

## **SECTION 5 – TECHNICAL SPECIFICATIONS**

**PAGE HAS BEEN INTENTIONALLY LEFT BLANK**

### **Item C-105 Mobilization**

**105-1 Description.** This item of work shall consist of, but is not limited to, work and operations necessary for the movement of personnel, equipment, material and supplies to and from the project site for work on the project except as provided in the contract as separate pay items.

**105-2 Mobilization limit.** Mobilization shall be limited to **5** percent of the total project cost.

**105-3 Posted notices.** Prior to commencement of construction activities, the Contractor must post the following documents in a prominent and accessible place where they may be easily viewed by all employees of the prime Contractor and by all employees of subcontractors engaged by the prime Contractor: Equal Employment Opportunity (EEO) Poster “Equal Employment Opportunity is the Law” in accordance with the Office of Federal Contract Compliance Programs Executive Order 11246, as amended; Davis Bacon Wage Poster (WH 1321) - DOL “Notice to All Employees” Poster; and Applicable Davis-Bacon Wage Rate Determination. These notices must remain posted until final acceptance of the work by the Owner.

**105-4 Engineer/RPR field office.** An Engineer/RPR field office is not required.

### **METHOD OF MEASUREMENT**

**105-5 Basis of measurement and payment.** Based upon the contract lump sum price for “Mobilization” partial payments will be allowed as follows:

- a. With first pay request, 25%.
- b. When 25% or more of the original contract is earned, an additional 25%.
- c. When 50% or more of the original contract is earned, an additional 40%.
- d. After Final Inspection, Staging area clean-up and delivery of all Project Closeout materials as required by Section 90, paragraph 90-11, *Contractor Final Project Documentation*, the final 10%.

### **BASIS OF PAYMENT**

**105-6 Payment will be made under:**

**Base Bid**

Item C-105-6.1 Mobilization - Per Lump Sum

**Add Alternate Bid No. 1**

Item C-105-6.2 Mobilization - Per Lump Sum

### **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.

Office of Federal Contract Compliance Programs (OFCCP)

Executive Order 11246, as amended

EEOC-P/E-1 – Equal Employment Opportunity is the Law Poster

United States Department of Labor, Wage and Hour Division (WHD)

WH 1321 – Employee Rights under the Davis-Bacon Act Poster

**END OF ITEM C-105**

## Item M-100 Maintenance and Protection of Traffic

### DESCRIPTION

**1.1- General.** This work shall consist of maintaining aircraft and vehicular traffic and protecting the public from damage to person and property within the limits of and for the duration of the Contract. This work shall also consist of implementing and complying with the Construction Safety and Phasing Plan (CSPP) and the Safety Plan Compliance Document (SPCD).

**2.1- Maintenance of Aircraft and Vehicular Traffic.** The requirements of Section 104, as specified in the Maryland State Department of Transportation State Highway Administration Standard Specifications for Construction and Materials latest issue, plus all revisions and addenda pertaining thereto, shall apply with the following modifications and/or revisions as described below.

The following additional items are specifically included without limiting the generality implied by these Specifications and the Contract Drawings.

- Restoration of all surfaces disturbed as a result of the Contractor's Operations.
- Installation, maintenance, and removal of temporary barricades, warning signs and hazard markings.
- Installation, maintenance, and removal of all temporary markings.
- Testing and maintenance of existing and new lighting circuitry.
- Installation, maintenance, and removal of barricade lights.
- Cleaning and maintenance of all paved areas.
- Security requirements including crossing guards, gate guards, and airfield escorts.
- Communication with the air traffic control tower.
- Dust control for the duration of the project.
- The Contractor shall have a dedicated employee to monitor the airfield radio during the execution of all work.

**2.2- Construction Safety and Phasing Plan (CSPP).** The Contractor shall complete the work in accordance with the approved Construction Safety and Phasing Plan (CSPP) developed in accordance with AC 150/5370-2, Operational Safety on Airports During Construction, latest edition. The requirements of the CSPP are included in the contract drawings and Appendix A of the Specifications.

If it is necessary for the Contractor to complete portions of the contract work for the beneficial occupancy of the Owner prior to completion of the entire contract, such “phasing” of the work is specified and indicated on the approved Construction Safety and Phasing Plan (CSPP) and the contract drawings. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified.

Contractor shall refer to the plans, specifications, and the approved CSPP to identify barricade requirements, temporary and/or permanent markings, transition ramps, airfield lighting, guidance signs and other safety requirements prior to opening up sections of work to traffic.

All Contractors’ operations shall be conducted in accordance with the approved project Construction Safety and Phasing Plan (CSPP) and the Safety Plan Compliance Document (SPCD) and the provisions set forth within the current version of AC 150/5370-2, Operational Safety on Airports During Construction, latest edition. The CSPP included within the contract documents conveys minimum requirements for operational safety on the airport during construction activities. The Contractor shall prepare and submit a SPCD that details how it proposes to comply with the requirements presented within the CSPP. **The SPCD must be approved by the RPR/Owner prior to issuance of the Notice to Proceed.**

The Contractor shall implement all necessary safety plan measures prior to commencement of any work activity. The Contractor shall conduct routine checks to assure compliance with the safety plan measures.

The Contractor is responsible for the conduct of all subcontractors it employs on the project. The Contractor shall assure that all subcontractors are made aware of the requirements of the CSPP and SPCD and that they implement and maintain all necessary measures.

No deviation or modifications may be made to the approved CSPP and SPCD unless approved in writing by the Owner. The necessary coordination to review Contractor proposed modifications to an approved CSPP or approved SPCD can require a significant amount of time.

The Contractor shall obtain approval from the RPR prior to beginning any work in all areas of the airport. No operating runway, taxiway, or air operations area (AOA) shall be crossed, entered, or obstructed while it is operational. The Contractor shall plan and coordinate work in accordance with the approved CSPP and SPCD.

In addition to the items listed in 2.1, the following items are specifically included in the CSPP, without limiting the generality implied by these Specifications and the Contract Drawings.

- Preparing the SPCD
- Scheduling and Updates
- Look Ahead Schedules
- Conducting and Attending Construction Progress, Safety and Security Meetings
- Providing flag people
- Installation, maintenance, and removal of flood lights for night time construction.
- Maintenance of access roads and staging areas
- Maintenance and protection of utilities
- Installation, maintenance, and removal of temporary protection during demolition, milling and paving operations
- Cleaning of paved surfaces
- Foreign Object Debris (FOD) removal

- Wildlife Management
- Restoration of surfaces disturbed as a result of the Contractor's operations
- Providing, maintaining, and removing warning signs, hazard markings, barricade lights
- Providing padlocks for access gates
- Providing a guard at access gates
- Security requirements.

## METHOD OF MEASUREMENT

**3.1-Basis of measurement.** This item will not be measured, payment for maintenance and protection of traffic and for the CSPP will be made on a lump sum basis. The lump sum shall include all items required to satisfy this Specification. **The lump sum price for Maintenance and Protection of Traffic and CSPP shall not exceed five (5) percent of the total Contract bid amount for base bid less the bid price for Maintenance and Protection of Traffic and CSPP, as shown on the provided Bid Tabulation Form.** No payment in excess of five (5) percent of the total Contract bid amount for base bid less the bid price for **Maintenance and Protection of Traffic and CSPP** will be made for this item. If the total cost for all items required for **Maintenance and Protection of Traffic and CSPP** is in excess of five (5) percent of the total Contract bid amount for base bid less the bid price for **Maintenance and Protection of Traffic and CSPP**, the Contractor shall include the excess in the unit price of other items of work.

## BASIS OF PAYMENT

**4.1-Basis of payment.** The lump sum price bid for maintenance and protection of traffic and CSPP shall include all equipment, materials, and labor necessary to adequately and safely maintain and protect traffic and to implement and comply with the CSPP and SPCD.

In the event the contract completion date is extended, no additional payment will be made for maintenance and protection of traffic and for the CSPP.

Progress payments will be made for this item in proportion to the total amount of contract work completed, less any deductions for unsatisfactory maintenance and protection of traffic and non-compliance and failure to implement the CSPP and SPCD.

No payment will be made under maintenance and protection of traffic and CSPP for each calendar day during which there are substantial deficiencies in compliance with the Specification requirements of any subsection of this Section as determined by the RPR.

The amount of such calendar day non-payment will be determined by dividing the lump sum amount bid for maintenance and protection of traffic and CSPP by the number of calendar days between the date the Contractor commences work and the date of completion as designated in this proposal, without regard to any extension of time.

If the Contractor fails to maintain and protect traffic and/or fails to comply with or implement the CSPP and SPCD adequately and safely for a period of 24 hours, the Owner shall correct the adverse conditions by any means it deems appropriate and shall deduct the cost of the corrective work from any monies due the Contractor. The cost of this work shall be in addition to the liquidated damages and non-payment for maintenance and protection of traffic and CSPP listed above.

However, where major nonconformance with the requirements of this Specification is noted by the RPR and prompt Contractor compliance is deemed not to be obtainable, all contract work may be stopped by direct order of the RPR regardless of whether corrections are made by the Owner as stated in the paragraph above.

**Payment will be made under:**

**Base Bid**

Item M-100-4.1 Maintenance and Protection of Traffic and CSPP – Per Lump Sum

**Add Alternate Bid No. 1**

Item M-100-4.2 Maintenance and Protection of Traffic and CSPP – Per Lump Sum

**END OF ITEM M-100**

## **Item M-150 Project Survey and Stakeout**

### **DESCRIPTION**

**1.1-** Under this item, the Contractor shall perform all necessary surveying required to construct all elements of the Project as shown on the Contract Drawings and specified in the Proposal and Specifications. This shall include but not be limited to stakeout, layout and elevations for pavement, structures, and control joints, forms, as shown and required, consistent with the current practices. The stakeout survey shall proceed immediately following the award of the Contract and shall be expeditiously progressed to completion in a manner and at a rate satisfactory to the RPR. The Contractor shall keep the RPR fully informed as to the progress of the stakeout survey. All survey work shall be provided under the direction of a Maryland licensed land surveyor.

### **MATERIALS**

**2.1-** All instruments, equipment, stakes and any other material necessary to perform the work satisfactorily shall be provided by the Contractor.

All stakes used shall be of a type approved by the RPR. It shall be the Contractor's responsibility to maintain these stakes in their proper position and location at all times.

### **CONSTRUCTION DETAILS**

**3.1-** The exact position of all work shall be established from control points, baseline transit points or other points of similar nature which are shown on the Contract Drawings and/or modified by the RPR. Any error, apparent discrepancy or absence in or of data shown or required for accurately accomplishing the stakeout survey shall be referred to the RPR for interpretation or furnishing when such is observed or required.

The Contractor shall place two offset stakes or references at each centerline station and at such intermediate locations as the RPR may direct. From computations and measurements made by the Contractor, these stakes shall be clearly and legibly marked with the correct centerline station number, offset and cut or fill so as to permit the establishment of the exact centerline location and elevation during construction. If markings become faded or blurred for any reason, the markings shall be restored by the Contractor and at the request of the RPR. He shall locate and place all cut, fill, slope, fine grade or other stakes and points, as the RPR may direct for the proper progress of the work. All control points shall be properly guarded and flagged for easy identification.

All structures shall be staked out by the Contractor at the locations and elevations shown on the Contract Drawings or specified by the RPR. Reference points, baselines, stakes and benchmarks for borrow pits shall be established by the Contractor. Permanent survey marker locations shall be established and referenced by the Contractor.

The Contractor shall be responsible for the accuracy of his work and shall maintain all reference points, stakes, etc., throughout the life of the Contract. Damaged or destroyed points, benchmarks or stakes, or any reference points made inaccessible by the progress of the construction, shall be replaced or transferred by the Contractor. Any of the above points which may be destroyed or damaged shall be transferred by the Contractor before they are damaged or destroyed. All control points shall be referenced by ties to acceptable objects and recorded. Any alterations or revisions in the ties shall be so noted and the information furnished to the RPR immediately. All stakeout survey work shall be referenced to the centerlines shown on the Contract Drawings. All computations necessary to establish the exact position of the work from control points shall be made and preserved by the Contractor. All computations, survey notes and other records

necessary to accomplish the work; shall be neatly made. Such computations, survey notes and other records shall be made available to the RPR upon request and shall become the property of the Owner and delivered to the RPR not later than the date of acceptance of the Contract.

The RPR may check all or any portion of the stakeout survey work or notes made by the Contractor. Any necessary correction to the work shall be made immediately by the Contractor. Such checking by the RPR shall not relieve the Contractor of any responsibilities for the accuracy or completeness of his work.

Prior to the final cross-section survey of the Project by the RPR, the Contractor shall reestablish centerline or baseline points and stationing as required by the RPR.

During the progress of the construction work, the Contractor will be required to furnish all of the surveying and stakeout incidental to the proper location by line and grade for each phase of the work. For paving and any other operation requiring extreme accuracy, the Contractor will re-stake with pins or other acceptable hubs located directly adjacent to the work as stated in the FAA General Provisions Section 50-07 Construction Layout and Stakes.

Any existing stakes, iron pins, survey monuments or other markers defining property lines or airfield features which may be disturbed during construction shall be properly tied into fixed reference points before being disturbed and accurately reset in their proper position upon completion of the work. Just prior to completion of the Contract, the Contractor shall reestablish, if necessary, and retie all control points as permanently as possible and to the satisfaction of the RPR. Contractor shall coordinate and confirm with QA survey firm the reestablishment of all control points. Contractor must also turn over all data collected to the RPR.

#### **METHOD OF MEASUREMENT**

**4.1-** Payment will be made at the lump sum price bid for this item.

#### **BASIS OF PAYMENT**

**5.1-** The lump sum price bid shall include the cost of furnishing all labor, equipment, instruments and all other material necessary to satisfactorily complete the Project surveying and stakeout. Partial payments may be made at the discretion of the RPR and owner as the work progresses.

Payment will be made under:

##### **Base Bid**

Item M-150-5.1	Project Survey and Stakeout – Per Lump Sum
----------------	--

#### **END OF ITEM M-150**

## **Item P-101 Preparation/Removal of Existing Pavements**

### **DESCRIPTION**

**101-1** This item shall consist of preparation of existing pavement surfaces for overlay, surface treatments, removal of existing pavement, and other miscellaneous items. The work shall be accomplished in accordance with these specifications and the applicable plans.

### **EQUIPMENT AND MATERIALS**

**101-2** All equipment and materials shall be specified here and in the following paragraphs or approved by the Resident Project Representative (RPR). The equipment shall not cause damage to the pavement to remain in place.

### **CONSTRUCTION**

#### **101-3.1 Removal of existing pavement.**

The Contractor's removal operation shall be controlled to not damage adjacent pavement structure, and base material, cables, utility ducts, pipelines, or drainage structures which are to remain under the pavement.

**a. Concrete pavement removal.** Full depth saw cuts shall be made perpendicular to the slab surface. The Contractor shall saw through the full depth of the slab including any dowels at the joint, removing the pavement and installing new dowels as shown on the plans and per the specifications. Where the perimeter of the removal limits is not located on the joint and there are no dowels present, the perimeter shall be saw cut the full depth of the pavement. The pavement inside the saw cut shall be removed by methods which will not cause distress in the pavement which is to remain in place. If the material is to be wasted on the airport site, it shall be reduced to a maximum size of **12"x12"x12"**. Concrete slabs that are damaged by under breaking shall be repaired or removed and replaced as directed by the RPR.

The edge of existing concrete pavement against which new pavement abuts shall be protected from damage at all times. Spall and underbreak repair shall be in accordance with the plans. Any underlying material that is to remain in place, shall be recompact and/or replaced as shown on the plans. Adjacent areas damaged during repair shall be repaired or replaced at the Contractor's expense.

**b. Asphalt pavement removal.** Asphalt pavement to be removed shall be cut to the full depth of the asphalt pavement around the perimeter of the area to be removed. The material shall be wasted off the airport site in a lawful manner.

**c. Repair or removal of Base, Subbase, and/or Subgrade.** All failed material including surface, base course, subbase course, and subgrade shall be removed and repaired as shown on the plans or as directed by the RPR. Materials and methods of construction shall comply with the applicable sections of these specifications. Any damage caused by Contractor's removal process shall be repaired at the Contractor's expense.

**101-3.2 Preparation of joints and cracks prior to overlay/surface treatment.** Remove all vegetation and debris from cracks to a minimum depth of 1 inch (25 mm). If extensive vegetation exists, treat the specific area with a concentrated solution of a water-based herbicide approved by the RPR. Fill all cracks

greater than 1/4 inch (6 mm) wide) with a crack sealant per ASTM D6690. The crack sealant, preparation, and application shall be compatible with the surface treatment/overlay to be used. To minimize contamination of the asphalt with the crack sealant, underfill the crack sealant a minimum of 1/8 inch (3 mm), not to exceed 1/4 inch (6 mm). Any excess joint or crack sealer shall be removed from the pavement surface.

