03 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather tight closure. Lubricate hardware and moving parts.
- B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

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- C. Clean glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- E. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION 08 51 13

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SECTION 08 71 00 – DOOR HARDWARE

PART 1 - GENERAL

1.01 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 283 (1991) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA L & R Directory (Effective thru Jun 1999) Directory of Certified Locks & Latches

BHMA Closer Directory (Effective thru Jul (1999) Directory of Certified Door Closers

BHMA Exit Devices Directory (Effective thru Aug 1998) Directory of Certified Exit Devices

BHMA A156.1 (1997) Butts and Hinges

BHMA A156.2 (1996) Bored and Preassembled Locks and Latches

BHMA A156.3 (1994) Exit Devices

BHMA A156.4 (1992) Door Controls - Closers

BHMA A156.5 (1992) Auxiliary Locks & Associated Products

BHMA A156.6 (1994) Architectural Door Trim

BHMA A156.7 (1997) Template Hinge Dimensions

BHMA A156.8 (1994) Door Controls - Overhead Stops and Holders

BHMA A156.16 (1989) Auxiliary Hardware

BHMA A156.18 (1993) Materials and Finishes

BHMA A156.21 (1996) Thresholds

DOOR AND HARDWARE INSTITUTE (DHI)

DHI Locations for CSD (1997) Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames

DHI Locations for SSD for (1990) Recommended Locations for Architectural Hardware Standard Steel Doors and Frames

DHI ANSI/DHI A115.1G (1994) Installation Guide for Doors and Hardware

DHI ANSI/DHI A115-W (Varies) Wood Door Hardware Standards (Incl A115-W1 thru A115-W9)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80 (1999) Fire Doors and Fire Windows

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NFPA 101	(1997; Errata 97-1; TIA-97-1) Life Safety Code
NFPA 105	(1999) Installation of Smoke-Control Door Assemblies

1.02 SUBMITTALS

- A. Government approval is required for all submittals. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES
- B. Hardware Schedule
- C. Hardware schedule listing all items to be furnished. The schedule shall include for each item: the quantities; manufacturer's name and catalog numbers; the ANSI number specified, sizes; detail information and catalog cuts; finishes; door and frame size and materials; location and hardware set identification cross-references to drawings; corresponding reference standard type number or function number from manufacturer's catalog if not covered by ANSI or BHMA; and list of abbreviations and template numbers.

1.03 DELIVERY, STORAGE, AND HANDLING

Hardware shall be delivered to the project site in the manufacturer's original packages. Each article of hardware shall be individually packaged in the manufacturer's standard commercial carton or container, and shall be properly marked or labeled to be readily identifiable with the approved hardware schedule. Each change key shall be tagged or otherwise identified with the door for which its cylinder is intended. Where double cylinder functions are used or where it is not obvious which is the key side of a door, appropriate instructions shall be included with the lock and on the hardware schedule. Manufacturer's printed installation instructions, fasteners, and special tools shall be included in each package.

1.04 SPECIAL TOOLS

Special tools, such as those supplied by the manufacturer, unique wrenches, and dogging keys, shall be provided as required to adjust hardware items.

1.05 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

1.06 OPERATION AND MAINTENANCE MANUALS

Three complete copies of maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides shall be provided.

PART 2 - PRODUCTS

2.01 GENERAL HARDWARE REQUIREMENTS

Hardware shall conform to the requirements specified herein and the DOOR HARDWARE SCHEDULES listed at the end of this section. All doors shall be operated by curved return lever handles, touch bar exit devices, J407 Pulls or J301/304 Push Plates. Door knobs are NOT acceptable devices.

2.02 TEMPLATES

Requirements for hardware to be mounted on metal doors or metal frames shall be coordinated between hardware manufacturer and door or frame manufacturer by use of templates and other information to establish location, reinforcement required, size of holes, and similar details. Templates of hinges shall conform to BHMA A156.7.

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2.03 HINGES

Hinges shall conform to BHMA A156.1. Hinges used on metal doors and frames shall also conform to BHMA A156.7. Hinges shall be at a minimum, Heavy Weight, 4-1/2" x 4-1/2" ANSI 5111, five knuckle with four ball bearings, non-rising removable pin with button tip and plug. Base shall be stainless steel or brass for exterior doors.

A. Hinges for Reverse Bevel Doors with Locks

Hinges for reverse bevel doors with locks shall have pins that are made nonremovable by means such as a set screw in the barrel, or safety stud, when the door is in the closed position.

2.04 LEVER HANDLE LOCKSETS & DEADBOLTS

To the maximum extent possible, lever handle locksets and deadbolts, and all components thereof, including cylinders and removable cores, shall be the products of a single manufacturer. Lock fronts for double-acting doors shall be rounded. Strikes for wood doors shall be furnished with wrought boxes.

A. Lever Handle Cylindrical Locksets

Lever Handle Cylindrical Locksets, and strikes shall be series 4000, and shall conform to BHMA A156.2, Grade 1. Lever Handle Cylindrical Locksets & Deadbolts shall have adjustable bevel fronts or otherwise conform to the shape of the door. Lever handles shall be Curved Return 14D, Best Series 9K, Grade 1, function ANSI F81 or approved equal.

B. Tubular Deadbolts

Tubular Deadbolts shall conform to BHMA A156.5, Grade 1.

C. Lock Cylinders/Interchangeable Key Cores

Lock Cylinders/Interchangeable Key Cores shall comply with BHMA A156.5. Lock cylinders/Interchangeable Key Cores shall be Best Lock Corp., 7 PIN interchangeable key core compatible. Final key cores shall be provided by this contract and be an extension of the existing Best style A3 keying system. Final coded core shall be delivered to LRAFB Locksmith Shop directly from the manufacturer or his designated supplier. Final coded cores will be installed by LRAFB Locksmith Shop. Provide two coded keys with each core. Disassembly of Lever Handle Cylindrical lockset or exit device shall not be required to remove core from lockset. All locksets, and lockable exit devices shall accept and be Best Lock Corp., 7 PIN interchangeable key core compatible.

D. Lock Trim

Lock trim shall be cast, forged, or heavy wrought construction of commercial plain design. In addition to meeting the test requirement of BHMA A156.2, lever handles, roses, and escutcheons shall be 0.050 inch thick, if unreinforced. If reinforced, the outer shell shall be 0.035 inch thick and the combined thickness shall be 0.070 inch except that knob shanks shall be 0.060 inch thick.

2.05 EXIT DEVICES AND EXIT DEVICE ACCESSORIES

Exit devices and exit device accessories shall conform to BHMA A156.3, Grade 1.

A. Exit Devices and Auxiliary Items

Trim shall be of wrought construction and commercial plain design with straight, beveled, or smoothly rounded sides, corners, and edges. Adjustable flush mortise strikes shall be provided vertical rod devices. Open back strikes shall be provided for pairs of doors with mortise and vertical rod devices; except open back strikes shall be used on labeled doors only where specifically provided for in the published listings. Touch bars shall be provided instead of

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conventional crossbars and arms. Von Duprin Series 99, Precision Hardware Inc/Apex 2000 Series or Hager Company Inc 4500 Series.

2.06 DOOR CLOSING DEVICES

Door closing devices shall conform to BHMA A156.4, Grade 1. Closing devices shall be products of one manufacturer for each type specified. The opening resistance of closing devices shall not exceed 5 lbs applied at the latch stile.

A. Surface Type Closers

Surface type closers shall be Grade 1, Series C02000 Full Cover with options PT-4H, Size 1, and PT-4D with back check position valve. Except as otherwise specified, sizes shall conform to the manufacturer's published recommendations. All closers be top jamb (push side) mounted.

2.07 ARCHITECTURAL DOOR TRIM

Architectural door trim shall conform to BHMA A156.6.

A. Door Protection Plates

1. Kick Plates

Kick plates shall be Type J102 stainless steel. Width of plates shall be 2 inches less than door width for single doors 1 inch less for pairs of doors. Height shall be 10 inches. Edges of metal plates shall be beveled.

2.08 MISCELLANEOUS

A. Metal Thresholds

Thresholds shall conform to BHMA A156.21. Thresholds for exterior doors shall be extruded aluminum of the type indicated and shall provide proper clearance and an effective seal with specified weather stripping. Where required, thresholds shall be modified to receive projecting bolts of exit devices. Thresholds shall be beveled with slopes not exceeding 1:2 and with heights not exceeding 1/2 inch. Air leakage rate of weatherstripping shall not exceed 0.5 cubic feet per minute per lineal foot of crack when tested in accordance with ASTM E 283 at standard test conditions.

B. Aluminum Housed Type Weatherseals

Weatherseals of the type indicated shall consist of extruded aluminum retainers not less than 0.07 inch wall thickness with TPE inserts. Aluminum shall be clear anodized. Weatherseal material shall be of an industrial/commercial grade. Seals shall remain functional through all weather and temperature conditions. Air leakage rate of weatherstripping shall not exceed 0.5 cubic feet per minute per lineal foot of crack when tested in accordance with ASTM E 283 at standard test conditions.

C. Door Stops

Wall stops, floor stops and combination stop and holders shall conform to BHMA A156.16.

2.09 FASTENINGS

Fastenings of proper type, size, quantity, and finish shall be supplied with each article of hardware. Machine screws and expansion shields shall be used for attaching hardware to concrete or masonry. Fastenings exposed to the weather in the finished work shall be of brass, bronze, or stainless steel. Sex bolts, through bolts, or machine screws and grommet nuts, where used on reverse-bevel exterior doors equipped with half-surface or full-surface hinges, shall employ one-way screws or other approved tamperproof screws. Screws for the jamb leaf of half-mortise and full-surface hinges attached to structural steel frames shall be one-way or other approved tamperproof type.

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2.10 FINISHES

Unless otherwise specified, finishes shall conform to those identified in BHMA A156.18. All finishes shall be Satin Chromium Plated unless otherwise noted.

2.11 HARDWARE FOR FIRE DOORS

Hardware for fire doors shall conform to the requirements of NFPA 80 and NFPA 101.

PART 3 - EXECUTION

3.01 APPLICATION

Hardware shall be located in accordance with DHI Locations for CSD and DHI Locations for SSD, except that deadlocks shall be mounted 48 inches above finish floor. When approved, slight variations in locations or dimensions will be permitted. Application shall be in accordance with DHI ANSI/DHI A115.1G or DHI ANSI/DHI A115-W. Door control devices for exterior doors such as closers and holders, shall be attached to doors with thru bolts and nuts or sex bolts. Alternate fastening methods may be approved by the Contracting Officer's Representative when manufacturers' documentation is submitted to verify that the fastening devices and door reinforcements are adequate to resist wind induced stresses.

A. Hardware for Fire Doors and Smoke-Control Door Assemblies

Hardware for fire doors shall be installed in accordance with the requirements of NFPA 80. Exit devices installed on fire doors shall have a visible label bearing the marking "Fire Exit Hardware". Other hardware installed on fire doors, such as locksets, closers, and hinges shall have a visible label or stamp indicating that the hardware items have been approved by an approved testing agency for installation on fire-rated doors. Hardware for smoke-control door assemblies shall be installed in accordance with NFPA 105.

B. Door-Closing Devices

Door-closing devices shall be installed and adjusted in accordance with the templates and printed instructions supplied by the manufacturer of the devices. All doors shall have the closer mounted on the push side of the door.

C. Kick Plates

Kick plates shall be installed on the push side of single-acting doors and on both sides of double-acting doors. Mop plates shall be installed on the pull side of the single acting doors.

D. Thresholds

Thresholds shall be secured with a minimum of three fasteners per single door width and six fasteners per double door width with a maximum spacing of 12 inches. Exterior thresholds shall be installed in a bed of sealant with expansion anchors and stainless steel screws, except that bronze or anodized bronze thresholds shall be installed with expansion anchors with brass screws. Minimum screw size shall be No. 10 length, dependent on job conditions, with a minimum of 3/4 inch thread engagement into the floor or anchoring device used.

E. Weatherseals

Weatherseals shall be located as indicated, snug to door face and fastened in place with color matched metal screws after door and frames have been finish painted. Screw spacing shall be as recommended by manufacturer.

3.02 OPERATIONAL TESTS

Prior to acceptance of any electrical hardware system, an operational test shall be performed to determine if devices are operating as intended by the specifications. Wiring shall be tested for

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correct voltage, current carrying capacity, and proper grounding. Stray voltages in lock wiring shall be eliminated to prevent locking devices from releasing in critical situations.

3.03 FIELD QUALITY CONTROL

Contractor shall inspect the completed installation and certify that the hardware has been furnished and installed in accordance with the manufacturers' instructions and as specified. The inspection report shall identify any malfunctioning items and recommend adjustment or replacement as appropriate.

3.04 HARDWARE SETS

Contractor shall provide and install door hardware as indicated on the following door hardware schedules. All door hardware shall be Grade 1. All door hardware shall be Builder Hardware Manufacturers Association (BHMA) Satin Chromium Plated, Brass, Bronze or Steel material unless otherwise noted to be Satin stainless steel (SS), brushed aluminum (A) or clear aluminum (X). Only items used within the conditioned building envelope will be allowed to be plated steel.

DOOR HARDWARE SCHEDULE

Hardware Set No. 1: Dorm Room Exterior

3	Hinges	Hager BB1168, 4-1/2" x 4-1/2" with non-removable pins (US32D)
1	Passage Set	Corbin Russwin – CL3310 with lever handles, Standard strike and wrought strike box (US32D)
1	Dead Bolt	Corbin Russwin – DL3013, keyed at exterior and Thumbturn at interior (FC), 7-pin conventional (US32D)
1	Closer	LCN 4030 interior mount with parallel arm mount
1	Kick Plate	Hager 193S- US32D, stainless steel beveled 3 sides
1	Door Viewer	Hager 1759 – US32D (185 degrees with privacy flap)
1	Wall Stop	Hager 255S (US32D)
1	Threshold	Hager 421 s (MIL)
1	Lot Weatherstripping	Hager 863S (CLR)
3	Door Silencers	Hager 307 D

Hardware Set No. 2: Dorm Bathroom

2	Hinges	Hager BB1168, 4-1/2" x 4-1/2" (US32D)
1	Privacy Set	Corbin Russwin – CL3320 with lever handle, Standard Strike and wrought strike box (US32D)
1	Wall Stop	Hager 242F (US32D)
3	Door Silencers	Hager 307D

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Hardware Set No. 3: Dorm Closet

2	Hinges	Hager BB1168, 4-1/2" x 4-1/2" (US32D)
1	Passage Set	Corbin Russwin – CL3310 with lever handle, Standard Strike and wrought strike box (US32D)
1	Wall Stop	Hager 242F (US32D)
3	Door Silencers	Hager 307D

Hardware Set No. 4:

3	Hinges	Hager BB1168, 4-1/2" x 4-1/2" with non-removable pins (US32D)
1	Passage Set	Corbin Russwin – CL3310 with lever handles, Standard strike and wrought strike box (US32D)
1	Dead Bolt	Corbin Russwin – DL3112, double cylinder, 7-pin (US32D)
1	Wall Stop	Hager 242F (US32D)
3	Door Silencers	Hager 307 D

Hardware Set No. 5:

3	Hinges	Hager BB1168, 4-1/2" x 4-1/2" with non-removable pin (US32D)
1	Panic Device	Von Duprin 99, CD with 99L lever (US32D) – 7 pin
1	Closer	LCN 4030 interior mount w/parallel arm mount
1	Kick Plate	Hager 193S- US32D, stainless steel beveled 3 sides
1	Wall Stop	Hager 255S (US32D)
1	Threshold	Hager 421 s
1	Lot Weatherstripping	Hager 863S (MIL)
3	Door Silencers	Hager 307 D

Hardware Set No. 6:

3	Hinges	Hager BB1168, 4-1/2" x 4-1/2", (US32D)
1	Passage Set	Corbin Russwin – CL3310 with lever handles, Standard strike and wrought strike box (US32D)
1	Closer	LCN 4030 interior mount with parallel arm mount
1	Wall Stop	Hager 242F (US32D)
3	Door Silencers	Hager 307 D (US32D)
1	Kick Plate	Hager 193S-US32D, bevel 3 sides (SS)

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Hardware Set No. 7:

3	Hinges	Hager BB1168, 4-1/2" x 4-1/2", (US32D)
1	Passage Set	Corbin Russwin – CL3310 with lever handles, Standard strike and wrought strike box
1	Dead Bolt	Corbin Russwin – DL3112, double cylinder, 7 pin
1	Wall Stop	Hager 232W (US32D)
3	Door Silencers	Hager 307 D (US32D)

Hardware Set No. 8:

3	Hinges	Hager BB1168, 4-1/2" x 4-1/2", (US32D)
1	Privacy Set	Corbin Russwin – CL3320 with lever handles, Standard strike and wrought strike box (US32D)
1	Closer	LCN 4030 interior mount with parallel arm mount
1	Wall Stop	Hager 232W (US32D)
3	Door Silencers	Hager 307 D

Hardware Set No. 9:

3	Hinges	Hager BB1168, 4-1/2" x 4-1/2", (US32D)
1	Passage Set	Corbin Russwin – CL3310 with lever handles, Standard strike and wrought strike box (US32D)
1	Dead Bolt	Corbin Russwin – DL3112, double cylinder, 7-pin
1	Wall Stop	Hager 232W (US32D)
3	Door Silencers	Hager 307 D

Hardware Set No. 10:

3	Hinges	Hager BB1168, 4-1/2" x 4-1/2", (US32D)
1	Passage Set	Corbin Russwin – CL3310 with lever handles, Standard strike and wrought strike box
1	Dead Bolt	Corbin Russwin – DL3112, double cylinder, 7-pin
1	Closer	LCN 4030 interior mount with parallel arm mount
1	Wall Stop	Hager 232W (US32D)
3	Door Silencers	Hager 307 D

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Hardware Set No. 11:

3	Hinges	Hager BB1168, 4-1/2" x 4-1/2" with non-removable pins (US32D)
1	Storeroom Lockset	Corbin Russwin, CL3357 with lever handles, standard Strike and wrought strike box, 7-pin
1	Closer	LCN 4030 with parallel arm mount
1	Threshold	Hager 421 S (MIL)
1	Lot Weatherstripping	Hager 863S (CLR)
1	Wall Stop with Holder	Hager 256S
3	Door Silencers	Hager 307 D

Hardware Set No. 12:

3	Hinges	Hager BB1168, 4-1/2" x 4-1/2" with non-removable pins (US32D)
1	Storeroom Lockset	Corbin Russwin, CL3357 with lever handles, standard Strike and wrought strike box, 7-pin
1	Closer	LCN 4030 with parallel arm mount
1	Wall Stop	Hager 232W
3	Door Silencers	Hager 307 D

Hardware Set No. 13:

3	Hinges	Hager BB1168, 4-1/2" x 4-1/2" with non-removable pins (US32D)
1	Storeroom Lockset	Corbin Russwin, CL3357 with lever handles, standard Strike and wrought strike box, 7-pin
1	Wall Stop	Hager 232W
3	Door Silencers	Hager 307 D

Hardware Set No. 14:

6	Hinges	Hager BB1168, 4-1/2" x 4-1/2" with non-removable pins (US32D)
1	Storeroom Lockset	Corbin Russwin CL3357 with lever handles, Standard strike and wrought strike box , 7 pin
1	Full Dummy Trim	Corbin Russwin – DL3370
2	Manual Flush Bolts	Hager 283D (Top & Bottom)
2	Dust Proof Strikes	Hager 280X

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2	Closers	LCN 4030 with parallel arm mount
1	Threshold	Hager 421 s (MIL)
1	Lot Weatherstripping	Hager 863S (CLR)
1	Wall Stop with Holder	Hager 256S
3	Door Silencers	Hager 307 D

Hardware Set No. 15:

3	Hinges	Hager BB1168, 4-1/2" x 4-1/2" with non-removable pins (US32D)
1	Passage Set	Corbin Russwin CL3310 with lever handles, standard Strike and wrought strike box
1	Deadbolt	Cornin Russwin, DL3112, double cylinder, 7-pin
1	Storeroom Lockset	Corbin Russwin, CL3357 with lever handles, standard Strike and wrought strike box, 7-pin
1	Closer	LCN 4030 with parallel arm mount
1	Threshold	Hager 421 s (MIL)
1	Lot Weatherstripping	Hager 863S (CLR)
1	Wall Stop with Holder	Hager 256S
3	Door Silencers	Hager 307 D

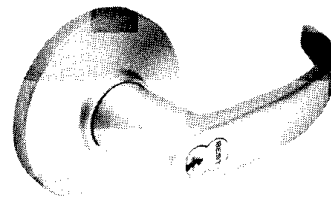
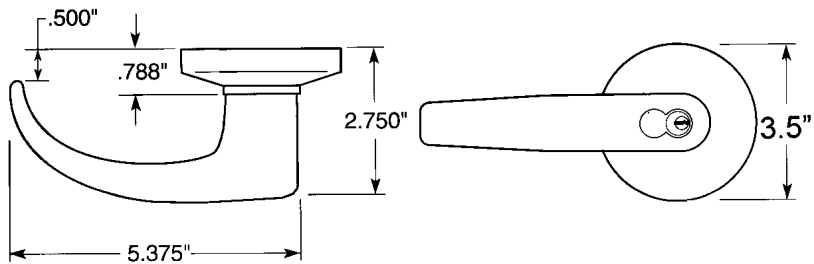
Hardware Set No. 16:

3	Hinges	Hager BB1168, 4-1/2" x 4-1/2", (US32D)
1	Passage Set	Corbin Russwin – CL3310 with lever handles, Standard strike and wrought strike box (US32D)
1	Deadbolt	Cornin Russwin, DL3112, double cylinder, 7-pin
1	Closer	LCN 4030 interior mount with parallel arm mount
1	Wall Stop	Hager 232W (US32D)
3	Door Silencers	Hager 307 D (US32D)
1	Kick Plate	Hager 193S-US32D, bevel 3 sides (SS)

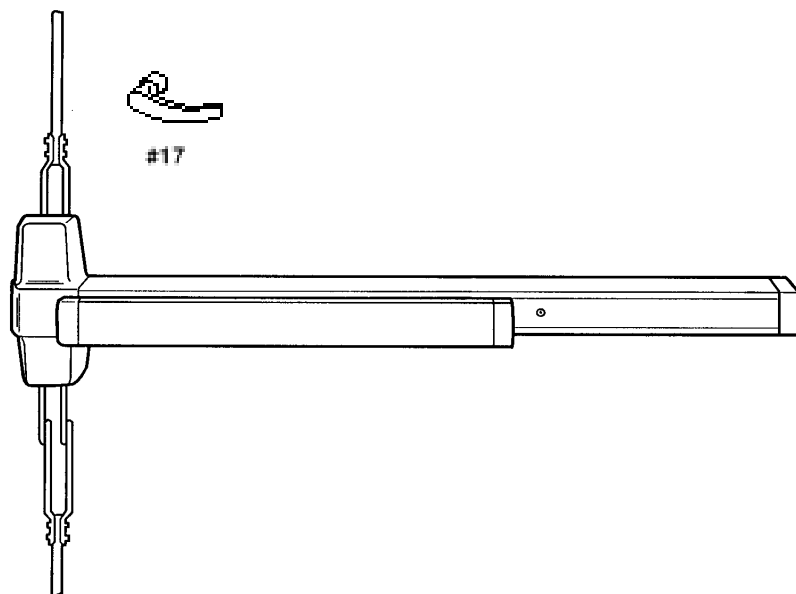
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SMALL FORMAT INTERCHANGABLE CORE – 7 PIN - TYPICAL



CURVED RETURN CYLINDRICAL LEVER HANDLE LOCKSET – TYPICAL



TOUCH BAR EXIT DEVICE WITH CONCEALED VERTICAL RODS, LEVER HANDLE AND FLUSH MORTISE STRIKES

END OF SECTION - DOOR HARDWARE 08 71 00

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SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Windows.
 - 2. Glazed entrances.
 - 3. Vision Panels.
- B. Related Sections:
 - 1. Division 08 Section "Aluminum Windows".
 - 2. Division 08 Section "Hollow Metal Doors and Frames" and "Flush Wood Doors" for door leaf types.

1.03 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- C. Warranties: Sample of special warranties.

1.04 QUALITY ASSURANCE

- A. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below **40 deg F (4.4 deg C)**.

1.07 WARRANTY

- A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge

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separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: 10 years from date of Substantial Completion.

- B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

2.02 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
- C. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
1. Construction: Laminate glass with polyvinyl butyral interlayer (PVB) to comply with interlayer manufacturer's written recommendations.
2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.03 INSULATING GLASS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. PPG Industries, Inc.
2. Or approved equal.
- B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

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1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
 2. Spacer: Aluminum with bronze, color anodic finish.
 3. Desiccant: Molecular sieve or silica gel, or blend of both.
- C. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Insulating-Glass Types" Article.

2.04 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
1. EPDM complying with ASTM C 864.
 2. Silicone complying with ASTM C 1115.
 3. Thermoplastic polyolefin rubber complying with ASTM C 1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.

2.05 GLAZING SEALANTS

- A. General:
1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Retain first subparagraph below if low-emitting materials are required for LEED-NC or LEED-CI Credit EQ 4.1.
 4. Colors of Exposed Glazing Sealants: To be selected by the Government.
- B. Glazing Sealant for Laminated and Insulated Glazing: Silicone Structural Sealant complying with ASTM C 290, Type S, Grade NS, Class 50, Use NT, G, and A.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. The Dow Chemical Company ("Dow"); Dowsil 995
 - b. Tremco; Proglaze SSG
 - c. Or approved equal.
 2. Applications: Exterior glazing in doors and windows.

2.06 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800.

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1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.07 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.08 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Grind smooth and polish exposed glass edges and corners.

2.09 GLAZING SCHEDULE

- A. Glass Type GL-1: Clear insulating tempered, laminated glass.
 1. Overall Unit Thickness: 1 inch (25 mm).
 2. Outdoor Lite: Heat-strengthened float glass
 - a. Thickness of Outdoor Lite: 0.25-inch (6.0 mm)
 3. Interspace Content: Air.
 4. Indoor Lite: Clear laminated glass with two plies of heat-strengthened float glass.
 - a. Thickness of Each Glass Ply: 1/8-inch (3.0 mm)
 - b. Interlayer Thickness: 0.030 inch (0.75 mm).
 5. Provide safety glazing labeling.
- B. Glass Type GL-1A: Clear insulating tempered, laminated glass with STC rating of 45.
 1. Overall Unit Thickness: 2 1/2 inch (25 mm).
 2. Outdoor Lite: Heat-strengthened float glass

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- a. Thickness of Outdoor Lite: 0.25-inch (6.0 mm)
- 3. Interspace Content: Air.
- 4. Indoor Lite: Clear laminated glass with two plies of heat-strengthened float glass.
 - a. Thickness of Each Glass Ply: 1/8-inch (3.0 mm)
 - b. Interlayer Thickness: 0.030 inch (0.75 mm).
- 5. Provide safety glazing labeling.
- C. Glass Type GL-2: Clear insulating laminated glass.
 - 1. Overall Unit Thickness: 1 inch (25 mm).
 - 2. Outdoor Lite: Heat-strengthened float glass
 - a. Thickness of Outdoor Lite: 0.25-inch (6.0 mm)
 - 3. Interspace Content: Air.
 - 4. Indoor Lite: Clear laminated glass with two plies of float glass.
 - a. Thickness of Each Glass Ply: 1/8-inch (3.0 mm)
 - b. Interlayer Thickness: 0.030 inch (0.75 mm).
 - 5. Provide safety glazing labeling.
- D. Glass Type GL-3: Clear laminated glass with two plies of heat-strengthened float glass
 - 1. Thickness of Each Glass Ply: 1/8-inch (3.0 mm)
 - 2. Interlayer Thickness: 0.030 inch
 - 3. Provide safety glazing labeling.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

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3.03 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 3/8-inch (10.0 mm) minimum bite of spacers on glass. Use 3/16-inch (5 mm) structural silicone bead. With glazing tape, bite shall be equal to two times the thickness of the laminated glass to which it adheres. The structural silicone bead or glazing tape shall be applied to both sides of single pane laminated glass, but need only be applied to the inboard (protected side) of insulated glazing units.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

3.04 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.

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- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. .
- I. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.05 GASKET GLAZING

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.06 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08 80 00

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DIVISION 09 – FINISHES

SECTION 09 00 00 – FINISHES

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Finishes and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – FINISHES

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SECTION 09 22 16 – NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes non-load-bearing steel framing members for the following applications:
 - 1. Interior Wall Framing Systems

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.01 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653/A 653M, **G40 (Z120)**, hot-dip galvanized, unless otherwise indicated.

2.02 STEEL FRAMING FOR FRAMED ASSEMBLIES

- A. Steel Studs and Runners: ASTM C 645.
 - 1. Minimum Base-Metal Thickness: **0.0359 inch (20 gauge)**.
 - 2. Depth: as indicated on the drawings
- B. Cold-Rolled Channel Bridging: **0.0538-inch** bare-steel thickness, with minimum **1/2-inch-** wide flanges.
 - 1. Depth: as indicated on the drawings.
 - 2. Clip Angle: Not less than **1-1/2 by 1-1/2 inches (38.1 by 38.1 mm)**, **0.068-inch- (1.73-mm-)** thick, galvanized steel.

2.03 AUXILIARY MATERIALS

- A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

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3.02 INSTALLING FRAMED ASSEMBLIES

- A. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb, unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum **1/2-inch (12.7-mm)** clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 3. Sound-Rated Partitions: Install framing to comply with sound-rated assembly as illustrated.

Installation Tolerance: Comply with all acoustic related requirements. Install each framing member so fastening surfaces vary not more than **1/8 inch (3 mm)** from the plane formed by faces of adjacent framing.

END OF SECTION 09 22 16

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SECTION 09 29 00 – GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Interior gypsum board.
 - 2. Miscellaneous metal trim and moldings.
- B. Related Sections include the following:
 - 1. Division 07 Section "Thermal Insulation" for sound attenuation bats installed in assemblies that incorporate gypsum board.
 - 2. Division 09 Section "Non-Structural Metal Framing" for metal framing that supports gypsum board.
 - 3. Division 09 Section "Painting" for primers applied to gypsum board surfaces.
 - 4. Division 09 Section "Tiling" for materials installed over Cementitious Backer Units

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

1.03 QUALITY ASSURANCE

- A. STC-Rated Assemblies: For STC-rated assemblies, STC-50 rating where indicated in the Drawings.

1.04 STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.05 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.

PART 2 - PRODUCTS

2.01 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

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

- a. American Gypsum Co.
- b. G-P Gypsum.
- c. National Gypsum Company.
- d. USG Corporation.
- e. Or approved equal.

B. Type X:

1. Thickness: 5/8 inch, Type SCX
2. Long Edges: Tapered.
3. Equal to USG Corporation, "Firecode X" Panels.

C. Cementitious Backer Units: Refer to Section 09 30 00.

2.02 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc
2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. L-Bead: L-shaped; exposed long flange receives joint compound.
 - d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - e. Expansion (control) joint.

2.03 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 4 finish, use drying-type, all-purpose compound

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2.04 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from **0.033 to 0.112 inch (0.84 to 2.84 mm)** thick.
- C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) as specified in Division 09 Section "Fiberglass Acoustic Blanket Insulation."
- D. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."

2.05 TEXTURE FINISHES

- A. Primer: As recommended by textured finish manufacturer.
- B. Aggregate Finish: Water-based, job-mixed, aggregated, drying-type texture finish for spray application.
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. G-P Gypsum; Georgia-Pacific Ceiling Textures/Vermiculite.
 - b. USG Corporation; SHEETROCK Wall and Ceiling Spray Texture (Aggregated).
 - c. Or approved equal.
- C. Texture: Knock-down finish, typical interior walls.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than **1/16 inch (1.5 mm)** of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place

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tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Fit gypsum panels around ducts, pipes, and conduits.
 - 2. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow **1/4- to 3/8-inch- (6.4- to 9.5-mm-)** wide joints to install acoustical sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide **1/4- to 1/2-inch- (6.4- to 12.7-mm-)** wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets between studs at locations indicated in the Drawings.

3.03 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Type X: Typical interior walls and ceilings as indicated in the Drawings.
 - 2. Cementitious Backer Board: under all ceramic wall tile.
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, **16 inches (400 mm)** minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
 - 1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member

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and face-layer joints offset at least one stud or furring member with base-layer joints. Stagger joints on opposite sides of partitions.

2. Fastening Methods: Fasten base layers and face layers separately to supports with screws

3.04 APPLYING TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.05 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. LC-Bead: Use at exposed panel edges
 - 3. U-Bead: Use at exposed panel edges

3.06 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 4: At panel surfaces that will be exposed to view.
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.07 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture (knock down finish – walls) free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove

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droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.08 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 09 29 00

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SECTION 09 30 00 - TILING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Ceramic tile.
2. Tile Backing Panels.
3. Metal Edge and Cove Strips.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples:

1. Each type and composition of tile and for each color and finish required.
2. Stone thresholds in 6-inch lengths.
3. Metal edge and cove strips in 6-inch lengths, each type indicated.

1.03 EXTRA MATERIALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.01 TILE PRODUCTS

A. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. Tile Type (CT-1): Factory-mounted Porcelain unpolished stone tile.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anatolia, Inc.
 - b. Or approved equal.
2. Composition: Porcelain.
3. Module Size: 6" x 36"
4. Thickness: 10.3 mm
5. Face: Plain with rectified edges.
6. Finish: Matte Rectified Tile
7. Tile Color and Pattern: Aspen Collection – Paper Birch, Pattern as indicated on the drawings.
8. Grout Color: As indicated on the drawings.

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9. Trim Units: Aluminum, anodized with brushed finish
 - a. Cove-shaped trim equal to Schluter DILEX. Provide end caps, inside corners, and outside corners as required.
 - b. L-shape Cap when tiled edges are exposed.
- C. Tile Type (CT-2): Factory-mounted unglazed ceramic mosaic tile.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Crossville, Inc.
 - b. Or approved equal.
 2. Composition: Porcelain.
 3. Module Size: 12"x12".
 4. Thickness: 3/8"
 5. Face: Plain with square edges
 6. Finish: Unpolished
 7. Tile Color and Pattern: Color Blox 2.0. Color as indicated on the Drawings.
 8. Grout: Custom Building Products, color as indicated on the Drawings
 9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Cove Base, nominal size 6" x 12"
 - b. Cove Base, nominal size 6"x8" corner (left & right as required)
- D. Tile type (CT-3A, CT-3B, CT-3C): Factory-mounted unglazed ceramic mosaic tile.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Crossville, Inc.
 - b. Or approved equal.
 2. Composition: Porcelain.
 3. Module Size: 4"x8".
 4. Thickness: 1/4"
 5. Face: Plain with square edges.
 6. Finish: Gloss
 7. Tile Color and Pattern: Color by Numbers. Color as indicated by A, B, or C on the Drawings.
 8. Grout Color: As indicated on the drawings.
 9. Trim Units: Aluminum, anodized with brushed finish.
 - a. Cove-shaped trim equal to Schluter DILEX. Provide end caps, inside corners, and outside corners as required.

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- b. L-shape Cap when tiled edges are exposed.

2.02 THRESHOLDS

- A. General: Provide profiles as indicated or required to provide transition between adjacent floor finishes.
- B. Ceramic tile to carpet transitions: Aluminum, anodized with brushed finish.
 - 1. Tile edge protection profile with minimum reveal for sloped transitions, ADA compliant, equal to Schluter RENO-TK.

2.03 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Custom Building Products; Wonderboard.
 - b. USG Corporation; DUROCK Cement Board.
 - c. Or approved equal.
 - 2. Thickness: 5/8"

2.04 WATERPROOF MEMBRANE

- A. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Custom Building Products; RedGard Waterproofing and Crack Prevention Membrane.
 - b. Or approved equal

2.05 SETTING MATERIALS

- A. Dry-Set Cement Mortar (Modified Mortar): ANSI A118.4.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Custom Building Products, ProLite
 - b. Or approved equal.
 - 2. Prepackaged, dry-mortar mix combined with liquid additive.
 - 3. For wall applications, provide nonsagging mortar.

2.06 GROUT MATERIALS

- A. Epoxy Grout: ANSI A118.3.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Custom Building Products Fusion Pro Single Component Grout.
 - b. Or approved equal.

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2.07 SEALANTS

- A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 07 Section "Joint Sealants."
- B. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; Dow Corning 786.
 - b. Laticrete International, Inc.; Latasil Tile & Stone Sealant.
 - c. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
 - d. Or approved equal.

2.08 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-Shape, stainless steel, ASTM A666, 300 Series exposed-edge material.
- C. Metal Cove Base Strip: Cove Shape, stainless steel, ASTM A666, 300 Series, for floor to wall transitions where indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

3.02 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.
- C. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

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3.03 INSTALLATION

- A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile walls composed of tiles **2 by 6 inches (200 by 200 mm)** or larger.
 - b. Tile floors in wet areas.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Jointing Pattern: Lay tile in pattern indicated on the Drawings unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
- E. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. CT-1: 1/8 inch
 - 2. CT-2: 3/16 inch
 - 3. CT-3: 1/8" inch (3.2 mm).
- F. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
 - 1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).
- G. Metal Edge Strips: Install at corners where exposed edge of wall tile meets exposed edge of wall tile.
- H. Grout Sealer: Apply grout sealer to cementitious grout joints in tile surfaces according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.
- I. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

END OF SECTION 09 30 00

CLASSIFICATION: **UNCLASSIFIED**

SECTION 09 51 13 – ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes acoustical panels and exposed suspension systems for ceilings.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.04 QUALITY ASSURANCE

- A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.
- B. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
 - 2. Suspension System: Obtain each type through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
 - 1. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
 - a. Smoke-Developed Index: 50 or less.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.06 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

CLASSIFICATION: **UNCLASSIFIED**

1.07 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.08 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.01 ACOUSTICAL PANELS, GENERAL

- A. Acoustical Panel Standard: Provide manufacturer's standard stone wool panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
- B. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
 - 1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.
- C. Antimicrobial Fungicide Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.02 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Armstrong "Cortega," wet-formed mineral fiber ceiling tiles.
 - 2. Or approved equal.
- B. Color: White.
- C. LR: .80.
- D. NRC: .55.
- E. Edge: 15/16" Angled Tegalur
- F. Thickness: 5/8" Angled Tegalur.
- G. Modular Size: 24 by 24 inches.
- H. Acoustic Stone Wool.

CLASSIFICATION: **UNCLASSIFIED**

2.03 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
- B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
 - 3. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
 - 4. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire.
- E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Angle Hangers: Angles with legs not less than **7/8 inch** wide; formed with **0.04-inch-** thick, galvanized steel sheet complying with ASTM A 653/A 653M, **G90** coating designation; with bolted connections and **5/16-inch-** diameter bolts.

2.04 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Armstrong Prelude XL.
 - 2. Or approved equal.
- B. Wide-Face, Capped, Double-Web Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than **G30** coating designation, with prefinished **15/16-inch-** wide metal caps on flanges.
 - 1. Structural Classification: HDG Steel body.
 - 2. Model: Prelude XL.
 - 3. Width: 15/16".
 - 4. Cap Material: Steel cold-rolled sheet.
 - 5. Cap Finish: Painted white.