**101-3.3 Removal of Foreign Substances/contaminates prior to remarking.** Removal of foreign substances/contaminates from existing pavement that will affect the bond of the new treatment shall consist of removal of rubber, fuel spills, oil, crack sealer, at least 90% of paint, and other foreign substances from the surface of the pavement. Areas that require removal are designated on the plans and as directed by the RPR in the field during construction.

High-pressure water or sandblasting may be used. ~~If chemicals are used, they shall comply with the state's environmental protection regulations.~~ Removal methods used shall not cause major damage to the pavement, or to any structure or utility within or adjacent to the work area. Major damage is defined as changing the properties of the pavement, removal of asphalt causing the aggregate to ravel, or removing pavement over 1/8 inch (3 mm) deep. If it is deemed by the RPR that damage to the existing pavement is caused by operational error, such as permitting the application method to dwell in one location for too long, the Contractor shall repair the damaged area without compensation and as directed by the RPR.

Removal of foreign substances shall not proceed until approved by the RPR. Water used for high-pressure water equipment shall be provided by the Contractor at the Contractor's expense. No material shall be deposited on the pavement shoulders. All wastes shall be disposed of in areas indicated in this specification or shown on the plans.

**101-3.4 Concrete spall or failed asphaltic concrete pavement repair.**

**a. Repair of concrete spalls in areas to be overlaid with asphalt.** The Contractor shall repair all spalled concrete as shown on the plans or as directed by the RPR. The perimeter of the repair shall be saw cut a minimum of 2 inches (50 mm) outside the affected area and 2 inches (50 mm) deep. The deteriorated material shall be removed to a depth where the existing material is firm or cannot be easily removed with a geologist pick. The removed area shall be filled with asphalt mixture with aggregate sized appropriately for the depth of the patch. The material shall be compacted with equipment approved by the RPR until the material is dense and no movement or marks are visible. The material shall not be placed in lifts over 4 inches (100 mm) in depth. This method of repair applies only to pavement to be overlaid.

**b. Asphalt pavement repair.** The Contractor shall repair all spalled concrete as shown on the plans or as directed by the RPR. The failed areas shall be removed as specified in paragraph 101-3.1b. All failed material including surface, base course, subbase course, and subgrade shall be removed. Materials and methods of construction shall comply with the applicable sections of these specifications.

**101-3.5 Cold milling.** Milling shall be performed with a power-operated milling machine or grinder, capable of producing a uniform finished surface. The milling machine or grinder shall operate without tearing or gouging the underlying surface. The milling machine or grinder shall be equipped with grade and slope controls, and a positive means of dust control. All millings shall be removed and disposed off Airport property. If the Contractor mills or grinds deeper or wider than the plans specify, the Contractor shall replace the material removed with new material at the Contractor's Expense.

**a. Patching.** The milling machine shall be capable of cutting a vertical edge without chipping or spalling the edges of the remaining pavement and it shall have a positive method of controlling the depth of cut. The RPR shall layout the area to be milled with a straightedge in increments of 1-foot (30 cm) widths. The area to be milled shall cover only the failed area. Any excessive area that is milled because the Contractor doesn't have the appropriate milling machine, or areas that are damaged because of his negligence, shall be repaired by the Contractor at the Contractor's Expense.

**b. Profiling, grade correction, or surface correction.**

**c. Clean-up.** The Contractor shall sweep the milled surface daily and immediately after the milling until all residual materials are removed from the pavement surface. Prior to paving, the Contractor shall wet down the milled pavement and thoroughly sweep and/or blow the surface to remove loose residual material. Waste materials shall be collected and removed from the pavement surface and adjacent areas by sweeping or vacuuming. Waste materials shall be removed and disposed in areas designated on the plans .

**101-3.6. Preparation of asphalt pavement surfaces prior to surface treatment.** Existing asphalt pavements to be treated with a surface treatment shall be prepared as follows:

**a.** Patch asphalt pavement surfaces that have been softened by petroleum derivatives or have failed due to any other cause. Remove damaged pavement to the full depth of the damage and replace with new asphalt pavement similar to that of the existing pavement in accordance with paragraph 101-3.4b.

**b.** Repair joints and cracks in accordance with paragraph 101-3.2.

**c.** Remove oil or grease that has not penetrated the asphalt pavement by scrubbing with a detergent and washing thoroughly with clean water. After cleaning, treat these areas with an oil spot primer.

**d.** Clean pavement surface immediately prior to placing the surface treatment so that it is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film.

**101-3.7 Maintenance.** The Contractor shall perform all maintenance work necessary to keep the pavement in a satisfactory condition until the full section is complete and accepted by the RPR. The surface shall be kept clean and free from foreign material. The pavement shall be properly drained at all times. If cleaning is necessary or if the pavement becomes disturbed, any work repairs necessary shall be performed at the Contractor's expense.

**101-3.8 Preparation of Joints in Rigid Pavement prior to resealing.** Prior to application of sealant material, clean and dry the joints of all scale, dirt, dust, old sealant, curing compound, moisture and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method used cleans the joint and does not damage the joint.

**101-3.8.1 Removal of Existing Joint Sealant.** All existing joint sealants will be removed by plowing or use of hand tools. Any remaining sealant and or debris will be removed by use of wire brushes or other tools as necessary. Resaw joints removing no more than 1/16 inch (2 mm) from each joint face. Immediately after sawing, flush out joint with water and other tools as necessary to completely remove the slurry.

**101-3.8.2 Cleaning prior to sealing.** Immediately before sealing, joints shall be cleaned by removing any remaining laitance and other foreign material. Allow sufficient time to dry out joints prior to sealing. Joint surfaces will be surface-dry prior to installation of sealant.

**101-3.8.3 Joint sealant.** Joint material and installation will be in accordance with Item P-605

**101-3.9 Preparation of Cracks in Flexible Pavement prior to sealing.** Prior to application of sealant material, clean and dry the joints of all scale, dirt, dust, old sealant, curing compound, moisture and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method used cleans the cracks and does not damage the pavement.

**101-3.9.1 Preparation of Crack.**

**101-3.9.2 Removal of Existing Crack Sealant.**

**101-3.9.3 Crack Sealant.** Crack sealant material and installation will be in accordance with Item P-605.

**101-3.9.4 Removal of Pipe and other Buried Structures.**

a. **Removal of Existing Pipe Material.** Remove the types of pipe as indicated on the plans. The pipe material shall be legally disposed of off-site in a timely manner following removal. Trenches shall be backfilled with material equal to or better in quality than adjacent embankment. Trenches under paved areas must be compacted to 95% of ASTM D1557.

**101-3.10 Removal of ARFF Building.** The Contractor shall complete demolition and removal of the entire above ground structure including appurtenances as shown on the drawings and specified herein. Provide safeguards, including warning signs, barricades, temporary fence, warning lights, and any other items that are required for protection of all personnel during demolition and removal operations. Prevent the spread of flying particles and dust. Due to the presence of Asbestos-Containing Materials (ACM) and Lead Based Paint (LBP), the Contractor must review the limited supplemental asbestos-containing material survey report in Appendix C which is included in the project manual. The Contractor must follow the ACM (Section 028213) and LBP (Section 028314) Abatement specifications which are also included in the project manual. The Contractor must disconnect utility services and notify utility companies or local authorities furnishing gas, water, electrical, telephone, or sewer service to remove any equipment in the structures to be demolished and to remove, disconnect, cap, or plug their services to facilitate demolition. All existing utilities and equipment shall be turned off and above ground facilities removed from the site. The existing concrete slab and underground conduits shall remain. All pipes, walls, columns, or structures extending out of the ground shall be cut flush to the existing grade. Once the building has been demolished to the ground level, any voids remaining shall be filled with 4000 psi concrete or flowable fill. This includes any voids associated with the concrete masonry walls and conduits. All material, equipment, rubble, debris, and other products of the demolition shall become property of the Contractor for his disposal off-site in accordance with all applicable laws and ordinances at the Contractors expense. The sale of the salvageable materials by the Contractor shall be conducted off-site. The sale of the removed items on the site is prohibited by the County. The Contractor shall examine the various Drawings, visit the site, determine the extent of the work, the extent of work affected therein, and all conditions under which he is required to perform the various operations. The Contractor shall fill and compact all voids left by the removal of any pipe, structures, etc. with materials described herein to a grade that will provide for positive drainage of the disturbed area to drain run-off in direction consistent with the surrounding area.

The Contractor shall provide all fill materials to the site as needed. Compaction of fill shall match the compaction of adjacent undisturbed material. Contractor shall obtain all necessary permits and licenses for performing the Work and shall furnish a copy of same to the Airport prior to commencing the Work. The Contractor shall comply with the requirements of the permits. Conduct operations to minimize damage by falling debris or other causes to adjacent pavement, structures, other facilities, and persons. On completion of work and after removal of all debris, leave site in clean condition satisfactory to the RPR. Cleanup shall include all items and materials not required to remain property of the Airport as well as all debris and rubbish resulting from demolition operations.

**101-3.11 Removal of Existing Markings.** Completely remove existing pavement marking from locations shown on the plan or as directed by RPR. Unless the bid item designates water blasting, the Contractor may use one or a combination of air blasting, water blasting, grooving, and grinding. Do not damage pavement and limit scaring. Also refer to section P-620-3.3b.

## METHOD OF MEASUREMENT

**101-4.1 Fence Removal.** The unit of measurement for fence removal shall be the number of linear foot removed by the Contractor. Any fence removed outside the limits of removal because of by negligence on the part of the Contractor shall not be included in the measurement for payment. No direct measurement

or payment shall be made for removal and disposal of posts, foundations, signs, barb wire, supports, grounding, conduit, lights, cable, and backfilling of post holes incidental to fence removal.

**101-4.2 Gate Removal.** The unit of measurement for gate removal shall be each removed by the Contractor. Any gates removed outside the limits of removal because of by negligence on the part of the Contractor shall not be included in the measurement for payment. No direct measurement or payment shall be made for removal and disposal of posts, foundations, signs, barb wire, access card reader and post, supports, grounding, conduit, light, cable, gate operators, gate supports, latches, and backfilling of post holes incidental to gate removal.

**101-4.3 ARFF Building Removal.** The unit of measurement for ARFF Building removal shall be the lump sum removed by the Contractor. No direct measurement or payment shall be made for removal and disposal of conduit, beams, supports, roof, lights, cable, pumps, windows, HVAC components, backfilling holes, doors, concrete blocks, and fixtures all incidental to removal.

**101-4.4 Electrical Transformer Pad Removal.** The unit of measurement of electrical transformer pad for removal shall be the lump sum removed by the Contractor. No direct measurement or payment shall be made for removal and disposal of transformer, pad, conduit, cable, and backfilling holes incidental to removal.

**101-4.5 Keypad Removal.** The unit of measurement of keypad for removal shall be for each removed by the Contractor. No direct measurement or payment shall be made for removal and disposal of conduit, cable, posts, foundations, signs, and backfilling holes incidental to removal.

**101-4.6 Bollard Removal.** The unit of measurement of bollard for removal shall be for each removed by the Contractor. No direct measurement or payment shall be made for removal and disposal of foundations, and backfilling holes incidental to removal.

**101-4.7 Electrical Rack Removal.** The unit of measurement of electrical racks for removal shall be the lump sum removed by the Contractor. No direct measurement or payment shall be made for removal and disposal of conduit, cable, posts, foundations, signs, and backfilling holes incidental to removal.

**101-4.8 Light Pole and Foundation Removal.** The unit of measurement of light pole and foundation for removal shall be per each removed by the Contractor. No direct measurement or payment shall be made for removal and disposal of conduit, cable, posts, foundations, signs, cameras, and backfilling holes incidental to removal.

**101-4.9 Infill Oil/Water Separator.** The unit of measurement of infilling of the oil/water separator shall be the lump sum of the cover removed by the Contractor, cleaned as necessary, and backfilled with concrete. No direct measurement or payment shall be made for concrete, capping of pipes, and backfilling incidental to infill.

**101-4.10 Infill Trench Drain.** The unit of measurement of infilling of the trench drain for removal of the existing grates shall be the lump sum removed by the Contractor. No direct measurement or payment shall be made for cleaning of trench drain, concrete, capping of pipes, and backfilling incidental to infill.

**101-4.11 Marking Removal.** The quantity of marking removal shall be measured by the number of square feet of marking that is removed.

## **BASIS OF PAYMENT**

**101-5.1 Payment.** Payment shall be made at contract unit price for the unit of measurement as specified above. This price shall be full compensation for furnishing all materials and for all preparation, disposal of all structures/building materials/equipment/accessories, hauling, cleaning, and placing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item.

**Base Bid**

Item P 101-5.1	Fence Removal – Per Linear Foot
Item P 101-5.2	Sliding Gate Removal – Per Each
Item P 101-5.3	Gate Supports Removal – Per Each
Item P 101-5.4	Box Frame Swing Gate Removal – Per Each
Item P 101-5.5	Swing Gate Removal – Per Each
Item P 101-5.6	ARFF Building Removal – Per Lump Sum
Item P 101-5.7	Electrical Transformer Pad Removal – Per Lump Sum
Item P 101-5.8	Keypad Removal – Per Each
Item P 101-5.9	Bollard Removal – Per Each
Item P 101-5.10	Electrical Rack Removal – Per Lump Sum
Item P 101-5.11	Light Pole and Foundation Removal – Per Each
Item P 101-5.12	Infill Oil/Water Separator – Per Lump Sum
Item P 101-5.13	Infill Trench Drain – Per Lump Sum
Item P 101-5.14	Pavement Marking Removal – Per Square Foot

**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.

Advisory Circulars (AC)

AC 150/5380-6	Guidelines and Procedures for Maintenance of Airport Pavements.
---------------	---

ASTM International (ASTM)

ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
------------	--

**END OF ITEM P-101**

## Item P-152 Excavation, Subgrade, and Embankment

### DESCRIPTION

**152-1.1** This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, runways, taxiways, aprons, and intermediate areas as well as other areas for drainage, building construction, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical sections shown on the plans.

**152-1.2 Classification.** All material excavated shall be classified as defined below:

**a. Unclassified excavation.** Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature which is not otherwise classified and paid for under one of the following items.

**152-1.3 Unsuitable excavation.** Unsuitable material shall be disposed in designated waste areas as shown on the plans. Materials containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material suitable for topsoil may be used on the embankment slope when approved by the RPR.

### CONSTRUCTION METHODS

**152-2.1 General.** Before beginning excavation, grading, and embankment operations in any area, the area shall be cleared or cleared and grubbed in accordance with Item P-151.

The suitability of material to be placed in embankments shall be subject to approval by the RPR. All unsuitable material shall be disposed of in waste areas as shown on the plans. All waste areas shall be graded to allow positive drainage of the area and adjacent areas. The surface elevation of waste areas shall be specified on the plans or approved by the RPR.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and the RPR notified per Section 70, paragraph 70-20. At the direction of the RPR, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

Areas outside the limits of the pavement areas where the top layer of soil has become compacted by hauling or other Contractor activities shall be scarified and disked to a depth of 4 inches (100 mm), to loosen and pulverize the soil. Stones or rock fragments larger than 4 inches (100 mm) in their greatest dimension will not be permitted in the top 6 inches (150 mm) of the subgrade.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the RPR, who shall arrange for their removal if necessary. The Contractor, at their own expense, shall satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

**a. Blasting.** Blasting shall not be allowed.

**152-2.2 Excavation.** No excavation shall be started until the work has been staked out by the Contractor and the RPR has obtained from the Contractor, the survey notes of the elevations and measurements of the ground surface. The Contractor and RPR shall agree that the original ground lines shown on the original topographic mapping are accurate, or agree to any adjustments made to the original ground lines.

All areas to be excavated shall be stripped of vegetation and topsoil. Topsoil shall be stockpiled for future use in areas designated on the plans or by the RPR. All suitable excavated material shall be used in the formation of embankment, subgrade, or other purposes as shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

The grade shall be maintained so that the surface is well drained at all times.

When the volume of the excavation exceeds that required to construct the embankments to the grades as indicated on the plans, the excess shall be used to grade the areas of ultimate development or disposed as directed by the RPR. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from borrow areas.

**a. Selective grading.** When selective grading is indicated on the plans, the more suitable material designated by the RPR shall be used in constructing the embankment or in capping the pavement subgrade. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas until it can be placed. The more suitable material shall then be placed and compacted as specified. Selective grading shall be considered incidental to the work involved. The cost of stockpiling and placing the material shall be included in the various pay items of work involved.

**b. Undercutting.** Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas intended for turf shall be excavated to a minimum depth of 12 inches (300 mm) below the subgrade or to the depth specified by the RPR. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be disposed of at locations shown on the plans. This excavated material shall be paid for at the contract unit price per cubic yard (per cubic meter) for **unclassified excavation**. The excavated area shall be backfilled with suitable material obtained from the grading operations or borrow areas and compacted to specified densities. The necessary backfill will constitute a part of the embankment. Where rock cuts are made, backfill with select material. Any pockets created in the rock surface shall be drained in accordance with the details shown on the plans. Undercutting will be paid as **unclassified excavation**.

**c. Over-break.** Over-break, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the RPR. All over-break shall be graded or removed by the Contractor and disposed of as directed by the RPR. The RPR shall determine if the displacement of such material was unavoidable and their own decision shall be final. Payment will not be made for the removal and disposal of over-break that the RPR determines as avoidable. Unavoidable over-break will be classified as "Unclassified Excavation."

**d. Removal of utilities.** The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by the Contractor as indicated on the plans. All existing foundations shall be excavated at least 2 feet (60 cm) below the top of subgrade or as indicated on the plans, and the material disposed of as directed by the RPR. All foundations thus excavated shall be backfilled with suitable material and compacted as specified for embankment or as shown on the plans.

**152-2.3 Borrow excavation.** Borrow areas are not required.

**152-2.4 Drainage excavation.** Drainage excavation shall consist of excavating drainage ditches including intercepting, inlet, or outlet ditches; or other types as shown on the plans. The work shall be performed in sequence with the other construction. Ditches shall be constructed prior to starting adjacent excavation operations. All satisfactory material shall be placed in embankment fills; unsuitable material shall be

placed in designated waste areas or as directed by the RPR. All necessary work shall be performed true to final line, elevation, and cross-section. The Contractor shall maintain ditches constructed on the project to the required cross-section and shall keep them free of debris or obstructions until the project is accepted.

**152-2.5 Preparation of cut areas or areas where existing pavement has been removed.** In those areas on which a subbase or base course is to be placed, the top 12 inches of subgrade shall be compacted to not less than 100 % of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM D1557 or ASTM D698. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

**152-2.6 Preparation of embankment area.** All sod and vegetative matter shall be removed from the surface upon which the embankment is to be placed. The cleared surface shall be broken up by plowing or scarifying to a minimum depth of 6 inches (150 mm) and shall then be compacted per paragraph 152-2.10.

Sloped surfaces steeper than one (1) vertical to four (4) horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches (300 mm) and compacted as specified for the adjacent fill.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.

**152-2.7 Control Strip.** The first half-day of construction of subgrade and/or embankment shall be considered as a control strip for the Contractor to demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of this specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not begin until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

**152-2.9 Proof rolling.** The purpose of proof rolling the subgrade is to identify any weak areas in the subgrade and not for compaction of the subgrade. Before start of embankment, and after compaction is completed, the subgrade area shall be proof rolled with a Tandem axle Dual Wheel Dump Truck loaded to the legal limit with tires inflated to 100 psi in the presence of the RPR. Apply a minimum of two (2) coverages, or as specified by the RPR, under pavement areas. A coverage is defined as the application of one tire print over the designated area. Soft areas of subgrade that deflect more than 1 inch or show permanent deformation greater than 1 inch shall be removed and replaced with suitable material or reworked to conform to the moisture content and compaction requirements in accordance with these specifications. Removal and replacement of soft areas is incidental to this item.

**152-2.10 Compaction requirements..** The subgrade under areas to be paved shall be compacted to a depth of 12 inches and to a density of not less than 100 percent of the maximum dry density as determined by ASTM D1557. The subgrade in areas outside the limits of the pavement areas shall be compacted to a depth of 12 inches and to a density of not less than 95 percent of the maximum density as determined by ASTM D698.

The material to be compacted shall be within  $\pm 2\%$  of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils). When the material has greater than 30 percent retained on the  $\frac{3}{4}$  inch sieve, follow the methods in procedures in AASHTO T180 Annex for correction of maximum dry density and optimum moisture for oversized particles. Tests for moisture content and compaction will be taken at a minimum of 3,000 S.Y. of subgrade. All quality assurance testing shall be done by the Contractor's laboratory in the presence of the RPR, and density test results shall be furnished upon completion to the RPR for acceptance determination.

The in-place field density shall be determined in accordance with ASTM D1556 or ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938 within 12 months prior to its use on this contract. The gage shall be field standardized daily.

Density tests will be taken by the RPR for every 3,000 square yards of completed subgrade. If a nuclear gage is used for density determination, two random readings shall be made for each 3,000 square yards.

Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

If the specified density is not attained, the entire lot shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

All cut-and-fill slopes shall be uniformly dressed to the slope, cross-section, and alignment shown on the plans or as directed by the RPR and the finished subgrade shall be maintained.

**152-2.11 Finishing and protection of subgrade.** Finishing and protection of the subgrade is incidental to this item. Grading and compacting of the subgrade shall be performed so that it will drain readily. All low areas, holes or depressions in the subgrade shall be brought to grade. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans. All ruts or rough places that develop in the completed subgrade shall be graded, re-compacted, and retested. The Contractor shall protect the subgrade from damage and limit hauling over the finished subgrade to only traffic essential for construction purposes.

The Contractor shall maintain the completed course in satisfactory condition throughout placement of subsequent layers. No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been accepted by the RPR.

**152-2.12 Haul.** All hauling will be considered a necessary and incidental part of the work. The Contractor shall include the cost in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work.

The Contractor's equipment shall not cause damage to any excavated surface, compacted lift or to the subgrade as a result of hauling operations. Any damage caused as a result of the Contractor's hauling operations shall be repaired at the Contractor's expense.

The Contractor shall be responsible for providing, maintaining and removing any haul roads or routes within or outside of the work area, and shall return the affected areas to their former condition, unless otherwise authorized in writing by the Owner. No separate payment will be made for any work or materials associated with providing, maintaining and removing haul roads or routes.

**152-2.13 Surface Tolerances.** In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence

of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

- a. **Smoothness.** The finished surface shall not vary more than  $\pm 1/2$  inch (12 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.
- b. **Grade.** The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within  $\pm 0.05$  feet (15 mm) of the specified grade.

On safety areas, turfed areas and other designated areas within the grading limits where no subbase or base is to be placed, grade shall not vary more than 0.10 feet (30 mm) from specified grade. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

**152-2.14 Topsoil.** When topsoil is specified or required as shown on the plans or under Item T-905, it shall be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of Item T-905. If, at the time of excavation or stripping, the topsoil cannot be placed in its final section of finished construction, the material shall be stockpiled at approved locations. Stockpiles shall be located as shown on the plans and the approved CSPP, and shall not be placed on areas that subsequently will require any excavation or embankment fill. If, in the judgment of the RPR, it is practical to place the salvaged topsoil at the time of excavation or stripping, the material shall be placed in its final position without stockpiling or further re-handling.

Upon completion of grading operations, stockpiled topsoil shall be handled and placed as shown on the plans and as required in Item T-905. Topsoil shall be paid for as provided in Item T-905. No direct payment will be made for topsoil under Item P-152.

## METHOD OF MEASUREMENT

**152-3.1** Excavation shall not be measured and be considered incidental to the cost of fence, gate, conduit, and junction box installation. This work shall be considered necessary and incidental to the work item requiring this work.

## BASIS OF PAYMENT

**152-4.1** Payment will not be made for excavation. The price of excavation shall be considered incidental to the unit price for fence, gate, conduit, and junction box installation. This work shall be considered necessary and incidental to the work item requiring this work.

## 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.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO T-180	Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
--------------	---

ASTM International (ASTM)

ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft <sup>3</sup> (600 kN-m/m <sup>3</sup> ))
-----------	--

ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> (2700 kN-m/m <sup>3</sup> ))
ASTM D6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
Advisory Circulars (AC)	
AC 150/5370-2	Operational Safety on Airports During Construction Software
Software	
FAARFIELD – FAA Rigid and Flexible Iterative Elastic Layered Design	
U.S. Department of Transportation	
FAA RD-76-66	Design and Construction of Airport Pavements on Expansive Soils

**END OF ITEM P-152**

## Item P-153 Controlled Low-Strength Material (CLSM)

### DESCRIPTION

**153-1.1** This item shall consist of furnishing, transporting, and placing a controlled low-strength material (CLSM) as flowable backfill in trenches or at other locations shown on the plans or as directed by the Resident Project Representative (RPR).

### MATERIALS

#### 153-2.1 Materials.

**a. Cement.** Cement shall conform to the requirements of ASTM C150 Type I.

**b. Fly ash.** Fly ash shall conform to ASTM C618, Class C or F.

**c. Fine aggregate (sand).** Fine aggregate shall conform to the requirements of ASTM C33 except for aggregate gradation. Any aggregate gradation which produces the specified performance characteristics of the CLSM and meets the following requirements, will be accepted.

Sieve Size	Percent Passing by weight
3/4 inch (19.0 mm)	100
No. 200 (75 $\mu$ m)	0 - 12

**d. Water.** Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

### MIX DESIGN

**153-3.1 Proportions.** The Contractor shall submit, to the RPR, a mix design including the proportions and source of aggregate, fly ash, cement, water, and approved admixtures. No CLSM mixture shall be produced for payment until the RPR has given written approval of the proportions. The proportions shall be prepared by a laboratory and shall remain in effect for the duration of the project. The proportions shall establish a single percentage or weight for aggregate, fly ash, cement, water, and any admixtures proposed. Laboratory costs are incidental to this item.

**a. Compressive strength.** CLSM shall be designed to achieve a 28-day compressive strength of 100 to 200 psi (690 to 1379 kPa) when tested in accordance with ASTM D4832, with no significant strength gain after 28 days.

**b. Consistency.** Design CLSM to achieve a consistency that will produce an approximate 8-inch (200 mm) diameter circular-type spread without segregation. CLSM consistency shall be determined per ASTM D6103.

## CONSTRUCTION METHODS

### 153-4.1 Placement.

**a. Placement.** CLSM may be placed by any reasonable means from the mixing unit into the space to be filled. Agitation is required during transportation and waiting time. Placement shall be performed so structures or pipes are not displaced from their final position and intrusion of CLSM into unwanted areas is avoided. The material shall be brought up uniformly to the fill line shown on the plans or as directed by the RPR. Each placement of CLSM shall be as continuous an operation as possible. If CLSM is placed in more than one lift, the base lift shall be free of surface water and loose foreign material prior to placement of the next lift.

**b. Contractor Quality Control.** The Contractor shall collect all batch tickets to verify the CLSM delivered to the project conforms to the mix design. The Contractor shall verify daily that the CLSM is consistent with 153-3.1a and 153-3.1b. Adjustments shall be made as necessary to the proportions and materials as needed. The Contractor shall provide all batch tickets to the RPR.

**c. Limitations of placement.** CLSM shall not be placed on frozen ground. Mixing and placing may begin when the air or ground temperature is at least 35°F (2°C) and rising. Mixing and placement shall stop when the air temperature is 40°F (4°C) and falling or when the anticipated air or ground temperature will be 35°F (2°C) or less in the 24-hour period following proposed placement. At the time of placement, CLSM shall have a temperature of at least 40°F (4°C).

### 153-4.2 Curing and protection

**a. Curing.** The air in contact with the CLSM shall be maintained at temperatures above freezing for a minimum of 72 hours. If the CLSM is subjected to temperatures below 32°F (0°C), the material may be rejected by the RPR if damage to the material is observed.

**b. Protection.** The CLSM shall not be subject to loads and shall remain undisturbed by construction activities for a period of 48 hours or until a compressive strength of 15 psi (105 kPa) is obtained. The Contractor shall be responsible for providing evidence to the RPR that the material has reached the desired strength. Acceptable evidence shall be based upon compressive tests made in accordance with paragraph 153-3.1a.

**153-4.3 Quality Assurance (QA) Acceptance.** CLSM QA acceptance shall be based upon batch tickets provided by the Contractor to the RPR to confirm that the delivered material conforms to the mix design.

## METHOD OF MEASUREMENT

### 153-5.1 Measurement.

No separate measurement for payment shall be made for controlled low strength material (CLSM). CLSM shall be considered necessary and incidental to the work of this Contract.

## **BASIS OF PAYMENT**

### **153-6.1 Payment.**

No payment will be made separately or directly for controlled low strength material (CLSM). CLSM shall be considered necessary and incidental to the work of this Contract.

## **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 C33	Standard Specification for Concrete Aggregates
ASTM C150	Standard Specification for Portland Cement
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C595	Standard Specification for Blended Hydraulic Cements
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D4832	Standard Test Method for Preparation and Testing of Controlled Low-Strength Material (CLSM) Test Cylinders
ASTM D6103	Flow Consistency of Controlled Low Strength Material (CLSM)

**END OF ITEM P-153**



Page Intentionally Blank

## Item P-605 Joint Sealants for Pavements

### DESCRIPTION

**605-1.1** This item shall consist of providing and installing a resilient and adhesive joint sealing material capable of effectively sealing joints in pavement; joints between different types of pavements; and cracks in existing pavement.

### MATERIALS

**605-2.1 Joint sealants.** Joint sealant materials shall meet the requirements of ASTM D6690.

Each lot or batch of sealant shall be delivered to the jobsite in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch or lot number, the safe heating temperature, and shall be accompanied by the manufacturer's certification stating that the sealant meets the requirements of this specification.

**605-2.2 Backer rod.** The material furnished shall be a compressible, non-shrinking, non-staining, non-absorbing material that is non-reactive with the joint sealant in accordance with ASTM D5249. The backer-rod material shall be  $25\% \pm 5\%$  larger in diameter than the nominal width of the joint.

**605-2.3 Bond breaking tapes.** Provide a bond breaking tape or separating material that is a flexible, non-shrinkable, non-absorbing, non-staining, and non-reacting adhesive-backed tape. The material shall have a melting point at least 5°F (3°C) greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D789. The bond breaker tape shall be approximately 1/8 inch (3 mm) wider than the nominal width of the joint and shall not bond to the joint sealant.

For installation of light cans, backup materials shall not be used between Items P-605 and P-606.

### CONSTRUCTION METHODS

**605-3.1 Time of application.** Joints shall be sealed as soon after completion of the curing period as feasible and before the pavement is opened to traffic, including construction equipment. The pavement temperature shall be 50°F (10°C) and rising at the time of application of the poured joint sealing material. Do not apply sealant if moisture is observed in the joint.

When used with Item P-606, such as light can installation, Item P-605 shall not be applied until the P-606 has fully cured.

**605-3.2 Equipment.** Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started and maintained in satisfactory condition at all times. Submit a list of proposed equipment to be used in performance of construction work including descriptive data, 15 days prior to use on the project.

**a. Hand tools.** Hand tools may be used, when approved, for removing defective sealant from a crack and repairing or cleaning the crack faces. Hand tools should be carefully evaluated for potential spalling effects prior to approval for use.

**b. Hot-poured sealing equipment.** The unit applicators used for heating and installing ASTM D6690 joint sealant materials shall be mobile and shall be equipped with a double-boiler, agitator-type kettle with an oil medium in the outer space for heat transfer; a direct-connected pressure-type extruding device with a nozzle shaped for inserting in the joint to be filled; positive temperature devices for controlling the temperature of the transfer oil and sealant; and a recording type thermometer for indicating the temperature of the sealant. The applicator unit shall be designed so that the sealant will circulate through the delivery hose and return to the inner kettle when not in use.

**605-3.3 Preparation of joints.** Pavement joints for application of material in this specification must be dry, clean of all scale, dirt, dust, curing compound, and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method cleans the joint and does not damage the joint.

**a. Sawing.** Not used.

**b. Sealing.** Immediately before sealing, the joints shall be thoroughly cleaned of all remaining laitance, curing compound, filler, protrusions of hardened concrete, old sealant and other foreign material from the sides and upper edges of the joint space to be sealed. The joint faces shall be surface dry when the seal is applied.

**c. Backer Rod.** When the joint opening is of a greater depth than indicated for the sealant depth, plug or seal off the lower portion of the joint opening using a backer rod in accordance with paragraph 605-2.2 to prevent the entrance of the sealant below the specified depth. Take care to ensure that the backer rod is placed at the specified depth and is not stretched or twisted during installation.

**d. Bond-breaking tape.** Where inserts or filler materials contain bitumen, or the depth of the joint opening does not allow for the use of a backup material, insert a bond-separating tape breaker in accordance with paragraph 605-2.3 to prevent incompatibility with the filler materials and three-sided adhesion of the sealant. Securely bond the tape to the bottom of the joint opening so it will not float up into the new sealant.

**605-3.4 Installation of sealants.** Joints shall be inspected for proper width, depth, alignment, and preparation, and shall be approved by the RPR before sealing is allowed. Sealants shall be installed in accordance with the following requirements:

Immediately preceding, but not more than 50 feet (15 m) ahead of the joint sealing operations, perform a final cleaning with compressed air. Fill the joints from the bottom up to 1/8 inch  $\pm$  1/16 inch below the top of pavement surface; or bottom of groove for grooved pavement. Remove and discard excess or spilled sealant from the pavement by approved methods. Install the sealant in such a manner as to prevent the formation of voids and entrapped air. In no case shall gravity methods or pouring pots be used to install the sealant material. Traffic shall not be permitted over newly sealed pavement until authorized by the RPR. When a primer is recommended by the manufacturer, apply it evenly to the joint faces in accordance with the manufacturer's instructions. Check the joints frequently to ensure that the newly installed sealant is cured to a tack-free condition within the time specified.