2.05 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

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1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders and comply with layout shown on reflected ceiling plans.

3.03 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636, per manufacturer's written instructions and Cisca's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 7. Space hangers not more than **48 inches** o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than **8 inches** from ends of each member.

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8. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
 1. Screw attach moldings to substrate at intervals not more than **16 inches** o.c. and not more than **3 inches** from ends, leveling with ceiling suspension system to a tolerance of **1/8 inch in 12 feet**. Miter corners accurately and connect securely.
 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
 1. Arrange directionally patterned acoustical panels as follows:
 - a. Install panels in a basket-weave pattern.
 2. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.04 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

CLASSIFICATION: **UNCLASSIFIED**

SECTION 09 65 13 – RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient base accessories.
- B. Related Sections:
 - 1. Division 09 Section “Gypsum Board” for substrate for attachment.
 - 2. Division 09 Section “Tile Carpet”.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each color and type of product indicated.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than **55 deg F (13 deg C)** or more than **85 deg F (29 deg C)**.

1.05 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than **70 deg F (21 deg C)** or more than **85 deg F (29 deg C)**, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than **55 deg F (13 deg C)** or more than **85 deg F (29 deg C)**.
- C. Install resilient products after other finishing operations, including painting, have been completed.

1.06 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- B. Furnish not less than **10 linear feet (3 linear m)** for every **500 linear feet (150 linear m)** or fraction thereof, of each type, color, pattern, and size of resilient product installed.

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PART 2 - PRODUCTS

2.01 RESILIENT BASE

A. Resilient Base:

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

- a. Armstrong World Industries, Inc.
- b. Mannington Commercial a business unit of Mannington Mills, Inc.; BurkeBase
- c. Tarkett Group; Johnsonite Traditional Wall Base.
- d. Or approved equal.

B. Resilient Base Standard: ASTM F 1861 Standard Specification for Resilient Thermoplastic Rubber Wall Base, Type TP, Group 1.

C. Minimum Thickness: 0.125 inch (3.2 mm).

D. Type: Coved

E. Height: 4 inches (102 mm); 6 inches (152 mm) Refer to drawings for locations and heights.

F. Lengths: Coils in manufacturer's standard length.

G. Outside Corners: Manufacturer's standard corner blocks to match profile and color selected.

H. Inside Corners: Manufacturer's standard corner blocks to match profile and color selected.

I. Colors and Patterns: Match existing resilient base color and as selected by the Government.

2.02 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

- a. Cove Base Adhesives: Not more than 50 g/L.

C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

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- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are same temperature as the space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.03 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, where base is required by the schedule.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.

3.04 RESILIENT ACCESSORY INSTALLATION

- A. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of resilient floor covering that would otherwise be exposed.

3.05 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

END OF SECTION 09 65 13

CLASSIFICATION: **UNCLASSIFIED**

SECTION 09 68 13 – TILE CARPETING

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes modular, **tufted** carpet tile.
- B. Related Sections include the following:
 - 1. Division 09 Section "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.
 - 2. Division 09 Section "Tiling" for floor transitions from ceramic tile to carpet tile.

1.02 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Samples: For each color and texture required.
 - 1. Carpet Tile: Full-size Sample.
 - 2. Exposed Edge, Transition, and other Accessory Stripping: **12-inch-** (300-mm-) long Samples.
- C. Maintenance data.

1.03 QUALITY ASSURANCE

- A. All carpeting specified in this section shall be purchased through the Air Force Carpet Program.
- B. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104, Section 5, "Storage and Handling."

1.05 PROJECT CONDITIONS

- A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."
- B. Environmental Limitations: Do not install carpet tiles until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

1.06 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.
 - 1. Warranty Period: **10** years from date of Substantial Completion.

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1.07 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to **5** percent of amount installed for each type indicated, but not less than **10 sq. yd. (8.3 sq. m)**.

PART 2 - PRODUCTS

2.01 CARPET TILE

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
- B. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Modular, as manufactured by Tarkett North America
 - a. Color: As selected by Architect.
 - b. Pattern: Geometric, as selected by Architect
 - d. Style: Blockade #11471
- C. Fiber Content: 100% Solution Dyed (SD) nylon.
- D. Pile Characteristic: Textured patterned loop.
- E. Density: 8,509 oz/cu yd
- F. Pile Thickness: .055 inches (1.04 mm).
- G. Stitches: 10.0 per inch
- H. Gauge: 5/64 (50.00 rows per 10 cm).
- I. Primary Backing/Backcoating: Synthetic non-woven.
- J. Secondary Backing: Closed cell cushion
- K. Backing System: Powerbond Cushion
- L. Size: 18 x 36 inches.
- M. Applied Soil-Resistance Treatment: Eco-Ensure.
- N. Antimicrobial Treatment: **Manufacturer's standard material.**

2.02 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
- C. Extruded aluminum transition strip 2" – 4" wide where carpet transitions to ceramic tile in public areas. Transition strip to be adhesively and mechanically attached.
- D. Stone threshold as specified in Division 9 Section "Tiling" where carpet transitions to ceramic tile in dorm suites.

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PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- D. Install vertical ashlar pattern parallel to walls and borders.

3.02 ACCESSORY INSTALLATION

- A. General: Install accessories according to manufacturer's written installation instructions.
- B. Place metal accessories so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.
- C. Metal transitions are to be installed where carpet is adjacent to ceramic tile in public areas.
- D. Stone thresholds are to be installed where carpet is adjacent to ceramic tile in dorm suites.

END OF SECTION 09 68 13

CLASSIFICATION: **UNCLASSIFIED**

SECTION 09 81 16 – ACOUSTIC BLANKET INSULATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Concealed sound attenuation blankets for interior partitions
- B. Related Sections include the following:
 - 1. Division 07 Section "Joint Sealants" for acoustical sealant in sound rated walls.
 - 2. Division 09 Section "Non-Structural Metal Framing" for installation in metal-framed assemblies of insulation specified by referencing this Section.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.04 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

1.05 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.01 ACOUSTIC BLANKET INSULATION (SOUND ATTENUATION BATTS), FIRE RATED

- A. Manufacturers:
 - 1. Owens Corning, Pink Next Gen Fiberglas Sound Attenuation Batts (SAB).
 - 2. Or approved equal.
- B. Type: Unfaced, glass fiber acoustical insulation: ASTM C 665, Type I (blankets without membrane facing).
- C. Surface Burning Characteristics: ASTM E84.

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1. Maximum flame spread: <25.
 2. Maximum smoke developed: <50
- D. Fire Resistance Ratings: Part of ASTM E119 fire tested wall assemblies.
- E. Glass-Fiber Blanket Insulation Schedule:
1. 2 ½" thick at interior walls receiving 2 ½" metal furring walls as indicated in the Drawings.
 2. 3 1/2" thick at interior walls with 3 5/8" metal stud walls as indicated in the Drawings.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

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

3.03 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.04 INSTALLATION OF SOUND ATTENUATION INSULATION

- A. Apply insulation units to substrates by method recommended by the manufacturer. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

3.05 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

END OF SECTION 09 81 16

CLASSIFICATION: **UNCLASSIFIED**

SECTION 09 91 00 – PAINTING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes surface preparation and field painting of the following:
 - 1. Exposed interior items and surfaces.
 - 2. Exposed exterior items and surfaces.
 - 3. Staining and transparent finishes on exposed wood products.
 - 4. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Government or User will select from standard colors and finishes available
- C. Do not paint prefabricated items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - 1. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
- D. Related Sections include the following:
 - 1. Division 05
 - 2. Division 07 Section "Joint Sealants"
 - 3. Division 08 Section "Flush Wood Doors"
 - 4. Division 09 Section "Gypsum Board."

1.03 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section
 - 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 - 2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
 - 3. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.
 - 4. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.

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5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

1.04 SUBMITTALS

- A. Product Data: For each paint system specified. Include block fillers and primers.
 - 1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
 - 3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
- B. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.
- B. Source Limitations: Obtain primers and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

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1.07 PROJECT CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F (10 and 32 deg C).
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F (7 and 35 deg C).
- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.08 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the User.
 - 1. Quantity: Furnish an additional five (5) percent, but not less than 1 gallon of each material and color applied.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in the paint schedules.
- B. Manufacturers Names: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:
 - 1. Sherwin Williams (SW)
 - 2. Or approved equal.

2.02 PAINT MATERIALS

- A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
 - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- C. Colors: Provide color selections made by the Architect.

CLASSIFICATION: **UNCLASSIFIED**

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
 - 1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify the Government about anticipated problems using the materials specified over substrates primed by others.

3.02 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
 - 1. Provide barrier coats over incompatible primers or remove and reprime.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Clay Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content of surfaces or alkalinity of mortar joints to be painted exceed that permitted in manufacturer's written instructions.
- F. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- G. Gypsum Board: Prepare all new gypsum board surfaces to receive paint as described in Gypsum Board, Section 09 29 00.
- H. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent

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or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.

1. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of SSPC-SP 10.
 2. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 3. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
- I. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- J. Wood: Apply wood filler paste to open-grain woods to produce smooth, glasslike finish.
- K. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 3. Use only thinners approved by paint manufacturer and only within recommended limits.
- L. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.03 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the schedules.
 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 3. Provide finish coats that are compatible with primers used.
 4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.

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7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 8. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer on metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
 2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- E. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.
- F. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- G. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

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3.04 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
 - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.05 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
 - 1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.06 PAINT SCHEDULE

- A. Gypsum Board (Walls & Ceilings: non-wet locations)
 - 1st Coat: Primer – (SW) ProMar 200 Zero VOC Interior Latex Primer
 - 2nd Coat: Topcoats – (SW) Pro Mar 200 Zero VOC Interior Latex, Eg-Shel
 - 3rd Coat: Topcoats – (SW) Pro Mar 200 Zero VOC Interior Latex, Eg-Shel
- B. Gypsum Board (Walls & Ceilings: wet locations)
 - 1st Coat: Primer – (SW) ProMar200 Zero VOC Interior Latex primer
 - 2nd Coat: Topcoats – (SW) Pro Industrial Pre-Catalyzed Waterbased Epoxy, Eg-Shel
 - 3rd Coat: Topcoats – (SW) Pro Industrial Pre-Catalyzed Waterbased Epoxy, Eg-Shel
- C. Interior Clay Block & Exposed Concrete Masonry Units
 - Units never coated – Block Fill with (SW) ConFlex Block Filler prior to 1st coat.
 - 1st Coat: Primer (SW) Loxon Concrete & Masonry Primer
 - 2nd Coat: Topcoats – (SW) Pro Industrial Pre-Catalyzed Waterbased Epoxy, Semi-Gloss
 - 3rd Coat: Topcoats – (SW) Pro Industrial Pre-Catalyzed Waterbased Epoxy, Semi-Gloss
- D. Painted Wood Millwork (closet shelving)
 - 1st Coat: Primer – (SW) Premium Wall & Wood Primer
 - 2nd Coat: Topcoats – (SW) Pro Mar 200 Zero VOC Interior Latex, Eg-Shel
 - 3rd Coat: Topcoats – (SW) Pro Mar 200 Zero VOC Interior Latex, Eg-Shel
- E. Stained Wood Millwork and Wood Doors
 - 1st Coat: Minwax Performance Series Tintable Wood Stain
 - 2nd Coat: Minwax Performance Series Fast-Dry Sanding Sealer
 - 3rd Coat: Minwax Performance Series Fast-Dry Oil Varnish, Satin.

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- F. Exterior Concrete (Existing building – exterior)
- 1st coat Block Filler (SW) ConFlex Block Filler
 - 2nd coat Primer (SW) Loxon Concrete & Masonry Primer
 - 3rd coat Topcoat (SW) ConFlex SherLastic Elastomeric Coating
 - 4th coat Topcoat (SW) ConFlex SherLastic Elastomeric Coating
- G. Metal (Electrical panels, mechanical equipment, conduit, etc.)
- 1st Coat Primer – (SW) Kem Kromik Universal Metal Primer B50NZ0006 Brown.
 - 2nd Coat: Topcoats – (SW) Direct-To-Metal Alkyd Enamel Semi-Gloss B55-100 Series.
 - 3rd Coat: Topcoats – (SW) Direct-To-Metal Alkyd Enamel Semi-Gloss B55-100 Series.
- H. Metal (Galvanized stair treads, handrails, decking, door frames, framing, etc. hollow metal doors and interior hollow metal frames)
- 1st Coat Primer – (SW) Pro Industrial Pro-Cryl Primer
 - 2nd Coat: Topcoats – (SW) Pro Industrial Pre-Catalyzed Waterbased Epoxy, Semi-Gloss
 - 3rd Coat: Topcoats – (SW) Pro Industrial Pre-Catalyzed Waterbased Epoxy, Semi-Gloss

END OF SECTION 09 91 00

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 10 – SPECIALTIES

SECTION 10 00 00 – SPECIALTIES

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Specialties and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – SPECIALTIES

CLASSIFICATION: **UNCLASSIFIED**

SECTION 10 14 02 – INTERIOR SIGNAGE

PART 1 - GENERAL

1.01 SUMMARY

- A. Contractor shall provide and install signage interior and exterior as indicated in the drawings.

1.02 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Include plans, elevations, details, and attachments to other Work.
 - 1. Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 2. Provide message list for each sign, including large-scale details of wording, lettering, numbering, symbols and Braille layout.
- C. Samples: For each sign material indicated that involves color selection.
 - 1. Contractor shall prepare list of all room names and room numbers in the facility and provide 4 copies (or e-mail MS Word document) to the Contracting Officer's Representative for verification of all text and room numbers, 14 calendar days prior to ordering signage package for the facility. Contracting Officer's Representative will verify data with User and provide corrected list to the Contractor for final ordering.

1.03 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 PANEL SIGNS

- A. General: Provide panel signs that comply with the requirements listed below.
 - 1. Letter height shall be 1-1/2 in height for Room Numbers and Room Names shall be 3/ 4" in height and all capital letters.
 - 2. Minimum distance from edge of sign to numbering, lettering, Braille and/or symbols shall not be less than 3/ 4".
 - 3. All numbers, letters, symbols shall be 1/ 32" raised and shall be accompanied by Grade 2 Braille.
 - 4. Numbers, symbols and letters shall be bright white.
 - 5. Background sign material shall be plastic. Coordinate color with Government.
 - 6. Signs that receive a printed paper insert should have a clear acrylic cover.
 - 7. All surfaces shall be bright white.
 - 8. All signs shall be in compliance with ANSI 117.1 and shall be the standard product of a sign manufacturer.
 - 9. Total thickness of sign shall not exceed 3/ 4" thick.

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10. Braille, raised letters and symbols shall be integral with sign material and shall not be surface applied or fused.

11. All signs shall have prefinished color matching aluminum frames.

2.02 EXTERIOR BUILDING IDENTIFICATION SIGNS:

A. Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with the following requirements.

1. Provide and install metal building identification sign.
2. Aluminum Sheet: 0.080 inch.
3. Edge Condition: Square cut.
4. Corner Condition: Rounded to radius indicated.
5. Mounting: Unframed.
 - a. Surface mounted.
 - b. Manufacturer's standard noncorroding anchors for substrates encountered.
6. Color: Match existing Base standard.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General Requirements:

1. Signs shall be mounted 3 " away from door frame at the latch side or centerline of door. Horizontal centerline of sign shall be 60" above finish floor or Refer to signage plans for locations.
2. Signs indicated to be mounted on doors shall be mounted at the centerline of the door
3. Sign shall be mechanically mounted to wall; adhesively attached sign systems will not be accepted.
4. Contractor shall prepare list of all room names and room numbers in the facility and provide 4 copies (or e-mail MS Word document) to the Contracting Officer's Representative for verification of all text and room numbers, 14 calendar days prior to ordering signage package for the facility. Contracting Officer's Representative will verify data with User and provide corrected list to the Contractor for final ordering.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 10 26 00 – WALL PROTECTION

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Corner guards.

1.02 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each exposed product and for each color and texture specified.

1.03 QUALITY ASSURANCE

A. Fire Performance Characteristics: Comply with ASTM E 84 for the fire performance characteristics indicated below. Identify components with markings from testing and inspection organization.

1. Flame Spread: 25 or less.
2. Smoke Developed: 450 or less.

B. Single Source Responsibility: Obtain wall surface protection system components from a single source

1.04 DELIVERY AND STORAGE

A. Deliver materials in original factory wrappings and containers, clearly labeled with manufacturer and brand name.

B. Store materials in original undamaged packages and containers inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1. Maintain room temperature within the storage area between 60° F (16° C) and 80° F (27° C) during the period plastic materials are stored. Keep materials out of direct sunlight to avoid excessive surface temperatures.
2. Store rigid plastic corner guards in a horizontal position for a minimum of 72 hours, or until the plastic material attains the ambient room installation temperature of between 65° F (18° C) and 75° F (24° C).

1.05 PROJECT CONDITIONS

A. Maintain ambient temperature within building at not less than 65° F (18° C) or greater than 75° F (24° C) for a minimum 72 hours prior to beginning of installation.

1.06 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Replacement Materials: Minimum 2 percent of each type, color, and pattern of wall of each type, color, and texture of units installed, but no fewer than two, 8-foot-long units. Include accessory components as required. Replacement materials shall be from the same production run as installed materials. Package with protective coverings and appropriate labels.

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PART 2 - PRODUCTS

2.01 MATERIALS

- A. Rigid Plastic Material: Extruded, textured, chemical-and stain-resistant, medium-impact, acrylic modified vinyl plastic, thickness as indicated

- 1. Adhesive: As recommended by wall protection manufacturer.

2.02 CORNER GUARDS

- A. Surface-Mounted, Opaque-Plastic Corner Guards where indicated on the drawings:
Fabricated from PVC plastic, acrylic-modified vinyl sheet or opaque polycarbonate sheet.

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

- a. Koroseal "Korogard" G100 Series Bumper Guard
 - b. Or Approved Equal.

- 2. Thickness: 0.078 inch (1.9mm)

- 3. Leg Length: 2 inch

- 4. Texture: P1 Pebbled Finish

- 5. Retainer: Continuous 6063-T5 aluminum retainer along entire length of Corner Guard, nominal 0.060 inch (1.52mm) thick.

- 6. Color: As indicated in the drawings..

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions in which wall surface protection components and wall protection systems will be installed.
- B. Complete finishing operations, including painting, before beginning installation of wall surface protection system materials.
- C. Wall surfaces to receive impact-resistant wall covering materials shall be dry and free from dirt, grease, loose paint, and scale.
- D. Do not proceed with installations until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Properly prepare substrate and clean to remove dust, debris, and loose particles.

3.03 INSTALLATION

- A. General: Install impact-resistant wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
 - 1. Install impact-resistant wall protection units in locations and at mounting heights where indicated on Drawings.
- B. Immediately after completion of installation, clean plastic covers and accessories using a standard, non-ammonia-based, household cleaning agent.

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- C. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 10 26 00

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 15 – RESERVED

SECTION 15 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Reserved and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION - RESERVED

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 16 – RESERVED

SECTION 16 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – RESERVED

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 17 – RESERVED

SECTION 17 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – RESERVED

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 18 – RESERVED

SECTION 18 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

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1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – RESERVED

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 19 – RESERVED

SECTION 19 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

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1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – RESERVED

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 20 – RESERVED

SECTION 20 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

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1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – RESERVED

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 21 – FIRE SUPPRESSION

SECTION 21 00 00 – FIRE SUPPRESSION

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Fire Suppression and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – FIRE SUPPRESSION

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SECTION 21 13 13.00 10 - SPRINKLER SYSTEMS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Existing sprinkler systems to be replaced in entirety from the stub-in floor flang.
- B. The work under this section shall include necessary design, labor, materials, appliances, and equipment to install complete automatic sprinkler system in accordance with the plans and specifications with no additional cost to Owner unless scope or use of building changes.
- C. Project involves replacing the sprinkler system with wet-pipe serving occupied areas and dry-pipe serving combustible attic.
- D. Provide black steel pipe and nitrogen generator for the attic protection. Ensure that attic pipe is properly supported to the exiting and new roof trusses. Provide additional bracing as necessary to support the weight of water filled pipe plus 250 lbs per NFPA 13.

1.03 DESIGN AND INSTALLATION STANDARDS

- A. NFPA Standard 13 – Automatic Sprinkler Systems, 2022
- B. UFC 3-600-01 Design: Fire Protection Engineering, Change 6, 2021
- C. Other NFPA pamphlets as may apply.
- D. Publications by governing authority as may apply.
- E. Applicable UL publications.

1.04 SUBMITTALS

- A. Product Data: For the following:
 - 1. Piping materials, including pipe and fittings.
 - 2. Pipe hangers and supports, including seismic restraints required by the applicable building code.
 - 3. Valves, including listed fire-protection valves, unlisted general-duty valves, and specialty valves and trim.
 - 4. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.
 - 5. Alarm devices, including electrical data.
 - 6. Backflow prevention and forward flush valves.
- B. Shop Drawings: Drawings shall include elevations, layout, and calculations.

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1. Shall be prepared by the contractor and shall have all applicable information indicated by NFPA 13. Shop drawings shall be prepared in an organized format.
 2. Hydraulic calculations shall be provided with nodes clearly indicated on plans.
- C. Shop drawings, calculations, and product data shall be reviewed and approved by the project fire protection engineer prior to submittal to the government.
- D. Field quality-control test reports including but not limited to pressure testing and flushing.
- E. Operation and Maintenance Data: To include emergency, operation, and maintenance manuals.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications:
1. Shop drawings and hydraulic calculations shall be prepared by a NICET Level III or IV technician in sprinkler systems.
 2. Shop drawings and data shall have the oversight of and be sealed by project Fire Protection Engineer.
- B. Installer Qualifications:
1. Installer's responsibilities include fabricating and installing fire-suppression systems.
 2. Installers shall have at least 3 years field experience of installing sprinkler systems.
 3. Installation shall be supervised by a NICET Level III or IV technician who shall assume responsibility for the final installation.
- C. Substitutions from that indicated are not permitted.

1.06 DESIGN

- A. Plans issued by engineer are diagrammatic, indicating conceptual location of feed mains, sprinkler heads, and owner's space allocation requirements.
- B. Coordinate sprinkler heads so that they are not obstructed in accordance with NFPA 13.
- C. The Contractor shall design a fire protection sprinkler system based on the classification, class and types as noted on the drawings.
- D. Contractor shall be responsible for coordination with all other phases in the contract documents such as mechanical, structural, electrical and architecture systems and shall design to facilitate all features of the building while complying with NFPA requirements.
- E. Where a conflict exists with regards to location of code regulated fire protection and non-code regulated systems, the code regulations shall prevail.
- F. Any conflict between the governing authority and the plans and specifications shall be called to the attention of the contracting officer as soon as possible.

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- G. The contractor/installer is responsible for repair of any damaged fire proofing material related to their installation. Any and all material removed for the installation of hangers, routing of pipe, or other related activities shall be repaired and/or replaced by an individual qualified through documented training to perform such functions.
 - 1. Only UL Listed and/or FM Approved fire stopping/coating material shall be used for protecting structural members or penetrations. Specification sheets and details shall be available for each penetration or coating application.
 - 2. Fire rated penetrations shall be in accordance with the manufactures listed assembly data sheet for the type of penetration.
- H. As-built plans in AutoCAD format, pdf electronic copies, owners' manuals, and a computer disk with drawings shall be provided by the contractor prior to final acceptance.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All materials, equipment, valves, and devices installed and/or furnished under this section shall be listed and/or approved for use in the fire protection installation by the authorities, agencies, codes and standards of the governing agencies.
- B. Underground Components
Not applicable
- C. Above Ground Components
 - 1. Above ground system components shall comply with NFPA 13
 - 2. Above ground wet pipe shall be black steel Schedule 10 2.5" and larger, and Schedule 40 2" and smaller.
 - 3. Provide air relief valve and pressure relief valve per NFPA 13 if not existing.
 - 4. Dry-pipe system shall be black steel piping as above.
 - 5. Nitrogen generator shall be provided for dry-pipe system in accordance with UFC 3-600-01 and NFPA 13.
 - 6. Double-check backflow preventer with forward flow valves shall be provided.
 - 7. Pressure relief valves
 - 8. Air vents per NFPA 13 and piped to user acceptable drain location.
 - 9. Valve labels for ALL valves. This includes trim valves on risers to be labeled as normally open/closed, and function.
 - 10. Pipe paint and labeling per UFC 3-600-01. Dry-pipe shall be specifically identified from wet- pipe.
 - 11. Tamper valve switches per NFPA 13.
- D. Sprinklers:
 - 1. See drawings.
 - 2. All heads in residential sleeping areas to be fast response residential heads.
 - 3. Other heads to be quick response unless indicated otherwise.
 - 4. Attic sprinklers to be listed or approved for the spacing and obstructions present. Temperature rating to be per NFPA 13.
- E. Riser Valves.
 - 1. Wet valve to include all trim, electric bell for water flow, vane-type flow switch, main drain, pressure relief with inspector test, and other criteria per NFPA 13.

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- 2. Dry valve to include all trim, pressure switches, main drain, nitrogen generator, pressure maintenance device, pressure relief, and other criteria per NFPA 13.
- F. If MIC corrosion has been found, suspected, or is known to exist in the area, the engineer shall be contacted prior to bidding project. If discovered or suspected after bid is submitted, work shall stop and engineer shall be notified immediately.
- G. Provide extra sprinkler heads with cabinet and wrench for each type in accordance with NFPA 13.

PART 3 - EXECUTION

3.01 GENERAL

- A. Comply with the requirements of the governing authority, and NFPA 13 for installation of fire sprinkler piping materials and UFC 3-600-01. Install fire sprinkler piping products where indicated, in accordance with the manufacturer's written instructions, and in accordance with recognized industry practices to ensure that fire sprinkler piping complies with requirements and serves its intended purpose.
- B. Coordinate with other work as necessary to interface components of fire sprinkler piping properly with other work.
- C. All sprinkler piping shall be concealed in building construction where possible.
- D. Sprinkler piping shall be installed in a manner and with provisions for flushing of the entire system in accordance with latest NFPA 13 requirements.
- E. Provide pressure relief as part of the trim in accordance with NFPA 13. Drain shall discharge through main drain to exterior.
- F. All piping and valves shall be labeled in accordance with NFPA 13 and UFC 3-600-01.
- G. All piping shall be stenciled / labeled in accordance with UFC 3-600-01.
- H. Provide air release vent per NFPA 13 and piped to approved drain location.
- I. Provide tamper switches for all isolation valves including post indicator valves per NFPA 13.

3.02 PIPE HANGING

- A. Pipe hangers and spacing shall conform to NFPA 13.
- B. Provided all auxiliary steel necessary for the installation of the pipe hangers and supports. All hangers and supports shall meet load and safety factor requirements of NFPA 13.
- C. Any connection to the structural members must be done in a manner as not to overload the members.
- D. Power driven studs and welding studs shall not be used.

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- E. Screws such as Sammy or similar shall be installed per the mfg instructions for the member they are used in. Pipe shall support the weight of water filled pipe plus 250 lbs per NFPA 13.

3.03 TEST AND AUXILIARY DRAINS

- A. Terminate all drains outside where water will not be objectionable, or in another location approved by engineer.
- B. For exterior drains, provide splash block to prevent damage to landscape.

3.04 WARRANTY AND INSPECTION

- A. The contractor shall warranty all components and labor for a period of one-year or as otherwise specified.

3.05 TRAINING

- A. Contractor shall provide user with an overview of new equipment and locations of any new valves.

END OF SECTION 21 13 13.00

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DIVISION 22 – PLUMBING

SECTION 22 00 00 – PLUMBING

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Plumbing and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – PLUMBING

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SECTION 22 05 00 - COMMON METHODS AND MATERIAL FOR PLUMBING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Except as modified in this section, General Conditions, Supplementary Conditions, applicable provisions of Division 1, General Requirements, and other provisions and requirements of the Contract Documents apply to work of Division 22.
- B. Each section included in Division 22 - Mechanical is incomplete without the provisions stated herein.

1.02 CODES

- A. Arkansas Fire Prevention Code, Current Edition, Volumes I, 2, and 3 (based on the International Fire and Building Codes with state amendments)
- B. Arkansas State Plumbing Code
- C. Arkansas Energy Code

1.03 REFERENCES

- A. ASTM D 698 - Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600kN-m/cu. m.)).
- B. ASTM E 814 - Fire Tests of Through-Penetration Fire Stops.
- C. ANSI/IEEE C2 - National Electrical Safety Code.
- D. UL 1479 - Fire Tests of Through-Penetration Firestops.

1.04 DEFINITIONS

- A. Provide: Where the word "provide" is used, the word shall be understood to mean "the Contractor shall furnish and install" the equipment, tests, inspections, etc. referenced.

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- B. Related Work: The sections referenced under RELATED SECTIONS shall be understood to include provisions that directly affect the work being specified in the section where RELATED SECTIONS occurs.
- C. Concealed: Where the word "concealed" is used in conjunction with piping, equipment, and the like, the word shall be understood to mean hidden from sight as in chases, furred spaces, or suspended ceilings.
- D. Exposed: Where the word "exposed" is used, the word shall be understood to mean open to view.

1.05 CONTRACT DRAWINGS

- A. Drawings are generally diagrammatic and are intended to encompass a system that will not interfere with the structural and architectural design of the building. Coordinate work to avoid interferences between piping, equipment, architectural, and structural work.
- B. Coordinate with architectural features, trim and millwork details, and install equipment in cabinets or other special areas as directed by A/E.

1.06 SUBMITTALS

- A. Manufacturers: Listed manufacturers will be acceptable as long as requirements are met. Manufacturers who are not listed as "acceptable manufacturers" bear the burden of proof to A/E that their products comply with specified requirements. Those manufacturers shall agree in writing to bear the cost of A/E time to review compliance with Specifications whether their products are approved or not.
- B. Submittals will be submitted only by Contractor. Indicate by signed stamp that Contract Documents have been checked, that the work shown in the submittals is in accordance with contract requirements and that dimensions and relationship with work of other trades have been checked. Submittals submitted for review that have not been checked and signed by Contractor, will be returned for checking before being considered by the A/E.
- C. Include information relevant to particular equipment or materials to be furnished, where product data published by manufacturer is part of submittal.
- D. Provide documentation of compliance with manufacturer's published literature or drawings or letter signed by officer of manufacturer in cases where compliance with UL, FM, ARI, IRI, or other similar organization standards are required.
- E. Furnish submittals within 45 days after receiving a signed contract and prior to the start of installation.

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- F. Include identifying symbols and equipment numbers used in Contract Documents for all equipment and material submitted.
- G. Cross reference sheet numbers on Drawings for shop drawings. Provide shop drawings consisting of plans drawn to scale, with elevations and sections, to show clearly the location of major items of equipment and clearances for maintenance and code requirements.
- H. Submit only requested submittals complete by types of equipment (i.e., pumps, air handling equipment, etc.) labeled with applicable specification section(s) included. Each submittal will be handled separately. Should any item not be acceptable, the entire submittal will be returned to Contractor for correction and resubmittal. Partial submittals will not be acceptable. The intent of this requirement is that all approved bound sets of data will be identical and will contain only acceptable information.
- I. Submit a compliance sheet for each submittal indicating the submittal is in full compliance with the drawings and specifications. Indicate by drawing number or specification section number and paragraph numbers all exceptions taken and include an explanation.
- J. The review of submittals **does not** relieve or modify Contractor's responsibility for compliance with Contract Documents or dimensions or errors contained in the submittal or quantity count. It is clearly understood that, in the review process, noting of some discrepancies but overlooking others does not grant Contractor permission to proceed in error. Regardless of any information contained in the submittals, Contract Documents govern the work, and are neither waived nor suspended in any way by the review of the submittals.
- K. A minimum review period of two weeks, exclusive of transmittal time, will be required in A/E office for each submittal. Take this time period into consideration when scheduling construction.

1.07 OPERATION AND MAINTENANCE MANUALS.

- A. Furnish four copies of complete operation and maintenance instructions, service manuals and parts list applicable to each manufactured item of equipment furnished. Bind operation and maintenance information in four separate looseleaf binders and deliver to the A/E at least four weeks prior to final review of the project.
- B. Organize binders to contain like equipment such as pumps, piping, valves or air handlers, terminal boxes, condensers, etc., in separate divisions. Provide a complete double index for each binder to include:
 - 1. An alphabetized list of the products by name.

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2. An alphabetized list of manufacturers whose products have been incorporated in the work, together with their addresses and the name, addresses and telephone numbers of the local sales representative or supplier.
- C. For each section of product, equipment or system, organize the data as follows:
1. Furnish a general description of the equipment or system listing the major components, intended service and other general data.
 2. Furnish technical data including nameplate data, design parameters, ratings, capacity, performance data, operating curves, characteristics and the like. Clearly distinguish between information which does and does not apply.
 3. List warnings and cautions to be observed during both installation and operations.
 4. Fully detailed installation and operation instructions including special tools required, alignment instructions, start-up, and shut-down sequences.
 5. Furnish maintenance, service and repair instructions including maintenance and service schedules, materials, and methods for performing routine and annual service.
 6. Furnish a troubleshooting guide and check list indicating common failures, test methods and procedures for determining component fault or failure.
 7. Furnish a spare parts list indicating part and order number with name, address, and telephone number of supplier. Include current prices of replacement parts and supplies.
 8. Furnish diagrams including controls, wiring, installation or operation of the equipment or system.
 9. Furnish copies of all approved submittals. Refer to Section 15051.
 10. Furnish copies of all test reports. Refer to Section 15950.
 11. Print copies of the "AS-BUILT" drawings. Refer to Section 15050.
 12. Furnish all warranties and guarantees.

1.08 PROJECT/SITE CONDITIONS

- A. Site Visitation: Visit the site of the proposed construction to become thoroughly familiar with details of work and working conditions, verify dimensions in the field, and advise A/E of discrepancies before performing Work.
- B. Space Requirements:
1. Consider space limitations imposed by contiguous work in location of equipment and material. Do not provide equipment or material that is not suitable in this respect.
 2. Make changes in equipment location of up to 5 feet, to allow for field conditions prior to actual installation, and as directed by the A/E.
- C. Conceal piping in finished areas, except in mechanical rooms, and where noted otherwise on the drawings. Route pipes through the building without interfering with other contractors' equipment or construction.

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1. Provide maximum possible clear height underneath piping and ductwork.
 2. Install equipment requiring service so that it is easily accessible.
 3. Compare the equipment sizes with the space allotted for installation before installation and make written notice of possible conflict. Disassemble large equipment to permit installation through normal room openings when required. Should written notice not be made in a timely manner, make adjustments and modifications necessary without additional compensation.
 4. Timely place equipment too large to fit through finished openings and stairways.
- D. Site Obstructions:
1. Drawings indicate certain information pertaining to surface and subsurface obstructions that has been taken from available drawings. Such information is not guaranteed as to accuracy of location or completeness of information.
 2. Verify with A/E, utility companies, municipalities, and other interested parties that available information has been provided before cutting or trenching operations are begun. Verify locations given.
 3. Alter routing of new work should obstruction be encountered, whether or not shown on Drawings. Reroute existing lines, remove obstruction where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of the new work and leave existing services and structures in a satisfactory and serviceable condition.
 4. Assume total responsibility for and repair damage to existing utilities caused by construction, whether or not such existing facilities are shown. Repair the lines, if damaged.
- E. Cutting and Patching:
1. Submit written request to A/E in advance of cutting or alterations.
 2. Execute cutting and demolition by methods that will prevent damages to other work and will provide proper surfaces to receive installation of repairs.
 3. Restore work which has been cut or removed; install new products complying with specified products, functions, tolerances, and finishes specified.
 4. Fit work airtight to pipes, sleeves, ducts, and other penetrations through surfaces. For fire-rated penetrations, provide assemblies in accordance with UL 1479 and ASTM E 814 utilizing products and materials equal to rating of surfaces penetrated.

1.09 MATERIALS AND WORKMANSHIP

- A. Provide new materials and equipment by those regularly engaged in the production and manufacture of specified materials and equipment. Where UL or other agency has established standards for materials, provide materials which are listed and labeled accordingly. The commercially standard items of equipment and the specific names mentioned herein are intended to identify

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standards of quality and performance necessary for the proper functioning of the work.

- B. Work shall be performed by workmen skilled in the trade required for the work. Install materials and equipment to present a neat appearance when completed in accordance with the approved recommendations of the manufacturer and in accordance with Contract Documents.
- C. Provide labor, materials, apparatus, and appliances essential to the complete functioning of the systems described or indicated herein, or which may be reasonably implied as essential whether mentioned in the Contract Documents or not.
- D. Make written request for supplementary instructions to A/E in cases of doubt as to Work intended or in the event of need for explanation thereof.
- E. Performance and material requirements scheduled or specified are minimum standards acceptable. The right to judge the quality of equipment that deviates from the Contract Documents remains solely with A/E.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Follow the manufacturer's directions completely in the delivery, storage, and handling of equipment and materials.
- B. Store equipment in a clean, dry place protected from other construction. While stored maintain factory wrapping or tightly cover and protect equipment against dirt, water, construction debris, chemical, physical or weather damage, traffic and theft.
- C. Adequately brace and package equipment to prevent breakage and distortion while in transit.

1.11 EXCAVATION

- A. Trenching:
 - 1. Perform excavation of every description and of whatever substance encountered to depths indicated or specified. Pile materials suitable for backfilling a sufficient distance from banks of trenches to prevent slides or cave-ins. Comply with OSHA requirements for excavation, trenching and shoring. Waste excavated materials not required or satisfactory for backfill. Remove water by pumping or other approved methods, discharge at a safe distance from the excavation.
 - 2. Provide trenches of necessary width for proper laying of pipe and comply with latest publication of OSHA 2226 Excavating and Trenching

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Operations. Coordinate trench excavation with pipe installation to avoid open trenches for prolonged periods. Accurately grade bottoms of trenches to provide uniform bearing and support for each section of pipe on undisturbed soil or the required thickness of bedding material at every point along its entire length.

3. Provide minimum 12 inches between outer surfaces and embankment or shoring that may be used, when excavating for manholes and similar structures. Remove unstable soil that is incapable of supporting the structure in the bottom of the excavation to the depth necessary to obtain design bearing.
4. Material to be excavated is "unclassified". No adjustment in the contract price will be made on account of the presence or absence of rock, shale, masonry, or other materials.
5. Protect existing utility lines that are indicated or the locations of which are made known prior to excavating and trenching and that are to be retained. Protect utility lines constructed during excavating and trenching operations, from damage during excavating, trenching and backfilling; if damaged, repair lines as directed by utilities, Owner, and A/E. Issue notices when utility lines that are to be removed are encountered within the area of operations in ample time for the necessary measures to be taken to prevent interruption of the service.
6. Provide trenches for utilities of a depth that will provide the following minimum depths of cover from existing grade or from indicated finish grades, whichever is lower:
 - a. 1-Foot Minimum Cover: Sanitary sewer, storm drainage, industrial waste, acid waste.
 - b. 2-Foot Minimum Cover: Domestic water, fire line.