**605-3.5 Inspection.** The Contractor shall inspect the joint sealant for proper rate of cure and set, bonding to the joint walls, cohesive separation within the sealant, reversion to liquid, entrapped air and voids. Sealants exhibiting any of these deficiencies at any time prior to the final acceptance of the project shall be removed from the joint, wasted, and replaced as specified at no additional cost to the airport.

**605-3.6 Clean-up.** Upon completion of the project, remove all unused materials from the site and leave the pavement in a clean condition.

## METHOD OF MEASUREMENT

**605-4.1** No separate measurement for payment shall be made for joint sealants for pavements. This work shall be considered necessary and incidental to the work item requiring this work.

### **BASIS OF PAYMENT**

**605-5.1** No payment will be made separately or directly for joint sealants for pavements. This work shall be considered necessary and incidental to the item requiring this work.

### **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 D789	Standard Test Method for Determination of Relative Viscosity of Polyamide (PA)
ASTM D5249	Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt]

#### Advisory Circulars (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
----------------	---

### **END OF ITEM P-605**

Page Intentionally Blank

## **Item P-606 Adhesive Compounds, Two-Component for Sealing Wire and Lights in Pavement**

### **DESCRIPTION**

**606-1.1** This specification covers two types of material; a liquid suitable for sealing electrical wire in saw cuts in pavement and for sealing light fixtures or bases in pavement, and a paste suitable for embedding light fixtures in the pavement. Both types of material are two-component filled formulas with the characteristics specified in paragraph 606-2.4. Materials supplied for use with asphalt and/or concrete pavements must be formulated so they are compatible with the asphalt and/or concrete.

### **MATERIALS**

**606-2.1 Curing.** When pre-warmed to 77°F (25°C), mixed, and placed in accordance with manufacturer's directions, the materials shall cure at temperatures of 45°F (7°C) or above without the application of external heat.

**606-2.2 Storage.** The adhesive components shall not be stored at temperatures over 86°F (30°C), unless otherwise specified by the manufacturer.

**606-2.3 Caution.** Installation and use shall be in accordance with the manufacturer's recommended procedures. Avoid prolonged or repeated contact with skin. In case of contact, wash with soap and flush with water. If taken internally, call doctor. Keep away from heat or flame. Avoid vapor. Use in well-ventilated areas. Keep in cool place. Keep away from children.

**606-2.4 Characteristics.** When mixed and cured in accordance with the manufacturer's directions, the materials shall have the following properties shown in Table 1.

**Table 1. Property Requirements**

Physical or Electrical Property	Minimum	Maximum	ASTM Method
Tensile			
Portland cement concrete	1,000 psi (70 kg/sq cm)		D 638
Asphalt concrete	500 psi (35 kg/sq cm)		
Elongation			
Portland cement concrete		See note <sup>1</sup>	D 638
Asphalt concrete	50%		D 638
Coef. of cub. exp. cu. cm/cu. cm/°C	0.00090	0.00120	D 1168
Coef. of lin. exp. cm/cm/°C	0.000030	0.000040	D 1168
Dielectric strength, short time test	350 volts/mil.		D 149
Arc resistance	125 sec		
Pull-off			
Adhesion to steel	1,000 psi (70 kg/sq cm)		
Adhesion to Portland cement concrete	200 psi (14 kg/sq cm)		
Adhesion to asphalt concrete	No test available.		
Adhesion to aluminum	250 psi		

<sup>1</sup> 20% or more (without filler) for formulations to be supplied for areas subject to freezing.

## **SAMPLING, INSPECTION, AND TEST PROCEDURES**

**606-3.1 Tensile properties.** Tests for tensile strength and elongation shall be conducted in accordance with ASTM D638.

**606-3.2 Expansion.** Tests for coefficients of linear and cubical expansion shall be conducted in accordance with, Method B, except that mercury shall be used instead of glycerine. The test specimen shall be mixed in the proportions specified by the manufacturer, and cured in a glass tub approximately 2 inch (50 mm) long by 3/8 inch (9 mm) in diameter. The interior of the tube shall be precoated with a silicone mold release agent. The hardened sample shall be removed from the tube and aged at room temperature for one (1) week before conducting the test. The test temperature range shall be from 35°F (2°C) to 140°F (60°C).

**606-3.3 Test for dielectric strength.** Test for dielectric strength shall be conducted in accordance with ASTM D149 for sealing compounds to be furnished for sealing electrical wires in pavement.

**606-3.4 Test for arc resistance.** Test for arc resistance shall be conducted for sealing compounds to be furnished for sealing electrical wires in pavement.

**606-3.5 Test for adhesion to steel.** The ends of two smooth, clean, steel specimens of convenient size (1 inch by 1 inch by 6 inch) (25 mm by 25 mm by 150 mm) would be satisfactory when bonded together

with adhesive mixture and allowed to cure at room temperature for a period of time to meet formulation requirements and then tested to failure on a Riehle (or similar) tensile tester. The thickness of adhesive to be tested shall be 1/4 inch (6 mm).

### 606-3.6 Adhesion to Portland cement concrete

**a. Concrete test block preparation.** The aggregate grading shall be as shown in Table 2.

The coarse aggregate shall consist of crushed rock having a minimum of 75% of the particles with at least one fractured face and having a water absorption of not more than 1.5%. The fine aggregate shall consist of crushed sand manufactured from the same parent rock as the coarse aggregate. The concrete shall have a water-cement ratio of 5.5 gallons (21 liters) of water per bag of cement, a cement factor of 6,  $\pm 0.5$ , bags of cement per cubic yard (0.76 cubic meter) of concrete, and a slump of 2-1/2 inch (60 mm),  $\pm 1/2$  inch (60 mm  $\pm 12$  mm). The ratio of fine aggregate to total aggregate shall be approximately 40% by solid volume. The air content shall be 5.0%,  $\pm 0.5\%$ , and it shall be obtained by the addition to the batch of an air-entraining admixture such as Vinsol® resin. The mold shall be of metal and shall be provided with a metal base plate.

Means shall be provided for securing the base plate to the mold. The assembled mold and base plate shall be watertight and shall be oiled with mineral oil before use. The inside measurement of the mold shall be such that several one inch (25 mm) by 2-inch (75 mm) by 3-inch (25 mm by 50 mm by 75 mm) test blocks can be cut from the specimen with a concrete saw having a diamond blade. The concrete shall be prepared and cured in accordance with ASTM C192.

**Table 2. Aggregate for Bond Test Blocks**

Type	Sieve Size	Percent Passing
<b>Coarse Aggregate</b>	3/4 inch (19.0 mm)	97 to 100
	1/2 inch (12.5 mm)	63 to 69
	3/8 inch (9.5 mm)	30 to 36
	No. 4 (4.75 mm)	0 to 3
<b>Fine Aggregate</b>	No. 4 (4.75 mm)	100
	No. 8 (2.36 mm)	82 to 88
	No. 16 (1.18 mm)	60 to 70
	No. 30 (600 $\mu$ m)	40 to 50
	No. 50 (300 $\mu$ m)	16 to 26
	No. 100 (150 $\mu$ m)	5 to 9

**b. Bond test.** Prior to use, oven-dry the test blocks to constant weight at a temperature of 220°F to 230°F (104°C to 110°C), cool to room temperature, 73.4°F  $\pm 3^\circ$ F (23°C  $\pm 1.6^\circ$ C), in a desiccator, and clean the surface of the blocks of film or powder by vigorous brushing with a stiff-bristled fiber brush. Two test blocks shall be bonded together on the one inch by 3 inch (25 mm by 75 mm) sawed face with the adhesive mixture and allowed to cure at room temperature for a period of time to meet formulation requirements and then tested to failure in a Riehle (or similar) tensile tester. The thickness of the adhesive to be tested shall be 1/4 inch (6 mm).

**606-3.7 Compatibility with asphalt mix.** Test for compatibility with asphalt in accordance with ASTM D5329.

**606-3.8 Adhesive compounds - Contractor's responsibility.** The Contractor shall furnish the vendor's certified test reports for each batch of material delivered to the project. The report shall certify that the

material meets specification requirements and is suitable for use with concrete pavements. The report shall be provided to and accepted by the Resident Project Representative (RPR) before use of the material. In addition, the Contractor shall obtain a statement from the supplier or manufacturer that guarantees the material for one year. The supplier or manufacturer shall furnish evidence that the material has performed satisfactorily on other projects.

**606-3.9 Application.** Adhesive shall be applied on a dry, clean surface, free of grease, dust, and other loose particles. The method of mixing and application shall be in strict accordance with the manufacturer's recommendations. When used with Item P-605, such as light can installation, Item P-605 shall not be applied until the Item P-606 has fully cured.

### **METHOD OF MEASUREMENT**

**606-4.1** The adhesive compound shall be considered incidental and no separate measurement shall be made. This work shall be considered necessary and incidental to the work item requiring this work.

### **BASIS OF PAYMENT**

**606-5.1** Adhesive compound shall be considered incidental to other items of work and no separate payment shall be made. This work shall be considered necessary and incidental to the work item requiring this work.

### **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 C192	Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM D149	Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
ASTM D638	Standard Test Method for Tensile Properties of Plastics
ASTM D5329	Standard Test Methods for Sealants and Fillers, Hot-applied, for Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements

### **END OF ITEM P-606**

## Item P-610 Concrete for Miscellaneous Structures

### DESCRIPTION

**610-1.1** This item shall consist of concrete and reinforcement, as shown on the plans, prepared and constructed in accordance with these specifications. This specification shall be used for all concrete other than airfield pavement which are cast-in-place.

### MATERIALS

**610-2.1 General.** Only approved materials, conforming to the requirements of these specifications, shall be used in the work. Materials may be subject to inspection and tests at any time during their preparation or use. The source of all materials shall be approved by the Resident Project Representative (RPR) before delivery or use in the work. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be stored and handled to ensure preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed in them.

The use of pit-run aggregates shall not be permitted unless the pit-run aggregate has been screened and washed, and all fine and coarse aggregates stored separately and kept clean. The mixing of different aggregates from different sources in one storage stockpile or alternating batches of different aggregates shall not be permitted.

**a. Reactivity.** Fine aggregate and coarse aggregates to be used in all concrete shall have been tested separately within six months of the project in accordance with ASTM C1260. Test results shall be submitted to the RPR. The aggregate shall be considered innocuous if the expansion of test specimens, tested in accordance with ASTM C1260, does not exceed 0.08% at 14 days (16 days from casting). If the expansion either or both test specimen is greater than 0.08% at 14 days, but less than 0.20%, a minimum of 25% of Type F fly ash, or between 40% and 55% of slag cement shall be used in the concrete mix. If expansion of either the coarse or fine aggregate exceeds 0.08% at 14 days, limit the alkali of the concrete to be less than or equal to 3.0 lb per cubic yard (1.8 kg per cubic meter), calculated in accordance with Engineering Brief (EB) 106.

If the expansion is greater than 0.20% the aggregates shall not be used, and test results for other aggregates must be submitted for evaluation.

**610-2.2 Coarse aggregate.** The coarse aggregate for concrete shall meet the requirements of ASTM C33 and the requirements of Table 4, Class Designation 5S; and the grading requirements shown below, as required for the project.

### Coarse Aggregate Grading Requirements

Maximum Aggregate Size	ASTM C33, Table 3 Grading Requirements (Size No.)
1 1/2 inch (37.5 mm)	467 or 4 and 67
1 inch (25 mm)	57
3/4 inch (19 mm)	67
1/2 inch (12.5 mm)	7

**610-2.2.1 Coarse Aggregate susceptibility to durability (D) cracking.** Not used.

**610-2.3 Fine aggregate.** The fine aggregate for concrete shall meet all fine aggregate requirements of ASTM C33.

**610-2.4 Cement.** Cement shall conform to the requirements of ASTM C150 Type I.

**610-2.5 Cementitious materials.**

**a. Fly ash.** Fly ash shall meet the requirements of ASTM C618, with the exception of loss of ignition, where the maximum shall be less than 6%. Fly ash shall have a Calcium Oxide (CaO) content of less than 15% and a total available alkali content less than 3% per ASTM C311. Fly ash produced in furnace operations using liming materials or soda ash (sodium carbonate) as an additive shall not be acceptable. The Contractor shall furnish the previous three most recent, consecutive ASTM C618 reports for each source of fly ash proposed in the concrete mix, and shall furnish each additional report as they become available during the project. The reports can be used for acceptance or the material may be tested independently by the RPR.

**b. Slag cement (ground granulated blast furnace (GGBF)).** Slag cement shall conform to ASTM C989, Grade 100 or Grade 120. Slag cement shall be used only at a rate between 25% and 55% of the total cementitious material by mass.

**610-2.6 Water.** Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

**610-2.7 Admixtures.** The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the RPR may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests may be made of samples taken by the RPR from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

**a. Air-entraining admixtures.** Air-entraining admixtures shall meet the requirements of ASTM C260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entrainment agent and any water reducer admixture shall be compatible.

**b. Water-reducing admixtures.** Water-reducing admixture shall meet the requirements of ASTM C494, Type A, B, or D. ASTM C494, Type F and G high range water reducing admixtures and ASTM C1017 flowable admixtures shall not be used.

**c. Other chemical admixtures.** The use of set retarding, and set-accelerating admixtures shall be approved by the RPR. Retarding shall meet the requirements of ASTM C494, Type A, B, or D and set-accelerating shall meet the requirements of ASTM C494, Type C. Calcium chloride and admixtures containing calcium chloride shall not be used.

**610-2.8 Premolded joint material.** Premolded joint material for expansion joints shall meet the requirements of ASTM D1751.

**610-2.9 Joint filler.** The filler for joints shall meet the requirements of Item P-605, unless otherwise specified.

**610-2.10 Steel reinforcement.** Reinforcing shall consist of Reinforcing Steel, Welded Steel Wire Fabric, and Welded Deformed Steel Fabric conforming to the requirements shown below.

**Steel Reinforcement**

<b>Reinforcing Steel</b>	<b>ASTM A615 Grade 60</b>
<b>Welded Steel Wire Fabric</b>	<b>ASTM A1064</b>
<b>Welded Deformed Steel Fabric</b>	<b>ASTM A1064</b>

**610-2.11 Materials for curing concrete.** Curing materials shall conform to the requirement shown below.

**Materials for Curing**

<b>White-pigmented Liquid Membrane-Forming Compound, Type 2, Class B</b>	<b>ASTM C309</b>
--	------------------

**CONSTRUCTION METHODS**

**610-3.1 General.** The Contractor shall furnish all labor, materials, and services necessary for, and incidental to, the completion of all work as shown on the drawings and specified here. All machinery and equipment used by the Contractor on the work, shall be of sufficient size to meet the requirements of the work. All work shall be subject to the inspection and approval of the RPR.

**610-3.2 Concrete Mixture.** The concrete shall develop a compressive strength of 4000 psi in 28 days as determined by test cylinders made in accordance with ASTM C31 and tested in accordance with ASTM C39. The concrete shall contain not less than 470 pounds of cementitious material per cubic yard. The water cementitious ratio shall not exceed 0.45 by weight. The air content of the concrete shall be 5% +/- 1.2% as determined by ASTM C231 and shall have a slump of not more than 4 inches as determined by ASTM C143.

**610-3.3 Mixing.** Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of ASTM C94 or ASTM C685.

The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40°F without the RPRs approval. If approval is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50°F nor more than 100°F. The Contractor shall be held responsible for any defective work, resulting from freezing or injury in any manner during placing and curing, and shall replace such work at his expense.

Retempering of concrete by adding water or any other material is not permitted.

The rate of delivery of concrete to the job shall be sufficient to allow uninterrupted placement of the concrete.

**610-3.4 Forms.** Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the RPR. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as shown on the plans. The forms shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent displacement and sagging between supports. The surfaces

of forms shall be smooth and free from irregularities, dents, sags, and holes. The Contractor shall be responsible for their adequacy.

The internal form ties shall be arranged so no metal will show in the concrete surface or discolor the surface when exposed to weathering when the forms are removed. All forms shall be wetted with water or with a non-staining mineral oil, which shall be applied immediately before the concrete is placed. Forms shall be constructed so they can be removed without injuring the concrete or concrete surface.

**610-3.5 Placing reinforcement.** All reinforcement shall be accurately placed, as shown on the plans, and shall be firmly held in position during concrete placement. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

**610-3.6 Embedded items.** Before placing concrete, all embedded items shall be firmly and securely fastened in place as indicated. All embedded items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The concrete shall be spaded and consolidated around and against embedded items. The embedding of wood shall not be allowed.

**610-3.7 Concrete Consistency.** The Contractor shall monitor the consistency of the concrete delivered to the project site; collect each batch ticket; check temperature; and perform slump tests on each truck at the project site in accordance with ASTM C143.

**610-3.8 Placing concrete.** All concrete shall be placed during daylight hours, unless otherwise approved. The concrete shall not be placed until the depth and condition of foundations, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved by the RPR. Concrete shall be placed as soon as practical after mixing, but in no case later than one (1) hour after water has been added to the mix. The method and manner of placing shall avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. The concrete shall not be dropped from a height of more than 5 feet. Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to rehandling or flowing. Do not subject concrete to procedures which cause segregation. Concrete shall be placed on clean, damp surfaces, free from running water, or on a properly consolidated soil foundation.