B. Backfilling:

1. Backfill trenches after piping, fittings, and joints have been tested and approved.
2. Backfill trenches with sand to provide 6 inches sand below piping and 12 inches sand cover.
3. Backfill remainder of trenches with satisfactory materials consisting of earth, loam, sandy clay, sand, and gravel, or soft shale, free from large clods of earth and stones not over 1-1/2 inches in size, and deposit in 9-inch maximum layers, loose depth as indicated or specified. Take care not to damage utility lines.
4. Deposit remainder of backfill materials in trench in 1-foot maximum layers, and compact by mechanical means. Re-open trenches and excavation pits improperly backfilled or where settlement occurs to depth required to obtain specified compaction, refill and compact with surface restored to required grade and compaction.
5. Backfill trench utility line with sand backfill material in 6-inch layers, where trenches cross streets, driveways, building slabs, or other pavements. Moisten each layer and compact to 95 percent of the maximum soil density as determined by ASTM D 698. Accomplish backfilling in such a manner as to permit the rolling and compaction of the filled trench with the adjoining material to provide the required bearing value so that paving of the area can proceed immediately after backfilling is complete.

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1.12 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Provide malleable iron, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 to 4 Inches and Cold Pipe Sizes 6 Inches and Over: Carbon steel, adjustable, clevis.
- C. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll.
- D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand for hot pipe sizes 6 inches and over.
- E. Vertical Support: Steel riser clamp.
- F. Floor Support for Pipe Sizes to 4 Inches and All Cold Pipe Sizes: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.
- G. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
- H. Design hangers without disengagement of supported pipe.
- I. Copper Pipe Support and Hangers: Carbon steel ring, adjustable, copper plated.
- J. Shield for Insulated Piping 2 Inches and Smaller: 18 gage galvanized steel shield over insulation in 180-degree segments, minimum 12 inches long at pipe support.
- K. Shield for Insulated Piping 2-1/2 Inch and Larger (Except Cold Water Piping): Use pipe covering protective saddles.
- L. Shields for Insulated Cold Water Piping 2-1/2 Inch and Larger: Galvanized steel shields in 180-degree segments in accordance with following table:

Pipe	Metal Gage	Shield Length
2 1/2" to 5"	16	12"
6" to 12"	14	24"

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Pipe	Metal Gage	Shield Length
Over 12"	12	24"

- M. Shields for Vertical Copper Pipe Risers: Sheet lead.

1.13 INSERTS

- A. Provide malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

1.14 FLASHING

- A. Metal Flashing: 26 gage galvanized steel.
- B. Lead Flashing: 5 pounds per square foot sheet lead for waterproofing; 1 pound per square foot sheet lead for soundproofing.
- C. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.
- D. Caps: Steel, 22 gage minimum; use 16 gage at fire resistant elements.

1.15 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 16 gage galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Above Grade: Form with 18 gage galvanized steel.
- C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Provide prefabricated fire rated sleeves including seals, UL listed; or provide Schedule 40 galvanized steel, sized for minimum 1 inch space between sleeve and carrier pipe.
- D. Sleeves for Pipes Through Floor Supporting Riser Piping: Standard weight galvanized steel pipe.
- E. Sleeves for Pipes Through Roof: Standard weight galvanized steel pipe.
- F. Sleeves for Round Ductwork: Form with galvanized steel.

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- G. Sleeves for Rectangular Ductwork: Form with galvanized steel or wood.
- H. Provide fire-stop compound at all penetrations of floor slabs or firewalls such that fire rating integrity of barrier is not lessened.
- I. Caulk: Caulk all sleeves water and airtight.
- J. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping. Provide pipe sleeves one size larger than the pipe it serves, including insulation, except where "Link Seal" casing seals are used.
- K. Sleeves Penetrating Walls Below Grade: Standard weight black steel pipe with 1/4-inch thick steel plate secured to pipe with continuous fillet weld. Provide plate that is 4 inches wider all around than the sleeve it encircles. Hot dip galvanize entire sleeve assembly after fabrication.

1.16 ANCHOR BOLTS

- A. Provide galvanized anchor bolts for equipment placed on concrete pads or on concrete slabs, of size and number recommended by manufacturer of equipment.

1.17 FASTENERS

- A. Adhesive Anchoring System for Pipe Supported from Existing Solid Base Material:
 - 1. Anchor Rods: ASTM A 193, Grade B7, Type 2, threaded both ends.
 - 2. Injection Adhesive: Hilti, Inc., "HIT HY 150".

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Anchor Diameter	Embedment Depth	Tension (pounds)	Shear (pounds)
3/8-inch	1-3/4 inches	596	872
3/8-inch	3-1/2 inches	976	872
1/2-inch	2-1/8 inches	780	1548
1/2-inch	4-1/4 inches	968	1548
5/8-inch	2-1/2 inches	960	1984
5/8-inch	3-3/8 inches	1408	2420

- B. Expansion Anchoring System for Pipe Supported from Existing Solid Base Material:
1. Expansion Anchors: CID A-A-1923, Type 4, stud type, zinc plated in accordance with ASTM B 633.
 2. Product: Hilti, Inc., "Kwik Bolt II Expansion Anchor".

Anchor Diameter	Embedment Depth	Tension 2,000 psi (pounds)	Shear 2,000 psi (pounds)
1/4-inch	1-1/8 inches	180	320
1/4-inch	Greater than or equal to 2 inches	260	400
3/8-inch	1-5/8 inches	340	620
3/8-inch	Greater than or equal to 2-1/2 inches	500	1100
1/2-inch	2-1/4 inches	580	1120
1/2-inch	Greater than or equal to 3-1/2 inches	880	1840
5/8-inch	2-3/4 inches	900	2000
5/8-inch	Greater than or equal to 4 inches	1320	2840
3/4-inch	3-1/4 inches	1260	2600
3/4-inch	Greater than or equal to 4-3/4 inches	1760	3760

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1.18 WELDING

- A. Weld piping and above grade steel tanks in accordance with qualified procedures using performance qualified welders and welding operators. Qualified procedures and welders in accordance with ASME Section IX. Welding procedures qualified by others and welders and welding operators qualified by another employer may be accepted as permitted by ANSI B31.1. Notify the A/E 24 hours in advance of tests, and perform the tests at the work site if practicable. Furnish A/E with a copy of qualified procedures and a list of names and identification symbols of qualified welders and welding operators. Apply welders or welding operators assigned symbols near each weld they make as permanent record.

1.19 PAINTING

- A. Properly prepare surfaces to receive paint. Prime prepared surfaces and finish with two coats of exterior oil base paint. Verify primer and paint are rated for application.
- B. Repair damage to factory painted finishes.
- C. Remove splattered and incidental paint from mechanical equipment.

1.20 NOISE AND VIBRATION

- A. Provide the entire operating system and its component items of equipment free of objectionable vibration or noises. Refer to ASHRAE handbook for recommended noise criteria (NC) unless otherwise noted. Statically and dynamically balance rotating equipment, and mount or fasten so that no equipment vibration will be transmitted to the building. If objectionable noise or vibration is produced or transmitted to or through the building structure by equipment, piping, ducts, or other parts of work, rectify such conditions at no additional compensation.

1.21 OPERATING INSTRUCTIONS

- A. Provide services of authorized representatives of manufacturer to ensure that the equipment is installed according to the manufacturer's recommendations, is operating properly, and to instruct Owner's operating personnel during start-up and operating tests of complete mechanical systems. Prove operation of equipment to A/E. Notify A/E seven days prior to beginning equipment start-up.
- B. Certify in writing that these services have been performed.

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1.22 PROJECT RECORD DOCUMENTS

- A. Maintain a set of Contract Documents at the job site for the purpose of recording final size, location, and interrelation of work under this Division. Mark this set of drawings as the job progresses to indicate "as-built" location of equipment, including concealed piping, valves, and ductwork.
- B. Clearly and accurately delineate work by dimensions on record drawings as installed, with equipment locations identified by at least two dimensions to permanent structures.
- C. Provide certified final record drawings, marked "AS-BUILT," and signed and dated by Contractor at conclusion of project.

1.23 FINAL REVIEW

- A. Obtain necessary Certificates of Occupancy from local authorities.
- B. Submit final approved operation and maintenance manuals including approved submittals, test reports, and "AS-BUILT" drawings prior to requesting final payment. Delivery of operation and maintenance manuals is a condition of final acceptance.

1.24 GUARANTEE

- A. Guarantee materials, parts, and labor for Work for one year from the date of issuance of occupancy permit. During that period, make good faults or imperfections that may arise due to defects or omissions in materials or workmanship with no additional compensation and as directed by A/E.
- B. Certain items of equipment, such as small sealed refrigeration units, are covered by the manufacturer's warranty of longer durations.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

CLASSIFICATION: **UNCLASSIFIED**

3.01 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as follows:

Pipe Size	Max. Hanger Spacing	Hanger Diameter
1/2" to 1-1/4"	6'-6"	3/8"
1-1/2" to 2"	10'-0"	3/8"
2-1/2" to 3"	10'-0"	1/2"
4" to 6"	10'-0"	5/8"
8" to 12"	14'-0"	7/8"
14" and Over	14'-0"	1"
PVC (All Sizes)	6'-0"	3/8"
C.I. Bell and Spigot (or No-Hub)	5'-0" and at Joints	

- B. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
- C. Place a hanger within 12 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with 5-foot maximum spacing between hangers.
- F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. Provide corrosion resistant hangers for piping hangers in corrosive areas. Provide hanger rods, bolts, nuts, and metal parts coated with same material as hangers.

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3.02 INSERTS

- A. Provide inserts for placement in concrete formwork.
- B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- D. Where concrete slabs form finished ceiling, provide inserts flush with slab surface.
- E. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.03 FLASHING

- A. Provide flexible flashing and metal counterflashing where sleeves, piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked 1-inch minimum into hub, 8 inches minimum clear on sides with 24-inch by 24-inch sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counterflash and seal.
- C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36-inch by 36-inch sheet size. Fasten flashing to drain clamp device.
- D. Seal floor drains watertight to adjacent materials.
- E. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms, installed in accordance with manufacturer's instructions for sound control.
- F. Flexible sheet flash and counterflash curbs for mechanical equipment on roof with sheet metal; seal watertight.

3.04 SLEEVES

- A. Provide sleeves for all pipe penetrations through walls, roof or slab above grade.

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- B. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- C. Extend sleeves through floors 2 inches above finished floor level. Caulk sleeves full depth and provide floor plate.
- D. Where piping or ductwork penetrates floor, ceiling or wall, close off space between pipe or duct and adjacent work with fire stopping insulation and seal airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration. When penetration is through a fire rated floor or wall, provide fire safing insulation so that the assembly when complete is UL listed and equals the fire rating of construction penetrated by the sleeve.
- E. Install chrome plated steel escutcheons at finished surfaces.
- F. Provide three 6 inch long reinforcing rods welded at 120-degree spacing to the sleeve on all sleeves supporting riser piping 4 inches and larger. Embed reinforcing rods in concrete or grout to existing concrete.
- G. Install sleeve assembly for walls below grade with 1/4-inch thick plate located in the middle of the wall.
- H. Neatly cut holes in existing walls, floors and roofs for placement of sleeves. Place sleeve and grout, and caulk annular space to provide finished appearance.
- I. Install pipe in sleeve so that neither the pipe nor its insulation touches the sleeve at any point.
- J. Seal space between pipe and sleeve watertight for all sleeves penetrating the roof.

3.05 ANCHOR BOLTS

- A. Locate position of anchor bolts by means of suitable templates.
- B. When equipment is placed on vibration isolators, secure equipment to the isolator and the isolator to the floor, pad or support as recommended by the vibration isolator manufacturer.

3.06 INSULATION SHIELDS

- A. Provide insulation shields at every hanger support.

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- B. Provide shields of the proper length to distribute weight evenly and to prevent sagging or indentation of insulation at hanger.
- C. Install shield so that hanger is placed at the center of the shield.
- D. Attach shield to insulation with adhesive to prevent slippage or movement; refer to Section 220700.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 22 07 00 - PIPING INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Thermal insulation for mechanical and plumbing piping systems including jackets and accessories.
- B. Mechanical system includes horizontal roof drains and waste lines that receive condensate from air handling units or evaporators as well as thermal system piping.

1.02 RELATED SECTIONS

- A. Section 220500 – Common Materials and Methods for Plumbing
- B. Section 221100 – Plumbing Piping.

1.03 REFERENCES

- A. ASTM B 209 - Aluminum and Aluminum-alloy Sheet and Plate.
- B. ASTM C 177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
- C. ASTM C 195 - Mineral Fiber Thermal Insulation Cement.
- D. ASTM C 533 - Calcium Silicate Block and Pipe Thermal Insulation.
- E. ASTM C 547 - Mineral Fiber Preformed Pipe Insulation.
- F. ASTM C 552 - Cellular Glass Block and Pipe Thermal Insulation.
- G. ASTM E 84 - Surface Burning Characteristics of Building Materials.
- H. ASTM E 96 - Water Vapor Transmission of Materials.

1.04 SUBMITTALS

- A. Include product description, list of materials, and thickness for each service and locations.
- B. Include detail drawings of insulation dams.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in piping insulation application with three years' minimum experience.
- B. Materials: Composite flame spread/smoke developed rating of 25/50 in accordance with ASTM E 84; includes jackets, adhesives, facing, coatings, and mastics.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesive and insulation.

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PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Insulation:
 - 1. Armstrong.
 - 2. Certainteed Corporation.
 - 3. Knauf Fiber Glass.
 - 4. Manville Corporation.
 - 5. Owens-Corning Fiberglass Corporation.
 - 6. Pittsburgh Corning.
 - 7. Rubatex.
- B. Jackets:
 - 1. Childers.
 - 2. Manville Corporation.
 - 3. Premetco.

2.02 INSULATION

- A. Type A: Mineral fiber or fiberglass preformed insulation; ASTM C 547; 'k' value of 0.26 at 75 degrees F; noncombustible.

2.03 JACKETS

- A. Interior:
 - 1. Type A Insulation: Provide factory applied white kraft foil vapor barrier.
 - 2. Insulate fittings, joints and valves with molded insulation of like material and thickness as adjoining pipe. Use insulating cement to fill voids and cracks. Finish with glass or canvas cloth and finish coat. PVC jackets may be used with glass cloth and finish coat.
- B. Jacket Materials:
 - 1. Factory Applied Jackets: White kraft bonded to reinforced foil vapor barrier with self-sealing adhesive joints.

2.04 ACCESSORIES

- A. Insulation Bands: 3/4-inch wide; 0.015-inch thick galvanized steel, stainless steel or 0.007-inch thick aluminum.
- B. Metal Jacket Bands: 3/8-inch wide; 0.015-inch thick aluminum or 0.010-inch thick stainless steel to match jacket.
- C. Insulating Cement: ASTM C 195; hydraulic setting mineral wool; Ryder One-Coat.

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- D. Sealants: Used at valves, fittings and where insulation is terminated. Sealant is brush applied to end of insulation and continued along pipe surface. Provide Childers CP-76.
- E. Adhesives: Used to adhere the longitudinal lap seam of vapor barrier jackets and at butt joints between insulation or fitting covers. Provide Childers CP-82 as general purpose adhesive. Use Childers CP-97 fibrous adhesive for calcium silicate or when adhering pipe saddles and shields to the insulation.
- F. Primers: Provide Childers CP-53 primer to cover insulating cements prior to finishing coating.
- G. Finish: Provide Childers CP-33 as a general purpose finish to coat the longitudinal seams and butt joints of vapor barrier jackets or glass cloth jackets. Use Childers CP-52 AHV2 reinforced with glass cloth as an adhesive and sizing for canvas and in other locations as indicated.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean surfaces to be insulated and install insulation material after performance tests for piping have been completed and approved.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Continue insulation with vapor barrier through penetrations.
- C. In exposed piping, locate insulation and cover seams in least visible locations.
- D. Insulate fittings, valves, flanges and strainers. On flexible connections, expansion joints and unions, bevel and seal ends of insulation and continue sealant a minimum of 4 inches along the piping.
- E. On insulated piping conveying fluids between 100 degrees F and 140 degrees F, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation at such locations. Continue sealant a minimum of 4 inches along the piping.
- F. Provide dams in insulation at intervals not to exceed 20 feet to prevent migration of condensation or leakage.
- G. Provide an insert, except where pipe covering protection saddles are specified, not less than 12 inches long, of same thickness and contour as adjoining insulation, between support shield and piping, but under the finish jacket, on piping 2-1/2 inch diameter or larger, to prevent insulation from sagging at support points. Provide inserts for 180-degree arc and not less than the length of the pipe shield manufactured of cork, cellular glass or other heavy density insulating material suitable for the planned temperature range. Factory fabricated inserts may be used. Adhere pipe shield to insulation with adhesive.
- H. Neatly finish and seal all insulation at supports, protrusions and interruptions. Maintain water vapor retarder with mastic.

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3.03 SCHEDULE

Piping	Type	Pipe Size	Insulation Thickness
Domestic Cold Water, Hot Water, Tempered Domestic Water, and Hot Water Return Piping.	A	1-1/2" & Smaller	1"
		2" to 4"	1-1/2"
		5" & Larger	2"

END OF SECTION

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SECTION 22 11 00 - PLUMBING PIPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Sanitary drainage and vent piping systems and domestic water piping, including valves and fittings.
- B. Miscellaneous apparatus attached to plumbing piping systems.

1.02 RELATED SECTIONS

- A. Section 220500 – Common Materials and Methods for Plumbing

1.03 REFERENCES

- A. ASME A112.26.1M - Water Hammer Arresters.
- B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- D. ASME B16.23 - Cast Copper Alloy Solder Joint Drainage Fittings - DMV.
- E. ASTM D2665 Poly Vinyl Chloride (PVC) Plastic Drain, Waste and Vent Pipe and Fittings
- F. ASTM D2729 Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings
- G. ASSE 1011 - Hose Connection Vacuum Breakers.
- H. ASSE 1013 - Backflow Preventers, Reduced Pressure Principle.
- I. ASSE 1019 - Wall Hydrants, Frost-Proof Automatic Draining Anti-Backflow Types.
- J. ASTM B 32 - Solder Metal.
- K. ASTM B 88 - Seamless Copper Water Tube.

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- L. MSS SP-110 - Ball Valves, Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.04 SUBMITTALS

- A. Include data on pipe materials, pipe fittings, and special fabricated items.
- B. Include component sizes, rough-in requirements, service sizes and finishes for specialties.
- C. Provide operation and maintenance manual.

1.05 QUALITY ASSURANCE

- A. For each product specified, provide components by same manufacturer throughout project.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Valves: Apollo, Crane, De Zurik, Nibco, Stockham.
- B. Floor Drains: Jay R. Smith, Josam, Tyler/Wade, Zurn.
- C. Cleanouts: Jay R. Smith, Josam, Tyler/Wade, Zurn.
- D. Water Hammer Arresters: Precision Plumbing Products, Watts, Tyler/Wade.
- E. Hose Bibbs/Hydrants: Chicago, Tyler/Wade, Josam, Woodford, Zurn.

2.02 SANITARY SEWER AND VENT PIPING

- A. Below Grade Within 5 Feet of Building:
 - 1. PVC plastic pipe, Schedule 40, Class 12454-B (PVC 1120), ASTM D1785; PVC plastic drain, waste and vent pipe and fittings, ASTM D2665; socket fitting patterns, ASTM D3311; primer, ASTM F656; solvent cement, ASTM D2564.

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- B. Above Grade:
 - 1. PVC plastic pipe, Schedule 40, Class 12454-B (PVC 1120), ASTM D1785; PVC plastic drain, waste and vent pipe and fittings, ASTM D2665; socket fitting patterns, ASTM D3311; primer, ASTM F656; solvent cement, ASTM D2564.

2.03 WATER PIPING

- A. Below Grade Beyond 5 Feet of Building:
 - 1. Copper Tubing: ASTM B 88, Type K, hard drawn.
 - a. Fittings: ASME B16.18 cast bronze or ASME B16.22 wrought copper or bronze.
 - b. Joints: AWS A5.8 BCuP silver braze (lead free).
- B. Below Grade Within 5 Feet of Building:
 - 1. Pipe 2 Inches and Smaller; Copper Tubing: ASTM B 88, Type K, annealed.
 - a. Fittings: None.
 - b. Joints: AWS A5.8 BCuP silver braze (lead free).
- C. Above Grade:
 - 1. Pipe 2-1/2 Inches and Smaller; Copper Tubing: ASTM B 88, Type L, hard drawn.
 - a. Fittings: ASME B16.18, cast bronze, or ASME B16.22 wrought copper and bronze.
 - b. Joints: ASTM B 32, solder, Grade 95TA (lead free).
 - 2. Pipe Over 2-1/2 Inches
 - a. Copper Tubing: ASTM B 88, Type K, hard drawn.
 - 1) Fittings: ASME B16.18, cast bronze or ASME B16.22, wrought copper and bronze.
 - 2) Joints: AWS A5.8 BCuP silver braze (lead free).

2.04 VALVES

- A. Ball Valves:
 - 1. 2 Inches and Smaller: Bronze body, full port, chrome plated brass/bronze ball, teflon seats, separate packnut with adjustable stem packing, rated 150 pounds per square inch steam and 600 WOG, solder or threaded ends. Valve ends shall have full depth ANSI threads or extended solder connections and be comply with MSS SP-110. Provide with balancing stops on hot water return line.
 - 2. Over 2 Inches: Cast steel body, Class 150 stainless steel ball and stem, teflon seat and stuffing box seals, lever handle, flanged ends.

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2.05 DRAINS

- A. Refer to fixture schedule.

2.06 CLEANOUTS

- A. Interior Service Floor Areas and Exterior Areas: Round coated cast iron floor cleanout with internal gasketed ABS cleanout plug and adjustable ABS housing with scoriated secured round satin nickel-bronze top. Provide satin finish bronze top.
- B. Interior Finishes Floor Areas: Square coated cast iron floor cleanout with internal gasketed ABS cleanout plug and adjustable ABS housing with secured scoriated square satin nickel-bronze top. Provide satin finish bronze top, secured vandal proof cover screws, clamp ring and flange.
- C. Interior Finished Wall Areas: Round stainless steel wall access cover with center screw, coated cast iron cleanout tee with hub and spigot connection and recessed bronze tapped plug. Provide secured cover vandal proof screw.

2.07 BACKFLOW PREVENTERS

- A. Reduced Pressure Backflow Preventer Assembly (High Hazard Applications): ASSE 1013, USC FCCC HR, and CSA B64.5.
 - 1. 3/4-inch to 2-inch: Bronze body, modular design with replaceable seats, two independent check valves with intermediate relief valve, ball valve test cocks, 1/4-turn full port resilient seated bronze ball valves, bronze strainer, soft seated check valve; Watts No. 909QT with 601 check.
 - 2. 2-1/2 inch to 10-inch: Iron body, removable bronze seats, two independent check valves with intermediate relief valve, external sensing line, stainless steel internal parts, cast iron check valve bodies, 125 lb. cast iron strainer, and nonrising stem gate valve shutoffs; Watts No. 909S.

2.08 ESCUTCHEONS

- A. Provide escutcheons at finished surfaces where bare or insulated piping exposed to view passes through floors, walls or ceilings, except in boiler, utility or equipment rooms. Fasten securely to pipe or pipe covering. Provide satin finish, corrosion resisting steel, polished chromium-plated zinc alloy or polished chromium-plated copper alloy of the one-piece or split-pattern held in place by internal spring tension or setscrew.

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2.09 WATER HAMMER ARRESTERS

- A. ASME A112.26.1M; sized in accordance with PDI WH-201, factory precharged suitable for operation in temperature range of minus 33 to 300 degrees F and maximum 250 pounds per square inch-gage working pressure.

2.10 HOSE BIBBS/HYDRANTS

- A. Hose Bibb: Chrome plated brass construction with hose thread spout, adjustable packing nut with deep stem guard, with vacuum breaker in accordance with ASSE 1011.
- B. Wall Hydrants (WH-A): ASSE 1019; concealed type, non-freeze, self-draining type with chrome plated brass casting, lockable recessed box, hose thread spout, stainless steel operating stem, removable key and vacuum breaker; Woodford Model No. B65.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Coordinate forming of floor construction to receive drains to required invert elevations.

3.02 INSTALLATION

- A. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- B. Route piping in orderly manner and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations.

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- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Provide clearance for installation of insulation and access to valves.
- G. Provide access where valves and fittings are not exposed.
- H. Establish elevations of buried piping outside the building to be below "frost line," but not less than 18 inches.
- I. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- J. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting.
- K. Establish invert elevations, slopes for drainage to 1/8-inch per foot (nominally 1 percent) minimum, as shown on Drawings. Maintain gradients.
- L. Excavate and backfill in accordance with the mechanical general provisions.
- M. Install hub and plain end pipe with hub end upstream.
- N. Install valves with stems upright or horizontal, not inverted.
- O. Use grooved mechanical couplings and fasteners only in accessible locations.
- P. Install unions downstream of valves and at equipment or apparatus connections.
- Q. Install brass male adapters each side of valves in copper pipe system. Sweat solder adapters to pipe.
- R. Install ball or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- S. Install ball or butterfly valves for throttling, bypass, or manual flow control services.
- T. Provide spring loaded check valves on discharge of water pumps.
- U. Slope water piping and arrange to drain at all low points.

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- V. Install piping parallel with or at right angles to walls unless otherwise shown on drawings.
- W. Conceal piping above ceiling, in walls or chases, etc., unless otherwise noted on the drawings.
- X. Bending of rigid piping is not permitted, only ells shall be utilized for a change in direction.
- Y. Temporarily plug or cap open ends of pipe at the end of each work day.

END OF SECTION

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SECTION 22 42 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Water closets, urinals, lavatories, sinks, electric water coolers, mop sinks, service sinks, showers, emergency showers, emergency eyewash, and emergency shower/eyewash combination.

1.02 RELATED SECTIONS

- A. Section 220500 – Common Materials and Methods for Plumbing

1.03 SUBMITTALS

- A. Include fixtures, sizes, utility sizes, trim and finishes.
- B. Provide operation and maintenance manual.

1.04 QUALITY ASSURANCE

- A. Fixtures: By same manufacturer for each type product specified throughout unless noted otherwise.
- B. Trim: By same manufacturer for each product specified throughout unless noted otherwise.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store fixtures in shipping containers with labelling in place.
- B. Handle fixtures with care to insure against breakage.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Fixtures: American Standard, Eljer, Kohler.
- B. Fixture Trim: Chicago, Kohler, Speakman, T&S, Zurn Industries.
- C. Flush Valves: Delany, Sloan, Zurn Industries.
- D. Water Closet Seats: Church, Kohler, Church, Olsonite.
- E. Fixture Carriers: Jay R. Smith, Josam, Tyler/Wade, Zurn Industries.
- F. Electric Water Coolers: Halsey Taylor, Elkay, Acorn Aqua.
- G. Emergency Eyewash Showers: Bradley, Haws, Speakman.

2.02 FIXTURES

- A. Refer to fixture schedule for equipment required.

2.03 WATER CLOSETS

- A. Flush Valve (if required): Exposed chrome plated, diaphragm type with oscillating handle, escutcheon, seat bumper, integral screwdriver stop and vacuum breaker (water saver 1.6 gallon flush cycle maximum) manufactured by Sloan.

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- B. Seat: Solid white plastic, open front, extended back, self-sustaining check hinge, brass bolts, without cover.
- C. Wall Mounted Carrier (wall hung fixtures): Adjustable cast iron frame, integral drain hub and vent, adjustable spud, lugs for floor and wall attachment, threaded fixture studs with nuts and washers.
- D. Supplies (tank type fixtures): McGuire No. 169LK tank supply assembly with angle valve, escutcheon and chrome plated tube riser.

2.04 URINALS

- A. Urinal: Provide units with integral trap, stainless steel strainer, 3/4-inch top spud, 2-inch IPS outlet, steel supporting hanger, and removable beehive strainer.
- B. Flush Valve: Exposed chrome plated, diaphragm type with oscillating handle, escutcheon, integral screwdriver stop, vacuum breaker; 1.5 gallons per minute flush manufactured by Sloan.
- C. Wall Mounted Carrier: Cast iron and steel frame with rectangular uprights, block bases for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.

2.05 LAVATORIES

- A. Basin and faucet as noted on the fixture schedule. Drilling widths shall be equal to the faucet noted on the schedule. Unless otherwise indicated, strainer shall be 1-1/4 inch chrome plated cast brass tailpiece with flat perforated open grid strainer.
- B. P-Trap: McGuire 8872 cast brass P-Trap with cast brass nuts and cleanout plug and a tubing drain to the wall with escutcheon.
- C. Stops: McGuire 170 with loose key angle stop, 1/2-inch copper 5-inch extension tube and chrome plated bell escutcheon and 3/8-inch outside diameter by 12-inch chrome riser.

Carrier (wall hung fixtures): floor mounted with concealed arms, leveling and securing screws, structural uprights and block bases.

- D. Protective Pipe Cover (ADA fixtures): Truebro, "LavGuard" ADA compliant, molded wheelchair accessible lavatory P-trap and angle valve antimicrobial undersink protective pipe cover; reusable fasteners; locking lid type cover on angle stop; white.

2.06 SINKS

- A. Basin and faucet as noted on the fixture schedule. Drilling widths shall be equal to the faucet noted on the schedule. Unless otherwise indicated, strainer shall be 1-1/4 inch chrome plated cast brass tailpiece with flat perforated open grid strainer.
- B. P-Trap: McGuire 8872 cast brass P-Trap with cast brass nuts and cleanout plug and a tubing drain to the wall with escutcheon.
- C. Stops: McGuire 170 with loose key angle stop, 1/2-inch copper 5-inch extension tube and chrome plated bell escutcheon and 3/8-inch outside diameter by 12-inch chrome riser.

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- D. Protective Pipe Cover (ADA fixtures): Truebro, "LavGuard" ADA compliant, molded wheelchair accessible lavatory P-trap and angle valve antimicrobial undersink protective pipe cover; reusable fasteners; locking lid type cover on angle stop; white.

2.07 ELECTRIC WATER COOLERS

- A. Electrical Water Cooler: Type, size, and capacity as noted on the fixture schedule. Unit shall include hermetic compressor with air cooled condenser; compressor motor, 115 volt, single-phase, 60 hertz.
- B. P-Trap: McGuire 8872 chrome plated cast brass P-trap with tubing drain to wall, cleanout and escutcheon.
- C. Supplies: McGuire No. 160, straight stop valve with loose key and escutcheon. Provide necessary copper tubing.
- D. Carrier: floor mounted with hanger plate, adjustable support rods, structural uprights and block bases.

2.08 SERVICE SINKS

- A. Service Sink: Provide fixture with cast brass drain body fitted with stainless steel strainer, lint basket and a self-draining stainless steel top.
- B. Faucets: Speakman SC-5811-USA mixing faucet with vacuum breaker, integral stops, adjustable wall brace, pail hook and 3/4-inch hose threads.
- C. Hose and Hose Bracket: Fiat 832-AA 30-inch long flexible heavy-duty rubber hose and stainless steel rubber grip.
- D. Mop Hanger: Fiat 889-CC, 24 inches long by 3 inches wide, stainless steel with three rubber tool grips.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Review millwork shop drawings. Confirm location with architectural drawings and size of fixtures and openings before rough-in and installation.
- B. Verify adjacent construction is ready to receive rough-in work of this Section.

3.02 INSTALLATION

- A. Install each fixture with trap, unless noted otherwise on the drawings, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall carriers and bolts.
- E. Seal fixtures to wall and floor surfaces with sealant as specified in Division 7 - Waterproofing; color to match fixture.

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- F. Mount fixtures to the following heights above finished floor:
1. Water Closet:
 - a. Standard: 15 inches to top of bowl rim.
 - b. Handicapped: 17 to 19 inches to top of seat.
 2. Urinal:
 - a. Standard: 24 inches to top of bowl rim.
 - b. Handicapped: 17 inches to top of bowl rim.
 3. Lavatory Wall-Hung:
 - a. Standard: 31 inches to top of bowl rim.
 - b. Handicapped: 34 inches to top of bowl rim.
 4. Electric Water Cooler:
 - a. Standard: 40 inches to top of basin rim.
 - b. Handicapped: 36 inches to spout.
 5. Water Closet Flush Valves: 11 inches minimum above bowl rim, oriented away from adjacent wall at handicapped water closets.

3.03 ADJUSTING AND CLEANING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.
- B. At completion clean plumbing fixtures and equipment.
- C. Solidly attach water closet carrier feet to floor with all screws, as recommended by manufacturer.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 23 – HEATING VENTILATING AND AIR CONDITIONING

SECTION 23 00 00 – HEATING VENTILATING AND AIR CONDITIONING

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Heating, Ventilating and Air Conditioning and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – HEATING VENTILATING AND AIR CONDITIONING

CLASSIFICATION: **UNCLASSIFIED**

SECTION 23 05 00 - COMMON METHODS AND MATERIAL FOR HVAC

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Except as modified in this section, General Conditions, Supplementary Conditions, applicable provisions of Division 1, General Requirements, and other provisions and requirements of the Contract Documents apply to work of Division 23.
- B. Each section included in Division 23 - Mechanical is incomplete without the provisions stated herein.

1.02 REFERENCES

- A. ASTM D 698 - Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600kN-m/cu. m.)).
- B. ASTM E 814 - Fire Tests of Through-Penetration Fire Stops.
- C. ANSI/IEEE C2 - National Electrical Safety Code.
- D. UL 1479 - Fire Tests of Through-Penetration Firestops.

1.03 DEFINITIONS

- A. Provide: Where the word "provide" is used, the word shall be understood to mean "the Contractor shall furnish and install" the equipment, tests, inspections, etc. referenced.
- B. Related Work: The sections referenced under RELATED SECTIONS shall be understood to include provisions that directly affect the work being specified in the section where RELATED SECTIONS occurs.
- C. Concealed: Where the word "concealed" is used in conjunction with piping, equipment, and the like, the word shall be understood to mean hidden from sight as in chases, furred spaces, or suspended ceilings.

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- D. Exposed: Where the word "exposed" is used, the word shall be understood to mean open to view.

1.04 CONTRACT DRAWINGS

- A. Drawings are generally diagrammatic and are intended to encompass a system that will not interfere with the structural and architectural design of the building. Coordinate work to avoid interferences between piping, equipment, architectural, and structural work.
- B. Coordinate with architectural features, trim and millwork details, and install equipment in cabinets or other special areas as directed by A/E.

1.05 PROJECT/SITE CONDITIONS

- A. Site Visitation: Visit the site of the proposed construction to become thoroughly familiar with details of work and working conditions, verify dimensions in the field, and advise A/E of discrepancies before performing Work.
- B. Space Requirements:
 - 1. Consider space limitations imposed by contiguous work in location of equipment and material. Do not provide equipment or material that is not suitable in this respect.
 - 2. Make changes in equipment location of up to 5 feet, to allow for field conditions prior to actual installation, and as directed by the A/E.
- C. Conceal piping and ductwork in finished areas, except in mechanical rooms, and where noted otherwise on the drawings. Route pipes and ducts through the building without interfering with other contractors' equipment or construction.
 - 1. Provide maximum possible clear height underneath piping and ductwork.
 - 2. Install equipment requiring service so that it is easily accessible.
 - 3. Compare the equipment sizes with the space allotted for installation before installation and make written notice of possible conflict. Disassemble large equipment to permit installation through normal room openings when required. Should written notice not be made in a timely manner, make adjustments and modifications necessary without additional compensation.
 - 4. Timely place equipment too large to fit through finished openings and stairways.
- D. Site Obstructions:
 - 1. Drawings indicate certain information pertaining to surface and subsurface obstructions that has been taken from available drawings. Such information is not guaranteed as to accuracy of location or completeness of information.

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2. Verify with A/E, utility companies, municipalities, and other interested parties that available information has been provided before cutting or trenching operations are begun. Verify locations given.
 3. Alter routing of new work should obstruction be encountered, whether or not shown on Drawings. Reroute existing lines, remove obstruction where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of the new work and leave existing services and structures in a satisfactory and serviceable condition.
 4. Assume total responsibility for and repair damage to existing utilities caused by construction, whether or not such existing facilities are shown. Repair the lines, if damaged.
- E. Cutting and Patching:
1. Submit written request to A/E in advance of cutting or alterations.
 2. Execute cutting and demolition by methods that will prevent damages to other work and will provide proper surfaces to receive installation of repairs.
 3. Restore work which has been cut or removed; install new products complying with specified products, functions, tolerances, and finishes specified.
 4. Fit work airtight to pipes, sleeves, ducts, and other penetrations through surfaces. For fire-rated penetrations, provide assemblies in accordance with UL 1479 and ASTM E 814 utilizing products and materials equal to rating of surfaces penetrated.

1.06 MATERIALS AND WORKMANSHIP

- A. Provide new materials and equipment by those regularly engaged in the production and manufacture of specified materials and equipment. Where UL or other agency has established standards for materials, provide materials which are listed and labeled accordingly. The commercially standard items of equipment and the specific names mentioned herein are intended to identify standards of quality and performance necessary for the proper functioning of the work.
- B. Work shall be performed by workmen skilled in the trade required for the work. Install materials and equipment to present a neat appearance when completed in accordance with the approved recommendations of the manufacturer and in accordance with Contract Documents.
- C. Provide labor, materials, apparatus, and appliances essential to the complete functioning of the systems described or indicated herein, or which may be reasonably implied as essential whether mentioned in the Contract Documents or not.
- D. Make written request for supplementary instructions to A/E in cases of doubt as to Work intended or in the event of need for explanation thereof.

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- E. Performance and material requirements scheduled or specified are minimum standards acceptable. The right to judge the quality of equipment that deviates from the Contract Documents remains solely with A/E.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Follow the manufacturer's directions completely in the delivery, storage, and handling of equipment and materials.
- B. Store equipment in a clean, dry place protected from other construction. While stored maintain factory wrapping or tightly cover and protect equipment against dirt, water, construction debris, chemical, physical or weather damage, traffic and theft.
- C. Adequately brace and package equipment to prevent breakage and distortion while in transit.

1.08 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Provide malleable iron, adjustable swivel, split ring.
- B. Hangers for Pipe Sizes 2 to 4 Inches and Cold Pipe Sizes 6 Inches and Over: Carbon steel, adjustable, clevis.
- C. Hangers for Hot Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll.
- D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand for hot pipe sizes 6 inches and over.
- E. Vertical Support: Steel riser clamp.
- F. Floor Support for Pipe Sizes to 4 Inches and All Cold Pipe Sizes: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.
- G. Floor Support for Hot Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
- H. Design hangers without disengagement of supported pipe.

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- I. Copper Pipe Support and Hangers: Carbon steel ring, adjustable, copper plated.
- J. Shield for Insulated Piping 2 Inches and Smaller: 18 gage galvanized steel shield over insulation in 180-degree segments, minimum 12 inches long at pipe support.
- K. Shield for Insulated Piping 2-1/2 Inch and Larger (Except Cold Water Piping): Use pipe covering protective saddles.
- L. Shields for Insulated Cold Water Piping 2-1/2 Inch and Larger: Galvanized steel shields in 180-degree segments in accordance with following table:

Pipe	Metal Gage	Shield Length
2 1/2" to 5"	16	12"
6" to 12"	14	24"
Over 12"	12	24"

- M. Shields for Vertical Copper Pipe Risers: Sheet lead.

1.09 INSERTS

- A. Provide malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

1.10 FLASHING

- A. Metal Flashing: 26 gage galvanized steel.
- B. Lead Flashing: 5 pounds per square foot sheet lead for waterproofing; 1 pound per square foot sheet lead for soundproofing.
- C. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.
- D. Caps: Steel, 22 gage minimum; use 16 gage at fire resistant elements.

1.11 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 16 gage galvanized steel.

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- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Above Grade: Form with 18 gage galvanized steel.
- C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Provide prefabricated fire rated sleeves including seals, UL listed; or provide Schedule 40 galvanized steel, sized for minimum 1 inch space between sleeve and carrier pipe.
- D. Sleeves for Pipes Through Floor Supporting Riser Piping: Standard weight galvanized steel pipe.
- E. Sleeves for Pipes Through Roof: Standard weight galvanized steel pipe.
- F. Sleeves for Round Ductwork: Form with galvanized steel.
- G. Sleeves for Rectangular Ductwork: Form with galvanized steel or wood.
- H. Provide fire-stop compound at all penetrations of floor slabs or firewalls such that fire rating integrity of barrier is not lessened.
- I. Caulk: Caulk all sleeves water and airtight.
- J. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping. Provide pipe sleeves one size larger than the pipe it serves, including insulation, except where "Link Seal" casing seals are used.
- K. Sleeves Penetrating Walls Below Grade: Standard weight black steel pipe with 1/4-inch thick steel plate secured to pipe with continuous fillet weld. Provide plate that is 4 inches wider all around than the sleeve it encircles. Hot dip galvanize entire sleeve assembly after fabrication.

1.12 ANCHOR BOLTS

- A. Provide galvanized anchor bolts for equipment placed on concrete pads or on concrete slabs, of size and number recommended by manufacturer of equipment.

1.13 FASTENERS

- A. Adhesive Anchoring System for Pipe Supported from Existing Solid Base Material:
 - 1. Anchor Rods: ASTM A 193, Grade B7, Type 2, threaded both ends.

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2. Injection Adhesive: Hilti, Inc., "HIT HY 150".

Anchor Diameter	Embedment Depth	Tension (pounds)	Shear (pounds)
3/8-inch	1-3/4 inches	596	872
3/8-inch	3-1/2 inches	976	872
1/2-inch	2-1/8 inches	780	1548
1/2-inch	4-1/4 inches	968	1548
5/8-inch	2-1/2 inches	960	1984
5/8-inch	3-3/8 inches	1408	2420

- B. Expansion Anchoring System for Pipe Supported from Existing Solid Base Material:
1. Expansion Anchors: CID A-A-1923, Type 4, stud type, zinc plated in accordance with ASTM B 633.
 2. Product: Hilti, Inc., "Kwik Bolt II Expansion Anchor".

Anchor Diameter	Embedment Depth	Tension 2,000 psi (pounds)	Shear 2,000 psi (pounds)
1/4-inch	1-1/8 inches	180	320
1/4-inch	Greater than or equal to 2 inches	260	400
3/8-inch	1-5/8 inches	340	620
3/8-inch	Greater than or equal to 2-1/2 inches	500	1100
1/2-inch	2-1/4 inches	580	1120
1/2-inch	Greater than or equal to 3-1/2 inches	880	1840
5/8-inch	2-3/4 inches	900	2000
5/8-inch	Greater than or equal to 4 inches	1320	2840
3/4-inch	3-1/4 inches	1260	2600
3/4-inch	Greater than or equal to 4-3/4 inches	1760	3760

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1.14 WELDING

- A. Weld piping and above grade steel tanks in accordance with qualified procedures using performance qualified welders and welding operators. Qualified procedures and welders in accordance with ASME Section IX. Welding procedures qualified by others and welders and welding operators qualified by another employer may be accepted as permitted by ANSI B31.1. Notify the A/E 24 hours in advance of tests, and perform the tests at the work site if practicable. Furnish A/E with a copy of qualified procedures and a list of names and identification symbols of qualified welders and welding operators. Apply welders or welding operators assigned symbols near each weld they make as permanent record.

1.15 PAINTING

- A. Properly prepare surfaces to receive paint. Prime prepared surfaces and finish with two coats of exterior oil base paint. Verify primer and paint are rated for application.
- B. Repair damage to factory painted finishes.
- C. Remove splattered and incidental paint from mechanical equipment.

1.16 ACCESS DOORS

- A. Provide access doors in walls, floors, and ceilings to permit access to equipment and piping requiring service or adjustment:
 - 1. Valves.
 - 2. Manual balance dampers and automatic control dampers.
 - 3. Fire dampers, smoke dampers and smoke/fire dampers.
 - 4. Air terminal units.
 - 5. Duct mounted filters and coils.
 - 6. Plumbing drainage cleanouts.
 - 7. Kitchen hood exhaust ductwork, in accordance with NFPA requirements.
 - 8. Other mechanical equipment indicated in mechanical equipment schedules requiring maintenance, adjustment, or operation.
- B. Provide hinged access doors and frames as follows:
 - 1. Drywall Construction:
 - a. Provide with concealed spring hinges and flush screwdriver operated cam locks in sufficient number of the size of the panel. Factory prime paint surfaces not galvanized.
 - b. Product: Milcor, "Style DW".
 - 2. Visible Masonry and Ceramic Tile: Milcor, "Style M".
 - 3. Gypsum and Cement Plaster: Milcor, "Style K".

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- 4. Acoustic Plaster:
 - a. Reinforce panel as required to prevent sagging. Provide continuous steel piano type hinge for the length of the panel, and sleeved and grommeted screwdriver operated cam locks in sufficient number for the size of the panel. Factory prime paint surfaces not galvanized.
 - b. Product: Milcor, "Style AP".
 - c. Acoustic Tile: Milcor, "Style AT".
- C. Provide continuous concealed hinges and cam locks.
- D. Provide UL listed 1-1/2 hour Label "B" access doors with automatic self-closing latching mechanism where required.
- E. Provide removable ceiling access tile section immediately adjacent to each mechanical or electrical device located in the ceiling plenum above removable tile ceiling.
- F. Coordinate approval and location of access doors with A/E.

1.17 NOISE AND VIBRATION

- A. Provide the entire operating system and its component items of equipment free of objectionable vibration or noises. Refer to ASHRAE handbook for recommended noise criteria (NC) unless otherwise noted. Statically and dynamically balance rotating equipment, and mount or fasten so that no equipment vibration will be transmitted to the building. If objectionable noise or vibration is produced or transmitted to or through the building structure by equipment, piping, ducts, or other parts of work, rectify such conditions at no additional compensation.

1.18 OPERATING INSTRUCTIONS

- A. Provide services of authorized representatives of manufacturer to ensure that the equipment is installed according to the manufacturer's recommendations, is operating properly, and to instruct Owner's operating personnel during start-up and operating tests of complete mechanical systems. Prove operation of equipment to A/E. Notify A/E seven days prior to beginning equipment start-up.
- B. Certify in writing that these services have been performed.

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1.19 SERVICE

- A. Inspect, clean, and service air filters and strainers immediately prior to final acceptance of project. Replace disposable type air filters.
- B. Provide lubrication for operation of equipment until final acceptance of the equipment by A/E. Protect bearings during installation and thoroughly grease steel shafts to prevent corrosion. Provide extended lubrication lines for parts requiring lubrication that are concealed or inaccessible.
- C. Provide complete and working charge of proper refrigerant, free of contaminants, into each refrigerant system. After each system has been in operation long enough to ensure completely balanced conditions, check the charge and modify it for proper operation as required.
- D. Provide protective guard for belts, pulleys, gears, couplings, projecting set screws, keys, and other rotating parts which are located so a person might come in close proximity with. Construct protective guard around angle iron frame, securely bolted to apparatus; comply with safety requirements. Install guard to completely enclose drives and pulleys, and not interfere with lubrication of equipment. Provide 2-inch minimum diameter opening in fan belt guards housing for tachometer.
- E. Place mechanical systems in complete working order, and clean and polish fixtures, equipment, and materials thoroughly returning to "as new" condition prior to request for final review.
- F. Remove excess material and debris. Clean out lines and fittings and adjust valves. Broom clean areas. Thoroughly clean ductwork inside and out before grilles are installed.

1.20 PROJECT RECORD DOCUMENTS

- A. Maintain a set of Contract Documents at the job site for the purpose of recording final size, location, and interrelation of work under this Division. Mark this set of drawings as the job progresses to indicate "as-built" location of equipment, including concealed piping, valves, and ductwork.
- B. Clearly and accurately delineate work by dimensions on record drawings as installed, with equipment locations identified by at least two dimensions to permanent structures.
- C. Provide certified final record drawings, marked "AS-BUILT," and signed and dated by Contractor at conclusion of project.

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1.21 FINAL REVIEW

- A. Obtain necessary Certificates of Occupancy from local authorities.
- B. Submit final approved operation and maintenance manuals including approved submittals, test reports, and "AS-BUILT" drawings prior to requesting final payment. Delivery of operation and maintenance manuals is a condition of final acceptance.

1.22 GUARANTEE

- A. Guarantee materials, parts, and labor for Work for one year from the date of issuance of occupancy permit. During that period, make good faults or imperfections that may arise due to defects or omissions in materials or workmanship with no additional compensation and as directed by A/E.
- B. Certain items of equipment, such as small sealed refrigeration units, are covered by the manufacturer's warranty of longer durations.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 PIPE HANGERS AND SUPPORTS

- A. Support horizontal piping as follows:

Pipe Size	Max. Hanger Spacing	Hanger Diameter
1/2" to 1-1/4"	6'-6"	3/8"
1-1/2" to 2"	10'-0"	3/8"
2-1/2" to 3"	10'-0"	1/2"
4" to 6"	10'-0"	5/8"
8" to 12"	14'-0"	7/8"

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Pipe Size	Max. Hanger Spacing	Hanger Diameter
14" and Over	14'-0"	1"
PVC (All Sizes)	6'-0"	3/8"
C.I. Bell and Spigot (or No-Hub)	5'-0" and at Joints	

- B. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
- C. Place a hanger within 12 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Support horizontal cast iron pipe adjacent to each hub, with 5-foot maximum spacing between hangers.
- F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.
- G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.
- I. Provide corrosion resistant hangers for piping hangers in corrosive areas. Provide hanger rods, bolts, nuts, and metal parts coated with same material as hangers.

3.02 INSERTS

- A. Provide inserts for placement in concrete formwork.
- B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
- C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- D. Where concrete slabs form finished ceiling, provide inserts flush with slab surface.

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- E. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.

3.03 FLASHING

- A. Provide flexible flashing and metal counterflashing where sleeves, piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting 3 inches minimum above finished roof surface with lead worked 1-inch minimum into hub, 8 inches minimum clear on sides with 24-inch by 24-inch sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counterflash and seal.
- C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36-inch by 36-inch sheet size. Fasten flashing to drain clamp device.
- D. Seal floor drains watertight to adjacent materials.
- E. Provide acoustical lead flashing around ducts and pipes penetrating equipment rooms, installed in accordance with manufacturer's instructions for sound control.
- F. Flexible sheet flash and counterflash curbs for mechanical equipment on roof with sheet metal; seal watertight.

3.04 EQUIPMENT BASES AND SUPPORTS

- A. Coordinate installation of equipment bases of concrete type specified under Division 3 for outdoor equipment on grade and floor mounted equipment as indicated on Drawings.
- B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- C. Construct support of steel members. Brace and fasten with flanges bolted to structure.
- D. Provide rigid anchors for pipes after vibration isolation components are installed.
- E. Provide base of a minimum height of 4 inches above finished grade and a width that projects a minimum of 3 inches beyond equipment on all sides. Bevel edges of base.

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- F. Prepare surface under bases by cleaning, clearing, chipping and roughing.
- G. Provide curbs of 14 inches minimum height above roofing surface for installation of mechanical equipment on roof.

3.05 SLEEVES

- A. Provide sleeves for all pipe penetrations through walls, roof or slab above grade.
- B. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- C. Extend sleeves through floors 2 inches above finished floor level. Caulk sleeves full depth and provide floor plate.
- D. Where piping or ductwork penetrates floor, ceiling or wall, close off space between pipe or duct and adjacent work with fire stopping insulation and seal airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration. When penetration is through a fire rated floor or wall, provide fire safing insulation so that the assembly when complete is UL listed and equals the fire rating of construction penetrated by the sleeve.
- E. Install chrome plated steel escutcheons at finished surfaces.
- F. Provide three 6 inch long reinforcing rods welded at 120-degree spacing to the sleeve on all sleeves supporting riser piping 4 inches and larger. Embed reinforcing rods in concrete or grout to existing concrete.
- G. Install sleeve assembly for walls below grade with 1/4-inch thick plate located in the middle of the wall.
- H. Neatly cut holes in existing walls, floors and roofs for placement of sleeves. Place sleeve and grout, and caulk annular space to provide finished appearance.
- I. Install pipe in sleeve so that neither the pipe nor its insulation touches the sleeve at any point.
- J. Seal space between pipe and sleeve watertight for all sleeves penetrating the roof.

3.06 ANCHOR BOLTS

- A. Locate position of anchor bolts by means of suitable templates.

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- B. When equipment is placed on vibration isolators, secure equipment to the isolator and the isolator to the floor, pad or support as recommended by the vibration isolator manufacturer.

3.07 INSULATION SHIELDS

- A. Provide insulation shields at every hanger support.
- B. Provide shields of the proper length to distribute weight evenly and to prevent sagging or indentation of insulation at hanger.
- C. Install shield so that hanger is placed at the center of the shield.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 23 05 53 - MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Materials for identification of mechanical products installed under this Division.

1.02 REFERENCES

- A. ANSI A13.1 - Scheme for the Identification of Piping Systems.
- B. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

1.03 SUBMITTALS

- A. Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Craftsmark.
- B. Markem Corporation.
- C. W. H. Brady Company.

2.02 MATERIALS

- A. Color: Meet requirements of ANSI A13.1, unless specified otherwise.
- B. Plastic Nameplates: Laminated three-layer plastic with engraved white letters on a black background; minimum size 3 inches long and 1 inch high. Minimum lettering height for numbers and names is 1/4-inch and other data is 1/8-inch.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- D. Stencils: With clean cut symbols and letters 2-1/2 inch high for ductwork and equipment.
- E. Stencil Paint: Semi-gloss, high build epoxy ester or alkyd paint.
- F. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and fluid being conveyed.
- G. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

CLASSIFICATION: **UNCLASSIFIED**

3.02 INSTALLATION

- A. Plastic Nameplates: Secure nameplates to equipment fronts using corrosive resistant screws and rivets. Install nameplates parallel to equipment lines.
- B. Metal Tags: Install with corrosive-resistant chain and "s-hook."
- C. Plastic Pipe Markers: Install in accordance with manufacturer's instructions.
- D. Plastic Tape Pipe Markers: Install completely around pipe in accordance with manufacturer's instructions.
- E. Valves: Identify valves in main and branch piping with metal tags.
- F. Fire Dampers: Label with plastic nameplates in accordance with NFPA 90A.
- G. Piping: Paint exposed piping in colors to meet ANSI standards. Identify piping, concealed or exposed, with plastic pipe markers or plastic tape pipe markers. Identify service, flow direction and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 10 feet on straight runs, including risers and drops, adjacent to each valve and tee at each side of penetration of structure or enclosure and at each obstruction. Provide a flow arrow at each identification marker.
- H. Ductwork: Identify ductwork with stenciled painting. Identify as to air handling unit number, and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure and at each obstruction.
- I. Use identification of equipment on the "Record Drawings" for nameplate designations.

3.03 VALVE CHART AND SCHEDULE

- A. Provide valve chart and schedule in aluminum frame with clear plastic shield. Install at location as directed.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 23 05 94 - BALANCING OF SYSTEMS

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Controls: Section 230923.

1.02 SUBMITTALS

- A. Quality Control Submittals:

- 1. Testing, Adjustment and Balancing Reports:

- a. Hydronic Systems: Submit results on Form BDC-374, which can be obtained from the Director's Representative or use a similar test report form which includes all of the items and data included on Form BDC-374.

- b. Air Systems: Submit results on Forms BDC-340 and 341 which can be obtained from the Director's Representative, or use similar test report forms, which includes all the items and data included on Forms BDC-340 and 341.

- c. Submit final testing and balancing results on applicable report forms, as approved or furnished by the environmental systems balancing council or bureau, which is certifying the independent member agency performing the Work, required by this Section. Each final systems report form shall bear the signature of the person performing the Work and recording the data and the signature of the certified supervisor for the performing agency. Submit simultaneously with the final reports, a list of the instruments used with the last date of calibration for each instrument.

1.03 QUALITY ASSURANCE

- A. Qualifications:

- 1. Provide the services of a certified independent agency for the testing, adjustment and balancing of all air distribution and hydronic distribution systems complete with all connected apparatus and equipment. The agency shall be certified by the Associated Air Balance Council Bureau - AABC, Los Angeles, Cal. 90026 or by National Environmental Balancing Bureau - NEBB, Arlington, Va. 22209.

- 2. The Work shall be performed by skilled mechanical technicians under the direct supervision of certified personnel in the employ of the independent agency. The supervisor shall be personally certified by the national council or bureau, as approved by the Director.

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1.04 SEQUENCING AND SCHEDULING

A. Scheduling:

1. Perform environmental systems testing and balancing after cleaning, miscellaneous testing, adjustment and operational testing Work has been completed.
2. Test and balance system during a period of time when outside temperature conditions will impose a significant load on the system; i.e., summer months for air conditioning system, winter months for heating system. Balance and adjust systems accordingly.
3. Send written notification to the Director a minimum of five days prior to the performance of testing and balancing Work. Perform testing and balancing Work in the presence of the Director's Representative.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

A. General Information: Test instruments are included in this specification for information only. Balancing of air and hydronic systems shall be performed by qualified personnel utilizing company owned test instruments, which will remain the property of the company. Use test instruments which are in first class operating condition, with individual calibration histories to guarantee their accuracy. Test instruments shall be of type and kind as required by the type of system installed. Trade names and manufacturer's names are mentioned in this section for descriptive purposes only; instruments of equivalent range and capabilities may be utilized.

B. Air Balancing Instruments:

1. Manometers: Inclined with ranges of 0 to 1/4 inch and 0 to 1 inch; Combination inclined and vertical with a range of 0 to 5 inches and U tube type, 18 inches.
2. Portable "Magnehelic" Draft Gages: Ranges 0 to 1/2 inch, 0 to 1 inch and 0 to 5 inches.
3. Anemometers: Deflecting vane type with a range of 100 to 3000 fpm, similar to Alnor Velometer Model 6000 BP and 4 inches diameter rotating vane type.
4. Pitot Tubes: ASHRAE standard type, stainless steel, 5/16 inch diameter, lengths as required.
5. Sling Psychrometer.
6. Smoke Candles and Smoke Generator.

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- C. Hydronic Balancing Instruments:
 - 1. Calibrated Test Gages: Ranges 0 to 30 lbs., 0 to 60 lbs., 0 to 200 lbs.
 - 2. Calibrated Test Gages (Compound Type): Ranges from -30 inches to 30 lbs. and -30 inches to 60 lbs.
 - 3. U Tube Manometer: 36 inches.

- D. Air and Hydronic Systems Balancing Instruments:
 - 1. Thermometers: 12 inches mercury column type and dial type, with a range of -40 to +120 degrees F. and 0 to 220 degrees F. Total of four thermometers.
 - 2. Universal Hand Tachometer: Herman H. Sticht Type UH.
 - 3. Stop Watch.
 - 4. Stroboscope.
 - 5. Contact Pyrometer: Thermocouple type.
 - 6. Volt-Ohm-Ammeter Test Kit, High Current Type: Sperry "Ohmprobe".
 - 7. Volt-Ammeter: With leads for connecting to lugs.

PART 3 - EXECUTION

3.01 PRELIMINARY WORK

- A. Circulating Water Systems: Prior to balancing the system, bleed all air vents so as to completely flood the system; check pumps for proper rotation; clean strainers and set balancing and system stop valves in the full-open position.

- B. Ventilating and Air Conditioning Systems: Prior to balancing the system, check fans for proper rotation; check filters for cleanliness and proper installation and set dampers in the normal operating position.

3.02 BALANCING OF CIRCULATING WATER SYSTEM AND ETHYLENE GLYCOL SYSTEMS

- A. Equipment Schedules and Report Sheets: Prepare itemized equipment schedules, listing all heating or cooling elements and equipment in the system to be balanced. List in order on equipment schedules, by pump or zone according to the design, all heating or cooling elements and all zone balancing valves or balancing devices. Break down schedules into zones to circuits, starting from the zone or circuit pump and terminating with the last item of equipment or transfer

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element in the respective zone or circuit. Include on schedule sheets, column titles listing the location, type of element or apparatus, design conditions and water balance readings. Prepare individual pump report sheets for each individual system or zone pump.

B. Balancing:

1. Place system in full automatic operation, with automatic controls set in accordance with design conditions, and allow water to reach design temperature.
2. Test pumps and balance flow. Record the following on pump report sheets:
 - a. Suction and discharge pressure.
 - b. Running amps and brake horsepower of pump motor under full flow and no flow conditions.
 - c. Pressure drop across pump in feet of water and total gpm pump is handling under full flow conditions.
3. Set zone or circuit balancing valve at each pump, to handle the design GPM.
4. When the design incorporates the use of air handling units containing coils, check and adjust each unit to insure the proper volume of air is passing through the coils, while the balancing procedure is in progress.
5. Check pumps for flow, after the system has been balanced.
6. Record test readings, calculations and results.

3.03 BALANCING OF VENTILATING AND AIR CONDITIONING SYSTEMS

A. Equipment Schedules and Report Sheets:

1. Prepare itemized air balance schedules for each system listing all air handling units and air outlets for each system. Schedule multi-zone systems by individual zones. Start each schedule from the inlet or the air handling unit and terminate with the last air inlet or outlet device in the system or zone.
2. Prepare individual air handling unit report sheets, noting manufacturer's published performance data.
3. Record all test readings, calculations and results.

B. Balancing:

1. Inspect All Equipment: Establish a definite operational test condition for test and air balance purposes. In accordance with test

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condition selected, such as minimum fresh air dampers open, turn on all air handling systems in the building, including all exhaust systems.

2. Balance a system starting with the air handling unit. Check fan speed, using a tachometer with a self-timing device and the power reading of the fan motor using a volt-amp meter. Calculate the actual brake horse power from the tachometer and volt-amp meter readings. Compare the actual fan speed reading and the motor power reading, with the air handling unit manufacturer's published performance data, and if they check within reasonable limits, make duct velocity readings on the main ducts. Drill holes in the main ducts and using a velocity measuring instrument take velocity readings. Take velocity readings in each zone duct of a multi-zone system and in addition, in the main branch ducts of a reheat type system. Close and seal test holes with metal snap hole plugs and duct tape. Calculate the cfm's of the ducts. Establish the total air for the fan or system under test. Compare the design data with the test results, and if the total air is high or low, adjust the fan speed accordingly. Repeat the described test procedure for all air handling units, including all supply air, return air and exhaust air apparatus. With the total air for the system established, use the same duct velocity check system for adjusting the main splitter dampers or other volume control devices for the various branches of the system. Test and adjust the individual air inlet or outlet devices, after the main ducts, zone ducts and branch ducts have been set at design conditions. Adjust individual air inlet and outlet devices, such as registers and diffusers, for air pattern and volume, in the manner recommended by the manufacturer of the devices. The total cfm of all inlets or outlets shall equal the total cfm of all branches, which in turn shall equal the total air volume of the air handling units. The system is balanced, when the results of the specified test procedures check with the design data, that is, fan speed and horsepower; total air by velocity readings and total air by inlet or outlet volume.

3.04 FIELD QUALITY CONTROL

A. Inspection: Prior to the environmental testing and balancing of hydronic and air distribution systems, the certified supervisor in the employ of the testing and balancing agency shall inspect the installations and notify the Director's Representative of any Work which must be performed or modified prior to initiating testing and balancing procedures.

B. Performance: Test and balance environmental hydronic and air distribution systems, including all connected equipment and apparatus, so as to conform to the design conditions. Perform the Work of this section in accordance with the published standards of the balancing council or bureau, which is certifying the member firm. Record all test readings, calculations and results.

END OF SECTION

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SECTION 23 07 13 - DUCT INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Thermal and acoustical insulation applied externally or internally to ductwork and air handling devices; including:
 - 1. Duct insulation.
 - 2. Insulation jackets.

1.02 REFERENCES

- A. ASTM C 553 - Mineral Fiber Blanket and Felt Insulation.
- B. ASTM E 84 - Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

- A. Include product description, list of materials, and thickness for each service and location.

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in duct insulation application with three years minimum experience.
- B. Materials: UL listed; flame spread/fuel contributed/smoke developed rating of 25/25/50 in accordance with ASTM E 84.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Certainteed Corporation.
- B. Knauf Fiber Glass.
- C. Manville Corporation.

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- D. Owens-Corning Fiberglass Corporation.

2.02 MATERIALS

- A. Type A: Flexible glass fiber; ASTM C 553; commercial grade; 'k' value of 0.29 at 75 degrees F; 1 pound per cubic foot minimum density; 0.002-inch foil scrim kraft facing for air ducts.
- B. Finish: Vapor barrier finish coating, Childers CP-33.
- C. Impale Anchors: Galvanized steel, 12 gage self-adhesive pad.
- D. Joint Tape: Glass fiber cloth, open mesh.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Install exterior materials after duct has been tested and approved.
- B. Clean surfaces for adhesives.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Insulation (Type A) Application for exterior of duct in Interior of Building:
 - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 - 2. Install without sag on underside of ductwork. Use 4 inch wide strips of adhesive on 8 inch centers or mechanical fasteners where necessary to prevent sagging. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
 - 3. On circumferential joints, the 2-inch flange on the facing shall be secured with 9/16-inch outward clinch steel staples on 2-inch centers, and taped with a minimum 3 inch wide strip of glass fabric and finish coating.

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3.03 SCHEDULE

A. Provide insulation or liner for duct in accordance with the following schedule:

Duct	Type	Insulation Thickness
Outside Air Intake Ducts	A	2"
Concealed Rectangular, Supply, Exhaust or Return Duct	A	2"

END OF SECTION

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SECTION 23 07 19 - PIPING INSULATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Thermal insulation for mechanical and plumbing piping systems including jackets and accessories.
- B. Mechanical system includes horizontal roof drains and waste lines that receive condensate from air handling units or evaporators as well as thermal system piping.

1.02 REFERENCES

- A. ASTM B 209 - Aluminum and Aluminum-alloy Sheet and Plate.
- B. ASTM C 177 - Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
- C. ASTM E 84 - Surface Burning Characteristics of Building Materials.
- D. ASTM E 96 - Water Vapor Transmission of Materials.

1.03 SUBMITTALS

- A. Include product description, list of materials, and thickness for each service and locations.
- B. Include detail drawings of insulation dams.

1.04 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in piping insulation application with three years' minimum experience.
- B. Materials: Composite flame spread/smoke developed rating of 25/50 in accordance with ASTM E 84; includes jackets, adhesives, facing, coatings, and mastics.

1.05 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesive and insulation.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Insulation:
 - 1. Armstrong.
 - 2. Certaineed Corporation.
 - 3. Knauf Fiber Glass.
 - 4. Manville Corporation.
 - 5. Owens-Corning Fiberglass Corporation.

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6. Pittsburgh Corning.
7. Rubatex.

2.02 INSULATION

- A. Type C: Elastomer, closed cell, flexible, insulation; ASTM E 96; maximum vapor transmission rating of 0.20 perms; ASTM C 177; 'k' value of 0.27 at 75 degrees F.

2.03 ACCESSORIES

- A. Insulation Bands: 3/4-inch wide; 0.015-inch thick galvanized steel, stainless steel or 0.007-inch thick aluminum.
- B. Metal Jacket Bands: 3/8-inch wide; 0.015-inch thick aluminum or 0.010-inch thick stainless steel to match jacket.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Clean surfaces to be insulated and install insulation material after performance tests for piping have been completed and approved.

3.02 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Continue insulation with vapor barrier through penetrations.
- C. In exposed piping, locate insulation and cover seams in least visible locations.
- D. Insulate fittings, valves, flanges and strainers. On flexible connections, expansion joints and unions, bevel and seal ends of insulation and continue sealant a minimum of 4 inches along the piping.
- E. On insulated piping conveying fluids between 100 degrees F and 140 degrees F, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation at such locations. Continue sealant a minimum of 4 inches along the piping.
- F. Provide dams in insulation at intervals not to exceed 20 feet to prevent migration of condensation or leakage.
- G. Provide an insert, except where pipe covering protection saddles are specified, not less than 12 inches long, of same thickness and contour as adjoining insulation, between support shield and piping, but under the finish jacket, on piping 2-1/2 inch diameter or larger, to prevent insulation from sagging at support points. Provide inserts for 180-degree arc and not less than the length of the pipe shield manufactured of cork, cellular glass or other heavy density insulating material suitable for the planned temperature range. Factory fabricated inserts may be used. Adhere pipe shield to insulation with adhesive.
- H. Neatly finish and seal all insulation at supports, protrusions and interruptions. Maintain water vapor retarder with mastic.

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3.03 SCHEDULE

Piping	Type	Pipe Size	Insulation Thickness
Refrigerant Liquid, Suction, H/L Piping, and Condensate	C	3" & Smaller	3/4"

END OF SECTION

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SECTION 23 09 23 - CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Automatic temperature controls, control and instrumentation equipment, automation equipment, and installation of electric/electronic control. Provide system of controls that will completely accomplish implied or intended functions of control system as shown on Drawings and as specified.

1.02 SUBMITTALS

- A. Contractor shall provide shop drawings and manufacturers' standard specification data sheets on all hardware and software to be provided. No work may begin on any segment of this project until the Engineer and Owner have reviewed submittals for conformity with the plan and specifications. Six (6) copies are required.
- B. Include control and interlock wiring diagrams and descriptions on operation of all control systems and their effect on other equipment and systems.
- C. Include an HVAC control schematic layout showing, in detail, the exact quantity of function points, printed circuit cards, the relationship of these elements and a description of how they interrelate operationally. Work shall not be initiated prior to the return of these documents by A/E with instructions to proceed with the installation; however, such instructions will not relieve Contractor from compliance with Contract Documents.
- D. A review of any submittal which results in a requirement for Contractor to resubmit, shall not be justified basis for work delay or additional compensation.
- E. Arrange a non-disclosure agreement with the manufacturers to permit the Owner to obtain and use documentation on the system of software.

1.03 DESCRIPTION

- A. General: The control system shall be as indicated on the drawings and described in the specifications and consist of a peer-to-peer network of digital building control panels and operator workstation. The system shall be an extension of the existing system. Software upgrades shall be included as necessary to upgrade the system to current.
- B. Direct Digital Control (DDC) technology shall be used to provide the functions necessary for control of systems defined for control on this project.
- C. The control system shall accommodate simultaneous multiple user operation. Access to the control system data should be limited by operator password. An operator shall be able to log onto any workstation of the control system and have access to all designated data.

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- D. The control system shall be designed such that each mechanical system will operate under stand-alone control. As such, in the event of a network communication failure, or the loss of other controllers, the control system shall continue to independently operate the unaffected equipment.
- E. Communication between the control panels and all workstations shall be over a high-speed network. All nodes on this network shall be peers. A modem or network communications card shall be provided to for remote access to the system.

1.04 WARRANTY

- A. Labor & materials for control system specified shall be warranted free from defects for a period of twelve (12) months after final completion acceptance by the Owner. Control System failures during the warranty period shall be adjusted, repaired, or replaced at no charge or reduction in service to the Owner. The Contractor shall respond to the Owner's request for warranty service within 24 hours during customary business hours.
- B. Operator workstation software, project specific software, graphics, database, and firmware updates shall be provided to the Owner at no charge during the warranty period.
- C. The control system shall accommodate simultaneous multiple user operation. Access to the control system data should be limited by operator password. An operator shall be able to log onto any workstation of the control system and have access to all designated data.
- D. The system provider shall provide a web-accessible system and support on-line resource that provides the Owner access to a question/answer forum, graphics library, user tips, upgrades, and manufacturer training schedules.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. It is the intention of this portion of the specifications to set a minimum standard of quality for all equipment and devices used in the control system and at the various control panels. Any reference to any equipment item, control system or panel shall be construed to apply equally to all similar items, systems or panels as may be applicable in the opinion of A/E. All hardware employed within this system shall be of the "first quality" grade. Equipment shall be selected on the basis of durability, serviceability and function. Provide only UL listed equipment.
- B. The equipment furnished under this section of the specifications shall be supplied as a complete system produced under the responsibility of the manufacturer utilizing all of the various components specified to meet the function and accuracies described within this section of the specifications.
- C. All products used in this installation shall be new, currently under manufacture, and shall be applied in similar installations for a minimum of 2 years. The installation shall not be used as a test site for any new products unless explicitly

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approved by the Owner's representative in writing. Spare parts shall be available for at least 5 years after completion of this contract.

2.02 COMMUNICATION

- A. This project shall comprise of a network utilizing high-speed [BACnet] for communications between Building Controllers and PC Workstations. LonTalk sub-networks shall be used for communications between Building Controllers, Custom Application Controllers and Application Specific Controllers.
- B. All Building Controllers shall have a communications port for connections with the operator interfaces. This may be either a network interface node for connection to the Ethernet network or an RS-232 port for Point to Point connection.
- C. Remote operator interface via a 56K baud modem shall allow for communication with any and all controllers on this network as described in the following paragraph.
- D. Communications services over the network shall result in operator interface and value passing that is transparent to the network architecture as follows:
 - 1. Connection of an operator interface device to any one building controller on the network will allow the operator to interface with all other building controllers as if that interface were directly connected to the other controllers. Data, status information, reports, system software, custom programs, etc., for all building controllers shall be available for viewing and editing from any one building controller on the network.
 - 2. All database values (i.e., points, software variable, custom program variables) of any one building controller shall be readable by any other building controller on the network. This value passing shall be automatically performed by a controller when a reference to a point name not located in that controller is entered into the controller's database. An operator/installer shall not be required to set up any communications services to perform network value passing.
- E. The time clocks in all controllers shall be automatically synchronized daily.

2.03 OPERATOR INTERFACE

- A. Workstation information access shall use the BACnet Protocol. Communication shall use Annex J of ASHRAE Standard 135-2004. Local connections of the workstation shall be on ISO 8802-3 (Ethernet). Remote communications shall use either the BACnet Point to Point Physical/Data Link Layer Protocol or IP over Point to point (PTP).
- B. Hardware. Furnish IBM-compatible PCs to be used as DDC system workstation. The CPU shall be a minimum of an Intel Pentium 4 or AMD Athlon 64 processor and operate at a minimum 2.2 GHz. Include a minimum 1014 Megabytes of RAM, 48X CD ROM drive, 150 Gigabyte hard disk, and two-button mouse with scroll wheel. Furnish all required serial, parallel, and network communication ports, and all cables for proper system operation. The PC shall include a minimum 17", flat panel color monitor with 1024 x 768 screen resolution.

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C. System Software

1. Operating System. Furnish a commercially available, concurrent multi-tasking operating system. Acceptable operating systems are Microsoft Windows XP Professional.
2. System Graphics. The Operator Workstation software shall be graphically oriented. The system shall allow display of up to 10 graphic screens at once for comparison and monitoring of system status. Provide a method for the operator to easily move between graphic displays and change the size and location of graphic displays on the screen. The system graphics shall be able to be modified while the system is on line. An operator with the proper password level shall be able to add, delete, or change dynamic points on a graphic. Dynamic points shall include analog and binary values, dynamic text, static text, and animation files. Graphics shall have the ability to show animation of equipment. Animation capabilities shall include the ability to show a sequence of images reflecting the position of analog outputs, such as valve or damper positions (V17). Graphics shall be capable of launching other PC applications.
3. Engineering Units. Allow for selection of the desired engineering units (i.e. Inch pound or SI) in the system. Unit selection shall be able to be customized by locality to select the desired units for each measurement. Engineering units on this project shall be Inch Pound.

D. System Applications. Each workstation shall provide operator interface and off-line storage of system information. Provide the following applications at each workstation.

1. Automatic System Database Save and Restore. Each workstation shall store on the hard disk a copy of the current database of each building controller. This database shall be updated whenever a change is made in any panel in the system. The storage of this data shall be automatic and not require operator intervention. In the event of a database loss in a building management panel, the first workstation to detect the loss shall automatically restore the database for that panel.
2. Manual Database Save and Restore. A system operator with the proper password clearance shall be able to archive the database from any system panel and store on magnetic media. The operator shall also be able to clear a panel database and manually initiate a download of a specified database to any panel in the system.
3. System Configuration. The workstation software shall provide a graphical method of configuring the system. The user with proper security shall be able to add new devices, and assign modems to devices. This shall allow for future system changes or additions.

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4. On-Line Help and Training. Provide a context sensitive, on line help system to assist the operator in operation and editing of the system. On-line help shall be available for all system functions and shall provide the relevant data for that particular screen. Additional help shall be available through the use of hypertext links onscreen.
5. Security. Each operator shall be required to log on to the system with a user name and password in order to view, edit, add, or delete data. System security shall be selectable for each operator. The system supervisor shall have the ability to set security levels for all other operators. Each operator password shall be able to restrict the operator's access for viewing and/or changing each system application, full screen editor, and object. Each operator shall automatically be logged off of the system if no keyboard or mouse activity is detected. This auto logoff time shall be set per operator password. All system security data shall be stored in an encrypted format.
6. System Diagnostics. The system shall automatically monitor the operation of all workstations, printers, modems, network connections, building management panels, and controllers. The failure of any device shall be annunciated to the operator.
7. Alarm Notification. Alarm messages shall use full language, easily recognized descriptors for alarm. System shall allow the user to have up to 10 popup windows appear for incoming alarms. The popup dialog shall allow the user to silence and acknowledge alarms, view an expanded message or graphic, and add and save comments for the alarm.
8. Alarm Processing. Any object in the system shall be configurable to alarm in and out of normal state. The operator shall be able to configure the alarm limits, warning limits, states, and reactions for each object in the system.
9. Alarm Reactions. The operator shall be able to determine what actions, if any, are to be taken, by object, during an alarm. Actions shall include logging, printing, start a custom control program, displaying messages, dialing out to remote workstations, paging or text message to a cell phone, forwarding to an e-mail address, providing audible annunciation or displaying specific system graphics. Each of these actions shall be configurable by workstation and time of day. An object in alarm that has not been acknowledged within an operator specified time period shall be re-routed to an alternate operator specified alarm receipt device. For text messaging, the system shall support TAP protocol including parities 7-E-1 and 8-n-1, such that if the system fails to dial out/connect with one parity it will automatically try the other one.
10. Alarm and Event Log. The operator shall be able to view all logged system alarms and events from any location in the system. The operator shall be able to sort and filter alarms from events. Alarms shall be sorted

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in up to 5 color-coded categories based on Owner preference (V17). Include an alarm count summary for each alarm category on the system toolbar. An operator with the proper security level may acknowledge and clear alarms. All that have not been cleared by the operator shall be archived to the hard disk on the workstation. Provide a comment field in the event log that allows a user to add specific comments associated with any alarm.