**610-3.9 Vibration.** Vibration shall follow the guidelines in American Concrete Institute (ACI) Committee 309R, Guide for Consolidation of Concrete.

**610-3.10 Joints.** Joints shall be constructed as indicated on the plans.

**610-3.11 Finishing.** All exposed concrete surfaces shall be true, smooth, and free from open or rough areas, depressions, or projections. All concrete horizontal plane surfaces shall be brought flush to the proper elevation with the finished top surface struck-off with a straightedge and floated.

**610-3.12 Curing and protection.** All concrete shall be properly cured in accordance with the recommendations in American Concrete Institute (ACI) 308R, Guide to External Curing of Concrete. The concrete shall be protected from damage until project acceptance.

**610-3.13 Cold weather placing.** When concrete is placed at temperatures below 40°F, follow the cold weather concreting recommendations found in ACI 306R, Cold Weather Concreting.

**610-3.14 Hot weather placing.** When concrete is placed in hot weather greater than 85°F, follow the hot weather concreting recommendations found in ACI 305R, Hot Weather Concreting.

## QUALITY ASSURANCE (QA)

**610-4.1 Quality Assurance sampling and testing.** Concrete for each day's placement will be accepted on the basis of the compressive strength specified in paragraph 610-3.2. The RPR will sample the concrete in

accordance with ASTM C172; test the slump in accordance with ASTM C143; test air content in accordance with ASTM C231; make and cure compressive strength specimens in accordance with ASTM C31; and test in accordance with ASTM C39. The QA testing agency will meet the requirements of ASTM C1077.

The Contractor shall provide adequate facilities for the initial curing of cylinders.

**610-4.2 Defective work.** Any defective work that cannot be satisfactorily repaired as determined by the RPR, shall be removed and replaced at the Contractor's expense. Defective work includes, but is not limited to, uneven dimensions, honeycombing and other voids on the surface or edges of the concrete.

### METHOD OF MEASUREMENT

**610-5.1** Concrete shall be considered incidental and no separate measurement shall be made. This work shall be considered necessary and incidental to the work item requiring this work.

### BASIS OF PAYMENT

**610-6.1** Concrete shall be considered incidental to other items of work and no separate payment shall be made. This work shall be considered necessary and incidental to the work item requiring this work.

### 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 A184	Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A704	Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
ASTM A706	Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A884	Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement
ASTM A934	Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM A1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	Standard Specification for Ready-Mixed Concrete

ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C114	Standard Test Methods for Chemical Analysis of Hydraulic Cement
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C143	Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C171	Standard Specification for Sheet Materials for Curing Concrete
ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C311	Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C666	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
ASTM C685	Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C989	Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1017	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1157	Standard Performance Specification for Hydraulic Cement
ASTM C1260	Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1365	Standard Test Method for Determination of the Proportion of Phases in Portland Cement and Portland-Cement Clinker Using X-Ray Powder Diffraction Analysis
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types)
ASTM D1752	Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
American Concrete Institute (ACI)	
ACI 305R	Hot Weather Concreting

ACI 306R	Cold Weather Concreting
ACI 308R	Guide to External Curing of Concrete
ACI 309R	Guide for Consolidation of Concrete

**END OF ITEM P-610**

Page Intentionally Blank

## Item P-620 Runway and Taxiway Marking

### DESCRIPTION

**620-1.1** This item shall consist of the preparation and painting of numbers, markings, and stripes on the surface of runways, taxiways, blast pads, hold pads and aprons, in accordance with these specifications and at the locations shown on the plans, or as directed by the Resident Project Representative (RPR). The terms “paint” and “marking material” as well as “painting” and “application of markings” are interchangeable throughout this specification. This item shall also consist of conducting a magnetic survey to verify the proposed site is acceptable for the marking of a compass rose.

### MATERIALS

**620-2.1 Materials acceptance.** The Contractor shall furnish manufacturer’s certified test reports, for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. This certification along with a copy of the paint manufacturer’s surface preparation; marking materials, including adhesion, flow promoting and/or floatation additive; and application requirements must be submitted and approved by the Resident Project Representative (RPR) prior to the initial application of markings. The reports can be used for material acceptance or the RPR may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the RPR upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers that are easily quantifiable for inspection by the RPR.

#### 620-2.2 Marking materials.

Table 1. Marking Materials

Paint <sup>1</sup>				Glass Beads <sup>2</sup>	
Type	Color	Fed Std. 595 Number	Application Rate Maximum	Type	Application Rate Minimum
II	White	37925	115 ft <sup>2</sup> /gal	III	10 lb/gal
II	Red	31136	115 ft <sup>2</sup> /gal	I, Gradation A	8 lb/gal
II	Yellow	33538 or 33655	115 ft <sup>2</sup> /gal	III	10 lb/gal
II	Black	37038	115 ft <sup>2</sup> /gal	N/A	N/A

<sup>1</sup> See paragraph 620-2.2a

<sup>2</sup> See paragraph 620-2.2b

**a. Paint.** Paint shall be waterborne in accordance with the requirements of this paragraph. Paint colors shall comply with Federal Standard No. 595. **Waterborne.** Paint shall meet the requirements of Federal Specification TT-P-1952F, Type II. The non-volatile portion of the vehicle for all paint types shall be composed of a 100% acrylic polymer as determined by infrared spectral analysis.

**b. Reflective media.** Glass beads for white and yellow paint shall meet the requirements for Federal Specification TT-B-1325D Type III.

Glass beads for red and pink paint shall meet the requirements for Type I, Gradation A.

Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment.

Glass beads shall not be used in black and green paint.

Type III glass beads shall not be used in red and pink paint.

## CONSTRUCTION METHODS

**620-3.1 Weather limitations.** Painting shall only be performed when the surface is dry, and the ambient temperature and the pavement surface temperature meet the manufacturer's recommendations in accordance with paragraph 620-2.1. Painting operations shall be discontinued when the ambient or surface temperatures does not meet the manufacturer's recommendations. Markings shall not be applied when the wind speed exceeds 10 mph unless windscreens are used to shroud the material guns. Markings shall not be applied when weather conditions are forecasts to not be within the manufacturers' recommendations for application and dry time.

**620-3.2 Equipment.** Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray-type or airless type marking machine with automatic glass bead dispensers suitable for application of traffic paint. It shall produce an even and uniform film thickness and appearance of both paint and glass beads at the required coverage and shall apply markings of uniform cross-sections and clear-cut edges without running or spattering and without over spray. The marking equipment for both paint and beads shall be calibrated daily.

**620-3.3 Preparation of surfaces.** Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other contaminants that would reduce the bond between the paint and the pavement. Use of any chemicals or impact abrasives during surface preparation shall be approved in advance by the RPR. After the cleaning operations, sweeping, blowing, or rinsing with pressurized water shall be performed to ensure the surface is clean and free of grit or other debris left from the cleaning process.

**a. Preparation of new pavement surfaces.** The area to be painted shall be cleaned by broom, blower, water blasting, or by other methods approved by the RPR to remove all contaminants, including PCC curing compounds, minimizing damage to the pavement surface.

**b. Preparation of pavement to remove existing markings.** Existing pavement markings shall be removed by rotary grinding, water blasting, or by other methods approved by the RPR minimizing damage to the pavement surface. The removal area may need to be larger than the area of the markings to eliminate ghost markings. After removal of markings on asphalt pavements, apply a fog seal or seal coat to 'block out' the removal area to eliminate 'ghost' markings.

**c. Preparation of pavement markings prior to remarking.** Prior to remarking existing markings, loose existing markings must be removed minimizing damage to the pavement surface, with a method approved by the RPR. After removal, the surface shall be cleaned of all residue or debris.

Prior to the application of markings, the Contractor shall certify in writing that the surface is dry and free from dirt, grease, oil, laitance, or other foreign material that would prevent the bond of the paint to the pavement or existing markings. This certification along with a copy of the paint manufactures application

and surface preparation requirements must be submitted to the RPR prior to the initial application of markings.

**620-3.4 Layout of markings.** The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall be shown on the plans.

**620-3.5 Application.** A period of 30 days shall elapse between placement of surface course or seal coat and application of the permanent paint markings. Paint shall be applied at the locations and to the dimensions and spacing shown on the plans. Paint shall not be applied until the layout and condition of the surface has been approved by the RPR.

The edges of the markings shall not vary from a straight line more than 1/2 inch in 50 feet, and marking dimensions and spacing shall be within the following tolerances:

**Marking Dimensions and Spacing Tolerance**

<b>Dimension and Spacing</b>	<b>Tolerance</b>
36 inch or less	±1/2 inch
greater than 36 inch to 6 feet	±1 inch
greater than 6 feet to 60 feet	±2 inch
greater than 60 feet	±3 inch

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rate shown in Table 1. The addition of thinner will not be permitted.

Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished that is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate shown in Table 1. Glass beads shall not be applied to black paint or green paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Different bead types shall not be mixed. Regular monitoring of glass bead embedment and distribution should be performed.

**620-3.6 Application--preformed thermoplastic airport pavement markings.**

Preformed thermoplastic pavement markings not used.

**620-3.7 Control strip.** Not Used.

**620-3.8 Retro-reflectance.** Reflectance shall be measured with a portable retro-reflectometer meeting ASTM E1710 (or equivalent). A total of 6 reading shall be taken over a 6 square foot area with 3 readings taken from each direction. The average shall be equal to or above the minimum levels of all readings which are within 30% of each other.

### Minimum Retro-Reflectance Values

Material	Retro-reflectance mcd/m <sup>2</sup> /lux		
	White	Yellow	Red
Initial Type I	N/A	N/A	35
Initial Type III	600	300	N/A
All materials, remark when less than <sup>1</sup>	100	75	10

<sup>1</sup> 'Prior to remarking determine if removal of contaminants on markings will restore retro-reflectance.

**620-3.9 Protection and cleanup.** After application of the markings, all markings shall be protected from damage until dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris, waste, loose reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the RPR. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and federal environmental statutes and regulations.

### METHOD OF MEASUREMENT

**620-4.2** The quantity of permanent pavement markings shall be measured by the number of square feet of taxiway marking.

### BASIS OF PAYMENT

**620-5.1** This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, surface preparation, and incidentals necessary to complete the item complete in place and accepted by the RPR in accordance with these specifications.

Payment will be made under:

#### Base Bid

Item P-620-5.1                  Permanent Pavement Marking - Per Square Foot

### 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 D476	Standard Classification for Dry Pigmentary Titanium Dioxide Products
ASTM D968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1652	Standard Test Method for Epoxy Content of Epoxy Resins

ASTM D2074	Standard Test Method for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D2240	Standard Test Method for Rubber Property - Durometer Hardness
ASTM D7585	Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments
ASTM E303	Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester
ASTM E1710	Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer
ASTM E2302	Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials
Code of Federal Regulations (CFR)	
40 CFR Part 60, Appendix A-7, Method 24	
	Determination of volatile matter content, water content, density, volume solids, and weight solids of surface coatings
29 CFR Part 1910.1200 Hazard Communication	
Federal Specifications (FED SPEC)	
FED SPEC TT-B-1325D	Beads (Glass Spheres) Retro-Reflective
FED SPEC TT-P-1952F	Paint, Traffic and Airfield Marking, Waterborne
FED STD 595	Colors used in Government Procurement
Commercial Item Description	
A-A-2886B	Paint, Traffic, Solvent Based
Advisory Circulars (AC)	
AC 150/5340-1	Standards for Airport Markings
AC 150/5320-12	Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces

**END OF ITEM P-620**

## Item F-162 Chain-Link Fence

### DESCRIPTION

**162-1.1** This item shall consist of furnishing and erecting a chain-link fence in accordance with these specifications, the details shown on the plans, and in conformity with the lines and grades shown on the plans or established by the RPR.

### MATERIALS

**162-2.1 Fabric.** The fabric shall be woven with a 9-gauge galvanized steel wire in a 2-inch (50 mm) mesh and shall meet the requirements of **ASTM A392, Class 2.**

**162-2.2 Barbed wire.** Barbed wire shall be 2-strand 12-1/2 gauge zinc-coated wire with 4-point barbs and shall conform to the requirements of **ASTM A121, Class 3, Chain Link Fence Grade.**

**162-2.3 Posts, rails, and braces.** Line posts, rails, and braces shall conform to the requirements of ASTM F1043 or ASTM F1083 as follows:

- Galvanized tubular steel pipe shall conform to the requirements of Group IA, (Schedule 40) coatings conforming to Type A, or Group IC (High Strength Pipe), External coating Type B, and internal coating Type B or D.
- Roll Formed Steel Shapes (C-Sections) shall conform to the requirements of Group IIA, and be galvanized in accordance with the requirements of ASTM F1043, Type A.
- Hot-Rolled Shapes (H Beams) shall meet the requirements of Group III, and be galvanized in accordance with the requirements of ASTM F1043, Type A.
- Aluminum Pipe shall conform to the requirements of Group IB.
- Aluminum Shapes shall conform to the requirements of Group IIB.
- Vinyl or polyester coated steel shall conform to the requirements of ASTM F1043, Paragraph 7.3, Optional Supplemental Color Coating.
- Composite posts shall conform to the strength requirements of ASTM F1043 or ASTM F1083. The strength loss of composite posts shall not exceed 10% when subjected to 3,600 hours of exposure to light and water in accordance with ASTM G152, ASTM G153, ASTM G154, and ASTM G155.
- Posts, rails, and braces furnished for use in conjunction with aluminum alloy fabric shall be aluminum alloy or composite.

Posts, rails, and braces, with the exception of galvanized steel conforming to ASTM F1043 or ASTM F1083, Group 1A, Type A, or aluminum alloy, shall demonstrate the ability to withstand testing in salt spray in accordance with ASTM B117 as follows:

- External: 1,000 hours with a maximum of 5% red rust.
- Internal: 650 hours with a maximum of 5% red rust.

The dimensions of the posts, rails, and braces shall be in accordance with Tables I through VI of Federal Specification RR-F-191/3.

**162-2.4 Gates.** Gate frames shall consist of aluminum alloy pipe and shall conform to the specifications for the same material under paragraph 162-2.3. The fabric shall be of the same type material as used in the fence.

**162-2.5 Wire ties and tension wires.** Wire ties for use in conjunction with a given type of fabric shall be of the same material and coating weight identified with the fabric type. Tension wire shall be 7-gauge marcelled steel wire with the same coating as the fabric type and shall conform to ASTM A824.

All material shall conform to Federal Specification RR-F-191/4.

**162-2.6 Miscellaneous fittings and hardware.** Miscellaneous steel fittings and hardware for use with zinc- steel fabric shall be of commercial grade steel or better quality, wrought or cast as appropriate to the article, and sufficient in strength to provide a balanced design when used in conjunction with fabric posts, and wires of the quality specified herein. All steel fittings and hardware shall be protected with a zinc coating applied in conformance with ASTM A153. Barbed wire support arms shall withstand a load of 250 pounds (113 kg) applied vertically to the outermost end of the arm.

**162-2.7 Concrete.** Concrete shall have a minimum 28-day compressive strength of 4000 psi (2670 kPa).

**162-2.8 Marking.** Each roll of fabric shall carry a tag showing the kind of base metal (steel, aluminum, or aluminum alloy number), kind of coating, the gauge of the wire, the length of fencing in the roll, and the name of the manufacturer. Posts, wire, and other fittings shall be identified as to manufacturer, kind of base metal (steel, aluminum, or aluminum alloy number), and kind of coating.

**162.2.9 Signs.** Signs to be mounted on Fence and Gates shall be of the quantity and type called for on the Drawings. Signs shall meet the requirements of ASTM D4956 Type I, Engineering Grade Reflective Aluminum, or better. All ancillary mounting brackets shall be rust free aluminum and hardware shall be galvanized or carbon steel.

**162.2.10 Concrete Median Barrier for Temporary Fence.** Median Barriers shall be MDOT, Standard for Highway & Incidental Structures, Current Edition, Specification Section 648, unless otherwise specified herein or on the drawings.