11. Trend Logs. The operator shall be able to define a trend log for any data in the system. This definition shall include interval, start-time, and stop-time. Trend intervals of 30 seconds, 1, 5, 15, 30, and 60 minutes as well as once a shift (8 hours), once a day, once a week, and once a month shall be selectable. Each trend shall accommodate up to 64 system objects. The system operator shall be able to determine how many samples are stored in each trend. Trend data shall be sampled and stored on the Building Controller panel and be archived on the workstation hard disk. Trend data shall be able to be viewed and printed from the operator interface software. Trends must be viewable in a text-based format or graphically. Trends shall also be storable in a tab delimited ASCII format for use by other industry standard word processing and spreadsheet packages.
12. Dynamic Graphical Trending. The system shall have the ability to save the data collected by a trend object and display that collected data in a graphical chart. Trend viewing capabilities shall include the ability to show up to 10 points on a chart, to include live and/or historical data. Each data point trend line shall be an individual color, and include on-graph icons that represent associated events/alarms, manual overrides, and automated changes that have occurred over the time frame represented on the chart. Navigation and viewing functions shall include scrolling and zooming of x and y axes, and a trace display of the associated time stamp, and values for any selected point along the x-axis. Trend data shall be able to be stored for up to 10 years on the PC workstation.
13. Object and Property Status and Control. Provide a method for the operator to view, and edit if applicable, the status of any object and property in the system. These statuses shall be available by menu, on graphics or through custom programs.
14. Clock Synchronization. The real time clocks in all building controllers and workstations shall be synchronized on command of an operator. The system shall also be able to automatically synchronize all system clocks; daily from any operator designated device in the system. The system shall automatically adjust for daylight savings time if applicable.
15. Reports and Logs. Provide a reporting package that allows the operator to select, modify, or create reports. Each report shall be definable as to data content, format, interval, and date. Report data shall be archived on

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the hard disk for historical reporting. Provide the ability for the operator to obtain real time logs of designated lists of objects. Reports and logs shall be stored on the PC hard disk in a format that is readily accessible by other standard software applications including spreadsheets and word processing. Reports and logs shall be readily printed to the system printer. The operator shall be able to designate reports that shall be printed or stored to disk at selectable intervals. Provide a means to list and access the last 10 reports viewed by the user.

- E. Workstation Applications Editors. Each PC workstation shall support dedicated screens for editing of all system applications. Provide editors for each application at the PC workstation. The applications shall be downloaded and executed at the appropriate controller panels.
 - 1. Controller. Provide a full screen editor for each type custom application and application specific controller that shall allow the operator to view and change the configuration, name, control parameters, and system set-points.
 - 2. Scheduling. An editor for the scheduling application shall be provided at each workstation. Provide a monthly calendar for each schedule. Exception schedules and holidays shall be shown clearly on the calendar. Provide a method for allowing several related objects to follow a schedule. An advance and delay time for each object shall be adjustable from this master schedule. An operator shall be able to modify the schedule. Schedules shall be able to be easily copied between objects and/or dates.
 - 3. Manual Control and Override. Provide a means of manually controlling analog and binary output points. Control overrides shall be performed through a simple, graphical on-off-auto editor for binary points, and auto-manual selector for analog control. Provide a icon indicator of override status when a point, unit controller or application has been overridden manually.
- F. Air System Equipment Coordination. Provide editor screens with monitoring and control functions that group together and coordinate the operation of air handling equipment.

2.04 APPLICATION AND CONTROL SOFTWARE

- A. Furnish the following applications software for building and energy management. All software applications shall reside and run in the system controllers. Editing of applications shall occur at the operator workstation.
- B. System Security
 - 1. User access shall be secured using individual security passwords and user names.
 - 2. Passwords shall restrict the user to only the objects, applications, and system functions as assigned by the system manager.
 - 3. User logon/logoff attempts shall be recorded.

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4. The system shall protect itself from unauthorized use by automatically logging off following the last keystroke. The delay time shall be user definable.
- C. Scheduling. Provide the capability to schedule each object or group of objects in the system. Each of these schedules shall include the capability for start, stop, optimal start, optimal stop, and night economizer actions. Each schedule may consist of up to [10] events. When a group of objects are scheduled together, provide the capability to define advances and delays for each member. Each schedule shall consist of the following:
1. Weekly Schedule. Provide separate schedules for each day of the week.
 2. Exception Schedules. Provide the ability for the operator to designate any day of the year as an exception schedule. This exception schedule shall override the standard schedule for that day. Exception schedules may be defined up to a year in advance. Once an exception schedule is executed it will be discarded and replaced by the standard schedule for that day of the week.
 3. Holiday Schedules. Provide the capability for the operator to define up to 99 special or holiday schedules. These schedules may be placed on the scheduling calendar and will be repeated each year. The operator shall be able to define the length of each holiday period.
 4. Optimal Start. The scheduling application outlined above shall support an optimal start algorithm. This shall calculate the thermal characteristics of a zone and start the equipment prior to occupancy to achieve the desired space temperature at the specified occupancy time. The algorithm shall calculate separate sets of heating and cooling rates for zones that have been unoccupied for less than and greater than 24 hours. Provide the ability to modify the start algorithm based on outdoor air temperature. Provide an early start limit in minutes to prevent the system from starting before an operator determined time limit.
- D. Remote Communications. The system shall have the ability to transmit alarms to multiple associated alarm receivers. Receivers shall include PC Workstations, email addresses, cell phones and alphanumeric pagers. The alarm message shall include the name of the alarm location, the device that generated the alarm, and the alarm message itself. The operator shall be able to remotely access and operate the system utilizing the system Ethernet communications, or dial up communications via modem, in the same format and method used on site as described under the Operator Interface section of this specification.
- E. Maintenance Management. The system shall monitor equipment status and generate maintenance messages based upon user designated run time, starts, and/or calendar date limits.

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- F. Timed Override. A standard application shall be utilized to enable/disable temperature control when a user selects on/cancel at the zone sensor, workstation, or the operator display. The amount of time that the override takes precedence will be selectable from the workstation.
- G. Staggered Start. This application shall prevent all controlled equipment from simultaneously restarting after a power outage. The order in which equipment (or groups of equipment) is started, along with the time delay between starts shall be user-selectable.
- H. System Calculations. Provide software to allow instantaneous power (e.g. KW), flow rates (e.g. L/s [GPM]) to be accumulated and converted to energy usage data. Provide an algorithm that calculates a sliding-window KW demand value. Provide an algorithm that calculates energy usage and weather data (heating and cooling degree days). These items shall all be available for daily, previous day, monthly and the previous month.
- I. Anti-Short Cycling. All binary output points shall be protected from short cycling. This feature shall allow minimum on-time and off-time to be selected.

2.05 AUTOMATIC TEMPERATURE CONTROL EQUIPMENT

- A. Temperature: Solid state electronic factory calibrated to within 1/2 degree F, interchangeable. Provide wall sensors in tamper-proof enclosures.
- B. Humidity Transmitters (Sensors): Provide a solid state relative humidity transmitter, complete with power supply, plus or minus 3 percent accuracy over 25 percent span.
- C. Thermostats: Provide fully-proportioning type thermostats with control within plus or minus 1 degree F of the temperature setting at the thermostat location, unless otherwise specified. Provide room thermostats with a bimetal element, adjustable sensitivity, pneumatic feedback relay, two pipe with calibration gage test port and have metal covers without thermometer to prevent unauthorized adjustments or damage. In spaces where separate heating and cooling actuators are employed, provide thermostats with a single output to control both heating and cooling actuators. Both the heating and cooling setpoints shall be independently adjustable in such a manner that the temperature difference between heating and cooling setpoints develops an energy deadband. When the space temperature is within the deadband, neither heating or cooling energy is added to the space.
- D. Static Pressure Sensors: Sensor shall have linear output signal. Zero and span shall be field-adjustable. Sensor sensing elements shall withstand continuous operating conditions plus or minus 50% greater than calibrated span without damage. Water pressure sensor shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Sensor shall be complete with 4-20 ma output, required mounting brackets, and block and bleed valves. Mount in location accessible for service. Water differential pressure sensor shall have stainless steel diaphragm construction, proof pressure of 150 psi minimum. Over-range limit (DP) and maximum static pressure shall be 3,000 psi.

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Transmitter shall be complete with 4-20 ma output, required mounting brackets, and five-valve manifold. Mount in a location accessible for service.

- E. Carbon Dioxide (CO₂) Sensors: Carbon Dioxide sensors shall measure CO₂ in PPM in a range of 0-2000 ppm. Accuracy shall be +/- 3% of reading with stability within 5% over 5 years. Sensors shall be duct or space mounted as indicated in the sequence of operation.
- F. Relays: Control relays shall be UL listed plug-in type with dust cover. Contact rating, configuration, and coil voltage suitable for application. Time delay relays shall be UL listed solid-state plug-in type with adjustable time delay. Delay shall be adjustable plus or minus 200% (minimum) from set-point shown on plans. Contact rating, configuration, and coil voltage suitable for application. Provide NEMA 1 Type enclosure when not installed in local control panel.
- G. Transformers and Power Supplies: Control transformers shall be UL listed, Class 2 current-limiting type, or shall be furnished with over-current protection in both primary and secondary circuits for Class 2 service. Unit output shall match the required output current and voltage requirements. Current output shall allow for a 50% safety factor. Output ripple shall be 3.0 mV maximum Peak-to-Peak. Regulation shall be 0.10% line and load combined, with 50 microsecond response time for 50% load changes. Unit shall have built-in over-voltage protection. Unit shall operate between 0 C and 50 C. Unit shall be UL recognized.
- H. Current Switches: Current-operated switches shall be self-powered, solid state with adjustable trip current. The switches shall be selected to match the current of the application and output requirements of the DDC system.
- I. Protective Guards: Provide on all controllers or transmitters in corridors, lobbies, meeting rooms, toilet rooms, instruction rooms and similar areas with vandalproof screws and finished in color selected by A/E.
- J. Smoke Detectors: Furnished by electrician and installed in ducts or equipment by this Division.
- K. Freezestats: 20 foot sensing element which can be controlled by the 1 foot portion of the tube sensing the lowest temperature. Stop the fan motor on a temperature fall, energizing the alarm system and be manually reset.
- L. Control Dampers: Provide all outside, return, supply and exhaust controls, actuators to be provided by controls contractor, damper provided under duct accessories.
- M. Nameplates: Secure to all switches, indicating lights and control devices (self-tapping screws or bolts) to identify the items. Provide engraved laminated plastic, black nameplates with white letters.
- N. Start-Stop Push Buttons: Maintain or momentary to perform the required functions (Green: On; Red: Off).

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PART 3 - EXECUTION

3.01 EXAMINATION

- A. The project plans shall be thoroughly examined for control device and equipment locations, and any discrepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started.
- B. The contractor shall inspect the site to verify that equipment is installable as shown, and any discrepancies, conflicts, or omissions shall be reported to the Architect/Engineer for resolution before rough-in work is started.

3.02 GENERAL WORKMANSHIP

- A. Install equipment, piping, wiring/conduit parallel to building lines (i.e. horizontal, vertical, and parallel to walls) wherever possible.
- B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.
- C. Install all equipment in readily accessible location as defined by chapter 1 article 100 part A of the NEC. Control panels shall be attached to structural walls unless mounted in equipment enclosure specifically designed for that purpose. Panels shall be mounted to allow for unobstructed access for service.
- D. Verify integrity of all wiring to ensure continuity and freedom from shorts and grounds.
- E. All equipment, installation, and wiring shall comply with acceptable industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

3.03 FIELD QUALITY CONTROL

- A. All work, materials and equipment shall comply with the rules and regulations of applicable local, state, and federal codes and ordinances as identified in Part 1 of this Section.
- B. Contractor shall continually monitor the field installation for code compliance and quality of workmanship. All visible piping and or wiring runs shall be installed parallel to building lines and properly supported.
- C. Contractor shall arrange for field inspections by local and/or state authorities having jurisdiction over the work.

3.04 WIRING

- A. All control and interlock wiring shall comply with the national and local electrical codes and Division 16 of these specifications. Where the requirements of this section differ with those in Division 16, the requirements of this section shall take precedence.
- B. Where Class 2 wires are in concealed and accessible locations including ceiling return air plenums, approved cables not in raceway may be used provided that:

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- C. Circuits meet NEC Class 2 (current-limited) requirements. (Low-voltage power circuits shall be sub-fused when required to meet Class 2 current-limit.)
- D. All cables shall be UL listed for application, i.e., cables used in ceiling plenums shall be UL listed specifically for that purpose.
- E. Do not install Class 2 wiring in conduit containing Class 1 wiring. Boxes and panels containing high voltage may not be used for low voltage wiring except for the purpose of interfacing the two (e.g. relays and transformers).
- F. Where class 2 wiring is run exposed, wiring shall be run parallel along a surface or perpendicular to it, and bundled, using approved wire ties at no greater than 3 m [10 ft] intervals. Such bundled cable shall be fastened to the structure, using specified fasteners, at 1.5 m [5 ft] intervals or more often to achieve a neat and workmanlike result.
- G. All wire-to-device connections shall be made at a terminal blocks or terminal strip. All wire-to-wire connections shall be at a terminal block, or with a crimped connector. All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.
- H. Maximum allowable voltage for control wiring shall be 120V. If only higher voltages are available, the Control System Contractor shall provide step down transformers.
- I. All wiring shall be installed as continuous lengths, where possible. Any required splices shall be made only within an approved junction box or other approved protective device.
- J. Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations in accordance with other sections of this specification and local codes.
- K. Size of conduit and size and type of wire shall be the design responsibility of the Control System Contractor, in keeping with the manufacturer's recommendation and NEC.
- L. Control and status relays are to be located in designated enclosures only. These relays may also be located within packaged equipment control panel enclosures. These relays shall not be located within Class 1 starter enclosures.
- M. Follow manufacturer's installation recommendations for all communication and network cabling. Network or communication cabling shall be run separately from other wiring.
- N. Adhere to Division 16 requirements for installation of raceway.
- O. This Contractor shall terminate all control and/or interlock wiring and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site.

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- P. Flexible metal conduits and liquid-tight, flexible metal conduits shall not exceed 3' in length and shall be supported at each end. Flexible metal conduit less than 1/2" electrical trade size shall not be used. In areas exposed to moisture, including chiller and boiler rooms, liquid-tight, flexible metal conduits shall be used.

3.05 INSTALLATION OF SENSORS

- A. Install sensors in accordance with the manufacturer's recommendations.
- B. Mount sensors rigidly and adequate for the environment within which the sensor operates.
- C. Room temperature sensors shall be installed on concealed junction boxes properly supported by the wall framing.
- D. All wires attached to sensors shall be air sealed in their conduits or in the wall to stop air transmitted from other areas affecting sensor readings.
- E. Install duct static pressure tap with tube end facing directly down-stream of air flow.
- F. Sensors used in mixing plenums, and hot and cold decks shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip.
- G. Wiring for space sensors shall be concealed in building walls. EMT conduit is acceptable within mechanical and service rooms.
- H. Install outdoor air temperature sensors on north wall complete with sun shield at designated location.

3.06 IDENTIFICATION OF HARDWARE AND WIRING

- A. All wiring and cabling, including that within factory-fabricated panels, shall be labeled at each end within 2" of termination with a cable identifier and other descriptive information.
- B. Permanently label or code each point of field terminal strips to show the instrument or item served.
- C. Identify control panels with minimum 1-cm (1/2") letters on nameplates.
- D. Identify all other control components with permanent labels. Identifiers shall match record documents. All plug-in components shall be labeled such that removal of the component does not remove the label.

3.07 PROGRAMMING

- A. Provide sufficient internal memory for the specified control sequences and trend logging. There shall be a minimum of 25% of available memory free for future use.
- B. Point Naming: System point names shall be modular in design, allowing easy operator interface without the use of a written point index.

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- C. Software Programming
 - 1. Provide programming for the system as written in the specifications and adhere to the sequence strategies provided. All other system programming necessary for the operation of the system but not specified in this document shall also be provided by the Control System Contractor. Imbed into any custom-written control programs sufficient comment statements or inherent flow diagrams to clearly describe each section of the program. The comment statements shall reflect the language used in the sequence of operations.
- D. Operators' Interface
 - 1. Standard Graphics. Provide graphics for each major piece of equipment and floor plan in the building.
 - 2. The controls contractor shall provide all the labor necessary to install, initialize, start-up, and trouble-shoot all operator interface software and their functions as described in this section. This includes any operating system software, the operator interface database, and any third party software installation and integration required for successful operation of the operator interface.
 - 3. As part of this execution phase, the controls contractor will perform a complete test of the operator interface. Test duration shall be a minimum of [16] hours on-site. Tests shall be made in the presence of the Owner or Owner's representative.
- E. Demonstration: A complete demonstration and readout of the capabilities of the monitoring and control system shall be performed. The contractor shall dedicate a minimum of 16 hours on-site with the Owner and his representatives for a complete functional demonstration of all the system requirements. This demonstration constitutes a joint acceptance inspection, and permits acceptance of the delivered system for on-line operation.

3.08 CLEANING

- A. This contractor shall clean up all debris resulting from his or her activities daily. The contractor shall remove all cartons, containers, crates, etc. under his control as soon as their contents have been removed. Waste shall be collected and placed in a location designated by the Construction Manager or General Contractor.
- B. At the completion of work in any area, the Contractor shall clean all of his/her work, equipment, etc., making it free from dust, dirt and debris, etc.
- C. At the completion of work, all equipment furnished under this Section shall be checked for paint damage, and any factory finished paint that has been damaged shall be repaired to match the adjacent areas. Any metal cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

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3.09 TRAINING

- A. Provide one 8 hour classroom training session for personnel designated by the Owner. Computer-based audio-visual training may be substituted for up to 4 hours of hands on training.
- B. Train the designated staff of Owner's representative and Owner to enable them to proficiently operate the system; create, modify and delete programming; add, remove and modify physical points for the system, and perform routine diagnostic and troubleshooting procedures.
- C. Additional training shall be available in courses designed to meet objectives as divided into three logical groupings; participants may attend one or more of these, depending on the level of knowledge required:
 - 1. Day-to-day Operators
 - 2. Advanced Operators
 - 3. System Managers/Administrators
- D. Provide course outline and materials as per Part 1 of this Section. The instructor(s) shall provide one copy of training material per student.
- E. The instructor(s) shall be factory-trained instructors experienced in presenting this material.
- F. Classroom training shall be done using a network of working controllers representative of the installed hardware or at the customer's site.
- G. This training shall be made available in addition to the interactive audio-visual tutorial, provided with the system.

3.10 ACCEPTANCE

- A. The control systems will not be accepted as meeting the requirements of Completion until all tests described in this specification have been performed to the satisfaction of both the Engineer and Owner. Any tests that cannot be performed due to circumstances beyond the control of the Contractor may be exempt from the Completion requirements if stated as such in writing by the Owner's representative. Such tests shall then be performed as part of the warranty.

END OF SECTION

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SECTION 23 21 13 - HYDRONIC PIPING AND SPECIALTIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Heating, Chilled water piping systems and Condensate drains; including:
 - 1. Pipe and pipe fittings.
 - 2. Valves.
 - 3. Air vents.
 - 4. Strainers.
- B. Expansion Tanks

1.02 REFERENCES

- A. ASME B31.9 - Building Services Piping.
- B. ASTM B 32 - Solder Metal.
- C. ASTM B 88 - Seamless Copper Water Tube.

1.03 SUBMITTALS

- A. Include data on pipe materials, pipe fittings and accessories.
- B. Include detailed shop drawings clearly indicating valve make, model, location, type, size and pressure rating.
- C. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.
- D. Provide operation and maintenance manual.

1.04 QUALITY ASSURANCE

- A. Conform to ASME B31.9.
- B. For each product specified, provide components by same manufacturer throughout.

PART 2 - PRODUCTS

2.01 PIPING

- A. Tubing: Copper ASTM B 88, Type L, hard drawn.
 - 1. Fittings: ASME B16.23 cast brass or ASME B16.29 solder wrought copper.
 - 2. Joints: ASTM B 32, solder, Grade 95TA.

2.02 EXPANSION TANKS

- A. Provide ASME stamped tanks.
- B. Refer to equipment schedule for type of expansion tank to be used.
- C. Tank: Closed type, welded steel rated for working pressure of 150 pounds per square inch-gage, cleaned, and prime coated.
- D. Supplied expansion tank with steel support saddles for horizontal units.
- E. Construct tank with tapplings for installation of accessories.
- F. Provide quick connect air inlet of automotive tire valve type and tank drain.

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- G. Provide pressure relief valve, and automatic cold water fill assembly complete with pressure reducing valve, reduced pressure double check back pressure valve with test cocks, strainer, vacuum breaker, and valved by-pass.
- H. Provide an Airtrol tank fitting as manufactured by Bell & Gossett.
- I. Support tanks inside building from building structure.
- J. Flush and clean tank prior to delivery to site and keep sealed during construction.
- K. Anchor tanks in accordance with manufacturer's instructions.

2.03 VALVES

- A. Manufacturers:
 - 1. Bray.
 - 2. Crane.
 - 3. Nibco
 - 4. Nexus
- B. General:
 - 1. Provide valves of same manufacturer throughout the project where possible.
 - 2. Provide valves with manufacturer's name and pressure rating clearly marked on outside of body.
- C. Valve Connections:
 - 1. Provide valves suitable to connect to adjoining piping as specified for pipe joints. Use line pipe size valves.
 - 2. Solder or screw to solder adapters for copper tubing.
- D. Check Valves:
 - 1. 2 Inches and Smaller: Bronze, swing disc, solder or screwed ends.
 - 2. Over 2 Inches: Iron body, bronze trim, swing disc, renewable disc and seat, flanged ends.
 - 3. Discharge of Pumps: Iron body, bronze trim, spring loaded, double disc wafer style.
- E. Drain Valves: Bronze compression stop with nipple and cap or hose thread.
- F. Pressure Ratings: Unless otherwise indicated, use valves suitable for 125 minimum pounds per square inch-gage WSP and 450 degrees F and maximum 200 pounds per square inch-gage and 250 degrees F.
- G. Ball Valves: Bronze body, full port, stainless steel ball and stem, teflon seats, threaded or soldered ends.

2.04 AIR VENTS

- A. Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8-inch brass needle valve at top of chamber.
- B. Float Type: Brass, cast iron or semi-steel body, copper or stainless steel float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.

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2.05 STRAINERS

- A. 2 Inches and Smaller: Screwed brass or iron body for 175 pounds per square inch-gage working pressure, Y pattern with 1/32-inch stainless steel perforated screen.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. After completion, fill, clean, and treat systems.

3.02 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.
- B. Install piping to conserve building space, and not interfere with use of space and other work.
- C. Group piping whenever practical at common elevations.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Provide clearance for installation of insulation, and access to valves and fittings.
- F. Provide access where valves and fittings are not exposed.
- G. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- H. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- I. Prepare pipe, fittings, supports, and accessories for finish painting.
- J. Use grooved mechanical couplings and fasteners only in equipment rooms.
- K. Install unions downstream of valves and at equipment or apparatus connections.
- L. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- M. Provide spring loaded check valves on discharge of chilled water and condenser water pumps.
- N. Provide 3/4-inch gate or ball drain valves at main shut-off valves, low points of piping, bases of vertical risers, and at equipment. Pipe to nearest drain.
- O. Install specialties in accordance with manufacturer's instructions to permit intended performance.
- P. Provide manual air vents at system high points readily accessible.

END OF SECTION

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SECTION 23 21 23 - HYDRONIC PUMPS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Pumps for mechanical systems except where integral with manufactured piece of equipment, including: Pumps and pump controls where self-contained.

1.02 SUBMITTALS

- A. Include certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. For each pump with a motor horsepower greater than 10, submit a certified shop performance test curve indicating capacity, head, horsepower and flow rates from shutoff to 125 percent of design flow.
- B. For centrifugal pumps, include certification that pump impeller diameter is less than 85 percent of the diameter of the maximum impeller possible for the pump casing, and that fabricated structural steel base is of sufficient strength to prevent vibration, warping or misalignment of the pump.
- C. Provide operation and maintenance manual.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. General Pumps: Armstrong, Bell and Gossett. PACO, Patterson, and Taco.

2.02 GENERAL

- A. Statically and dynamically balance rotating parts.
- B. Capacity test for design flow after final assembly.

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- C. Construction to permit complete servicing without breaking piping or motor connections.
- D. Pumps to operate at 1,750 rotations per minute unless specified otherwise.
- E. Complete pump assembly, including casing, flanges and seals, suitable for the service intended and the working pressure and temperatures scheduled for the system. Scheduled working pressure applies to the entire pump assembly including the suction and discharge flanges.
- F. Pumps to be complete with grease lubricated ball bearings, grease fittings and relief plugs, unless stated otherwise hereinafter.
- G. Free of flashing and cavitation at all flow rates from 25 to 125 percent of design flow under the suction conditions of the actual pump installation.
- H. Critical speed at least 115 percent of the running speed listed in the schedule.
- I. Pump connections to be flanged, except that on end suction, base mounted pumps connection sizes 2-1/2 inch and less may be threaded.
- J. Heating pumps to be suitable for handling water at 230 degrees F.
- K. Select motors to drive the pump through its characteristics curve from zero flow to 25 percent above the design flow without exceeding rated full load nameplate horsepower. Provide a non-overloading motor, such that the rated horsepower will not be exceeded at any point on the pump curve. Do not use the motor service factor. Motor shall be inverter rated to be used with variable frequency drive.

2.03 IN-LINE PUMP

- A. Type: Centrifugal, single stage, close coupled in-line, back pullout design, suitable for horizontal or vertical operation.
- B. Casing: Cast iron, rated for greater of 125 pounds per square inch or 1.5 times actual discharge working pressure, suction and discharge gage port, air vent, wear rings, seal flush connection, drain plug, flanged suction and discharge.
- C. Impeller: Bronze, fully enclosed, keyed to shaft and secured with locknut.

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- D. Shaft: Stainless steel or carbon steel with bronze or stainless steel sleeve through seal chamber.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide drains for bases and stuffing boxes piped to and discharging into floor drains.
- B. Provide air cock and drain connection on horizontal pump casings.
- C. Provide line sized gate valve and strainer on suction side and line sized soft seated check valve and globe valve on discharge side of all pumps except sump pumps.
- D. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. Provide supports under elbows on pump suction and discharge line sizes 4 inch and over.
- E. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
- F. Level and align pump baseplate, pump and driver. Provide metal supporting blocks, wedges and shims as required. Rigidly bolt pump base plate to the concrete base. After final alignment of centrifugal pumps, 25 horsepower and larger, dowel the pump and motor to the base.
- G. Provide one set of replacement seals for each size pump.

END OF SECTION

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SECTION 23 31 13 - METAL DUCTWORK

PART 1 - GENERAL

1.01 REFERENCES

- A. National Fire Protection Association (NFPA).
- B. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

1.02 SUBMITTALS

- A. Shop Drawings:
 - 1. Layouts for areas in which it may be necessary to deviate substantially from layout shown on the Drawings. Show major relocation of ductwork and major changes in size of ducts. Minor transitions in ductwork, if required due to job conditions, need not be submitted as long as the duct area is maintained.
 - 2. Layout and fabrication details for cooking equipment exhaust ductwork.
 - 3. Layouts of mechanical equipment rooms and penthouses.
 - 4. Details of intermediate structural steel members required to span main structural steel for the support of ductwork.
 - 5. Method of attachment of duct hangers to building construction.
 - 6. Coordinate shop drawings with related contracts prior to submission.
- B. Product Data: Material, gage, type of joints, sealing materials, and reinforcing for each duct size range, including sketches or SMACNA plate numbers for joints, method of fabrication and reinforcing. Include ACGIH figure numbers for hoods if applicable.

1.03 QUALITY ASSURANCE

- A. SMACNA: Gages of materials, fabrication, reinforcement, sealing requirements, installation, and method of supporting ductwork shall be in accordance with the following SMACNA manuals, unless otherwise shown or specified:

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1. HVAC Duct Construction Standards.
2. Round Industrial Duct Construction Standard.
3. Rectangular Industrial Duct Construction Standard.

B. Unless otherwise shown or specified, follow the Hood Design Data, and Construction Guidelines for Local Exhaust Systems from the ACGIH Industrial Ventilation Manual.

C. Conform to the applicable requirements of NFPA 90A, 90B, 91, 96, and 101.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Sheet Metal:

1. Aluminum: ASTM B-209, Alloy 3003, Temper H-14.
2. Copper: ASTM B-370.
3. Galvanized Steel: ASTM A653, Class LFQ (lock forming quality), coating designation G-90.
4. Monel: ASTM B-127.
5. Stainless Steel: AISI Types 302, 304 and 316, as specified.

B. Duct Hangers:

1. Strap Hangers: Same material as ducts, except that hangers for stainless steel ducts in unfinished spaces may be galvanized steel.
2. Rod Type Hangers: Mild low carbon steel, unless otherwise specified; fully threaded or threaded each end, with 2 removable nuts each end for positioning and locking rod in place. Unless stainless steel, galvanized or cadmium plated; shop coat with metal primer.

C. Miscellaneous Fasteners and Upper Hanger Attachments:

1. Sheet Metal Screws, Machine Bolts and Nuts: Same material as duct, unless otherwise specified.
2. Concrete Inserts: Steel or malleable iron, galvanized; continuously slotted or individual inserts conforming with MSS SP-58, Types 18 & 19, Class A-B.

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3. C Clamps: Fee & Mason Co.'s 255L with locking nut, and 255S with retaining strap.
4. Metal Deck Ceiling Bolts: B-Line Systems, Inc.'s Fig. B3019.
5. Welding Studs: Erico Fastening Systems, capacitor discharge, low carbon steel, copper flashed.
6. Structural (carbon) Steel Shapes and Steel Plates: ASTM A36, shop primed.
7. Stainless Steel Shapes and Plates: ASTM A276 and ASTM A666.
8. Machine Bolt Expansion Anchors:
 - a. Non-caulking single unit type: FS FF-S-325, Group II, Type 2, Class 2, Style 1.
 - b. Non-caulking double unit type: FS FF-S-325, Group II, Type 2, Class 2, Style 2.
 - c. Self-drilling type: FS FF-S-325, Group III, Types 1 and 2.

2.02 FABRICATION - GENERAL

- A. Fabricate ductwork from galvanized sheet metal, except as follows:
 1. Fabricate the following ductwork from aluminum:
 - a. Inlet and discharge ductwork connected to cooling towers and evaporative condensers.
 - b. Exhaust ductwork from shower, locker, can washing and steam service rooms, and swimming pool areas.
 2. Fabricate the following ductwork from stainless steel:
 - a. Supply, return, and recirculated air ductwork connected to inlet or outlet devices installed in surgical operating, surgical scrub-up, surgical recovery and surgical work rooms. Use AISI Type 302 or 304 stainless steel.
 - b. Exhaust ductwork connected to cooking equipment, dishwashing, and other scullery equipment hoods. Install stainless steel from the individual hood to its respective fan and from the fan to the point of discharge to the outside air. Use AISI Type 302 or 304 stainless steel.
 - c. Exhaust ductwork connected to laboratory exhaust fume hoods. Install stainless steel from the individual hood to its respective fan and from the fan to the point of discharge to the outside air. Use AISI Type 316 stainless steel.

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d. Use stainless steel with a No. 4 finish where installed exposed in finished rooms and No. 2B finish in other locations. Use stainless steel fasteners for ductwork installed exposed in finished rooms and where fastener penetrates duct. Galvanized fasteners may be used in unfinished spaces for non-penetrating service.

B. Dissimilar Metals: Separate dissimilar metals used for ductwork with 12 oz vinyl coated woven fiberglass duct connector fabric, such as Duro Dyne's Glasseal. No separation is required between screws or rivets and the materials in which they are inserted.

2.03 VIBRATION ISOLATION FOR DUCTWORK

A. Type: Combination rubber and spring type designed for insertion in a split hanger rod for isolating ductwork from the overhead construction.

1. Approved isolators: Amber Booth Type BSSR, Korfund Type VX, Mason Industries, Type DNHS, Vibration Eliminator Co. Type SNRC and Vibration Mountings and Controls Type RSH.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL

A. Install ductwork to allow maximum headroom. Properly seam, brace, stiffen, support and render ducts mechanically airtight. Adjust ducts to suit job conditions. Dimensions may be changed as approved, if cross sectional area is maintained.

B. Pitch horizontal ducts connected to hoods downward toward hood not less than 1 inch in 10 feet.

C. Provide necessary transformation pieces, and flexible fabric connections for ductwork connected to air handling equipment or air inlet and outlet devices.

3.02 SEALING SEAMS, JOINTS, AND PENETRATIONS

A. Seal ductwork in accordance with the SMACNA Manual except for the following:

1. Ductwork Specified to be Insulated: Conform with Seal Class A for all pressure classes.

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2. Cooking Equipment Exhaust Ductwork: Conform with NFPA 96.
3. Horizontal Ductwork for Dishwashing, and Other Scullery Equipment Exhausts:
 - a. Continuously solder transverse joints vaportite along bottom, and up both sides 2 inches minimum.
 - b. Continuously solder longitudinal seams vaportite if seams are approved to be located at bottom of duct.

3.03 HANGERS FOR DUCTS, UNDER 2 INCHES W.G.

- A. Install hangers for ducts as specified in the SMACNA Manual, with the following exceptions:
 1. Rectangular ducts up to 42 inches wide, not having welded or soldered seams, and supported from overhead construction; extend strap hangers down over each side of the duct and turn under bottom of duct a minimum of 2 inches. Secure hanger to duct with 3 full thread sheet metal screws, one in the bottom and 2 in the side of the duct.
 2. Rectangular ducts 43 inches wide and over, and all sizes of duct with welded or soldered seams, and supported from overhead construction; use trapeze hangers.
 3. Prime coat plain steel rods threaded at the site immediately after installation with metal primer.

3.04 HANGERS FOR DUCTS, 2 INCHES W.G. AND OVER

- A. Install hangers for ducts as specified in the SMACNA Manual, with the following exceptions:
 1. Support rectangular ducts, regardless of size, by means of trapeze hangers, framed all four sides. Provide minimum 1 x 1 x 1/8 inch angle iron framing for duct having a maximum side dimension up to and including 36 inches in size. Install framing snug to all four sides of duct.

3.05 UPPER HANGER ATTACHMENTS

- A. General:
 1. Secure upper hanger attachments to structural steel or steel bar joists wherever possible.
 2. Do not use drive-on beam clamps, flat bars or bent rods, as upper hanger attachments.

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3. Do not attach hangers to steel decks which are not to receive concrete fill.
4. Do not attach hangers to precast concrete planks less than 2-3/4 inches thick.
5. Avoid damage to reinforcing members in concrete construction.
6. Metallic fasteners installed with electrically operated or powder driven tools may be used as upper hanger attachments, in accordance with the SMACNA Manual, with the following exceptions:
 - a. Do not use powder driven drive pins or expansion nails.
 - b. Do not attach powder driven or welded studs to structural steel less than 3/16 inch thick.
 - c. Do not support a load, in excess of 250 lbs from any single welded or powder driven stud.
 - d. Do not use powder driven fasteners in precast concrete.

B. Attachment to Steel Frame Construction: Provide intermediate structural steel members where required by ductwork support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of 5.

1. Secure upper hanger attachments to steel bar joists at panel points of joists.
2. Do not drill holes in main structural steel members.

C. Attachment to Concrete Filled Steel Decks:

1. New Construction: Install metal deck ceiling bolts.
2. Existing Construction: Install welding studs (except at roof decks).
3. Do not attach hangers to decks less than 2-1/2 inches thick.

D. Attachment to Existing Cast-In Place Concrete:

1. Secure hangers to overhead construction with self drilling type expansion anchors and machine bolts.
2. Secure hanger attachments required to be supported from wall or floor construction with single unit expansion anchors or self drilling type expansion anchors and machine bolts.

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- E. Attachment to Cored Precast Concrete Decks (Flexicore, Dox Plank, Spancrete, etc.): Toggle bolts may be installed in cells for the support of ducts up to a maximum of 60 inches in width.
- F. Attachment to Hollow Block or Hollow Tile Filled Concrete Decks:
1. New Construction: Omit block or tile and pour solid concrete with cast-in-place inserts.
 2. Existing Construction: Break out block or tile to access, and install machine bolt anchors at highest practical point on side of web.
- G. Attachment to Waffle Type Concrete Decks:
1. New Construction: Install cast-in-place inserts.
 2. Existing Construction: Install machine bolt expansion anchors at highest practical point on side of web.
- H. Attachments to Precast Concrete Tee Construction:
1. Secure hangers to tees by any of the following methods:
 - a. Tee hanger inserts between adjacent flanges.
 - b. Install double unit expansion anchors and machine bolts at highest practical point on side of web.
- I. Attachment to Wood Construction:
1. Secure strap hangers to the sides of wood beams with one No. 18 x 1-1/2 inch long (minimum) wood screws or 2 No. 16 x 1-1/2 inch long (minimum) drive screws. Do not hammer in wood screws.
 2. Secure rod hangers to angle iron clip angles, bolted or screwed to the sides of the wood beams with 3/8 inch bolts or 3/8 inch lag screws. Install hanger rods with a threaded end through a hole in the angle, secured with a double nut, one above and one below the angle. Do not use lag screws in wood beams, having a nominal face width under 2 inches. Install bolts or lag screws in the side of beams at mid-point or above.
 3. Pre-drill holes for lag screws 1/8 inch in diameter less than the root diameter of the lag screw thread.
 4. Where wood trusses are approved to support ductwork, hangers may be attached only to the bottom chord. Method of attachment must be specifically approved.
 5. Do not secure hanger attachments to nailing strips resting on top of steel beams.

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3.06 DUCT RISER SUPPORTS, 2 INCHES W.G. AND OVER

A. Support vertical round ducts by means of double-ended split steel pipe riser clamps welded to the ducts and bearing on floor slabs or adjacent structural members, at every other floor through which the riser passes.

B. Support vertical rectangular ducts by means of two steel angles or channels, anchor bolted to floor slab or adjacent structural member at every other floor through which the riser passes. Secure steel angles or channels to a transverse joint by means of 3/8 inch bolts, or by welding. Size supports as follows:

MAXIMUM SIDE DIMENSION (inches)	SUPPORT ANGLE (inches)	SUPPORT CHANNEL (inches)	MINIMUM BEARING AT EACH END (inches)
36	1 x 1 x 1/8	1 x 1/2 x 1/8	2
48	1-1/2 x 1-1/2 x 1/8	1-1/2 x 3/4 x 1/8	3
60	2 x 2 x 1/8	2 x 1 x 1/8	3
61 - up	2-1/2 x 2-1/2 x 3/16	2 x 1 x 3/16	4

3.07 VIBRATION ISOLATION FOR DUCTWORK

A. Install vibration isolation in accordance with the manufacturer's printed installation instructions, unless otherwise specified.

B. High Velocity Ductwork Installed within Mechanical Equipment, Machine and Penthouse Mechanical Equipment Rooms: Provide combination rubber and spring type isolators, designed for insertion in a split hanger rod for overhead supported ductwork and double rubber-in-shear isolators for floor supported ductwork. Provide isolators designed for a static deflection of 1/2 inch.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 23 37 00 - AIR OUTLETS AND INLETS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Ceiling, wall, and floor diffusers, registers and grilles, and louvers.

1.02 REFERENCES

- A. ADC 1062 - Certification, Rating and Test Manual.
- B. AMCA 500 - Test Method for Louvers, Dampers and Shutters.
- C. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- D. ARI 650 - Air Outlets and Inlets.
- E. ASHRAE 70 - Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.
- F. SMACNA 1035 - HVAC Duct Construction Standards - Metal and Flexible.

1.03 SUBMITTALS

- A. Include product data for outlets and inlets indicating type, size, location, application, and noise level.
- B. Review requirements of outlets and inlets as to size, finish, and type of mounting prior to submitting product data and schedules of outlets and inlets.
- C. Include manufacturer's installation instructions.

1.04 QUALITY ASSURANCE

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- D. Test and rate performance of air outlets and inlets in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.
- E. Test and rate performance of louvers in accordance with AMCA 500.
- F. Conform to NFPA 90A.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Ceiling Diffusers: Anemostat, Krueger, Metal Aire, Price, Titus Products.
- B. Louvers: American Warming, Greenheck, Ruskin, Sunvent.

2.02 DIFFUSERS / GRILLES

- A. Refer to air device schedule for type, size and capacities.
- B. Fabricate of steel or aluminum as indicated with baked enamel off-white finish.

2.03 LOUVERS

- A. Refer to louver schedule for type, size and capacities.
- B. Provide 6-inch deep louvers with blades on 45-degree slope with center baffle and return bend, heavy channel frame, birdscreen on interior side with 1/2-inch square mesh for exhaust and 3/4-inch for intake.
- C. Fabricate of 12 gage extruded aluminum, welded assembly, with factory prime coat finish.
- D. Furnish with exterior angle flange for installation.
- E. Fabricate louver penthouses with mitered corners and reinforce with structural angles.
- F. Pass 750 feet per minute free velocity with less than 0.10 inches of water pressure drop, based in accordance with AMCA 500. Water penetration less

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than 0.025 ounce of water per foot of free area at 900 feet per minute. Provide a minimum of 45 percent free area.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install items in accordance with manufacturers' instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, regardless of whether dampers are specified as part of the diffuser, or grille and register assembly.
- E. Paint ductwork visible behind air outlets and inlets matte black.
- F. Provide all specialties and frames for air devices required for installation in ceiling type indicated in architectural documents. Provide all cutting and patching of T-bars, gypsum board and other ceiling systems as required for installation of air devices.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 23 52 16 - HEATING BOILERS AND ACCESSORIES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Condensing Boilers, controls and boiler trim, hot water connections, fuel burning system and connections,.

1.02 REFERENCES

- A. AGA - Directory of Certified Appliances and Accessories.
- B. AGA Z21.13 - Gas-Fired Low-Pressure Steam and Hot Water Boilers.
- C. ASME SEC I - Boiler and Pressure Vessels Code - Rules for Construction of Power Boilers.
- D. ASME SEC IV - Boiler and Pressure Vessels Code - Rules for Construction of Heating Boilers.
- E. ASME SEC VIII DIV 1 - Boilers and Pressure Vessels Code - Rules for Construction of Pressure Vessels.
- F. HI - Testing and Rating Standard for Cast Iron and Steel Heating Boilers.
- G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- H. NFPA 31 - Installation of Oil Burning Equipment.
- I. NFPA 54 (AGA Z223.1) - National Fuel Gas Code.

1.03 SUBMITTALS

- A. Product Data: Submit general layout and dimensions. Include size and location of water, fuel, electric and vent connections, electrical characteristics, weight and mounting loads.
- B. Test Reports: Indicate specified performance and efficiency is met or exceeded. Provide combustion test that includes boiler firing rate, over fire draft, gas flow

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rate, heat input, burner manifold gas pressure, percent carbon monoxide (CO), percent oxygen (O), percent excess air, flue gas temperature at outlet, ambient temperature, net stack temperature, percent stack loss, percent combustion efficiency, and heat output.

- C. Manufacturer's Installation Instructions: Submit assembly, support details, connection requirements, and include start-up instructions.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturers Field Reports: Indicate condition of equipment after start-up including control settings and performance chart of control system.
- F. Operation and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, cleaning procedures, replacement parts list, and maintenance and repair data.

1.04 QUALITY ASSURANCE

- A. Conform to ASME Section IV for construction of boilers. The boiler shall be registered with the National Board Of Boiler And Pressure Vessel Inspectors
- B. Unit Certification: CSA certified as a direct vent boiler.
- C. Conform to applicable code for internal wiring of factory wired equipment.
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., as suitable for the purpose specified and indicated.
- E. Maintain one copy of each document on site.
- F. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- G. Installer Qualifications: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

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- A. Accept boilers and accessories on site in factory shipping packaging. Inspect for damage.
- B. Protect boilers from damage by leaving packing in place until installation.

1.06 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.07 WARRANTY

- A. Provide one-year manufacturers warranty for boilers with the pressure vessel guaranteed for 10 years against thermal shock.

1.08 MAINTENANCE SERVICE

- A. Provide service and maintenance of boilers for one year from Date of Substantial Completion.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Refer to schedule on drawings for acceptable manufacturers.

2.02 CONDENSING BOILERS

- A. Description: Factory assembled, factory fire tested, self contained, readily transported unit ready for automatic operation except for connection of water, fuel, electrical, and vent services.
- B. Unit: Mount on integral structural steel frame base and include integral forced draft burner, burner controls, boiler trim, refractory, insulation and jacket.

2.03 BOILER SHELL

- C. Construct to applicable ASME Boiler and Pressure Vessels Code for allowable working pressure of 60 pounds per square inch water.
- D. Provide two lifting eyes on top of boiler.

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- E. Hinged front and rear doors, gas tight, insulated, and secured with heavy-duty cap screws and replaceable brass nuts.
- F. Front and rear tube sheets and flue fully accessible for inspection and cleaning when doors are open.
- G. Insulate casing with readily removable, 2-inch thick glass fiber blanket insulation covered by sectional preformed sheet metal jacket. Boiler casing temperature not to exceed ambient room temperature by 18 degrees F maximum with surface air velocity of 1 foot per second.
- H. Provide bi-metal type thermometer, 3-1/2 inch diameter with black letters on white background.

2.04 HOT WATER BOILER CONTROLS AND TRIM

- A. ASME rated pressure relief valve, 80 pounds per square inch-gage.
- B. Water temperature gage.
- C. Water pressure gage.
- D. Low water cut-off with manual reset to prevent burner operation when boiler water falls below safe level.
- E. Air safety switch cut-off to prevent operation of unit until sufficient prepurge is assured.
- F. High limit temperature controller with manual reset for burner to prevent boiler water temperature from exceeding safe system temperature.
- G. Proof of flame switch.
- H. High condensate cut-off switch.
- I. Operating temperature controller for automatic start and stop with full modulation for burner to maintain water temperature set point.
- J. Water and gas flex connectors shall be provided with the boiler to be installed by the contractor.

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2.05 BOILER FUEL BURNING SYSTEM

- A. General: Atmospheric designed to burn natural gas, modulating with low fire ignition position and automatically maintains fuel-air ratio.
 - 1. Blower: Statically and dynamically balanced to supply combustion air; direct connected to motor.
 - 2. Damper Motor: Single motor controlling combustion air damper and fuel valves.
- B. Gas Burner: Forced draft, high-radiant multi-port power burner with electric ignition. Natural gas burner piping, include on unit complete gas train including high and low gas pressure switches, plug valve, and gas pressure regulator.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install in accordance with NFPA 54.
- B. Install boiler on concrete housekeeping base, minimum 3-1/2 inches high and 6 inches larger on each side than boiler base.
- C. Provide connection of natural gas service in accordance with NFPA 54 (AGA Z223.1).
- D. Pipe relief valves and drain valves to nearest floor drain.
- E. Provide for connection to electrical service.

3.02 STARTUP, DEMONSTRATION, AND TRAINING

- A. Factory startup is required for all boilers and associated controls by the manufacturer's representative. Demonstrate operation and maintenance procedures.

END OF SECTION

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SECTION 23 64 23 - AIR COOLED WATER CHILLERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Chiller package, charge of refrigerant and oil, controls and control connections, chilled water connections, condenser water connections, refrigerant connections, auxiliary water connections, starters.

1.02 REFERENCES

- A. ASHRAE 14 - Rating Positive Displacement Condensing Units.
- B. ASHRAE 15 - Safety Code for Mechanical Refrigeration.
- C. ASHRAE 90A - Energy Conservation in new Building Design.
- D. ANSI/NFPA 70 - National Electrical Code
- E. ASME SEC VIII - Boiler and Pressure Vessel Code.
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- G. UL 207 - Refrigerant-Containing Components and Accessories, Non-Electrical.
- H. UL 303 - Refrigeration and Air Conditioning Condensing, and Air-Source Heat Pump Equipment.
- I. UL 1995 - Heating and Cooling Equipment.

1.03 SUBMITTALS

- A. Shop Drawings: Indicate components, assembly, dimensions, weights and loads, required clearances, and location and size of field connections. Indicate valves, strainers, and thermostatic valves required for complete system.

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- B. Product Data: Submit rated capacities, weights, specialties and accessories, electrical requirements and wiring diagrams.
- C. Manufacturer's Installation Instructions: Submit Rigging and details of connections to other Work.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements including those furnished but not produced by the manufacturer.

1.04 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Submit start-up instructions, maintenance data, parts lists, controls, and accessories. Include trouble- shooting guide.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept chillers on site in factory packaging. Inspect for damage.
- B. Protect indoor chillers from weather by storing under roof.

1.06 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.07 WARRANTY

- A. Provide five-year manufacturer warranty to include coverage for complete assembly including materials only.

1.08 MAINTENANCE SERVICE

- A. Provide service and maintenance of complete assembly for one year from Date of Substantial Completion.

1.09 MAINTENANCE MATERIALS

- A. Provide two containers of lubricating oil.

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PART 2 - PRODUCTS

2.01 Manufacturer's: Carrier, McQuay, Trane, York

2.02 EVAPORATOR

A. Scroll Compressors:

1. Unit: Direct drive, hermetic, 3,600 rotations per minute, fixed compression, scroll motor-compressor with control panel.
2. Features: Centrifugal oil pump, sump oil heater, oil level sight glass, oil charging valve, two point lubrication for each motor bearing, flooded lubrication for the journal and thrust bearings, check valve on scroll discharge port.
3. Motor: Suction-gas cooled, hermetically sealed, squirrel cage induction.
4. Control panel: Factory mounted panel with separate starter and refrigeration control sections:
 - a. Starter Section:
 - 1) Non-fused, molded case, disconnect switch.
 - 2) Single point power connection and grounding lug.
 - 3) Control power transformer with fuse.
 - 4) Solid state overload relay for each compressor.
 - 5) Phase loss/reversal monitor.
 - 6) Cycle counter and hour meter per compressor.
 - b. Refrigeration Section:
 - 1) Anti-recycle timer.
 - 2) Reset relay.
 - 3) Reset switch.
 - 4) Low and high, pressure control.
 - 5) Motor winding temperature protection.
 - c. Manual reset for compressor overload, high motor temperature, and low and high refrigerant pressure.

2.03 EVAPORATOR

- #### A.
- Provide evaporator of shell and tube type, seamless or welded steel construction with cast iron or fabricated steel, heads, seamless copper tubes or red brass

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tubes with integral fins, rolled or silver brazed into tube sheets. Provide multiple refrigerant circuits on multiple compressor units.

- B. Design, test, and stamp refrigerant side for 225 pounds per square inch-gage working pressure and water side for 150 pounds per square inch-gage working pressure, in accordance with ASME SEC 8.
- C. Insulate with 0.75-inch minimum thick flexible expanded polyvinyl chloride insulation with maximum K factor of 0.26.
- D. Provide water drain connection and thermometer wells for temperature controller and low temperature cutout.

2.04 CONDENSERS

- A. Provide condensers of shell and tube type, seamless or welded steel construction with cast iron or fabricated steel, heads, seamless copper tubes or red brass tubes with integral fins, rolled or silver brazed into tube sheets.
- B. Design, test, and stamp refrigerant side for 450 pounds per square inch-gage working pressure in accordance with ASME SEC 8.
- C. Provide integral sub-cooling circuit.
- D. Provide 450 pounds per square inch-gage safety relief valve on condenser shell.
- E. Design, test, and stamp water side for 150 pounds per square inch-gage working pressure in accordance with ASME Pressure Vessel Code.

2.05 CONDENSER COILS, FANS AND MOTORS

- A. Coils: Aluminum fins mechanically bonded to seamless copper tubing. Provide sub-cooling circuits as applicable. Air test under water to 425 pounds per square inch-gage, and vacuum dehydrate
- B. Vertical propeller type condenser fans with fan guard on discharge, equipped with roller or ball bearings with grease fittings extended to outside of casing.

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- C. Weatherproof motors suitable for outdoor use, single phase permanent split capacitor or 3 phase, with permanent lubricated ball bearings and built-in current and thermal overload protection refer to Section 16220.

2.06 REFRIGERANT CIRCUIT

- A. Provide refrigerant circuits, factory supplied and piped. Refer to Section 15183.
- B. Provide for each refrigerant circuit:
 - 1. Liquid line solenoid valve.
 - 2. Filter dryer (replaceable core type).
 - 3. Liquid line sight glass and moisture indicator.
 - 4. Thermal expansion for maximum operating pressure.
 - 5. Charging valve.
 - 6. Insulated suction line.
 - 7. Discharge line check valve.
 - 8. Compressor discharge service valve.
 - 9. Pressure relief device.

2.07 CONTROLS

- A. Locate on chiller, mount steel control panel, containing starters, power and control wiring, molded case disconnect switch, factory wired with single point power connection.
- B. For each compressor, provide across-the-line starter, non-recycling compressor overload, starter relay, and control power transformer or terminal for control power. Provide manual reset, current overload protection.
- C. Provide devices on control panel face:
 - 1. Compressor, run lights.
 - 2. System start-stop switch.
 - 3. Control power fuse or circuit breaker.
 - 4. Compressor lead-lag switch.
 - 5. Demand limit switch.

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- D. Provide safety controls with indicating lights arranged so any one will shut down machine and require manual reset:
1. Low chilled water temperature switch.
 2. High discharge pressure switch for each compressor.
 3. Low suction pressure switch for each compressor.
 4. Oil pressure switch.
 5. Flow switch in chilled water line.
 6. Flow switch in condenser water line.
 7. Relay for remote mounted emergency shutdown.
- E. Provide Operating Controls:
1. Multi-step chilled water temperature controller which cycles compressor and activates capacity controls, with remote thermostat.
 2. Five minute off timer prevents compressor from short cycling.
 3. Part winding start timer.
 4. Periodic pump-out-timer to pump down on chilled water flow and high evaporator refrigerant pressure.
 5. Solenoid valve between heat recovery condenser and receiver to limit refrigerant level in condenser.
 6. Provide thermostat to cycle fan motors in response to out-door ambient temperature.
 7. Provide head pressure switch to cycle fan motors in response to refrigerant condensing pressure.
 8. Provide solid state control to vary speed of one condenser fan motor in response to refrigerant condensing pressure.
 9. Provide electronic low ambient control consisting of mixing damper assembly, controlled to maintain constant refrigerant condensing pressure.
 10. Load limit thermostat to limit compressor loading on high return water temperature.
 11. Three phase monitor to protect unit by stopping compressor on phase loss, phase reversal, phase unbalance, or under voltage.
 12. Hot gas bypass sized for minimum compressor loading on one compressor only, bypasses hot refrigerant gas to evaporator.
 13. Cycle counter and operating hour meter.

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- F. Provide pre-piped gage board with pressure gages for suction and discharge refrigerant pressures, and oil pressures for each compressor.
- G. Provide alarm package with test button and indicating lights which indicate control circuit is energized and compressor is running, and will sound an audible alarm and light an indicating light upon detection of compressor malfunction, low chilled water temperature, or evaporator water flow failure.

2.08 PERFORMANCE

- A. Refer to Equipment Schedule

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Provide for connection to electrical service.
- A. Align indoor chiller on concrete housekeeping pad minimum 3-1/2 inches high and 6 inches wider than the equipment base on all sides.
- B. Install units on vibration isolation. Refer to Section 15070.
- C. Provide connections to chilled-water piping.
 - 1. On inlet, provide:
 - a. Thermometer well for temperature controller.
 - b. Thermometer.
 - c. Strainer.
 - d. Flow switch.
 - e. Flexible pipe connection.
 - f. Pressure gage.
 - g. Shut-off valve.
 - 2. On outlet, provide:
 - a. Thermometer.
 - b. Flexible pipe connection.
 - c. Pressure gage.

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- D. Furnish and install necessary auxiliary water piping for oil cooling units and purge condensers.
- E. Provide connection to condenser water piping. Refer to Section 15183.
 - 1. On inlet, provide:
 - a. Thermometer well for temperature limit controller.
 - b. Thermometer.
 - c. Strainer.
 - d. Flow switch.
 - e. Flexible pipe connection.
 - f. Pressure gage.
 - g. Shut-off valve.
 - 2. On outlet, provide:
 - a. Thermometer.
 - b. Flexible pipe connection.
 - c. Pressure gage.
 - d. Shut-off valve.
- F. Arrange piping for easy dismantling to permit tube cleaning.

3.02 FIELD QUALITY CONTROL

- A. Provide cooling season start-up, winter season shutdown service, for first year of operation. If initial start-up and testing takes place in winter and machines are to remain inoperative. Repeat start-up and testing operation at beginning of first cooling season.

3.03 DEMONSTRATION AND TRAINING

- A. Demonstrate system operations and verify specified performance Demonstrate low ambient operation during winter testing for air-cooled condensers.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 23 82 00 - TERMINAL HEATING AND COOLING UNITS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Water coils, glycol coils, fan-coil units.

1.02 REFERENCES

- A. ARI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils.
- B. SMACNA 1035 - HVAC Duct Construction Standards - Metal and Flexible.
- C. UL 1096 - Electric Central Air Heating Equipment.

1.07 SUBMITTALS

- A. Shop Drawings: Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations. Indicate schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers
- B. Product Data: Submit coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions. Submit mechanical and electrical service locations, capacities and requirements.
- C. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access to valves.
- D. Operation and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. Accept units on site in factory packing. Inspect for damage. Store under roof.
- B. Protect coil fins from crushing and bending by leaving in shipping cases until installation, and by storing indoors. Protect coils from entry of dirt and debris with pipe caps or plugs.

1.13 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.14 WARRANTY

- A. Provide one-year manufacturer's warranty for equipment within the section.

1.19 EXTRA MATERIALS

- A. Supply two sets of filters.

PART 2 - PRODUCTS

2.01 FABRICATION

- A. Tubes: 1/2-inch or 5/8-inch outside diameter seamless copper arranged in parallel or staggered pattern, expanded into fins with brazed joints.

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- B. Fins: Aluminum or copper continuous plate type with full fin collars or individual helical spiral finned tube type wound under tension.
- C. Casing: Die formed channel frame of galvanized steel with mounting holes on 6 inch centers. Provide intermediate center tube supports for plate fin coils longer than 36 inches. Provide intermediate tube supports for spiral fin coils at intervals required to eliminate any sagging during operation.
- D. Capacity: As scheduled.

2.02 WATER HEATING COILS

- A. Headers: Tubes expanded into header, seamless copper tube with silver brazed joints, or prime coated steel pipe with brazed joints.
- B. Leak Testing: Air test under water to 300 pounds per square inch-gage for working pressure of 200 pounds per square inch-gage and 200 degrees F.
- C. Configuration: Self draining circuitry, with threaded plugs for drain and vent; serpentine type with return bends on smaller sizes and return headers on larger sizes.

2.03 WATER COOLING COILS

- A. Headers: Copper with tubes expanded into header, seamless copper tube with silver brazed joints, or prime coated steel pipe with brazed joints.
- B. Leak Testing: Air test under water to 300 pounds per square inch-gage for working pressure of 200 pounds per square inch-gage and 220 degrees F.
- C. Configuration: Self draining circuitry, with threaded plugs for drain and vent; threaded plugs in return bends or in headers opposite top and bottom of each tube.

2.04 FAN-COIL UNITS

- A. Coils: Evenly spaced aluminum fins mechanically bonded to copper tubes, designed for 200 pounds per square inch and 220 degrees F. Provide drain pan under cooling coil, easily removable for cleaning, with drain connection.
- B. Cabinet: 0.0598-inch thick steel with exposed corners and edges rounded, easily removed panels and glass fiber insulation. Refer to plans for duct and piping configuration.
- C. Finish: Factory applied baked enamel with color on visible surfaces of enclosure or cabinet.
- D. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.
- E. Control: Multiple speed switch, factory wired, located in cabinet.
- F. Filter: Easily removed 1-inch pleated type, located to filter air before coil.
- G. Capacity: As Scheduled

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PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify wall construction and ductwork is ready for installation.
- B. Verify concealed blocking and supports are in place and connections are correctly located.

3.02 INSTALLATION

- A. Install coils in ducts and casings in accordance with SMACNA 1035.
- B. Support coil sections independent of piping on steel channel or double angle frames and secure to casings. Provide frames for maximum three coil sections. Arrange supports to avoid piercing drain pans. Provide airtight seal between coil and duct or casing.
- C. Make connections to coils with unions or flanges.
- D. On water coils, provide shut-off valve on supply line and lockshield balancing valve on return line. Locate water supply at bottom of supply header and return water connection at top. Provide manual air vents at high points complete with stop valve. Ensure water coils are drainable and provide drain connection at low points.
- E. Provide drain pan and drain connection for cooling coils. Fabricate drain pan from 20 gage galvanized steel. Extend 3 inches from face of coil entering air side, 6 inches from face of coil leaving air.
- F. Insulate headers located outside airflow as specified for piping.
- G. Install equipment exposed to finished areas after walls and ceilings are finished and painted. Avoid damage.
- H. Protection: Provide finished cabinet units with protective covers during balance of construction.
- I. Fan-Coil Units: Install as indicated. Coordinate to assure correct recess size for recessed units.
- J. Hydronic Units: Provide with shut-off valve on supply and lockshield balancing valve on return piping. If not easily accessible, extend vent to exterior surface of cabinet for easy servicing. For cabinet unit heaters, fan coil units, and unit heaters, provide float operated automatic air vents with stop valve.

3.03 CLEANING

- A. After construction is completed, including painting, clean exposed surfaces of units. Vacuum clean coils and inside of cabinets.
- B. Touch-up marred or scratched surfaces of factory-finished cabinets, using finish materials furnished by manufacturer.
- C. Install new filters.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 24 – RESERVED

SECTION 24 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Reserved and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – RESERVED

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 25 – INTEGRATED AUTOMATION

SECTION 25 00 00 – INTEGRATED AUTOMATION

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Integrated Automation and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – INTEGRATED AUTOMATION

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 26 – ELECTRICAL

SECTION 26 00 00 – ELECTRICAL

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Electrical and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – ELECTRICAL

CLASSIFICATION: **UNCLASSIFIED**

SECTION 26 05 11 - BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Basic Electrical Requirements specifically applicable to Division 26, 27, and 28 Sections, in addition to Division 1 - General Requirements.

1.02 REFERENCES

- A. The following specifications and standards of issues listed below but referred to thereafter by basic designation only, form a part of these specifications:

1. National Electrical Code, 2008 Edition.
2. National Fire Protection Association's Recommended Practices.
3. Local, City and State Codes and Ordinances.
4. National Electrical Safety Code, 1997 Edition.
5. Underwriter's Laboratories, Inc.
6. Illuminating Engineering Society.
7. Institute of Electrical and Electronic Engineers.
8. Power Cable Engineers Association.
9. National Electrical Manufacturers Association.
10. American Standards Association.
11. American Society for Testing Materials.
12. Occupational Safety and Health Act.
13. Service requirements of serving utility company.

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14. Americans with Disabilities Act (ADA).
15. Arkansas Energy Code (ASHRAE 90.1).

1.03 SUBMITTALS

- A. Submit six (6) sets of shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal. The basic information for each item of equipment to be included is as follows:
 1. Index.
 2. Installation and Operating Instructions
 - a. Individual tabbed sections.
 - b. Manufacturer descriptive literature.
 - c. Applicable control diagrams.
 - d. Composite wiring diagrams.
 3. Each submittal sheet shall be clearly marked with equipment Catalog Number and accessory items being submitted.

1.04 REGULATORY REQUIREMENTS

- A. Work shall conform to all applicable codes, specifications, local ordinances, industry standards and utility company regulations.
- B. Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, such references shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. The Contractor, in such cases, may at his option propose any article, approved equal to or better than that specified, as approved in writing by the Engineer.

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- C. All materials and workmanship shall comply with all applicable codes, specifications, local ordinances, industry standards and utility company regulations.
- D. In case of difference between building codes, specifications, state laws, local ordinances, industry standards, and utility company regulations and the contract documents, the most stringent shall govern. The Contractor shall promptly notify the Engineer in writing of any such difference.
- E. Non-Compliance: Should the contractor perform any work that does not comply with the requirements of the applicable building codes, state laws, local ordinances, industry standards and utility company regulations, he shall bear all costs arising in correcting the deficiencies.
- F. All required fees, permits and inspections shall be obtained and paid for by the contractor under the section of the specifications for which they are required.
- G. All Utility costs and fees for Utility service installation, removal or relocation shall be paid for by the contractor. This is applicable for electrical power, telephone and cable television. Contractor shall paid for any material, labor or equipment costs required for Utility service installation, removal or relocation not performed by the Utility,

1.05 ELECTRICAL LICENSE REQUIREMENT

- A. No person shall perform electrical work on the Contract without possessing an Arkansas State Master or Journeyman License from the Arkansas State Electrical Examiner's Board. All electrical work and apprentice electricians shall be supervised by a Master or Journeyman Electrician on a one to one ratio.
- B. All electricians shall have a copy of their license with them and shall be required to show it to an appropriate inspector upon request.

1.06 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions. The Engineer/Owner reserves the right to relocate any device a maximum distance of 6'-0" at the time of installation without an extra cost being incurred.

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- B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Engineer before proceeding.

1.07 CONTRACTOR REVISED DRAWINGS

- A. The Contractor shall, during the progress of the work, keep an accurate record of all changes and corrections from the layouts shown on the drawings. Record of changes may be kept by accurately making all changes on a set of prints during the progress of the job.
- B. Upon completion of the work and prior to final payment, the Contractor shall furnish to the Engineer, one set of "contractor revised" reproducibles, legibly and accurately marked to indicate all changes, additions, deletions, etc., from the contract drawings.

1.08 GUARANTEE

- A. The work herein specified shall be free from defects in workmanship and material under normal use and service. If, within twelve (12) months from date of substantial completion and Owner acceptance of the work herein described, any of the equipment or materials, or the installation thereof, is found to be defective in workmanship or material, it shall be replaced or repaired free of charge.
- B. The Contractor shall, after completion of the original test of the installation, and acceptance by the Engineer, provide any service incidental to the proper performance of the electrical systems under guarantees outlined above for a period of one (1) year.

1.09 OPERATING AND MAINTENANCE MANUALS

- A. After approval of materials and equipment for use in this project, 3 copies of an Operation and Maintenance Manual shall be submitted for approval.
- B. The basic information for each item of equipment to be included is as follows:
 - 1. Index
 - 2. Maintenance and operating instructions

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- a. Manufacturer's descriptive literature and maintenance manuals
 - b. An Approved Set of Shop drawings
 - c. Applicable control diagrams
 - d. Composite wiring diagrams as applicable showing all motor controllers, relays, etc., with interlocking provisions as built in the job, along with a written description of the control sequence if applicable.
 - e. Spare parts list (when parts are provided) and listing of part suppliers and their addresses
 - g. Power riser or single line diagram of the "as built" building electrical distribution system.
 - h. Submit fire alarm system components inspection testing forms and system certification forms as required by NFPA 72.
- C. Upon final approval, submit one (1) bound copy of the approved Operation and Maintenance Manual to the Architect/ Engineer and hold two (2) copies for instruction of Owner as hereinafter specified.

PART 2 - PRODUCTS

2.01 UL LISTING

- A. Where the Underwriter's Laboratories have an applicable standard, the product shall be listed with UL and shall be so marked.
- B. The Contractor shall bear all responsibility for any work which he performs that voids any UL listings of any equipment.

2.02 SUBSTITUTIONS

- A. Each Section of the Project Manual, when applicable, has a paragraph entitled "Manufacturers". If "Engineer Approved Equal" is not in the list of manufacturers, no substitutions will be accepted. Submit one of the manufacturers listed.

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- B. The Engineer does not give any prior approvals on submittals. Do not call the Engineer for prior approval.

PART 3 - EXECUTION

3.01 600 VOLT INSULATION TEST

- A. Prior to energizing the electrical system the contractor shall provide insulation resistance tests for all distribution and utilization equipment. The Contractor shall provide a suitable and stable source of test power. The insulation test shall be a "megger" test at 500 volts D.C. for one-half minute. A test report shall be submitted to the Engineer. The minimum insulation resistance for No. 12 AWG conductors shall be 1,000,000 ohms and for larger conductors shall be 250,000 ohms. Conductors testing below the minimum insulation resistance shall be replaced and tested again.

3.02 CONTINUITY TEST

- A. The Contractor shall perform a continuity test on the entire electrical system prior to energizing the system to insure proper cable connections.

3.03 CONNECTION TORQUE TESTS

- A. All No. 1/0 AWG and larger conductors with bolted connections shall be torque tested using a torque wrench. Torque shall be to National Electrical Testing Association's (NETA) Standards.

3.04 REMOVAL OF RUBBISH

- A. Contractor shall remove his rubbish from building site at intervals and shall maintain the spaces allotted him in an orderly manner. On completing his work, and prior to submission of final estimate, he shall remove all tools, appliances, material and rubbish from the grounds.

3.05 FIRE ALARM SYSTEM TEST

- A. The fire alarm system shall be tested by the company responsible for the installation. The fire alarm contractor shall submit a certification that the system operates properly.

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3.06 GROUND RESISTANCE MEASUREMENTS

- A. Ground resistance measurements of each ground rod shall be taken and certified by the Contractor to the Engineer. No part of the electrical distribution system shall be energized prior to the resistance testing of that system's ground rods and grounding system and submission of test results to the Engineer. Test reports shall indicate the location of the ground rod and grounding system and the resistance and the coil conditions at the time the test was performed. When the building water service is used as a ground of part of the grounding system, ground-resistance measurements shall also be made of this connection. Ground resistance measurements shall be made in normally dry weather, not less than 48 hours after rainfall, and with the ground under test isolated from other grounds. The resistance to ground shall be measured using the fall-of-potential method described in IEEE No. 142.

3.07 MECHANICAL OPERATION TESTS

- A. All electrical equipment, such as switches, circuit breakers, etc., shall be tested by operating the device to verify that the mechanical portions of the device are functioning.

3.08 ROTATIONAL TESTS

- A. The Contractor shall assist Division 15 in performing rotational tests on all motors. If rotational tests determine that conductors must be transposed to change direction of rotation, the conductors shall be changed at the make-up box on the motor; or if the change is made elsewhere, then the conductor's color coding shall be changed.

3.09 INSTRUCTING OWNER'S REPRESENTATIVE

- A. The Contractor shall instruct representatives of the Owner in the proper operation and maintenance of all elements of the Electrical system.
- B. Contractor shall spend not less than one-half (1/2) day in such formal instruction to fully prepare the Owner's representative to operate and maintain the Electrical systems.

END OF SECTION

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SECTION 26 05 19 - BUILDING WIRE AND CABLE

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Building wire and cable.
- B. Wiring connectors and connections.

1.02 RELATED SECTIONS

1.03 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.
- B. UL 83 - Thermoplastic Insulated Wires and Cables.
- C. UL 486 A - Wire Connectors and Soldering Lugs for Use with Copper Conductors.
- D. UL 486 C - Splicing Wire Connectors.
- E. UL 1581 - Reference Standard for Electrical Wires, Cables and Flexible Cords.

1.04 SUBMITTALS

- A. Submit under provisions of Division 1 and Section 260511.
- B. Product Data: Provide for each cable assembly type.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.05 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.07 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.

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- B. Conductors shall be copper.
- C. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions.
- D. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

1.08 COORDINATION

- A. Determine required separation between cable and other work.
- B. Determine cable routing to avoid interference with other work.

PART 2 - PRODUCTS

2.01 MANUFACTURERS - BUILDING WIRE AND CABLE

- A. Triangle.
- B. American.
- C. Engineer Approved.

2.02 BUILDING WIRE AND CABLE

- A. Description: Single conductor insulated wire.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation: ANSI/NFPA 70, Type THW (feeder circuits) and THHN/THWN (branch circuits).

2.03 WIRING CONNECTORS

- A. All cable and wire terminals, taps and splices shall be made secure with compression type connectors, approved for the service. Connections shall be installed with approved tools and dies to assure a permanent secure joint. Compression joints shall be cleaned, made smooth with insulating compound, wrapped with varnish cambric and insulated with approved electrical grade plastic tape. Where conductors are to be connected to metallic surfaces, the coated surfaces of the metal shall be polished before installing the connector. Lacquer coating of conduits shall be removed where ground clamps are to be installed. Provide all necessary hangers, racks, cleats, and supports required to make a neat installation. Wire connectors shall conform to UL 486.

PART 3 - EXECUTION

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3.01 EXAMINATION

- A. Prior to installation verify that interior of building has been protected from weather.
- B. Prior to installation verify that mechanical work likely to damage wire and cable has been completed.

3.02 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.03 WIRING METHODS

- A. Interior Locations: Use only building wire, Type THW or use THHN/THWN insulation, in raceway unless otherwise indicated on the Drawings.
- B. Wet or Damp Interior Locations: Use only building wire, Type THW or THHN/THWN in raceway or liquid tight flexible conduit.
- C. Exterior Locations: Use only building wire, Type THW or THHN/THWN insulation in raceway.
- D. Underground Installations: Use only building wire, Type THW or THHN/THWN insulation in raceway.
- E. Use wiring methods indicated on Drawings.
- F. On the loadside of GFIC circuit breaker, use only Type XHHW conductors.

3.04 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Use solid conductors for feeders and branch circuits No 10 AWG and smaller, except branch circuits to motors shall be stranded copper for flexibility.
- C. Use stranded conductors for control circuits 24 volts and below. Minimum size shall be No. 16 AWG.
- D. Use conductors not smaller than No. 12 AWG for power and lighting circuits and 120 volt control circuits.
- E. Conductors shall be continuous from outlet to outlet.
- F. Use No. 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 100 feet or where the distance to the first outlet exceeds 50 feet.
- G. Use No. 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.

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- H. Pull all conductors into raceway at same time.
- I. Use suitable wire pulling lubricant for building wire No. 4 AWG and larger.
- J. Protect exposed cable from damage.
- K. Support cables above accessible ceiling, using spring metal clips on cable ties to support cables from structure. Do not rest cable on ceiling panels.
- L. Use suitable cable fittings and connectors.
- M. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- N. Clean conductor surfaces before installing lugs and connectors.
- O. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- P. Use sleeve compression connectors for copper conductor splices and taps, No. 6 AWG and larger. Insulate any uninsulated conductors and connector with heat shrink insulation rated 600 volts.
- Q. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, No. 8 AWG and smaller.
- R. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, No. 10 AWG and smaller.
- S. Route circuits at own discretion; however, circuit numbers shall be according to Drawings.
- T. On three phase, four wire systems, do not use a common neutral for more than 3 circuits.
- U. On single phase, three wire systems, do not use a common neutral for more than 2 circuits.
- V. Where a common neutral is run for 2 or 3 homerun circuits, connect phase conductors to breakers in panel which are attached to separate phase legs in order that the neutral conductors will carry only the unbalanced current. Neutral conductors shall be of same size as phase conductors unless specifically noted otherwise.
- W. Run conductors of same circuit in same conduit.
- X. Run conductors of different voltage system in separate conduits.
- Y. Color code conductors as follows:

	<u>480Y277 Volts</u>	<u>240/120 Volts</u>
Phase A	Brown	Black

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Phase B
Phase C
Ground
Neutral

Orange
Yellow
Green
Gray

Red

Green
White

208Y120 Volts

Phase A
Phase B
Phase C
Ground
Neutral
Isolated
Ground

Black
Red
Blue
Green
White
Green w/ Yellow Stripe

Switchlegs

Violet
Pink

- Z. Contractor shall not install more than three (3) current-carrying conductors in one conduit without derating the conductors per NFPA 70 (NEC).
- AA. Where cables not in conduit pass through floors, cables shall be enclosed in conduit extending at least 6 inches above the floor.
- BB. Cables shall be protected from physical damage where necessary by conduit.
- CC. All cable splices shall be made in boxes.
- DD. The radius of bends in cables shall not be less than five times the diameter of the cable.
- EE. Cables shall be secured by staples, straps, j-hooks or similar fittings every 4-1/2 feet and within 12 inches of every cabinet, box and fitting.
- FF. Do not pull cable sheaths back more than necessary to separate conductors.
- GG. Do not score conductors when peeling back conductor insulation. Scored conductors will be replaced.
- HH. Do not cut off strands from stranded conductors at terminations. Conductors with strands missing shall be replaced.
- II. Kinked, torn, or twisted cable sheaths are unacceptable and shall be replaced.
- JJ. Install wire and cables to avoid chemicals, cold temperature bending and different lengths of conductors of same circuit.
- KK. Make sure conduits are properly terminated, reamed and brushed before installation of wire and cables.
- LL. Cable sheaths shall be held in place by strain relief fittings.
- MM. Verify proper conductor location at each termination before energizing.

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- NN. All parallel conductors shall be of the same length, type, size and shall have the same connector pressures.

3.05 INTERFACE WITH OTHER PRODUCTS

- A. Identify wire and cable.
- B. Identify each conductor with its circuit number or other designation indicated on Drawings in each junction box and in each panelboard.

3.06 FIELD QUALITY CONTROL

- A. Perform field inspection and testing.
- B. Inspect wire and cable for physical damage and proper connection.
- C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- D. Verify continuity of each branch circuit conductor.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 26 05 25 - CONDUIT

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Rigid steel conduit.
- B. Flexible metal conduit.
- C. Liquidtight flexible metal conduit.
- D. Electrical metallic tubing.
- E. Surface mounted raceway.
- F. PVC conduit.
- G. Fittings and conduit bodies.

1.02 RELATED SECTIONS

1.03 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
- B. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- C. ANSI/NFPA 70 - National Electrical Code.
- D. NECA "Standard of Installation."
- E. NEMA TC 3 - PVC Fittings to Use with Rigid PVC Conduit and Tubing.
- F. UL 1 - Flexible Metal Conduit.
- G. UL 5 - Surface Metal Raceways and Fittings
- H. UL 6 - Rigid Metal Conduit.
- I. UL 360 - Liquid-tight Flexible Steel Conduit.
- J. UL 652 - Schedule 40 and 80 Rigid PVC Conduit.

1.04 DESIGN REQUIREMENTS

- A. Conduit Size: ANSI/NFPA 70.