**162.2.11 Access Controls.** The access card readers for the gates shall be a multiCLASS Open Supervised Device Protocol (OSDP), meeting the Security Industry Association (SIA) standard with Secure Channel Protocol (SCP) to provide secure communications and central management meeting the requirements of HID Multiclass SE RK40 or approved equal. Must integrate into our current Washington County Genetec Enterprise System and include all necessary Genetec Advantage licenses. Each door requires Genetec SMA Enterprise Reader Support for 5 Years. Contractor shall be pre-qualified as a Genetec Unified Elite Dealer and must be able to make components work into our current live Genetec system. Cabling, each reader and lock must be home run cabled back to IT Closet. Access control cable must contain the following four components in a single jacket (18/4, 22/4, 22/2 and 22/6 shielded CMP). This is normally called Banana cable. Power and communication cabling shall be installed per hardware specs. If other Genetec parts are needed and not listed, it is the responsibility of the contractor to provide those parts. These are the standard hardware parts:

- Sy-Cloudlink – typically one per building can control up to 32 Mercury EP panels with total of 256 readers
- Sy-EP1502 – 2-door network panel – supports up to 31 expansion boards
- Sy-MR52-S3 2-door expansion board

- FPO150-C8D8E4M – LifeSafety power enclosure – supports 8 12VDC locks and has space for 4 boards( any combination of Cloudlink, EP1502 and MR52-S3) this is a custom part so there is no spec sheet for it
- Note each power supply must be hardwired into an electrical system using a P&S Security Forked Keyed Switch single pole.
- Must Use Genetec Enclosures

**162.2.12 Cameras.** The gate camera shall be panoramic with built in IR, remote focus, remote zoom, and day/night functionality meeting the requirements of Axis P37 Camera or approved equal. Each camera requires 1 Genetec Omni cast Enterprise Camera Connection, 1 Failover Connection and 1 Genetec SMA or 5 Year Enterprise Camera License. Camera network cabling must be green Plenum Category 6 homerun to IT closet and terminated with the rest of the network cabling on patch panel. All cabling must be labeled as to which lock, reader, and camera they go to.

**162.2.13 Pedestrian gate lock.** The pedestrian gate lock shall be an electric gate lock with keyswitch and fail secure capabilities (SDC Gatelok GL 263AH or Approved Equal) Including all required components and hardware for the pedestrian gate.

**162.2.14 Telecommunications Cabling & Systems Description.** This shall meet the Washington County Maryland Government Structural Cabling Specifications 2018, see attached Appendix D.

**162.2.15 Milling.** All cold milling and transitional milling shall meet the requirements of Maryland Department of Transportation State Highway Administration Section 508. This is incidental to the telescoping gate installation pay item.

**162.2.16 Asphalt Repair/Overlay.** Maryland Department of Transportation State Highway Administration Sections 504 Asphalt Pavement and 904 Performance Graded Asphalt Binders and Asphalt Mixes specifications must be followed. A 9.5mm PG 64-22 asphalt with a compaction level of 65 Gyration should be utilized. A tack coat of emulsified asphalt must be applied to ensure bond between the existing surface and the asphalt overlay. It should be applied in an even, thin coat at a rate of application of .05 gallons per square yard with a tolerance of .01 gallons per square yard. All longitudinal and transverse joints shall be properly tacked. All of this work is incidental to the telescoping gate installation pay item.

## CONSTRUCTION METHODS

**162-3.1 General.** The fence shall be constructed in accordance with the details on the plans and as specified here using new materials. All work shall be performed in a workmanlike manner satisfactory to the RPR. The Contractor shall layout the fence line based on the plans. The Contractor shall span the opening below the fence with barbed wire at all locations where it is not practical to conform the fence to the general contour of the ground surface because of natural or manmade features such as drainage ditches. The new fence shall be permanently tied to the terminals of existing fences as shown on the plans. The Contractor shall stake down the woven wire fence at several points between posts as shown on the plans.

The Contractor shall arrange the work so that construction of the new fence will immediately follow the removal of existing fences. The length of unfenced section at any time shall not exceed 300 feet (90 m). The work shall progress in this manner and at the close of the working day the newly constructed fence shall be tied to the existing fence.

**162-3.2 Clearing fence line.** Clearing shall consist of the removal of all stumps, brush, rocks, trees, or other obstructions that will interfere with proper construction of the fence. Stumps within the cleared area of the fence shall be grubbed or excavated. The bottom of the fence shall be placed a uniform distance

above ground, as specified in the plans. When shown on the plans or as directed by the RPR, the existing fences which interfere with the new fence location shall be removed by the Contractor as a part of the construction work unless such removal is listed as a separate item in the bid schedule. All holes remaining after post and stump removal shall be refilled with suitable soil, gravel, or other suitable material and compacted with tampers.

The cost of removing and disposing of the material shall not constitute a pay item and shall be considered incidental to fence construction.

**162-3.3 Installing posts.** All posts shall be set in concrete at the required dimension and depth and at the spacing shown on the plans.

The concrete shall be thoroughly compacted around the posts by tamping or vibrating and shall have a smooth finish slightly higher than the ground and sloped to drain away from the posts. All posts shall be set plumb and to the required grade and alignment. No materials shall be installed on the posts, nor shall the posts be disturbed in any manner within seven (7) days after the individual post footing is completed.

Should rock be encountered at a depth less than the planned footing depth, a hole 2 inches (50 mm) larger than the greatest dimension of the posts shall be drilled to a depth of 12 inches (300 mm). After the posts are set, the remainder of the drilled hole shall be filled with grout, composed of one part Portland cement and two parts mortar sand. Any remaining space above the rock shall be filled with concrete in the manner described above.

In lieu of drilling, the rock may be excavated to the required footing depth. No extra compensation shall be made for rock excavation.

**162-3.4 Installing top rails.** No top rail shall be installed.

**162-3.5 Installing braces.** Horizontal brace rails, with diagonal truss rods and turnbuckles, shall be installed at all terminal posts.

**162-3.6 Installing fabric.** The wire fabric shall be firmly attached to the posts and braced as shown on the plans. All wire shall be stretched taut and shall be installed to the required elevations. The fence shall generally follow the contour of the ground, with the bottom of the fence fabric no less than one inch (25 mm) or more than 4 inches (100 mm) from the ground surface. Grading shall be performed where necessary to provide a neat appearance.

At locations of small natural swales or drainage ditches and where it is not practical to have the fence conform to the general contour of the ground surface, longer posts may be used and multiple strands of barbed wire stretched to span the opening below the fence. The vertical clearance between strands of barbed wire shall be 6 inches (150 mm) or less.

**162-3.7 Electrical grounds.** Electrical grounds shall be constructed at 500 feet (150 m) intervals. The ground shall be accomplished with a copper clad rod 8 feet (2.4 m) long and a minimum of 5/8 inches (16 mm) in diameter driven vertically until the top is 6 inches (150 mm) below the ground surface. A No. 6 solid copper conductor shall be clamped to the rod and to the fence in such a manner that each element of the fence is grounded. Installation of ground rods shall not constitute a pay item and shall be considered incidental to fence construction. The Contractor shall comply with FAA-STD-019, Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment, paragraph 4.2.3.8, Lightning Protection for Fences and Gates, when fencing is adjacent to FAA facilities.

**162-3.8 Cleaning up.** The Contractor shall remove from the vicinity of the completed work all tools, buildings, equipment, etc., used during construction. All disturbed areas shall be seeded per T-901.

## METHOD OF MEASUREMENT

**162-4.1** Chain-link fence will be measured for payment by the linear foot (meter). Measurement will be along the top of the fence from center to center of end posts, excluding the length occupied by gate openings. The signs to be mounted on the fence should be incidental to this line item.

**162-4.2** Gates will be measured as complete working units.

**162-4.3** Bollards will be measured as individual complete units.

**162-4.4** Gate operators will be measured as individual complete working units installed.

## BASIS OF PAYMENT

**162-5.1** Payment for chain-link fence will be made at the contract unit price per linear foot (meter).

**162-5.2** Payment for vehicle or pedestrian gates will be made at the contract unit price for each gate including access controls, gate sensors, cameras, foundation for track system including stone aggregate, transitional milling, paving, signs and all components to make the automatic/manual gate function as intended.

**162-5.3** Payment for gate operator installation will be made at the contract unit price for each operator including gate loops and access controls.

**162-5.4** Payment for bollard installation will be made at the contract unit price for each bollard installed including bollard sleeve.

The price shall be full compensation for furnishing all materials, and for all preparation, erection, and installation of these materials, and for all labor equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item F-162-5.1	10' Chain-link Fence with Barbed Wire Installation - Per Linear Foot
Item F-162-5.2	10' Chain-link Fence with Barbed Wire Installation on concrete median barrier - Per Linear Foot
Item F-162-5.3	160' Electric Telescoping Gate Installation - Per Each
Item F-162-5.4	Pedestrian Gate Installation - Per Each
Item F-162-5.5	Gate Operator Installation - Per Each
Item F-162-5.6	6" Bollards - Per Each

## 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 A121	Standard Specification for Metallic-Coated Carbon Steel Barbed Wire
ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A392	Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric
ASTM A491	Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric
ASTM A824	Standard Specification for Metallic-Coated Steel Marcellled Tension Wire for Use with Chain Link Fence
ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM F668	Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and other Organic Polymer Coated Steel Chain-Link Fence Fabric
ASTM F1043	Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework
ASTM F1083	Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
ASTM F1183	Standard Specification for Aluminum Alloy Chain Link Fence Fabric
ASTM F1345	Standard Specification for Zinc 5% Aluminum-Mischmetal Alloy Coated Steel Chain-Link Fence Fabric
ASTM G152	Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
ASTM G153	Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials
ASTM G155	Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials
Federal Specifications (FED SPEC)	
FED SPEC RR-F-191/3 Fencing, Wire and Post, Metal (Chain-Link Fence Posts, Top Rails and Braces)	
FED SPEC RR-F-191/4 Fencing, Wire and Post, Metal (Chain-Link Fence Accessories)	
FAA Standard	
FAA-STD-019	Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment
FAA Orders	
5300.38	AIP Handbook

**END OF ITEM F-162**

## Item T-901 Seeding

### DESCRIPTION

**901-1.1** This item shall consist of soil preparation, fertilizing, liming, and seeding the areas shown on the plans or as directed by the RPR in accordance with these specifications.

### MATERIALS

**901-2.1 Seed.** The species and application rates of grass, legume, and cover-crop seed furnished shall be those stipulated herein. Seed shall conform to the requirements of Federal Specification JJJ-S-181, Federal Specification, Seeds, Agricultural.

Seed shall be furnished separately or in mixtures in standard containers labeled in conformance with the Agricultural Marketing Service (AMS) Seed Act and applicable state seed laws with the seed name, lot number, net weight, percentages of purity and of germination and hard seed, and percentage of maximum weed seed content clearly marked for each kind of seed. The Contractor shall furnish the RPR duplicate signed copies of a statement by the vendor certifying that each lot of seed has been tested by a recognized laboratory for seed testing within six (6) months of date of delivery. This statement shall include: name and address of laboratory, date of test, lot number for each kind of seed, and the results of tests as to name, percentages of purity and of germination, and percentage of weed content for each kind of seed furnished, and, in case of a mixture, the proportions of each kind of seed. Wet, moldy, or otherwise damaged seed will be rejected.

Seeds shall be applied as follows:

#### Seed Properties and Rate of Application

Seed	Minimum Seed Purity (Percent)	Minimum Germination (Percent)	Rate of Application lb/acre
Kentucky Bluegrass ( <i>Poa pratensis</i> ) (Certified Domestic Origin)	98	90	15
Annual Ryegrass ( <i>Lolium</i> species)	98	90	20
Perennial Ryegrass ( <i>Lolium perenne</i> )	98	90	10
Tall Fescue ( <i>Festuca arundinacea</i> ) (Certified Seed Only)	98	90	125
Hard Fescue ( <i>Festuca longifolia</i> )	98	90	85
Chewings Red Fescue ( <i>Festuca rubra commutata</i> )	98	90	23

Seed	Minimum Seed Purity (Percent)	Minimum Germination (Percent)	Rate of Application lb/acre
Red Top (Agrostis alba)	98	90	30

No seeding shall be performed on frozen ground or when the temperature is 32 degrees F. or lower. Seeding shall be performed during the period between March 1 to May 15 and August 1 to October 20 inclusive, unless otherwise approved by the RPR.

Seeding mixtures shall be as follows:

Seed Mixture No. 3: Mowed Areas (Slopes flatter than 4:1)

<u>Seed</u>	<u>Rate of Application (lbs/acre)</u>
1. 85 Percent Tall Fescue	125
2. 10 Percent Kentucky Bluegrass	15
3. 5 Percent Perennial Ryegrass	10
	<hr/> 150 Lbs/ac Total

Supplemental Seed

Annual Ryegrass	20 lb/ac
-----------------	----------

Seed Mixture No. 2: Non-Mowed Areas (Slopes 4:1 or Steeper)

<u>Seed</u>	<u>Rate of Application (lbs/acre)</u>
1. 75 Percent Hard Fescue	85
2. 20 Percent Chewings Red Fescue	23
3. 5 Percent Kentucky Bluegrass	7
	<hr/> 115 Lbs/ac Total

Supplemental Seed

Red Top	30 lbs/ac
---------	-----------

**901-2.2 Lime.** Lime shall be ground limestone containing not less than 85% of total carbonates, and shall be ground to such fineness that 90% will pass through a No. 20 (850 µm) mesh sieve and 50% will pass through a No. 100 (150 µm) mesh sieve. Coarser material will be acceptable, providing the rates of application are increased to provide not less than the minimum quantities and depth specified in the special provisions on the basis of the two sieve requirements above. Dolomitic lime or a high magnesium lime shall contain at least 10% of magnesium oxide. Lime shall be applied at the rate of 5,000 pounds per acre with

prior approval of, or as directed by, the RPR. All liming materials shall conform to the requirements of ASTM C602.

**901-2.3 Fertilizer.** Fertilizer shall be standard commercial fertilizers supplied separately or in mixtures containing the percentages of total nitrogen, available phosphoric acid, and water-soluble potash. They shall be applied at the rate and to the depth specified, and shall meet the requirements of applicable state laws. They shall be furnished in standard containers with name, weight, and guaranteed analysis of contents clearly marked thereon. No cyanamide compounds or hydrated lime shall be permitted in mixed fertilizers.

The fertilizers may be supplied in one of the following forms:

- a. A dry, free-flowing fertilizer suitable for application by a common fertilizer spreader;
- b. A finely-ground fertilizer soluble in water, suitable for application by power sprayers; or
- c. A granular or pellet form suitable for application by blower equipment.

Fertilizer for topsoiled areas shall be 10-22-22 (50% ureaform nitrogen) commercial fertilizer and shall be spread at the rate of 1,000 pounds per acre or as directed by the RPR.

Fertilizer for non-topsoiled areas shall be 38-0-0 ureaform nitrogen commercial fertilizer applied at the rate of 1,000 pounds per acre.

**901-2.4 Soil for repairs.** The soil for fill and topsoiling of areas to be repaired shall be at least of equal quality to that which exists in areas adjacent to the area to be repaired. The soil shall be relatively free from large stones, roots, stumps, or other materials that will interfere with subsequent sowing of seed, compacting, and establishing turf, and shall be approved by the RPR before being placed.

## CONSTRUCTION METHODS

**901-3.1 Advance preparation and cleanup.** After grading of areas has been completed and before applying fertilizer and ground limestone, areas to be seeded shall be raked or otherwise cleared of stones larger than 2 inches (50 mm) in any diameter, sticks, stumps, and other debris that might interfere with sowing of seed, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other causes has occurred after the completion of grading and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage include filling gullies, smoothing irregularities, and repairing other incidental damage.

An area to be seeded shall be considered a satisfactory seedbed without additional treatment if it has recently been thoroughly loosened and worked to a depth of not less than 5 inches (125 mm) as a result of grading operations and, if immediately prior to seeding, the top 3 inches (75 mm) of soil is loose, friable, reasonably free from large clods, rocks, large roots, or other undesirable matter, and if shaped to the required grade.

When the area to be seeded is sparsely sodded, weedy, barren and unworked, or packed and hard, any grass and weeds shall first be cut or otherwise satisfactorily disposed of, and the soil then scarified or otherwise loosened to a depth not less than 5 inches (125 mm). Clods shall be broken and the top 3 inches (75 mm) of soil shall be worked into a satisfactory seedbed by discing, or by use of cultipackers, rollers, drags, harrows, or other appropriate means.

### 901-3.2 Dry application method.

**a. Liming.** Lime shall be applied separately and prior to the application of any fertilizer or seed and only on seedbeds that have previously been prepared as described above. The lime shall then be worked into the top 3 inches (75 mm) of soil after which the seedbed shall again be properly graded and dressed to a smooth finish.

**b. Fertilizing.** Following advance preparations and cleanup fertilizer shall be uniformly spread at the rate that will provide not less than the minimum quantity stated in paragraph 901-2.3.

**c. Seeding.** Grass seed shall be sown at the rate specified in paragraph 901-2.1 immediately after fertilizing. The fertilizer and seed shall be raked within the depth range stated in the special provisions. Seeds of legumes, either alone or in mixtures, shall be inoculated before mixing or sowing, in accordance with the instructions of the manufacturer of the inoculant. When seeding is required at other than the seasons shown on the plans or in the special provisions, a cover crop shall be sown by the same methods required for grass and legume seeding.

**d. Rolling.** After the seed has been properly covered, the seedbed shall be immediately compacted by means of an approved lawn roller, weighing 40 to 65 pounds per foot (60 to 97 kg per meter) of width for clay soil (or any soil having a tendency to pack), and weighing 150 to 200 pounds per foot (223 to 298 kg per meter) of width for sandy or light soils.

### **901-3.3 Wet application method.**

**a. General.** The Contractor may elect to apply seed and fertilizer (and lime, if required) by spraying them on the previously prepared seedbed in the form of an aqueous mixture and by using the methods and equipment described herein. The rates of application shall be as specified in the special provisions.