CLASSIFICATION: **UNCLASSIFIED**

1.05 SUBMITTALS

- A. Submit under provisions of Division 1 and Section 260511.
- B. Product Data: Provide for metallic conduit, flexible metal conduit, liquidtight flexible metal conduit, metallic tubing, fittings and conduit bodies.

1.06 PROJECT RECORD DOCUMENTS

- A. Accurately record actual routing of conduits larger than 2 inches.

1.07 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect, and handle Products to site.
- B. Inspect all conduit for damage.
- C. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- D. Protect PVC conduit from sunlight.

1.09 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Route conduit as shown on Drawings in approximate locations unless specifically dimensioned. Route as required to complete wiring system.

PART 2 - PRODUCTS

2.01 CONDUIT REQUIREMENTS

- A. Minimum Size: 3/4 inch unless otherwise specified.
- B. Underground Installations:

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1. Below Grade: Conduit installed below grade shall be Schedule 40 PVC. All elbows shall be galvanized rigid steel conduit (RSC).
- C. Outdoor Locations, Above Grade., On Roofs and on Canopies: Use galvanized rigid steel conduit.
- D. Dry Locations:
 1. Concealed: Use electric metallic tubing.
 2. Exposed: Metal-Clad (MC) is acceptable in unfinished areas below 10'-0"
- E. Temperature Controls: Use electrical metallic tubing (EMT) conduit for line voltage and HVAC equipment control. Refer to Division 15 for specific requirements and locations.
- F. All final connections to light fixtures, transformers, mechanical/HVAC equipment, pumps, water heaters, etc., and any equipment subject to vibration shall be in liquid-tight flexible metal conduit.
- G. Minimum size of flexible metal conduit shall be 3/4" except for tap connections to luminaires, which shall be no smaller than 3/8". Length of flexible metal conduit for luminaire tap connections shall not exceed 6'-0".

2.02 RIGID STEEL CONDUIT

- A. Manufacturers:
 1. Allied.
 2. Triangle.
 3. Engineer Approved.
- B. Rigid Steel Conduit: ANSI 80.1
- C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; material to match conduit.

2.03 FLEXIBLE METAL CONDUIT

- A. Manufacturers:
 1. Allied.
 2. Triangle.
 3. Engineer Approved.
- B. Description: Interlocked steel construction.

CLASSIFICATION: **UNCLASSIFIED**

- C. Fittings: ANSI/NEMA FB 1.

2.04 LIQUIDTIGHT METAL CONDUIT

- A. Manufacturers:
 - 1. Allied.
 - 2. Triangle.
 - 3. Engineer Approved.
- B. Description: Interlocked steel construction with PVC jacket.
- C. Fittings: ANSI/NEMA FB 1.

2.05 ELECTRICAL METALLIC TUBING (EMT)

- A. Manufacturers:
 - 1. Allied.
 - 2. Triangle.
 - 3. Engineer Approved.
- B. Description: ANSI C80.3; galvanized tubing.
- C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; die-cast compression type.

2.06 SURFACE METAL RACEWAY

- A. Manufacturers:
 - 1. Wiremold.
 - 2. Panduit
 - 3. Engineer Approved.
- B. Description: Surface metal raceway with hidden supports.
- C. Fittings Boxes and Conduit Bodies: As manufactured by surface metal raceway manufacturer.

2.07 NONMETALLIC CONDUIT

- A. Manufacturers:
 - 1. Carlon.

CLASSIFICATION: **UNCLASSIFIED**

- 2. Engineer Approved.
- B. Description: NEMA TC 3; Schedule 40 PVC.
- C. Fittings and Conduit Bodies: NEMA TC 3.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install conduit in accordance with NECA "Standard of Installation."
- B. Install surface metal raceway in accordance with manufacturer's directions.
- C. Arrange supports to prevent misalignment during wiring installation.
- D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers. Supports shall be installed within 3 feet of every outlet box, junction box, panel, or other tubing terminations. Fastening of unbroken lengths shall be permitted to be increased to a distance of 5 feet where structural members do not readily permit fastening within 3 feet. Do not space supports further than 10 feet apart.
- E. Group related conduits; support using conduit rack. Construct rack using steel channel.
- F. Fasten conduit supports to building structure and surfaces
- G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
- H. Do not attach conduit to ceiling support wires.
- I. Arrange conduit to maintain headroom and present neat appearance.
 - 1. Interior: All conduit in finished spaces shall be concealed unless specifically noted otherwise or unless construction prohibits.
 - 2. Exterior: All branch circuit conduit serving exterior, building mounted light fixtures, receptacles, and other devices/equipment on finished-out exterior building walls shall be concealed unless specifically noted otherwise or unless construction prohibits.
- J. Route all conduit parallel and perpendicular to walls. This includes conduit installed above ceilings, in attics, and in crawl spaces.
- K. Install insulated bushings or approved equivalent on each end of all conduit.

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- L. Install raintight conduit hubs on all exterior rigid galvanized steel conduit where it enters NEMA 3R rated enclosures on the top or sides.
- M. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
- N. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- O. Bring conduit to shoulder of fittings; fasten securely.
- P. Install no more than equivalent of four 90-degree bends between boxes. Use factory elbows for all 90 degree bends.
- Q. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- R. Provide suitable fittings to accommodate expansion and deflection where conduit crosses expansion joints.
- S. Use suitable caps to protect installed conduit against entrance of dirt and moisture during construction.
- T. Ground and bond conduit
- U. Identify conduit
- V. Provide suitable pullboxes in all conduit runs as required by the National Electrical Code and as required to facilitate wire installation.
- W. Holes for passage of conduits through all one-hour and two-hour drywall partitions shall be neatly cut to the required size. If holes are cut larger than necessary, they shall be covered with two (2) additional pieces of 5/8 inch type X gypsum wallboard, each 8 inches by 16 inches with a half circular cutout of the proper size, one (1) layer on one-hour partitions and two (2) layers on two-hour partitions.
- X. Holes for passage of conduits through one-hour, two-hour and four-hour masonry walls shall be fireproofed. Fireproofing materials shall be as follows:
 - 1. Cellular Glass Insulation: Pittsburgh Corning Corp. Foamglas "Regular" or UL rated or UNI-JAC UI rated pipe insulation, or approved equal.
 - 2. Fire Retardant Putty: IPC Flamesafe Type FAS500 or FST600 Series, or improved equal, for one-hour and two-hour walls.
 - 3. IPC/KB5 Mortar Seal, or approved equal (full depth of wall) for four-hour walls.
- Y. Holes for passage of conduits through masonry floors shall be fireproofed. Fireproofing material shall be Firestop Compound - IPC Flamesafe Type 500/FST 600, or approved equal, filled to full depth of slab. Minimum annular space around conduit shall be 3/16 inch.

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- Z. Refer to Architectural drawings for locations of fire-rated walls, ceilings and floors.
- AA. Not used.
- BB. All flexible conduit in Mechanical Rooms and outside shall be liquidtight flexible conduit.
- CC. All conduits with conductors inside that enter a building wall below grade shall have a fitting equal to OZ Type CSBI installed inside conduit.
- DD. Conduits which enter refrigerated areas, such as walk-in coolers and wall-in freezers, shall have a seal-off installed on the non-refrigerated side of the conduit where the conduit exits or enters the refrigerated area.
- EE. Make sure conduits are properly terminated, reamed and brushed before installation of wire or cable.
- FF. Not used.
- GG. Structural Engineer shall approve placement of conduits in all concrete slabs, beams and columns.
- HH. Underground duct installation requirements:
1. Ducts shall be in accordance with the NEC, as shown on the drawings, and as specified.
 2. Underground conduit stub-ups and sweeps to equipment inside of buildings shall be galvanized rigid steel, and shall extend a minimum of 5 feet outside of building foundation or as directed on plans..
 3. Stub-ups, sweeps, and risers to equipment mounted on outdoor concrete slabs shall be galvanized rigid steel, and shall extend a minimum of 5 feet away from edge of slab.
 4. Install insulated grounding bushings on the terminations.
 5. Rigid steel conduit turns of direction for all duct lines shall have minimum 4 feet radius in the horizontal and vertical directions. Sweeps for all duct lines shall have a minimum 40 feet radius in the horizontal and 4 feet in the vertical directions. Where a 40 feet radius is not possible, horizontal turns of direction shall be rigid steel.
 6. All multiple conduit runs shall have conduit spacers. Spacers shall securely support and maintain uniform spacing of the duct assembly

CLASSIFICATION: **UNCLASSIFIED**

a minimum of 3 inches above bottom of trench during the concrete pour.
Spacer spacing shall not exceed 5 feet.

7. Duct lines shall be installed no less than 12 inches from other utility systems, such as water, sewer, and chilled water.

8. Clearances between individual ducts:

a. For like services, not less than 3 inches.

b. For power and signal services, not less than 6 inches.

c. Provide plastic spacers to maintain clearances.

d. Provide nonferrous tie wires to prevent displacement of the ducts during pouring of concrete or backfill. Tie wires shall not act as substitute for spacers.

9. Couple the ducts with proper couplings. Stagger couplings in rows and layers to insure maximum strength and rigidity of the duct bank.

10. Keep ducts clean of earth, sand, or gravel during construction, and seal with tapered plugs upon completion of each portion of the work.

3.02 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance of partitions and other elements.

B. Pullboxes shall be provided at points shown on the plans or required to overcome mechanical difficulties due to arrangement of runs or the fixed characteristics of the building construction.

D. All threaded conduit shall be secured to boxes, cabinets, panels, etc. by means of a threaded bushing on the inside and locknuttred on the box exterior and interior.

3.03 USE OF THE FOLLOWING IS PROHIBITED

A. EMT crimp-on, tap-on, indenter type fittings.

B. EMT set- screw fittings on conduit smaller than 2".

C. All thread nipples in other than dry locations.

D. Wooden plugs inserted in concrete or masonry units as bases for fastening conduits, tubing, boxes, cabinets, or other equipment.

E. Installation of conduit or tubing which has been crushed or deformed.

F. LB Fittings. All bends shall be factory made 90 degree elbows.

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- G. Type ENT tubing.
- H. Armored cable.
- I. Type NMR (Romex) cable.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 26 05 26 - GROUNDING AND BONDING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Grounding electrodes and conductors.
- B. Equipment grounding conductors.
- C. Bonding.
- D. Chemicals.
- E. Conduit.

1.02 RELATED SECTIONS

1.03 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.
- B. UL 467 - Grounding and Bonding Equipment.

1.04 GROUNDING ELECTRODE SYSTEM

- A. Metal underground water pipe, if any.
- B. Metal frame of the building, if any.
- C. Electrode.
- D. Rod electrode.

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- E. "GEM encased in direct contact with earth.

1.05 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: No greater than 5 ohms.

1.06 SUBMITTALS

- A. Submit under provisions of Division 1 and Section 260511.
- B. Product Data: Provide data for grounding electrodes and connections.
- C. Test Reports: Indicate overall resistance to ground and resistance of each electrode.
- D. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of exothermic connectors.

1.07 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 1.
- B. Accurately record actual locations of grounding electrodes.

1.08 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 3 years documented experience.

1.09 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc.

CLASSIFICATION: **UNCLASSIFIED**

PART 2 - PRODUCTS

2.01 ROD ELECTRODE

- A. Material: Copper clad steel.
- B. Diameter: 5/8 inch.
- C. Length: 10 feet.

2.02 WIRE

- A. Material: Stranded or solid copper.
- B. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

2.03 CONNECTIONS

- A. Compression connector.

2.04 CHEMICALS (as required)

- A. Ground enhancement materials (50 lbs. minimum per rod).
- B. Cadweld "GEM" system, or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that final backfill and compaction has been completed around area where chemical ground is to be installed.

3.02 INSTALLATION

CLASSIFICATION: **UNCLASSIFIED**

- A. Install Products in accordance with manufacturer's instructions.
- B. Auger a 3 inch diameter hole to a dept of 9-1/2 feet.
- C. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground. Drive rod 1 foot into ground. Make compression connection connection. Pour chemicals (as required) around rod. Tamp around rod. Pour water in augured hole. Remove excess water from hole. Fill remainder of augured hole with soil. Tamp soil.
- E. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus or bushing.
- F. Size and type of green equipment ground conductors and method of securing then to obtain electrical continuity and effective grounding as per NFPA 70 - National Electrical Code, Article 250. Conduit shall not be used for grounding.
- G. Neutrals of lighting systems shall be grounded in accordance with NFPA 70 - National Electrical Code.
- H. All metal raceway system, including cabinets, conduit and boxes, shall be grounded in accordance with the NFPA 70 - National Electrical Code.
- I. An equipment ground conductor shall be installed in all conduits.
- J. Install a grounding electrode and grounding electrode conductor at each main distribution panel and dry type transformer.
- K. The grounding electrode shall be connected to the metal structure of all buildings with metal structures and to a 1-1/2 inch or larger cold water pipe, if metallic.
- L. Install isolated ground conductors all the way back to the Main Distribution Panel for 240 and 208 volt services, and back to dry type transformer ground in 460 volt services.
- M All unburied grounding conductors shall be installed in conduit.
- N. Provide grounding of pad-mounted transformer as required by the serving Utility.

CLASSIFICATION: **UNCLASSIFIED**

3.03 FIELD QUALITY CONTROL

- A. Inspect equipment grounding conductors and connections for tightness and proper installation.
- B. Use suitable test instrument to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer's recommendations using the fall- of-potential method.
- C. Grounding conductors shall be so installed as to permit shortest and most direct path from equipment to ground. All connections to ground conductors shall be accessible for inspections. All contact surfaces shall be thoroughly cleaned before connections are made to insure good metal-to-metal contact.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 26 05 34 - BOXES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Wall and ceiling outlet boxes.
- B. Floor boxes.
- C. Pull and junction boxes.

1.02 RELATED SECTIONS

1.03 REFERENCES

- A. ANSI/NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
- B. ANSI/NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- C. ANSI/NFPA 70 - National Electrical Code.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- E. UL 38 - Boxes for Use with Fire-Protection Signaling Systems, Manually Actuated Signaling.
- F. UL 50 - Cabinets and Boxes.
- G. UL 514A - Metallic Outlet Boxes.
- H. UL 514B - Fittings for Conduit and Outlet Boxes.

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- I. UL 996 - Electrical Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.
- J. UL 1241 - Junctions Boxes for Swimming Pool Lighting Fixtures.
- K. UL 1773 - Termination Boxes.
- L. UL 65 - Wired Cabinets.

1.04 SUBMITTALS

- A. Submit under provisions of Division 1 and Section 260511.
- B. Product Data: Provide for each cable assembly type.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.05 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 1.
- B. Accurately record actual locations and mounting heights of outlet, pull, and junction boxes.

1.06 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.07 PROJECT CONDITIONS

- A. Verify field measurements are as shown on Drawings.

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- B. Verify locations of all outlets prior to rough-in.
- C. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose. The exact location of all electrical boxes shall be as approved by Engineer who reserves the right to change any outlet for a distance of 6 feet in any direction from position shown on plans, before work is roughed-in, without extra charge.

PART 2 - PRODUCTS

2.01 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized steel.
 - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported, include 1/2 inch male fixture studs where required.
 - 2. Concrete Ceiling Boxes: Concrete type.
 - 3. Receptacle, single switch, and 2 gang switch boxes for wood studs shall be Raco #194 or #235 with plaster ring of proper depth.
 - 4. Receptacle, single switch, and 2 gang switch boxes for metal studs shall be Raco #196 or #235 with plaster ring for proper depth.
 - 5. Gang switches of 3 or more devices for wood or metal studs and exposed work shall be Raco #950 Series, appropriate gang box and raised cover.
 - 6. Lighting fixture outlet boxes for wood or metal studs, masonry walls, and furred ceilings shall be Raco #166, #167, or Raco #194 or #235 with plaster ring.
 - 7. Junction boxes for wood or metal studs, masonry walls, furred ceilings and interior exposed work shall be Raco #231, #232, #233, or #235.
 - 8. Receptacle boxes for masonry walls shall be Raco #695 or #191 with #785 device cover.

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9. Switches in 6 inch and wider masonry walls shall be 3-1/2 inch deep masonry boxes of gang required. Masonry boxes in 4 inch walls shall be 2-1/2 inches deep.
 10. Television outlet boxes shall be Racor #246, 4-1/16 inch box with #836 device cover ring. Telephone outlet boxes shall be Racor #256.
 - 11.. Outlet boxes for interior exposed work shall be Racor #191, #192, #231, or #232 boxes with 1/2 inch raised, 4 inch square cover of appropriate configuration.
- B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer.
- C. Boxes shall be oversized when required by Table 370-16(a) of the National Electrical Code.

2.02 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- B. Surface-Mounted Cast Metal Box: NEMA 250, Type as required; flat-flanged, surface-mounted junction box.
1. Material: Galvanized steel.
 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.

CLASSIFICATION: **UNCLASSIFIED**

- B. Install electrical boxes to maintain headroom and to present neat mechanical appearance.
- C. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- D. Install boxes to preserve fire resistance rating of partitions and other elements.
- E. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.
- F. Use flush mounting outlet boxes in finished areas, unless noted otherwise on the Drawings.
- G. Do not install flush mounting boxes back-to-back in walls; provide minimum 6 inch separation. Provide minimum 24 inch separation in acoustic rated walls. See Architectural floor plans for acoustic rated wall locations.
- H. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- I. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- J. Install flush mounting box without damaging wall insulation or reducing the effectiveness.
- K. Use adjustable steel channel fasteners for hung ceiling outlet box.
- L. Do not fasten boxes to ceiling support wires.
- M. Support boxes independently of conduit.
- N. Use gang box where more than one device is mounted together. Do not use sectional box.
- O. In other than masonry, use 4 inch square by 1-1/2 inch minimum box with plaster ring for single devices.

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- P. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- Q. Use cast floor boxes for installations in slab on grade; formed steel boxes are acceptable for other installations.
- R. Set floor boxes level.
- S. Large Pull Boxes: Boxes larger than 100 cubic inches in volume or 12 inches in any dimension.
 - 1. Interior Dry Locations: Use hinged enclosure.
 - 2. Other Locations: Use surface-mounted cast metal box.
- T. Locate boxes so outlets are not obstructed by pipes, ducts, or other items.
- U. Boxes for switches shall generally be located within 6 inches of door jamb, opposite side from the door hinges.
- V. Pullboxes shall be provided at points shown on plans or required to overcome mechanical difficulties due to arrangement of runs or the fixed characteristics of the building construction. No runs of over 100 feet shall be made without use of pullbox.
- W. All boxes shall have covers. All boxes installed above a ceiling and installed in unfinished spaces (Mechanical and Electrical Rooms, etc.) shall have the covers clearly and legibly marked with the circuits contained within them.
- X. All flush-mounted boxes shall come within 1/4 inch of finished surface of wall.
- Y. Fireproof all poke-through devices in accordance with manufacturer's directions.

3.02 INTERFACE WITH OTHER PRODUCTS

- A. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.

CLASSIFICATION: **UNCLASSIFIED**

- B. Coordinate mounting heights and locations of outlets mounted above counters, branches and backsplashes with Architect prior to rough-in.
- C. Position outlet boxes to locate luminaires as shown on reflected ceiling plan.

3.03 ADJUSTING

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closure in all unused box openings.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 26 05 35 - SUPPORTING DEVICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Conduit, cable and equipment supports.
- B. Anchors and fasteners.

1.02 REFERENCES

- A. NECA - National Electrical Contractors Association.
- B. ANSI/NFPA 70 - National Electrical Code.
- C. UL 514B - Fittings for Conduit and Outlet Boxes.

1.03 RELATED SECTIONS

1.04 SUBMITTALS

- A. Submit under provisions of Division 1 and Section 260511.
- B. Product Data: Provide manufacturer's catalog data for fastening systems.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.05 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.

CLASSIFICATION: **UNCLASSIFIED**

- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.01 PRODUCT REQUIREMENTS

- A. Materials and Finishes: Provide adequate corrosion resistance.
- B. Provide materials, sizes, and types of anchors, fasteners and supports to carry the loads of equipment and conduit. Consider weight of wire in conduit when selecting products.
- C. Perforated strap iron will not be acceptable as hanger or fastening material.
- D. Plastic tie wraps will not be acceptable as support materials except for securing light fixture whips.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
- C. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.
- D. Obtain permission from the Engineer before using powder-actuated anchors.
- E. Obtain permission from the Engineer before drilling or cutting structural members.
- F. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

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- G. Install surface-mounted cabinets and panelboards with minimum of four anchors. Provide blocks between studs to support anchors.
- H. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch off wall.
- I. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- J. All conduits, both horizontal and vertical, shall be accurately supported. Each hanger shall be properly sized to fit supported pipe or conduit.
- K. Where lines are supported under concrete construction, hanger rods shall be secured with concrete inserts.
- L. All hangers shall be so located as to properly grade and support horizontal conduits without appreciable sagging of these lines.
- M. Where multiple conduits are run horizontally at the same elevation and grade, they may be supported on trapezes of channels suspended on rods. Trapeze numbers, including suspension rods, shall be properly sized for number, size and loaded weight of conduits to be supported.
- N. Conduit supports shall be installed within 3 feet of each coupling, connector and box.
- O. Ceiling support wires shall not be used to support cables, conduit or boxes.
- P. Electrical contractor shall install his own supports for his equipment.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Branch circuit panelboards.
- B. Distribution panelboards.

1.02 RELATED SECTIONS

1.03 REFERENCES

- A. NECA (National Electrical Contractors Association) "Standard of Installation."
- B. NEMA AB 1 - Molded Case Circuit Breakers.
- C. NEMA KS 1 - Enclosed Switches.
- D. NEMA PB 1 - Panelboards.
- E. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- F. NFPA 70 - National Electrical Code.
- G. UL 67 - Panelboards.

1.04 SUBMITTALS

- A. Submit under provisions of Division 1 and Section 260511.

CLASSIFICATION: **UNCLASSIFIED**

- B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.05 RECORD DOCUMENTS

- A. Record actual locations of Products; indicate actual branch circuit arrangement.

1.06 OPERATION AND MAINTENANCE DATA

- A. Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.07 QUALITY ASSURANCE

- A. Perform Work in accordance with NECA Standard of Installation.

1.08 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.09 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by UL as suitable for purpose specified and indicated.

1.10 FIELD MEASUREMENTS

CLASSIFICATION: **UNCLASSIFIED**

- A. Verify that field measurements are as indicated on shop drawings.

1.11 MAINTENANCE MATERIALS

- A. Provide two of each panelboard key.

PART 2 - PRODUCTS

2.01 MANUFACTURER OR EQUAL

- A. Square D
- B. General Electric
- C. Siemens
- D. Cutler-Hammer

2.02 PANELBOARDS

- A. Panelboards: NEMA PB1, circuit breaker type.
- B. Panelboard Bus: Tin plated copper, ratings as indicated. Provide copper ground bus in each panelboard; provide insulated ground bus where scheduled.
- C. Minimum integrated short circuit rating, or as indicated on the Drawings. Panelboards shall have a fully-rated interrupting rating. Series-rated equipment will not be accepted.
- D. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled. Do not use tandem circuit breakers. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.
- E. Enclosure: NEMA PB 1, Type 1.

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- F. Cabinet box: 6 inches deep; width: 20 inches for 240 volt and less panelboards, 20 inches for 480 volt panelboards.
- G. Cabinet Front: Surface cabinet front with concealed trim clamps, concealed hinge, and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.
- H. The use of multiple single-pole circuit breakers with wire ties or common trip plastic caps in lieu of single handle 2- and 3-pole circuit breakers is not acceptable.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install panelboards in accordance with NEMA PB 1.1.
- B. Install panelboards plumb.
- C. Height: 6 ft to top of panelboard; install panelboards taller than 6 ft with bottom no more than 4 inches above floor.
- D. Provide filler plates for unused spaces in panelboards.
- E. Provide typed or neatly handwritten circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
- F. Provide engraved plastic nameplates.
- G. Provide a minimum of four (4) spare 20A/1P circuit breakers in each branch circuit panelboard or as indicated on the drawings.
- H. Install all screws and bolts in coverplates.
- I. Install knockout plugs in all unused openings in enclosure.
- J. Install nameplates on all circuit breakers of large panelboards.

CLASSIFICATION: **UNCLASSIFIED**

- K. Not used.
- L. Panelboards installed on basement walls shall be installed on 1-1/2 inch channel.
- M. The first section of multi-section panelboards shall have feed-through lugs. Contractor shall install conductors with ampacities equal to the bus rating of the panelboards, from the feed-through lugs to the main lugs only of Section #2 panelboard.

3.02 FIELD QUALITY CONTROL

- A. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 20 percent of each other. Maintain proper phasing for multi-wire branch circuits.
- B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.
- C. Device plates.

1.02 RELATED SECTIONS

1.03 REFERENCES

- A. NEMA WD 1 - General Purpose Wiring Devices.
- B. NEMA WD 6 - Wiring Device Configurations.
- C. UL 20 - General Use Snap Switches.
- D. UL 498 - Attachment Plugs and Receptacles.
- E. UL 894 - Switches for Use in Hazardous (Classified) Locations.
- F. UL 1010 - Receptacle Plug Combinations for Use in Hazardous (Classified) Locations.

1.04 SUBMITTALS

- A. Submit under provisions of Division 1 and Section 260511.
- B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

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C. Manufacturer's Instructions:

1. Indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements.
2. Include instructions for storage, handling, protection, examination, preparation, operation and installation of product.

1.05 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

1.06 EXTRA MATERIALS

- A. Provide protective rings and split nozzles as required and as specified.

PART 2 - PRODUCTS

2.01 WALL SWITCHES

A. Single Pole Switch:

1. Hubbell #1221.
2. Pass & Seymour #20AC1.
3. Arrow-Hart #1991.

B. Double Pole Switch:

1. Hubbell #1222.

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2. Pass & Seymour #20AC2.

3. Arrow-Hart #1992.

C. Three-way Switch:

1. Hubbell #1223.

2. Pass & Seymour #20AC3.

3. Arrow-Hart #1993.

D. Four-way Switch:

1. Hubbell #1224.

2. Pass & Seymour #20AC4.

3. Arrow-Hart #1994.

2.02 RECEPTACLES (Heavy Duty, Specification Grade)

A. Single Convenience Receptacle:

1. Hubbell #5361.

2. Pass & Seymour #5361.

3. Arrow-Hart #5361.

B. Duplex Convenience Receptacle:

1. Hubbell #5362.

2. Pass & Seymour #5362.

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3. Arrow-Hart #5362.
- C. GFCI Receptacle:
1. Hubbell #GF5352.
 2. Pass & Seymour #2091.
 3. Arrow-Hart #GF5342.
- D. Isolated Ground Duplex Receptacle:
1. Hubbell #IG5362.
 2. Pass & Seymour #IG6300.
 3. Arrow-Hart #IG5362.
- E. Special Purpose Receptacle:
1. Type, NEMA configuration and voltage as specified on Drawings as manufactured by:
 - a. Hubbell.
 - b. Pass & Seymour.
 - c. Arrow-Hart.
- F. Color of devices as selected by Architect/Engineer.

2.03 WALL PLATES

- A. Cover Plates:

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1. High impact smooth nylon in all areas except where specifically noted otherwise. Color shall be selected by the Architect.

2. Stainless steel in all mechanical, electrical, and equipment rooms and any unfinished spaces.

B. Weatherproof Enclosures:

1. Receptacles in wet locations shall be installed with an outlet enclosure clearly marked "Suitable for Wet Locations While in Use." There shall be a gasket between the enclosure and the mounting surface, and between the cover and the base to assure proper seal.

2. The enclosure must employ stainless steel mounting hardware and be constructed of impact resistant polycarbonate. The outlet enclosure shall be UL listed, TayMac Corporation #MM400GY-B, or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify conditions.

B. Verify outlet boxes are installed at proper height.

C. Verify wall openings are neatly cut and will be completely covered by wall plates.

D. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

E. Verify color of all devices and coverplates prior to ordering or purchase.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

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- B. Clean debris from outlet boxes.

3.03 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install devices plumb and level. Coverplates shall be snug to wall on all four sides, but not overly tightened to cause center depression.
- C. Install switches with OFF position down.
- D. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
- E. Install plates on switch, receptacle, and blank outlets in all areas. Install cover plate on all unused boxes.
- F. Connect wiring devices by wrapping conductor around screw terminal.
- G. Use jumbo size plates for outlets installed in masonry walls.
- H. Install galvanized steel plates on outlet boxes and junction boxes above accessible ceilings, and on surface mounted outlets.
- I. All plates shall be secured by means of screws with heads matching coverplates.
- J. Receptacles shall be installed with equipment grounds down, unless local codes require otherwise. Regardless, all receptacles, including GFI receptacles, shall be installed in the same way with the ground, turned in the same direction.

3.04 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes to obtain mounting heights specified and indicated on Drawings.
- B. Install wall switch 48 inches above finished floor.

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- C. Install convenience receptacle 18 (vertically oriented) inches above finished floor unless noted otherwise on Drawings.
- D. Install convenience receptacle 6 (horizontally oriented) inches above counter. Coordinate with Architect as to counter height.
- E. Install data and telephone outlets 18 (vertically oriented) inches above finished floor.
- F. Install fire alarm audio and/or visual devices 6'-8" above finished floor, or 6 inches below finish ceiling, whichever is lower.
- G. Install fire alarm pull station 44" above finished floor.

3.05 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Operate each wall switch with circuit energized and verify proper operation.
- C. Verify that each receptacle device is energized.
- D. Test each receptacle device for proper polarity.
- E. Test each GFCI receptacle device for proper operation.
- F. Replace any device or correct installation for any device that fails testing.

3.06 ADJUSTING

- A. Adjust devices and wall plates to be flush and level and fit snug to wall.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 26 27 28 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Nameplates and labels.
- B. Wire and cable markers.

1.02 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.

1.03 SUBMITTALS

- A. Submit under provisions of Division 1 and Section 260511.
- B. Product Data: Provide catalog data for nameplates, labels, and markers.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under regulatory requirements. Include instructions for storage, handling, protection, examination, preparation and installation of Product.

1.04 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

CLASSIFICATION: **UNCLASSIFIED**

2.01 NAMEPLATES AND LABELS

- A. Nameplates: Engraved three-layer laminated plastic, white letters on black background.
- B. Locations:
 - 1. Each electrical distribution equipment (panelboards, transformers) and control equipment enclosure (starters, disconnect switches, etc.).
- C. Letter Size:
 - 1. Use 1/2 inch letters for identifying equipment designation and voltage.
- D. Provide typewritten directory in each panelboard of circuit designations in clear/transparent protective envelope attached to inside of panelboard door.

2.02 WIRE MARKERS

- A. Description: Tape or tubing type wire markers.
- B. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.
- C. Legend:
 - 1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

2.03 TRENCH TAPE

- A. Tape shall be detectable aluminum foil polyethylene laminate.
- B. Tape shall be the following color and have the following wording:

Application	Color	Caution Wording

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Cable TV	Orange	"Caution - Cable TV Line Buried Below"
Electrical	Red	"Caution - Electric Line Buried Below"
Telephone	Orange	"Caution - Telephone Line Buried Below"
Fiber Optic	Orange	"Caution - Buried Fiber Optic Cable"

- C. Tape shall be equal to Panduit Type HTDU.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.

3.02 APPLICATION

- A. Install nameplate and label parallel to equipment lines.
- B. Secure nameplate to equipment front using No. 4 round heat cadmium plated, steel self-tapping screws or nickel-plated brass plates.
- C. Identify underground conduits using underground warning tape. Install one tape per trench at 6 inches below finished grade.
- D. All fire alarm junction boxes, pullboxes and covers shall be painted red.
- E. Both ends of pullwires shall be identified by means of labels or tags, reading "PULLWIRE" and shall be numbered to refer to same pullwire.
- F. Install nameplates at each circuit breaker on all switchboards and large panelboards.

END OF SECTION

CLASSIFICATION: **UNCLASSIFIED**

SECTION 26 51 10 - INTERIOR LUMINAIRES

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Interior luminaires and accessories.
- B. Exit signs.
- C. Luminaire accessories.

1.02 RELATED SECTIONS

1.03 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.
- B. ANSI/NFPA 101 - Life Safety Code.
- C. UL 924 - Emergency Lighting and Power Equipment.

1.04 SUBMITTALS

- A. Submit under provisions of Division 1 and Section 260511.
- B. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- C. Product Data: Provide dimensions, ratings, and performance data.
- D. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.05 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of each luminaire.

1.06 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Division 1 and Section 260511.
- B. Maintenance Data: Include replacement parts list.

1.07 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.

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- B. Conform to requirements of NFPA 101.
- C. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

PART 2 - PRODUCTS

2.01 LUMINAIRES

- A. Furnish products as specified on Drawings.
- B. Install fixtures, batteries and specified accessories at factory.

2.02 EXIT SIGNS

- A. Manufacturers: As scheduled on Drawings.
- B. Description: Exit sign fixture.
- C. Housing: High impact thermoplastic unless scheduled otherwise on Drawings.
- D. Face: As scheduled on Drawings.
- E. Directional Arrows: As indicated on Drawings.
- F. Mounting: As indicated on Drawings.
- G. Battery: As scheduled on Drawings.
- H. Battery Charger: Dual-rate type, with sufficient capacity to recharge discharged battery to full charge within twelve hours.
- I. Manufacturers standard LED.
- J. Input Voltage: 120/208/277/480 volts (multi-volt).

2.03 Fixtures - LED

- A. Light Emitting Diode. LED per manufactures specifications for the fixtures installed.
- B. Provide LED type specified for luminaire as required.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrate and supporting grids for luminaires.

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- B. Examine each luminaire to determine suitability as specified.

3.02 INSTALLATION

- A. Install in accordance with manufacturers instructions.
- B. Support luminaires larger than 2 x 4 foot size independent of ceiling framing.
- C. Locate recessed ceiling luminaires as indicated on Architectural reflected ceiling plan.
- D. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prohibit movement.
- E. Exposed Grid Ceilings: Fasten surface mounted luminaires to ceiling T using bolts, screws, rivets, or suitable clips.
- F. Install recessed luminaires to permit removal from below. Final connections to lay-in light fixtures shall be made with 6'-0" flexible conduit.
- G. Gyp board ceilings with a fire rating: Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating at ceiling.
- H. Install clips to secure recessed grid-supported luminaires in place.
- I. Install wall mounted luminaires, emergency lighting units and exit signs at height as indicated on Drawings as scheduled.
- J. Install all accessories furnished with each luminaire or as required for a complete installation as indicated.
- K. Connect luminaires, emergency lighting units and exit signs to outlet boxes.
- L. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- M. Bond products and metal accessories to branch circuit equipment grounding conductor.
- N. Install specified luminaire, emergency lighting unit and exit sign.
- O. All fixtures shall be guaranteed for a period of one year after final acceptance and any defects in material or workmanship during this period shall be replaced or repaired to the Engineer's satisfaction without extra cost.
- P. All supports, safety chains, swivels, etc. shall be furnished as required for a complete installation.
- Q. Securely fasten all exit signs to surface to which they are mounted.

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- R. Replace all broken or cracked lens.
- S. Replace all scratched or bent reflectors and door frames.
- T. Light fixtures shall not be supported by lay-in ceilings. Light fixtures shall be independently supported to the building structure.
- U. Light fixtures shall not be supported from conduits, duct or piping.
- V. All recessed light fixtures shall have seismic clips firmly situated over tops of ceiling grid tees or plaster rings.
- W. All light fixtures that weigh more than 50 pounds shall have a safety chain or safety cable attached to building structure in addition to its other support.

3.03 FIELD QUALITY CONTROL

- A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.
- B. Turn off circuit breakers serving emergency self-contained batteries and self-contained exit signs to verify that emergency lighting is working properly.

3.04 ADJUSTING

- A. Aim and adjust luminaires as indicated on Drawings or as directed.
- B. Set exit sign directional arrows as indicated on drawings.

3.05 CLEANING

- A. Clean electrical parts to remove conductive and deleterious materials.
- B. Remove dirt and debris from enclosure.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finishes and touch up damage.
- E. Clean interior face of all lens fixtures upon project completion.

END OF SECTION

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DIVISION 27 – COMMUNICATIONS

SECTION 27 00 00 – COMMUNICATIONS

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Communications and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – COMMUNICATIONS

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

SECTION 28 00 00 – ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Electronic Safety & Security and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – ELECTRONIC SAFETY AND SECURITY

CLASSIFICATION: **UNCLASSIFIED**

SECTION 28 31 00 - FIRE ALARM AND MASS NOTIFICATION

PART 1 - GENERAL

1.01 WORK INCLUDED:

- A. Existing fire alarm system shall be removed in its entirety.
- B. Provide a complete new fire alarm and mass notification system for detecting, monitoring, reporting, and other purposes, as herein described and indicated.
- C. Voice system shall include speakers for intelligibility, Local Operator Controls for easy access to occupants.
- D. The equipment shall be properly installed, completely interconnected, and placed in working order as herein described and as shown on the issued Drawings. The system shall provide an electrically supervised fire detection system as specifically listed below.
- E. Operation of any automatic fire detection device or manual station shall result in the sounding of all audio/visual devices in the building, and the automatic transmission of all signals to the base Central Fire Station.
- F. Codes, Laws, and Regulations: Install all electrical work to comply with the requirements of the National Electrical Code and NFPA 72, which shall serve as the minimum requirements. Where electrical work is indicated and/or specified in excess of these minimum requirements, install the work accordingly. Requirements of UFC 3-600-01 and UFC 4-021-01 shall be complied with.

1.02 APPLICABLE PUBLICATIONS:

- A. Factory Mutual System (FMS) Publication: (Use latest editions) Factory Mutual Approval Guide.
- B. National Fire Protection Association (NFPA) Standards: (Use latest editions)
 - 1. No. 70 National Electrical Code, latest edition
 - 2. No. 72 National Fire Alarm Code, latest edition
 - 3. No. 90A Standard for the Installation of Air Conditioning and Ventilating Systems, latest edition
 - 4. No. 90B Standard for the Installation of Warm Air Heating and Air Conditioning Systems, latest edition
- C. Underwriters' Laboratories, Inc. (UL) Publication: (Use latest editions) Fire Protection Equipment List, Standard 864
- D. UFC 3-600-01 Fire Protection Engineering for Facilities (Change 6).
- E. UFC 4-021-01 Mass Notification

1.03 MATERIAL AND EQUIPMENT:

- A. In addition to all requirements specified herein, each material and equipment item shall have all features as standard with its manufacturer and/or as required for the complete operational electrical system. Where two or more pieces of equipment must perform the same functions, they shall be duplicates produced by one manufacturer. The name of the manufacturer, and the serial numbers shall appear on all major components. Locks for all

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cabinets shall be keyed alike. Equipment added to an existing system shall function in the same manner as similar components of the existing system.

- B. Capacities, ratings, sizes, and other requirements not specified hereinafter shall be as scheduled or otherwise indicated on the Drawings. All materials and equipment shall be new unless noted on plans.
- C. All materials and equipment shall conform to the requirements of the UL, or the FMS for fire alarm systems of the type indicated. The contractor's submittals shall supply proof that the items furnished under this specification conform to these requirements. The label, seal, or listing in the Factory Mutual Approval Guide will be accepted as sufficient evidence that the items conform to the FMS requirements.