**b. Spraying equipment.** The spraying equipment shall have a container or water tank equipped with a liquid level gauge calibrated to read in increments not larger than 50 gallons (190 liters) over the entire range of the tank capacity, mounted so as to be visible to the nozzle operator. The container or tank shall also be equipped with a mechanical power-driven agitator capable of keeping all the solids in the mixture in complete suspension at all times until used.

The unit shall also be equipped with a pressure pump capable of delivering 100 gallons (380 liters) per minute at a pressure of 100 lb / sq inches (690 kPa). The pump shall be mounted in a line that will recirculate the mixture through the tank whenever it is not being sprayed from the nozzle. All pump passages and pipe lines shall be capable of providing clearance for 5/8 inch (16 mm) solids. The power unit for the pump and agitator shall have controls mounted so as to be accessible to the nozzle operator. There shall be an indicating pressure gauge connected and mounted immediately at the back of the nozzle.

The nozzle pipe shall be mounted on an elevated supporting stand in such a manner that it can be rotated through 360 degrees horizontally and inclined vertically from at least 20 degrees below to at least 60 degrees above the horizontal. There shall be a quick-acting, three-way control valve connecting the recirculating line to the nozzle pipe and mounted so that the nozzle operator can control and regulate the amount of flow of mixture delivered to the nozzle. At least three different types of nozzles shall be supplied so that mixtures may be properly sprayed over distance varying from 20 to 100 feet (6 to 30 m). One shall be a close-range ribbon nozzle, one a medium-range ribbon nozzle, and one a long-range jet nozzle. For case of removal and cleaning, all nozzles shall be connected to the nozzle pipe by means of quick-release couplings.

In order to reach areas inaccessible to the regular equipment, an extension hose at least 50 feet (15 m) in length shall be provided to which the nozzles may be connected.

**c. Mixtures.** Lime, if required, shall be applied separately, in the quantity specified, prior to the fertilizing and seeding operations. Not more than 220 pounds (100 kg) of lime shall be added to and mixed with each 100 gallons (380 liters) of water. Seed and fertilizer shall be mixed together in the relative proportions specified, but not more than a total of 220 pounds (100 kg) of these combined solids shall be added to and mixed with each 100 gallons (380 liters) of water.

All water used shall be obtained from fresh water sources and shall be free from injurious chemicals and other toxic substances harmful to plant life. The Contractor shall identify to the RPR all sources of water at least two (2) weeks prior to use. The RPR may take samples of the water at the source or from the

tank at any time and have a laboratory test the samples for chemical and saline content. The Contractor shall not use any water from any source that is disapproved by the RPR following such tests.

All mixtures shall be constantly agitated from the time they are mixed until they are finally applied to the seedbed. All such mixtures shall be used within two (2) hours from the time they were mixed or they shall be wasted and disposed of at approved locations.

**d. Spraying.** Lime, if required, shall be sprayed only upon previously prepared seedbeds. After the applied lime mixture has dried, the lime shall be worked into the top 3 inches (75 mm), after which the seedbed shall again be properly graded and dressed to a smooth finish.

Mixtures of seed and fertilizer shall only be sprayed upon previously prepared seedbeds on which the lime, if required, shall already have been worked in. The mixtures shall be applied by means of a high-pressure spray that shall always be directed upward into the air so that the mixtures will fall to the ground like rain in a uniform spray. Nozzles or sprays shall never be directed toward the ground in such a manner as might produce erosion or runoff.

Particular care shall be exercised to ensure that the application is made uniformly and at the prescribed rate and to guard against misses and overlapped areas. Proper predetermined quantities of the mixture in accordance with specifications shall be used to cover specified sections of known area.

Checks on the rate and uniformity of application may be made by observing the degree of wetting of the ground or by distributing test sheets of paper or pans over the area at intervals and observing the quantity of material deposited thereon.

On surfaces that are to be mulched as indicated by the plans or designated by the RPR, seed and fertilizer applied by the spray method need not be raked into the soil or rolled. However, on surfaces on which mulch is not to be used, the raking and rolling operations will be required after the soil has dried.

**901-3.4 Soil Stabilization Matting.** Soil stabilization matting shall be applied in accordance with Item C-102 and the contract drawings. Soil stabilization matting shall be applied within 48 hours after completion of seeding operations.

**901-3.5 Maintenance of seeded areas.** The Contractor shall protect seeded areas against traffic or other use by warning signs or barricades, as approved by the RPR. Surfaces gullied or otherwise damaged following seeding shall be repaired by regrading and reseeding as directed. The Contractor shall mow, water as directed, and otherwise maintain seeded areas in a satisfactory condition until final inspection and acceptance of the work.

When either the dry or wet application method outlined above is used for work done out of season, it will be required that the Contractor establish a good stand of grass of uniform color and density to the satisfaction of the RPR. A grass stand shall be considered adequate when bare spots are one square foot (0.01 sq m) or less, randomly dispersed, and do not exceed 3% of the area seeded.

## METHOD OF MEASUREMENT

**901-4.1** The quantity of seeding to be paid for shall be lump sum of all grass areas disturbed by the contractor, completed and accepted.

## BASIS OF PAYMENT

**901-5.1** Payment shall be made at the contract unit price for a lump sum price thereof, which price and payment shall be full compensation for furnishing and placing all materials, seed, fertilizer, lime, mulch, repairs, labor, equipment, tools, and incidentals necessary to complete the work prescribed in this item.

Payment will be made under:

**Base Bid**

Item T-901-5.1            Seeding - Per Lump Sum

**Add Alternate Bid No. 1**

Item T-901-5.2            Seeding - Per Lump Sum

**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 C602                Standard Specification for Agricultural Liming Materials

Federal Specifications (FED SPEC)

FED SPEC                JJJ-S-181, Federal Specification, Seeds, Agricultural

Advisory Circulars (AC)

AC 150/5200-33           Hazardous Wildlife Attractants on or Near Airports

FAA/United States Department of Agriculture

Wildlife Hazard Management at Airports, A Manual for Airport Personnel

**END OF ITEM T-901**

## Item T-908 Mulching

### DESCRIPTION

**908-1.1** This item shall consist of furnishing, hauling, placing, and securing mulch on surfaces indicated on the plans or designated by the RPR.

### MATERIALS

**908-2.1 Mulch material.** Acceptable mulch shall be the materials listed below or any approved locally available material that is similar to those specified. Mulch shall be free from noxious weeds, mold, and other deleterious materials. Mulch materials, which contain matured seed of species that would volunteer and be detrimental to the proposed overseeding, or to surrounding farm land, will not be acceptable. Straw or other mulch material which is fresh and/or excessively brittle, or which is in such an advanced stage of decomposition as to smother or retard the planted grass, will not be acceptable.

a. Hay. Hay shall be native hay in an air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Hay shall be sterile, containing no fertile seed.

b. Straw. Straw shall be the stalks from threshed plant residue of oats, wheat, barley, rye, or rice from which grain has been removed. Furnish in air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Straw shall contain no fertile seed.

c. Hay mulch containing seed. Hay mulch shall be mature hay containing viable seed of native grasses or other desirable species stated in the special provisions or as approved by the RPR. The hay shall be cut and handled so as to preserve the maximum quantity of viable seed. Hay mulch that cannot be hauled and spread immediately after cutting shall be placed in weather-resistant stacks or baled and stored in a dry location until used.

d. Manufactured mulch. Cellulose-fiber or wood-pulp mulch shall be products commercially available for use in spray applications.

e. Asphalt binder. Asphalt binder material shall conform to the requirements of ASTM D977, Type SS-1 or RS-1.

**908-2.2 Inspection.** The RPR shall be notified of sources and quantities of mulch materials available and the Contractor shall furnish him with representative samples of the materials to be used 30 days before delivery to the project. These samples may be used as standards with the approval of the RPR and any materials brought on the site that do not meet these standards shall be rejected.

### CONSTRUCTION METHODS

**908-3.1 Mulching.** Before spreading mulch, all large clods, stumps, stones, brush, roots, and other foreign material shall be removed from the area to be mulched. Mulch shall be applied immediately after seeding. The spreading of the mulch may be by hand methods, blower, or other mechanical methods, provided a uniform covering is obtained.

Mulch material shall be furnished, hauled, and evenly applied on the area shown on the plans or designated by the RPR. Straw or hay shall be spread over the surface to a uniform thickness at the rate of 2 to 3 tons per acre (1800 - 2700 kg per acre) to provide a loose depth of not less than 1-1/2 inches (38

cm) nor more than 3 inches (75 mm). Other organic material shall be spread at the rate directed by the RPR. Mulch may be blown on the slopes and the use of cutters in the equipment for this purpose will be permitted to the extent that at least 95% of the mulch in place on the slope shall be 6 inches (150 mm) or more in length. When mulches applied by the blowing method are cut, the loose depth in place shall be not less than one inch (25 mm) nor more than 2 inches (50 mm).

**908-3.2 Securing mulch.** The mulch shall be held in place by light discing, a very thin covering of topsoil, pins, stakes, wire mesh, asphalt binder, or other adhesive material approved by the RPR. Where mulches have been secured by either of the asphalt binder methods, it will not be permissible to walk on the slopes after the binder has been applied. When an application of asphalt binder material is used to secure the mulch, the Contractor must take every precaution to guard against damaging or disfiguring structures or property on or adjacent to the areas worked and will be held responsible for any such damage resulting from the operation.

If the “peg and string” method is used, the mulch shall be secured by the use of stakes or wire pins driven into the ground on 5-foot (1.5-m) centers or less. Binder twine shall be strung between adjacent stakes in straight lines and crisscrossed diagonally over the mulch, after which the stakes shall be firmly driven nearly flush to the ground to draw the twine down tight onto the mulch.

**908-3.3 Care and repair.**

a. The Contractor shall care for the mulched areas until final acceptance of the project. Care shall consist of providing protection against traffic or other use by placing warning signs, as approved by the RPR, and erecting any barricades that may be shown on the plans before or immediately after mulching has been completed on the designated areas.

b. The Contractor shall be required to repair or replace any mulch that is defective or becomes damaged until the project is finally accepted. When, in the judgment of the RPR, such defects or damages are the result of poor workmanship or failure to meet the requirements of the specifications, the cost of the necessary repairs or replacement shall be borne by the Contractor.

c. If the “asphalt spray” method is used, all mulched surfaces shall be sprayed with asphalt binder material so that the surface has a uniform appearance. The binder shall be uniformly applied to the mulch at the rate of approximately 8 gallons (32 liters) per 1,000 square feet (100 sq m), or as directed by the RPR, with a minimum of 6 gallons (24 liters) and a maximum of 10 gallons (40 liters) per 1,000 square feet (100 sq m) depending on the type of mulch and the effectiveness of the binder securing it. Asphalt binder material may be sprayed on the mulched slope areas from either the top or the bottom of the slope. An approved spray nozzle shall be used. The nozzle shall be operated at a distance of not less than 4 feet (1.2 m) from the surface of the mulch and uniform distribution of the asphalt material shall be required. A pump or an air compressor of adequate capacity shall be used to ensure uniform distribution of the asphalt material.

d. If the “asphalt mix” method is used, the mulch shall be applied by blowing, and the asphalt binder material shall be sprayed into the mulch as it leaves the blower. The binder shall be uniformly applied to the mulch at the rate of approximately 8 gallons (32 liters) per 1,000 square feet (100 sq m) or as directed by the RPR, with a minimum of 6 gallons (24 liters) and a maximum of 10 gallons (40 liters) per 1,000 square feet (100 sq m) depending on the type of mulch and the effectiveness of the binder securing it.

**METHOD OF MEASUREMENT**

**908-4.1** Mulching shall not be measured and be considered incidental to the cost of seeding.

### **BASIS OF PAYMENT**

**908-5.1** Payment will not be made for mulching. The price of mulching shall be considered incidental to the unit price for seeding.

### **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 D977                      Standard Specification for Emulsified Asphalt

Advisory Circulars (AC)

AC 150/5200-33              Hazardous Wildlife Attractants on or Near Airports

FAA/United States Department of Agriculture

Wildlife Hazard Management at Airports, A Manual for Airport Personnel

**END OF ITEM T-908**

Page Intentionally Blank

## **Item L-108 Underground Power Cable for Airports**

### **DESCRIPTION**

**108-1.1** This item shall consist of furnishing and installing power cables that are direct buried and furnishing and/or installing power cables within conduit or duct banks per these specifications at the locations shown on the plans. It includes excavation and backfill of trench for direct-buried cables only. Also included are the installation of counterpoise wires, ground wires, ground rods and connections, cable splicing, cable marking, cable testing, and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the RPR. This item shall not include the installation of duct banks or conduit, trenching and backfilling for duct banks or conduit, or furnishing or installation of cable for FAA owned/operated facilities.

### **EQUIPMENT AND MATERIALS**

#### **108-2.1 General.**

**a.** Airport lighting equipment and materials covered by advisory circulars (AC) shall be approved under the Airport Lighting Equipment Certification Program per AC 150/5345-53, current version.

**b.** All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the RPR.

**c.** Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

**d.** All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

**e.** The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format. The RPR reserves the right to reject any and all equipment, materials, or procedures that do not meet the system design and the standards and codes, specified in this document.

**f.** All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner. The Contractor shall maintain a minimum insulation

resistance in accordance with paragraph 108-3.10e with isolation transformers connected in new circuits and new segments of existing circuits through the end of the contract warranty period when tested in accordance with AC 150/5340-26, *Maintenance Airport Visual Aid Facilities*, paragraph 5.1.3.1, Insulation Resistance Test.

**108-2.2 Cable.** Underground cable for airfield lighting facilities (runway and taxiway lights and signs) shall conform to the requirements of AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits latest edition. Conductors for use on 6.6 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #8 American wire gauge (AWG), L-824 Type C, 5,000 volts, non-shielded, with ethylene propylene insulation, cross-linked polyethylene insulation. Conductors for use on 20 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #6 AWG, L-824 Type C 5,000 volts, non-shielded, with ethylene propylene insulation, cross-linked polyethylene insulation. L-824 conductors for use on the L-830 secondary of airfield lighting series circuits shall be sized in accordance with the manufacturer's recommendations. All other conductors shall comply with FAA and National Electric Code (NEC) requirements. Conductor sizes noted above shall not apply to leads furnished by manufacturers on airfield lighting transformers and fixtures.

Wire for electrical circuits up to 600 volts shall comply with Specification L-824 and/or Commercial Item Description A-A-59544A and shall be type THWN-2, 75°C for installation in conduit and RHW-2, 75°C for direct burial installations. Conductors for parallel (voltage) circuits shall be type and size and installed in accordance with NFPA-70, National Electrical Code.

Unless noted otherwise, all 600-volt and less non-airfield lighting conductor sizes are based on a 75°C, THWN-2, 600-volt insulation, copper conductors, not more than three single insulated conductors, in raceway, in free air. The conduit/duct sizes are based on the use of THWN-2, 600-volt insulated conductors. The Contractor shall make the necessary increase in conduit/duct sizes for other types of wire insulation. In no case shall the conduit/duct size be reduced. The minimum power circuit wire size shall be #12 AWG.

Conductor sizes may have been adjusted due to voltage drop or other engineering considerations. Equipment provided by the Contractor shall be capable of accepting the quantity and sizes of conductors shown in the Contract Documents. All conductors, pigtails, cable step-down adapters, cable step-up adapters, terminal blocks and splicing materials necessary to complete the cable termination/splice shall be considered incidental to the respective pay items provided.

Cable type, size, number of conductors, strand and service voltage shall be as specified in the Contract Document.

**108-2.3 Bare copper wire (counterpoise, bare copper wire ground and ground rods).** Wire for counterpoise or ground installations for airfield lighting systems shall be No. 6 AWG bare solid copper wire for counterpoise and/or No. 6 AWG insulated stranded for grounding bond wire per ASTM B3 and ASTM B8, and shall be bare copper wire. For voltage powered circuits, the equipment grounding conductor shall comply with NEC Article 250.

Ground rods shall be copper-clad. The ground rods shall be of the length and diameter specified on the plans, but in no case be less than 8 feet (2.4 m) long and 3/4 inch (19 mm) in diameter.

**108-2.4 Cable connections.** In-line connections or splices of underground primary cables shall be of the type called for on the plans, and shall be one of the types listed below. No separate payment will be made for cable connections.

**a. The cast splice.** A cast splice, employing a plastic mold and using epoxy resin equivalent to that manufactured by 3M™ Company, "Scotchcast" Kit No. 82-B, or an approved equivalent, used for potting the splice is acceptable.

**b. The field-attached plug-in splice.** Field attached plug-in splices shall be installed as shown on the plans. The Contractor shall determine the outside diameter of the cable to be spliced and furnish appropriately sized connector kits and/or adapters. Tape or heat shrink tubing with integral sealant shall be in accordance with the manufacturer's requirements. Primary Connector Kits manufactured by Amerace, "Super Kit", Integro "Complete Kit", or approved equal is acceptable.