1.04 QUALITY ASSURANCE

- A. Design drawings, shop drawings and as-built drawings shall be prepared by, or under the supervision of a qualified Fire Protection Engineer (FPE). The engineer shall have at least a Bachelor of Science degree in Engineering from an accredited university engineering program plus a minimum of 5 years work experience in engineering related to fire alarm systems or individual building mass notification systems. Contractor shall submit data showing the names and certification of the technician or engineer when drawings are submitted. All submittals, including shop drawings, shall be reviewed and signed-off by the FPE before submittal to LRAFB. See UFC 3-600-01 for all requirements.
- B. Installers: Provide the services of a qualified manufacturer's representative or technician, experienced in the installation and operation of the type of system being provided to supervise the installation, testing (including final testing), and adjustment of the system. Installer shall have minimum of four years' experience and factory training.
- C. Installation Supervisors: Submit names of personnel who will supervise installation and testing of the system, and who will provide instruction to government personnel, along with the manufacturer's certification of the qualifications of the named supervisors. Supervisor shall have minimum Nicet Level III in fire alarm systems and five years' experience.
- D. Regulatory Requirements: Fire Alarm Systems shall be installed in buildings as specified in UFC 3-600-01.

1.05 SUBMITTALS:

- A. Design submittal:
 - 1. Submit wiring diagrams and schematics. The Contractor shall design the complete fire protection system based on actual equipment intended. Submit wiring diagrams and schematics on a floor plan indicating locations of all fire alarm equipment. Drawings shall be 1/8 inch or 1/4 inch scale and shall indicate by number the detectors in the exact sequence in which installation in the circuit is proposed. See NFPA 72 Annex A for complete requirements.
 - 2. Submit product brochures/data completely describing all items of equipment.
 - 3. Submit power supply and battery calculations with initial submittal. Calculations shall show the sufficiency of proposed power supply and battery.
 - 4. Submit voltage drop calculations for notification circuits, including speaker db drop calculations.
 - 5. Submit manufacturer's installation instructions.
- B. Training submittal:

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1. Submit training session lesson plan and all instruction materials for review at least two weeks prior to scheduled date of training.
 2. Contractor shall request in writing with the COR that training be scheduled within one week following final inspections.
 3. Final system shall not be accepted by the government until training is performed.
- C. Pre-final inspection submittal: At least two weeks prior to the pre-final inspection the following shall be provided to the COR.
1. Accurate updated "contractor revised" as-built wiring diagrams and schematics.
 2. Preliminary copy of Operation and Maintenance Manuals, software and 'Certificate of completion'.
- D. Completion submittal: Upon completion and acceptance of the fire alarm system, the following shall be submitted.
1. OPERATION AND MAINTENANCE MANUALS: The Contractor shall furnish four (4) copies of Operation and Maintenance Manuals. Manuals shall be in booklet form with binder, Table of Contents, tab dividers and shall be arranged in sections as required. Manuals shall contain, as a minimum:
 - a. Complete instructions for the operation of the system including all programming operations.
 - b. Complete instructions for inspection, testing, trouble shooting and maintenance of the system. Include a guide listing troubles, possible causes and corrective actions.
 - c. Complete wiring schematics and diagrams.
 - d. As-built wiring diagrams.
 - e. Power Supply & Battery calculations.
 2. The contractor shall update government furnished AutoCAD drawing files with as-built information and digitally stamp these drawings as "as-built". A copy of the drawing files associated with the Fire Alarm System shall be turned over to the Alarm Shop on compact disk (CD) or USB stick prior to final inspection.
 3. Submit all documents required by NFPA 72 including electronic copy of the site-specific software and 'Certificate of Completion'.

1.06 TECHNICAL REPRESENTATIVE

The Contractor shall provide a factory trained technical representative of the manufacturer. This representative shall perform the following:

- A. Directly supervise the final connection of the system.
- B. Thoroughly inspect the complete system including all components and certify in writing that the following requirements are satisfied:
 1. Complete and functional system.
 2. Compliant with UL and FM requirements.
 3. Installation in accordance with manufacturer's recommendations.

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4. Adherence to regulations covering supervision of components on completion of contract or acceptance of building.
 5. Submit a fire alarm system certification and description in accordance with NFPA 72.
- C. Conduct two separate classes on separate days, each consisting of two, two-hour sessions. The training shall be specific to the system installed including detailed discussion on the panel, panel programming and operation, panel wiring schematics and system wiring diagrams. Each student shall receive copies of all training materials including as-built wiring and schematic diagrams. A proposed lesson plan is available upon request.
1. SESSION 1 of each class shall cover:
 - a. Theory of operation.
 - b. Detailed explanations of all circuit cards and their functions.
 - c. Schematics of entire panel including zoning devices, signal cards, power supply and transmitter.
 2. SESSION 2 of each class shall cover: Troubleshooting and repair procedures for all equipment including demonstrations, teaching materials, computer software and programming and editing of system setup, and hands-on training.

1.07 ACCURACY OF DATA AND DRAWINGS; INTERFERENCES, EQUIPMENT INSTALLATION:

- A. The fire alarm drawings prepared by engineer are generally diagrammatic, and except where specifically dimensioned or detailed, indicate the approximate locations and general arrangement of the work. Examine carefully all contract drawings for installation of fire alarm devices and coordination with all other work, avoid all interference therewith, and to meet the manufacturer's limitations. The fire alarm system shall comply with the NFPA standards and design per this section and approved by the Contracting Officer or his designated representative before construction commences.
- B. All interference or discrepancies, which may be discovered or anticipated, shall be reported promptly to the Contracting Officer for decision before proceeding with the work.
- C. Install each item of equipment in accordance with its manufacturer's recommendations, and as indicated on the Drawings, and/or specified. Where there is a discrepancy, the manufacturer's recommendations shall be followed with the exception of wire size.
- D. When fire alarm system is completely installed, the manufacturer's representative shall check entire system installation and operation, and submit a letter of certification to the Contracting Officer before final inspection.

1.08 CONTRACTOR REVISED DRAWINGS:

The Contractor shall furnish completed and corrected "contractor revised" drawings. Drawings shall show by number, the detectors in the exact sequence in which they are installed on the circuit. Drawings shall also show the exact wiring diagram and termination of all wiring and jumpers installed in panel, and the location of all detectors, conduit runs, zone panels, and transmitter. Contractor shall also furnish one framed laminated plastic copy of a building floor plan showing all devices installed and zone layout. Contractor shall provide drawings in an As-Built cabinet adjacent to the fire alarm panel before the final inspection. Size of prints shall match what was submitted.

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1.09 TOOLS AND SPARE PARTS:

Special tools necessary for the maintenance of the equipment shall be furnished. Unless otherwise indicated on drawings, the following shall be provided. One spare set of fuses of each type and size required, and 2 percent of the total number of each type of detector, but no less than one (1) thereof, shall be furnished. Any spare parts normally furnished by the manufacturer as part of the equipment package shall be furnished.

1.10 Software and Programming Codes:

If manufacturer's literature indicates computer software is available for use with the system, provide all software for the system. All programming codes software or hardware keys, or passwords required to access, update, modify and maintain the ACU shall be provided to Little Rock AFB alarm shop. If the manufacturer requires an individual to be trained before this information can be provided the Contractor shall provide the required training at no additional cost to the Government. Little Rock AFB alarm shop shall be provided with everything necessary to fully support the system after installation.

1.11 CIRCUIT CLASSIFICATION:

All detection and notification circuits shall be class A with no T-Taps allowed. The return wires from furthest device in the circuit shall be in a separate conduit at least ten feet away from the outgoing circuit wires (except within six feet of the control panel or as allowed by NFPA 72).

PART 2 - PRODUCTS

2.01 ALARM SIGNALING DEVICE:

- A. Audio/Visual Device: Provide both visual and audible alarm indicators. The visual indicator shall be 24-volt DC high intensity xenon-flasher or listed LED lamp with "ALERT" written on the device. The audible indicator shall be 24 volt DC with output rating of not less than 95 dB at 10 feet.
- B. Approved manufacturers include System Sensor, Wheelock, or Gentex. If the FACP uses voice annunciation in lieu of tone generation for the audible portion of the annunciation the speakers shall be UL listed to UL 1480 5th edition.
- C. Voice systems used for residential / sleeping occupancies shall be listed for 520 Hz tone in accordance with NFPA 72. This includes the speakers specifically listed with the amplifiers and ACU as a complete system for 520 Hz signals.
- D. Text signs shall be of the scrolling LED type with programmable controller. Sign message is to correlate with the voice message.
- E. Voice messages to be as provided by LRAFB.

2.02 MANUAL FIRE ALARM BOXES:

- A. Pull stations shall be of durable plastic or metal construction. Surface mounted pull stations shall have an integral or matching back box. Outdoor pull stations shall be approved for such use. Pull stations shall not be of the breakglass or break rod type. Pull stations shall be addressable.
- B. Shall be of a double-action type.

2.03 FIRE DETECTING EQUIPMENT:

- A. Heat Detectors: Not used, unless integrated into a multi-criteria smoke detector.

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- B. Water flow switches shall be monitored by the fire alarm system for automatic activation of the fire alarm system.

2.04 CONVENTIONAL SMOKE DETECTORS

- A. Addressable smoke detectors shall be state-of-the-art 'intelligent' photoelectric type with diagnostic self-check, with sensitivity of each detector adjustable from the panel, and have latching LED indicator. Detectors shall be addressable.
- B. Duct Smoke Detectors: Detectors shall be addressable.
 - 1. Addressable duct smoke detectors shall have manual reset, be state-of-the-art 'intelligent' photoelectric type with diagnostic self-check, with sensitivity adjustable from the panel, and have latching LED indicator. Provide remote key reset/test of duct smoke detectors if detectors are more than 7' above finished floor, where climbing on ducting would be needed to reach, or where indicated on plans. Remote key reset shall be mounted at 48" above finished floor.
- C. Monitor modules and control relays – Units shall be full size mounting to standard metal conduit box. Monitor modules shall be capable of monitoring either class "A" or "B" circuits. Control relays shall be capable of being individually controlled from the FACP based on programmable input events. Relays shall at minimum have Form C contacts rated at 3 amps @ 30VDC and 0.9 amps @ 120 VAC. Units shall be listed for use with the FACP panel.

2.05 CONTROL UNIT - MAIN PANEL:

- A. Control unit shall be a fully integrated microprocessor based addressable fire alarm control panel. All monitoring, supervision, signaling, and recording functions shall be incorporated into the main unit. Basic system design shall be modular. Any auxiliary control, monitor, relay or other function devices that exceed the capacity of the main panel enclosure shall be neatly mounted in an enclosure located next to the main panel. Auxiliary panel shall be keyed the same as the main panel. The Fire Alarm Control UNIT (FACU) and all ancillary parts shall be listed for use as 'Local, Auxiliary, Remote Station, Proprietary and Emergency Voice/Alarm' and 'Releasing (when a releasing type panel is indicated in Contract Documents). All panels shall have built in TVSS devices as required by the NFPA. A complete one line, mechanically drawn, circuit diagram shall be laminated and posted inside or adjacent to the control panel.
- B. Unit shall be field programmable and editable to meet requirements including reporting to the transmitter the required number of discreet zone trouble and alarm conditions. Unit shall be expandable. Unit shall have on-board trouble shooting diagnostics. Liquid Crystal Display (LCD) shall be a minimum of 40 characters. Unit shall have a minimum 500 event historical logging capacity. Unit shall have the capability to group points into zones and assign specific zones to activate one or more individually assigned output circuits.
- C. Control unit shall be approved for use with the fire detecting equipment, manual fire alarm boxes or stations, and alarm sounding appliances. The control unit shall be housed in a substantial steel cabinet with lock and key. The cabinet shall be painted inside and out. The control unit shall include a suitable means for testing the system. The unit shall be arranged so as to operate the audio/visual devices in the event of fire and to continue operation until silenced by switch within the unit cabinet. Operation of the silencing switch shall light an indicator lamp. Indicator lamp shall be plainly visible when the cabinet of the control unit is closed. Relays shall be the plug-in type.

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- D. If a trouble alarm condition occurs, the panel shall operate a local audible and visual indication. If the condition which caused the trouble alarm clears, before or after acknowledgment, the panel shall return itself to the NORMAL mode without operator action and note condition in the history file.
- E. Control unit shall be connected to transceiver and be configured to report required number of zones to the transceiver based on panel selected. All necessary equipment to transmit each zone's trouble and alarms individually to the transceiver shall be included in control unit.
- F. Specific requirements by panel type and size:
 - 1. Addressable Units - Panels shall support two or more Class A SLC loop(s) and use automatic drift compensation and 'program-controlled' sensitivity adjustment of detectors technologies. Unit shall have onboard trouble shooting diagnostics with at least two Class A intelligent SLC circuits supporting 198 intelligent devices. The Unit shall have a minimum of four (4) Class A signaling circuits (NAC). Unit shall be capable of reporting at least 16 discreet zones alarm functions and panel trouble conditions to the transmitter and remote control/LCD display. Provide at least 6 additional assignable relays. Control panels shall be compatible with supplied addressable devices. Only panels listed for discharge by UL or FM shall be used for that purpose.
- G. Acceptable Manufacturer:
 - 1. Notifier
 - 2. Silent Knight
 - 3. FCI
- H. Specifically prohibited systems: Systems that utilize addressable notification appliances or notification appliances operating at voltage other than nominal 24 VDC are prohibited.
- I. Voice Systems
 - 1. Where voice systems are called out to provide mass notification function, they shall comply with UFC requirements.
 - 2. Voice systems shall be configured to provide Class A circuits.
 - 3. Voice systems shall be capable of incorporating local operator control (LOC) panels as required by UFC and as spaced on performance drawings. LOC's shall be mounted at heights as outlined by NFPA 72 for reach of buttons.
 - 4. Voice systems shall be listed for mass notification.

2.06 FACILITIES FOR TRANSMISSION OF SIGNALS:

- A. Transceiver shall be Monaco BTX-F 8 zone minimum or approved equal, and shall be able to transmit all zone trouble and alarms individually to receiving equipment. A minimum of eight zones shall be provided. Signal identification for both fire and line-trouble conditions shall be transmitted over radio signals at M163.4625. Transmissions shall be over a 'narrow band' conforming to the "Manual of Regulations and Procedures for Federal Radio Frequency Management" (latest edition). The transceiver may be an integral part of the Control unit/main panel.
- B. Antenna: Contractor shall provide a minimum ¾ inch conduit run from the transmitter to exterior eve mounted OMNI directional antenna (Monaco BSA-1) and a lightning arrestor

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(Monaco Part Number 198-001-01) in a rain tight NEMA 3R enclosure. All connections are to use Type 2 coaxial cable and proper PL259 and BNC connectors.

- C. Grounding: A new ¾ inch, ten foot long, copper clad ground rod shall be installed directly under the lightning arrestor. Lightning arrestor shall be grounded at the new rod and connected to the building's grounding system.
- D. Headquarters Equipment: The headquarters equipment is a Monaco D-21 located in Building 239, Base Fire Station. Contractor shall make final hook up and transmit a coded signal to the Base Fire Station. Coordinate testing with Contracting Officer who will provide the ZID (Zone IDentification) Number for each transmitted zone.

2.07 POWER SUPPLY:

- A. Primary power supply shall be low voltage, rectified and filtered 24-volt direct current. Rectifiers shall be of the solid state type. Point of connection shall be on the supply side of the main service switch through a fire alarm disconnect switch, fused at 20 amperes. The connection shall comply with applicable requirements of Standard 72 of the National Fire Protection Association and Article 230-82 of the National Electrical Code. Power supply wiring shall be in conduit or metallic tubing. Transformer, rectifier, resistor, and other required power supply components shall be incorporated in the control unit.
- B. Stand-by Power Supply: Stand-by power that will insure operation of all of the fire alarm devices within the protected building in the event of power failure shall be provided by a storage battery with an automatic transfer switch.
 - 1. The transfer to and from the battery shall be automatic upon failure and restoration of the primary power supply.
 - 2. Transfer to the battery shall cause a trouble signal to sound at the local control panel and a trouble signal to be transmitted to the base Fire Station.
 - 3. The battery shall be housed in the control unit, transmitter cabinet or in a separate cabinet if sufficient room is not available. If a separate cabinet is used, it shall be directly nipped to the control unit cabinet or the transmitter cabinet. The auxiliary cabinet shall be keyed the same as the main panel. Positive separation shall be provided to prevent contact between cell terminals, and between terminals and the cabinet.
 - 4. Battery backup shall be capable of operating the system for 24 hours in standby mode and, after the 24-hour reserve time has elapsed, shall sound all alarms for a period of fifteen minutes in accordance with NFPA 72 10.6.7.2.10. For voice systems, the batteries shall also be sized to provide 60 minutes of continuous voice delivery. The built-in charger shall:
 - a. Operate in the automatic mode
 - b. Maintain the batteries fully charged
 - c. Be rated to recharge fully discharged batteries in 24 hours

2.08 DISCONNECT SWITCHES:

Fused disconnect switches supplying power to fire alarm equipment shall be lockable in both positions, be rated "heavy-duty", be painted RED and properly identified per the NEC.

2.09 REMOTE ANNUNCIATION:

- A. Standard: Provide supervised remote annunciator including audible and visual indication of addressable signals including alarms, supervisory, and trouble conditions. Panel shall be semi-flush mounted and contain an audible alert, common trouble, drill switch, reset switch,

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power "ON" LED and push-button control. Annunciator shall be equal to Notifier LCD-80, ACM-16AT or approved equal.

2.10 MONITORING OF TAMPER SWITCHES:

Provide conduit, wiring, boxes, fittings, modules, etc. to monitor sprinkler system tamper switches in accordance with NFPA 70. This includes plastic electrical conduit and fittings from building out to post indicator valve tamper switches.

PART 3 - EXECUTION

3.01 INSTALLATION:

System components shall be securely fastened to their support independently of the wiring. Runs of conduit, wire and cable shall be straight, neatly arranged, properly supported, and parallel or perpendicular to walls and partitions. Junction boxes shall be painted red and shall be accessible for proper inspection and troubleshooting. Installation of wiring and fire detecting circuit shall conform to NFPA Standard No. 72.

3.02 WIRING:

- A. The contractor shall furnish and install, in accordance with the manufacturer's instructions, all wiring, conduit and outlet boxes required to complete the system as described herein and as shown on the plans. All wiring shall be in minimum 3/4" conduit/raceway and shall comply with the requirements of applicable sections of Division 16 herein and the National Electrical Code.
- B. Wire size shall be as specified by the equipment manufacturer and as indicated on drawings and per UFC 3-600-01. Surface mounted conduit is allowed only in Mechanical Rooms or open and exposed areas. Use surface metal raceway equal to Wiremold or Walker Duct only where indicated on drawings. All surface metal raceway shall be painted to match wall finish as directed by the Contracting Officer.
- C. Wire nuts shall not be used. Splices shall be minimized. Terminal strips shall be used where splices are required.

3.03 ALARM EQUIPMENT:

- A. Locate audio/visual devices and manual boxes approximately as shown on the approved shop drawings.
- B. Mount alarm audio/visual devices 80 – 96 inches above the finished floor or 6 inches below the bottom surface of the ceiling.
- C. Mount manual fire alarm pull stations so that top of the box is 48 inches above finish floor.

3.04 SMOOTH SURFACE

For the purpose of this specification, a surface shall be considered smooth where not broken as a result of variances in elevation or by obstruction such as structural members, ducts, or similar conditions having a depth of 10 or less inches, or as outlined by NFPA 72.

3.05 DETECTOR SPACING

The spacing on smooth surfaces shall not exceed the distance recommended by the testing and approving laboratory for the particular device installed. In areas where irregularities exceed those described, the detector spacing shall be reduced to provide detection coverage equaling or exceeding that required for smooth surfaces. An open area underneath a deck, mezzanine, or floor landing of a stairway having a minor linear

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dimension of four or more feet shall be considered a separate subdivision and protected accordingly.

3.06 FIRE RATED ASSEMBLIES

Seal around all conduits passing through fire barriers with listed fire stop material. Penetrations shall be sealed in accordance with the manufacturers listed or engineered approved assembly detail for the type of barrier and penetration.

3.07 REPAIR OF EXISTING WORK

The work shall be carefully laid out in advance. Cutting, channeling, chasing, or drilling of floors, walls, partitions, ceilings or other surfaces necessary for the proper installation, support or anchorage of the conduit or other work shall be carefully done. Damage to buildings, piping, or equipment shall be repaired and refinished by skilled mechanics of the trades involved at no cost to the Government.

3.08 TESTING:

After complete installation of the equipment and system testing by contractor, at the time as directed by the Contracting Officer, the Contractor shall conduct tests to demonstrate that operating and installation requirements of this specification have been met. This certification test shall not be scheduled until after approval of pre-final inspection submittal. Test shall be witnessed by and coordinated with the alarm shop. Testing shall comply with NFPA 72 and UFC 3-600-01 including requirements for intelligibility where voice enunciation is used. Contractor shall provide all personnel and equipment required for testing.

END OF SECTION – FIRE DETECTION AND ALARM SYSTEM

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DIVISION 29 – RESERVED

SECTION 29 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Reserved and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – RESERVED

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 30 – RESERVED

SECTION 30 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Reserved and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – RESERVED

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 31 – EARTHWORK

SECTION 31 00 00 – EARTHWORK

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Earthwork and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – EARTHWORK

CLASSIFICATION: **UNCLASSIFIED**

SECTION 31 20 00 – EARTH MOVING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. Section Includes:
 - 1. Preparing subgrades slabs-on-grade and sodding.
 - 2. Excavating and backfilling for building slabs and structures.
 - 3. Drainage course for concrete slabs-on-grade
 - 4. Subbase course for concrete pads
 - 5. Subsurface drainage backfill for walls and trenches.
 - 6. Excavating and backfilling for utility trenches.
- B. Related Sections:
 - 1. Divisions 21, 22, 23, 26, 27, 28, and 33 Sections for installing underground mechanical and electrical utilities and buried mechanical and electrical structures.
 - 2. Division 32 Section "Concrete Paving" for exterior concrete on grade.
 - 3. Division 32 Section "Sodding" for finish grading in areas to receive sod.

1.03 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without notifying the Government 48 (forty-eight hours) in advance.
- B. Utility Locator Service: The Government will locate the existing site utilities before any work may commence on site.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

- A. General: The site will receive trenching for the installation of conduits. Backfill the trenches with the soil removed from the trench excavation where possible.
- B. Satisfactory Soils: suitable fill free of rock or gravel larger than 1 1/2 inch in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Compacted Aggregate Fill (at first floor Mechanical rooms): 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 3/4-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.
- D. Drainage Course: Narrowly graded mixture of **washed** crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

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- E. Bedding Course: Clean, pea gravel or coarse-graded sand free of clay or organic materials.

2.02 COMPACTION EQUIPMENT

- A. Suitable type and adequate to obtain the amount of compaction specified.
- B. Operate in strict accordance with manufacturer's instructions and recommendations and maintain conditions so that it delivers manufacturer's rated compactive effort.

2.03 IMPORTED TOPSOIL (IF REQUIRED)

- a. Suitable sandy loam from an approved source.
- b. Free of clods, roots, gravel, and other inert material.
- c. Free of quackgrass, horsetail, and other noxious vegetation and seed.

2.04 ACCESSORIES

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

PART 3 - EXECUTION

3.01 PREPARATION IN UTILITY TRENCHES

- A. Prior to placing fill all organic-containing soils should be removed. The location and extent of weak subgrade may be established by proof-rolling the site using a loaded dump truck or similar equipment.
- B. Protect and maintain erosion and sedimentation controls during earth moving operations.

3.02 DEWATERING

- A. Prevent surface water and ground water from entering excavations and from ponding on prepared subgrades.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.03 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered.

3.04 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus **1 inch (25 mm)**. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

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B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

3.05 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.06 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to depths as indicated on the Drawings.
1. Saw cut and remove paving where required. Dispose of pavement and debris as specified in Division 2 "Construction & Waste Management."
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to **24 inches** higher than top of pipe or conduit unless otherwise indicated.
1. Clearance: 12 inches each side of pipe or conduit.
- C. Trench Bottoms: Excavate trenches **3 inches** deeper than bottom of pipe and conduit elevations to allow for bedding course.

3.07 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
1. Inspecting underground utilities.
 2. Removing trash and debris.
- B. Place trench backfill on subgrades free of mud, frost, snow, or ice.

3.08 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 5 percent of optimum moisture content.
1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 5 percent and is too wet to compact to specified dry unit weight.

3.09 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and for joints, fittings, and bodies of conduits.
- C. Place and compact initial backfill of bedding course, free of organic matter to a height of 6 inches over the conduit.

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1. Carefully compact initial backfill under pipes and compact evenly up on both sides and along the full length of conduit to avoid damage or displacement of conduit. Coordinate backfilling with utilities installation.
- D. Place suitable fill soil materials in layers not more than **6 inches** in compacted lifts to at least 90 percent of standard proctor at lawn areas.
- E. Install warning tape directly above utilities, **12 inches (300 mm)** below finished grade, except **4 inches** below concrete pavement finished grade.

3.10 UTILITY TRENCH SURFACE REPAIR

- A. Sodding: Place and compact fill material in layers to required elevations to match existing grade with the top 4 inches as loosely compacted topsoil as indicated in the Drawings. Sod to be installed as specified in Section 32 "Sodding"
- B. Concrete paving: Concrete paving and base to be installed as specified in Section 32 "Concrete Paving"

3.11 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
 1. Under grass and planted areas, use satisfactory soil material.
 2. Under walks and pavements, use satisfactory soil material.
 3. Under steps and ramps, use Drainage Fill.
 4. Under building slabs, Compacted Aggregate Fill.
 5. Under footings and foundations, use Drainage Fill.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than **8 inches** loose depth for material compacted by heavy compaction equipment, and not more than **4 inches (100 mm)** in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. The Contractor shall retain a geotechnical engineer to test & approve the compaction of the soils during compaction operations and at completion of the rough grading. Compact soil materials to not less than the following percentages of maximum dry unit weight according to:
 1. Under structures, building slabs, steps, and pavements, scarify and recompact top **12 inches (300 mm)** of existing subgrade and each layer of backfill or fill soil material at 95 percent modified proctor, ASTM D1557.
 2. Under walkways and pads, scarify and recompact top **6 inches (150 mm)** below subgrade and compact each layer of backfill or fill soil material at **95 percent** standard proctor, ASTM D 698.
 3. Under turf or unpaved areas, scarify and recompact top **6 inches (150 mm)** below subgrade and compact each layer of backfill or fill soil material at 90 percent standard proctor, ASTM D 698.

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4. For utility trenches, each layer of initial and final backfill soil material, loosely compacted.

3.13 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 1. Turf or Unpaved Areas: Plus or minus 1 inch.
 2. Walks: Plus or minus 1 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot (3-m) straightedge.

3.14 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and drainage course under pavements and walks as follows:
 1. Shape subbase course and drainage course to required crown elevations and cross-slope grades.

3.15 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
 1. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
 2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent modified proctor according to ASTM D 1557.

3.16 PROTECTION

- A. Protecting Graded Areas: Protect newly repaired areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent backfill operations or weather conditions.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional suitable base material, compact (if required), and reconstruct surfacing.
 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil and waste materials and legally dispose of them off Government's property.

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END OF SECTION 31 20 00

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EARTH MOVING

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DIVISION 32 – EXTERIOR IMPROVEMENTS

SECTION 32 00 00 – EXTERIOR IMPROVEMENTS

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Exterior Improvements and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – EXTERIOR IMPROVEMENTS

CLASSIFICATION: **UNCLASSIFIED**

SECTION 32 11 13 – CRUSHED STONE SUBBASE COURSE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Preparing subbase course for concrete walks, steps and exterior maintenance pads.

B. Related Sections:

1. Division 32 Section "Concrete Walks & Pads".
2. Division 32 Section "Earth Moving".

PART 2 - PRODUCTS

2.01 MATERIALS

- A. This material shall consist of crusher run stone or a mixture of crushed stone and natural fines uniformly mixed and so proportioned as to meet all the requirements hereinafter specified, with further provisions that a mixture of crushed stone and natural fines shall contain not less than 90 percent crusher produced material. The stone shall be hard and durable with a percent of wear by the Los Angeles Test (AASHTO T96) not greater than 45. For the purpose of this specification, shale and slate are not considered to be stone.
- B. Class 7 base course shall be used to adhere to the Arkansas Highway and Transportation Department Specifications for Highway Construction Section 303, Class 7.
- C. When the material contains aggregate larger than that specified above for the class called for in the Contract, the oversize aggregate shall be removed by screening or by screening and crushing.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.02 SUBBASE COURSES UNDER PAVEMENTS

- A. Place crushed stone on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place gravel subbase course under concrete walks and pads as follows:
1. Shape subbase course to required crown elevations and cross-slope grades to match the adjacent elevations.
 2. Compact subbase course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent modified proctor under paving.
- C. The crushed stone shall be placed on the subgrade or other base course material and spread uniformly to such depth and lines that when compacted it will have the thickness, width and cross section as indicated in the Drawings.

3.03 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Government's property.

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END OF SECTION 32 11 13

CLASSIFICATION: **UNCLASSIFIED**

CRUSHED STONE SUBBASE COURSE

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SECTION 32 13 13 - CONCRETE WALKS AND PADS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes the preparation and installation for concrete walks, steps and exterior maintenance pads.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design mixtures: For each concrete pavement mixture.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials of the same type, brand, and source throughout the Project:
 - 1. Portland Cement: ASTM C 150, Type I/II, gray.
 - a. Fly Ash: ASTM C 618, Class F, 25 percent by volume of cement.
- B. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate, uniformly graded. Provide aggregates from a single source.
- C. Water: ASTM C 94/C 94M.
- D. Air-Entraining Admixtures: ASTM C 260 at exterior concrete only.

2.02 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporative Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
- E. Note: Protect freshly placed concrete when temperatures are 40 degrees and falling with insulated blankets.

2.03 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, with the following properties:
 - 1. Compressive Strength (28 Days): 3500 psi.
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.

CLASSIFICATION: **UNCLASSIFIED**

2.04 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116.

PART 3 - EXECUTION

3.01 CONCRETE PLACEMENT

- A. Moisten sub-base to provide a uniform dampened condition at time concrete is placed.
- B. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- C. Deposit and spread concrete in a continuous operation. Do not push or drag concrete into place or use vibrators to move concrete into place.
- D. Screed surfaces with a straightedge and strike off.
- E. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

3.02 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface by hand floating. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - 1. Medium-to-Fine Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.03 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft.x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surfaces.

3.04 PAVEMENT TOLERANCES

- A. Comply with tolerances of ACI 117 as follows:
 - 1. Elevation: $\frac{1}{4}$ inch.
 - 2. Thickness: Plus $\frac{3}{8}$ inch, minus $\frac{1}{4}$ inch.
 - 3. Surface: Gap below 10-foot-long, unlevelled straightedge not to exceed $\frac{1}{4}$ inch.

CLASSIFICATION: **UNCLASSIFIED**

3.05 REPAIRS AND PROTECTION

- A. Remove and replace concrete that is damaged, or defective or that does not comply with requirements of this Section.
- B. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement.
- C. Maintain concrete surfaces free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date schedule for Substantial Completion inspections.

END OF SECTION 32 13 13

CLASSIFICATION: **UNCLASSIFIED**

SECTION 32 13 73 – CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Cold-applied joint sealants for exterior expansion joints in curbs, walks, and similar concrete features.

1.02 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples: For each color of joint sealant options.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Compatibility: Provide joint sealants over expansion joint filler strips and other related materials that are compatible with one another and with joint substrates under conditions of service and application.

B. Colors of Exposed Joint Sealants: As selected by the Government.

2.02 COLD-APPLIED JOINT SEALANTS

A. Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant for Concrete: ASTM C 920, Type M, Grade P, Class 25, for Use T.

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

- a. Pecora Corporation; Urexpan NR-200.
- b. Or approved equal.

2.03 PRIMERS

A. Primers: Product procedures as recommended by joint-sealant manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Cleaning of Joints: Clean out joints immediately before installing joint sealants.

C. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

D. Install joint-sealant backings of kind indicated to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint-sealant backings.
2. Do not stretch, twist, puncture, or tear joint-sealant backings.

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3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:
 1. Place joint sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
 - F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.
 - G. Clean off excess joint sealant or sealant smears adjacent to joints as the Work progresses, by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

END OF SECTION 32 13 73

CLASSIFICATION: **UNCLASSIFIED**

SECTION 32 92 23 - SODDING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Preparation of subsoil
- B. Sod installation
- C. Maintenance

1.02 RELATED SECTION

- A. Section 31 20 00 – Earth Moving.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sod on pallets. Protect exposed roots from dehydration.
- B. Do not deliver more sod than can be laid within 24 hours.
- C. Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

1.04 MAINTENANCE SERVICE

- A. Maintain sodded areas immediately after placement until Date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Sod: ASPA field grown, cultivated grass sod; ; type indicated; with strong fibrous root system, free of stones, burned or bare spots; containing no more than 10 weeds per 500 sq. ft.
 - 1. Bermuda

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that prepared soil base is ready to receive the work of this section.

3.02 PREPARATION OF SUBSOIL

- A. Prepare subsoil and eliminate uneven areas and low spots.
- B. Make changes in grade gradual. Blend slopes into level areas.
- C. Remove foreign materials and undesirable plants and their roots. Do not bury foreign material beneath areas to be sodded.
- D. Scarify subsoil to a depth of 4 inches where topsoil is to be placed.
- E. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

3.03 PLACING TOPSOIL

- A. Spread topsoil to a minimum depth of 4 inches, loosely compacted over area to be sodded.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.

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- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.

3.04 LAYING SOD

- A. Moisten prepared surface immediately prior to laying sod.
- B. Lay sod within 24 hours after harvesting to prevent deterioration.
- C. Lay sod tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.
- D. Lay smooth.
- E. Place top elevation of sod $\frac{1}{2}$ inch below adjoining edging, paving or curbs.
- F. Water sodded areas immediately after installation. Saturate sod to 4 inches of soil.
- G. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities. Roll sodded areas with roller.

3.05 MAINTENANCE

- A. Mow grass at regular intervals to maintain at a maximum height of 2 inches. Do not cut more than $\frac{1}{3}$ of grass blade at any one mowing.
- B. Neatly trim edges and hand clip where necessary.
- C. Immediately remove clippings after mowing and trimming.
- D. Water to prevent grass and soil from drying out.
- E. Roll surface to remove irregularities.
- F. Immediately replace sod to areas, which show deterioration or bare spots.
- G. Protect sodded areas with warning signs during maintenance period that will extend to the Date of Substantial Completion.

END OF SECTION 32 92 23

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 33 – UTILITIES

SECTION 33 00 00 – UTILITIES

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Utilities and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – UTILITIES

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 36 – RESERVED

SECTION 36 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Reserved and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – RESERVED

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 37 – RESERVED

SECTION 37 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Reserved and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – RESERVED

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 38 – RESERVED

SECTION 38 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Reserved and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – RESERVED

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 39 – RESERVED

SECTION 39 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Reserved and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – RESERVED

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 40 – PROCESS INTEGRATION

SECTION 40 00 00 – PROCESS INTEGRATION

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Process Integration and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – PROCESS INTEGRATION

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 41 – MATERIAL PROCESSING & HANDLING EQUIPMENT

SECTION 41 00 00 – MATERIAL PROCESSING & HANDLING EQUIPMENT

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Material Processing & Handling Equipment and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – MATERIAL PROCESSING & HANDLING EQUIPMENT

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 42 – PROCESS HEATING COOLING & DRYING EQUIPMENT

SECTION 42 00 00 – PROCESS HEATING COOLING & DRYING EQUIPMENT

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Process Heating Cooling & Drying Equipment and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – PROCESS HEATING COOLING & DRYING EQUIPMENT

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 43 – PROCESS GAS & LIQUID HANDLING PURIFICATION & STORAGE EQUIPMENT

SECTION 43 00 00 – PROCESS GAS & LIQUID HANDLING PURIFICATION & STORAGE EQUIPMENT

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Process Gas & Liquid Handling Purification & Storage Equipment and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – PROCESS GAS & LIQUID HANDLING PURIFICATION & STORAGE
EQUIPMENT

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 44 – POLLUTION CONTROL EQUIPMENT

SECTION 44 00 00 – POLLUTION CONTROL EQUIPMENT

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Pollution Control Equipment and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – POLLUTION CONTROL EQUIPMENT

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 45 – INDUSTRY SPECIFIC MANUFACTURING EQUIPMENT

SECTION 45 00 00 – INDUSTRY SPECIFIC MANUFACTURING EQUIPMENT

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Industry Specific Manufacturing Equipment and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – INDUSTRY SPECIFIC MANUFACTURING EQUIPMENT

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 46 – RESERVED

SECTION 46 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Reserved and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

The specifications described within this Division are local modifications or addendums to the Unified Facilities Guide Specifications. If there is a conflict between these specifications, and those contained in the Unified Facilities Guide Specifications, the local specifications contained herein will take precedence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – RESERVED

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 47 – RESERVED

SECTION 47 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Reserved and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – RESERVED

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 48 – ELECTRICAL POWER GENERATION

SECTION 48 00 00 – ELECTRICAL POWER GENERATION

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Electrical Power Generation and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – ELECTRICAL POWER GENERATION

CLASSIFICATION: **UNCLASSIFIED**

DIVISION 49 – RESERVED

SECTION 49 00 00 – RESERVED

PART 1 - GENERAL

1.01 UNIFIED FACILITY GUIDE SPECIFICATIONS (UFGS)

All standard UFGS specifications, pertaining to Reserved and applicable to the scope of effort identified in this contract, in the most recent version of the Unified Facilities Guide Specifications are incorporated into this specification by reference. The *Contractor* may download the latest version of these specifications for free from the Whole Building Design Guide, Construction Criteria Base Web Site for the Unified Facilities Guide Specifications at http://www.wbdg.org/ccb/browse_org.php?o=70.

1.02 LITTLE ROCK AIR FORCE BASE SPECIFICATIONS

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION – RESERVED

CLASSIFICATION: **UNCLASSIFIED**

LRAFB ENVIRONMENTAL MANAGEMENT SYSTEM (EMS) AWARENESS AND DOCUMENTATION

Contractor: _____

Contract Title: _____

Contract No: _____

Environmental Management System (EMS) is an ISO 14,001 tool used by the USAF to identify and mitigate threats to our environment. LRAFB's ultimate goal is to protect our environment (work environment and the natural environment) while accomplishing our mission. All Contractors working on LRAFB are expected to acknowledge their role in EMS while completing their mission. Threats associated with construction sites include, but are not limited to: hazardous materials, spills, equipment leaks, air-born dust, soil erosion, track-out, and lack of recycling. This will be communicated and documented initially for each project with monthly updates provided to the Government Contracting Officer's Representative. Contractor shall sign form monthly acknowledging that they have kept subcontractor's aware of EMS.

Name	Signature	Company	Date

CLASSIFICATION: **UNCLASSIFIED**

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CLASSIFICATION: **UNCLASSIFIED**