**c. The factory-molded plug-in splice.** Specification for L-823 Connectors, Factory-Molded to Individual Conductors, is acceptable.

**d. The taped or heat-shrink splice.** Taped splices employing field-applied rubber, or synthetic rubber tape covered with plastic tape is acceptable. The rubber tape should meet the requirements of ASTM D4388 and the plastic tape should comply with Military Specification MIL-I-24391 or Commercial Item Description A-A-55809. Heat shrinkable tubing shall be heavy-wall, self-sealing tubing rated for the voltage of the wire being spliced and suitable for direct-buried installations. The tubing shall be factory coated with a thermoplastic adhesive-sealant that will adhere to the insulation of the wire being spliced forming a moisture- and dirt-proof seal. Additionally, heat shrinkable tubing for multi-conductor cables, shielded cables, and armored cables shall be factory kits that are designed for the application. Heat shrinkable tubing and tubing kits shall be manufactured by Tyco Electronics/ Raychem Corporation, Energy Division, or approved equivalent.

In all the above cases, connections of cable conductors shall be made using crimp connectors using a crimping tool designed to make a complete crimp before the tool can be removed. All L-823/L-824 splices and terminations shall be made per the manufacturer's recommendations and listings.

All connections of counterpoise, grounding conductors and ground rods shall be made by the exothermic process or approved equivalent, except that a light base ground clamp connector shall be used for attachment to the light base. All exothermic connections shall be made per the manufacturer's recommendations and listings.

**108-2.5 Splicer qualifications.** Every airfield lighting cable splicer shall be qualified in making airport cable splices and terminations on cables rated at or above 5,000 volts AC. The Contractor shall submit to the RPR proof of the qualifications of each proposed cable splicer for the airport cable type and voltage level to be worked on. Cable splicing/terminating personnel shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable.

**108-2.6 Concrete.** Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

**108-2.7 Flowable backfill.** Flowable material used to backfill trenches for power cable trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

**108-2.8 Cable identification tags.** Cable identification tags shall be made from a non-corrosive material with the circuit identification stamped or etched onto the tag. The tags shall be of the type as detailed on the plans.

**108-2.9 Tape.** Electrical tapes shall be Scotch™ Electrical Tapes –Scotch™ 88 (1-1/2 inch (38 mm) wide) and Scotch™ 130C® linerless rubber splicing tape (2-inch (50 mm) wide), as manufactured by the Minnesota Mining and Manufacturing Company (3M™), or an approved equivalent.

**108-2.10 Electrical coating.** Electrical coating shall be Scotchkote™ as manufactured by 3M™, or an approved equivalent.

**108-2.11 Existing circuits.** Whenever the scope of work requires connection to an existing circuit, the existing circuit's insulation resistance shall be tested, in the presence of the RPR. The test shall be performed per this item and prior to any activity that will affect the respective circuit. The Contractor shall record the results on forms acceptable to the RPR. When the work affecting the circuit is complete, the circuit's insulation resistance shall be checked again, in the presence of the RPR. The Contractor shall

record the results on forms acceptable to the RPR. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the existing circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

**108-2.12 Detectable warning tape.** Plastic, detectable, American Public Works Association (APWA) Red (electrical power lines, cables, conduit and lighting cable) with continuous legend tape shall be polyethylene film with a metalized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item. Detectable warning tape for communication cables shall be orange. Detectable warning tape color code shall comply with the APWA Uniform Color Code.

## CONSTRUCTION METHODS

**108-3.1 General.** The Contractor shall install the specified cable at the approximate locations indicated on the plans. Unless otherwise shown on the plans, all cable required to cross under pavements expected to carry aircraft loads shall be installed in concrete encased duct banks. Cable shall be run without splices, from fixture to fixture.

Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isolation transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable runs without connections unless otherwise authorized in writing by the RPR or shown on the plans.

In addition to connectors being installed at individual isolation transformers, L-823 cable connectors for maintenance and test points shall be installed at locations shown on the plans. Cable circuit identification markers shall be installed on both sides of the L-823 connectors installed and on both sides of slack loops where a future connector would be installed.

Provide not less than 3 feet (1 m) of cable slack on each side of all connections, isolation transformers, light units, and at points where cable is connected to field equipment. Where provisions must be made for testing or for future above grade connections, provide enough slack to allow the cable to be extended at least one foot (30 cm) vertically above the top of the access structure. This requirement also applies where primary cable passes through empty light bases, junction boxes, and access structures to allow for future connections, or as designated by the RPR.

Primary airfield lighting cables installed shall have cable circuit identification markers attached on both sides of each L-823 connector and on each airport lighting cable entering or leaving cable access points, such as manholes, hand holes, pull boxes, junction boxes, etc. Markers shall be of sufficient length for imprinting the cable circuit identification legend on one line, using letters not less than 1/4 inch (6 mm) in size. The cable circuit identification shall match the circuits noted on the construction plans.

**108-3.2 Installation in duct banks or conduits.** This item includes the installation of the cable in duct banks or conduit per the following paragraphs. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the current-carrying capacity of each cable shall be per the latest version of the National Electric Code, or the code of the local agency or authority having jurisdiction.

The Contractor shall make no connections or splices of any kind in cables installed in conduits or duct banks.

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and that any potential interference is avoided.

Duct banks or conduits shall be installed as a separate item per Item L-110, Airport Underground Electrical Duct Banks and Conduit. The Contractor shall run a mandrel through duct banks or conduit prior to installation of cable to ensure that the duct bank or conduit is open, continuous and clear of debris. The mandrel size shall be compatible with the conduit size. The Contractor shall swab out all conduits/ducts and clean light bases, manholes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed, the light bases and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, light bases, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be re-cleaned at the Contractor's expense. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

The cable shall be installed in a manner that prevents harmful stretching of the conductor, damage to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape providing moisture-tight mechanical protection with minimum bulk, or alternately, heat shrinkable tubing before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a conduit, all cable shall be pulled in the conduit at the same time. The pulling of a cable through duct banks or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall not exceed the cable manufacturer's recommendations. A non-hardening cable-pulling lubricant recommended for the type of cable being installed shall be used where required.

The Contractor shall submit the recommended pulling tension values to the RPR prior to any cable installation. If required by the RPR, pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the RPR. Cable pull tensions shall be recorded by the Contractor and reviewed by the RPR. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

The manufacturer's minimum bend radius or NEC requirements (whichever is more restrictive) shall apply. Cable installation, handling and storage shall be per manufacturer's recommendations. During cold weather, particular attention shall be paid to the manufacturer's minimum installation temperature. Cable shall not be installed when the temperature is at or below the manufacturer's minimum installation temperature. At the Contractor's option, the Contractor may submit a plan, for review by the RPR, for heated storage of the cable and maintenance of an acceptable cable temperature during installation when temperatures are below the manufacturer's minimum cable installation temperature.

Cable shall not be dragged across base can or manhole edges, pavement or earth. When cable must be coiled, lay cable out on a canvas tarp or use other appropriate means to prevent abrasion to the cable jacket.

**108-3.3 Installation of direct-buried cable in trenches.** Unless otherwise specified, the Contractor shall not use a cable plow for installing the cable. Cable shall be unreeled uniformly in place alongside or in the trench and shall be carefully placed along the bottom of the trench. The cable shall not be unreeled and pulled into the trench from one end. Slack cable sufficient to provide strain relief shall be placed in the trench in a series of S curves. Sharp bends or kinks in the cable shall not be permitted.

Where cables must cross over each other, a minimum of 3 inches (75 mm) vertical displacement shall be provided with the topmost cable depth at or below the minimum required depth below finished grade.

**a. Trenching.** Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored. Trenches for cables may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of surface is disturbed. Graders shall not be used to excavate the trench with their blades. The bottom surface of trenches shall be essentially smooth and free from coarse aggregate. Unless otherwise specified, cable

trenches shall be excavated to a minimum depth of 18 inches (0.5 m) below finished grade per NEC Table 300.5, except as follows:

- When off the airport or crossing under a roadway or driveway, the minimum depth shall be 36 inches (91 cm) unless otherwise specified.
- Minimum cable depth when crossing under a railroad track, shall be 42 inches (1 m) unless otherwise specified.

The Contractor shall excavate all cable trenches to a width not less than 6 inches (150 mm). Unless otherwise specified on the plans, all cables in the same location and running in the same general direction shall be installed in the same trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required cable depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill material may alternatively be used.

Duct bank or conduit markers temporarily removed for trench excavations shall be replaced as required.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

(1) Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred.

(2) Trenching, etc., in cable areas shall then proceed, with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair or replacement.

**b. Backfilling.** After the cable has been installed, the trench shall be backfilled. The first layer of backfill in the trench shall encompass all cables ; be 3 inches (75 mm) deep, loose measurement; and shall be either earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. This layer shall not be compacted. The second layer shall be 5 inches (125 mm) deep, loose measurement, and shall contain no particles that would be retained on a one inch (25.0 mm) sieve. The remaining third and subsequent layers of backfill shall not exceed 8 inches (20 cm) of loose measurement and be excavated or imported material and shall not contain stone or aggregate larger than 4 inches (100 mm) maximum diameter.

The second and subsequent layers shall be thoroughly tamped and compacted to at least the density of the adjacent material. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be to a minimum of 100 percent of ASTM D1557.

Trenches shall not contain pools of water during backfilling operations. The trench shall be completely backfilled and tamped level with the adjacent surface, except that when turf is to be established over the trench, the backfilling shall be stopped at an appropriate depth consistent with the type of turfing operation to be accommodated. A proper allowance for settlement shall also be provided. Any excess excavated material shall be removed and disposed of per the plans and specifications.

Underground electrical warning (caution) tape shall be installed in the trench above all direct-buried cable. Contractor shall submit a sample of the proposed warning tape for acceptance by the RPR. If not

shown on the plans, the warning tape shall be located 6 inches (150 mm) above the direct-buried cable or the counterpoise wire if present. A 3-6 inch (75 - 150 mm) wide polyethylene film detectable tape, with a metalized foil core, shall be installed above all direct buried cable or counterpoise. The tape shall be of the color and have a continuous legend as indicated on the plans. The tape shall be installed 8 inches (200 mm) minimum below finished grade.

**c. Restoration.** Following restoration of all trenching near airport movement surfaces, the Contractor shall visually inspect the area for foreign object debris (FOD) and remove any that is found. Where soil and sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by work shall be restored to its original condition. The restoration shall include the seeding and mulching as shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. When trenching is through paved areas, restoration shall be equal to existing conditions. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be to a minimum of 100 percent of ASTM D1557. Restoration shall be considered incidental to the pay item of which it is a component part.

**108-3.4 Cable markers for direct-buried cable.** The location of direct buried circuits shall be marked by a concrete slab marker, 2 feet (60 cm) square and 4-6 inch (10 - 15 cm) thick, extending approximately one inch (25 mm) above the surface. Each cable run from a line of lights and signs to the equipment vault shall be marked at approximately every 200 feet (61 m) along the cable run, with an additional marker at each change of direction of cable run. All other direct-buried cable shall be marked in the same manner. Cable markers shall be installed directly above the cable. The Contractor shall impress the word "CABLE" and directional arrows on each cable marking slab. The letters shall be approximately 4 inches (100 mm) high and 3 inches (75 mm) wide, with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep. Stencils shall be used for cable marker lettering; no hand lettering shall be permitted.

At the location of each underground cable connection/splice, except at lighting units, or isolation transformers, a concrete marker slab shall be installed to mark the location of the connection/splice. The Contractor shall impress the word "SPLICE" on each slab. The Contractor also shall impress additional circuit identification symbols on each slab as directed by the RPR. All cable markers and splice markers shall be painted international orange. Paint shall be specifically manufactured for uncured exterior concrete. After placement, all cable or splice markers shall be given one coat of high-visibility aviation orange paint as approved by the RPR. Furnishing and installation of cable markers is incidental to the respective cable pay item.

**108-3.5 Splicing.** Connections of the type shown on the plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

**a. Cast splices.** These shall be made by using crimp connectors for jointing conductors. Molds shall be assembled, and the compound shall be mixed and poured per the manufacturer's instructions and to the satisfaction of the RPR.

**b. Field-attached plug-in splices.** These shall be assembled per the manufacturer's instructions. These splices shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint or (3) On connector kits equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

**c. Factory-molded plug-in splices.** These shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) Wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half

lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint. (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint. or (3) On connector kits so equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

**d. Taped or heat-shrink splices.** A taped splice shall be made in the following manner:

Bring the cables to their final position and cut so that the conductors will butt. Remove insulation and jacket allowing for bare conductor of proper length to fit compression sleeve connector with 1/4 inch (6 mm) of bare conductor on each side of the connector. Prior to splicing, the two ends of the cable insulation shall be penciled using a tool designed specifically for this purpose and for cable size and type. Do not use emery paper on splicing operation since it contains metallic particles. The copper conductors shall be thoroughly cleaned. Join the conductors by inserting them equidistant into the compression connection sleeve. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Test the crimped connection by pulling on the cable. Scrape the insulation to assure that the entire surface over which the tape will be applied (plus 3 inches (75 mm) on each end) is clean. After scraping, wipe the entire area with a clean lint-free cloth. Do not use solvents.

Apply high-voltage rubber tape one-half lapped over bare conductor. This tape should be tensioned as recommended by the manufacturer. Voids in the connector area may be eliminated by highly elongating the tape, stretching it just short of its breaking point. The manufacturer's recommendation for stretching tape during splicing shall be followed. Always attempt to exactly half-lap to produce a uniform buildup. Continue buildup to 1-1/2 times cable diameter over the body of the splice with ends tapered a distance of approximately one inch (25 mm) over the original jacket. Cover rubber tape with two layers of vinyl pressure-sensitive tape one-half lapped. Do not use glyptol or lacquer over vinyl tape as they react as solvents to the tape. No further cable covering or splice boxes are required.

Heat shrinkable tubing shall be installed following manufacturer's instructions. Direct flame heating shall not be permitted unless recommended by the manufacturer. Cable surfaces within the limits of the heat-shrink application shall be clean and free of contaminants prior to application.

**e. Assembly.** Surfaces of equipment or conductors being terminated or connected shall be prepared in accordance with industry standard practice and manufacturer's recommendations. All surfaces to be connected shall be thoroughly cleaned to remove all dirt, grease, oxides, nonconductive films, or other foreign material. Paints and other nonconductive coatings shall be removed to expose base metal. Clean all surfaces at least 1/4 inch (6.4 mm) beyond all sides of the larger bonded area on all mating surfaces. Use a joint compound suitable for the materials used in the connection. Repair painted/coated surface to original condition after completing the connection.

**108-3.6 Bare counterpoise wire installation for lightning protection and grounding.** If shown on the plans or included in the job specifications, bare solid #6 AWG copper counterpoise wire shall be installed for lightning protection of the underground cables. The RPR shall select one of two methods of lightning protection for the airfield lighting circuit based upon sound engineering practice and lightning strike density.

**a. Equipotential.** The counterpoise size is as shown on the plans. The equipotential method is applicable to all airfield lighting systems; i.e. runway, taxiway, apron – touchdown zone, centerline, edge, threshold and approach lighting systems. The equipotential method is also successfully applied to provide lightning protection for power, signal and communication systems. The light bases, counterpoise, etc – all components - are bonded together and bonded to the vault power system ground loop/electrode.

Counterpoise wire shall be installed in the same trench for the entire length of buried cable, conduits and duct banks that are installed to contain airfield cables. The counterpoise is centered over the cable/conduit/duct to be protected.

The counterpoise conductor shall be installed no less than 8 inches (200 mm) minimum or 12 inches (300 mm) maximum above the raceway or cable to be protected, except as permitted below:

(1) The minimum counterpoise conductor height above the raceway or cable to be protected shall be permitted to be adjusted subject to coordination with the airfield lighting and pavement designs.

(2) The counterpoise conductor height above the protected raceway(s) or cable(s) shall be calculated to ensure that the raceway or cable is within a 45-degree area of protection, (45 degrees on each side of vertical creating a 90 degree angle).

The counterpoise conductor shall be bonded to each metallic light base, mounting stake, and metallic airfield lighting component.

All metallic airfield lighting components in the field circuit on the output side of the constant current regulator (CCR) or other power source shall be bonded to the airfield lighting counterpoise system.

All components rise and fall at the same potential; with no potential difference, no damaging arcing and no damaging current flow.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Equipotential Method of lightning protection.

Reference FAA STD-019E, Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment, Part 4.1.1.7.][not used]

**b. Isolation.** Counterpoise size is as shown on the plans. The isolation method is an alternate method for use only with edge lights installed in turf and stabilized soils and raceways installed parallel to and adjacent to the edge of the pavement. NFPA 780 uses 15 feet to define “adjacent to”.

The counterpoise conductor shall be installed halfway between the pavement edge and the light base, mounting stake, raceway, or cable being protected.

The counterpoise conductor shall be installed 8 inches (203 mm) minimum below grade. The counterpoise is not connected to the light base or mounting stake. An additional grounding electrode is required at each light base or mounting stake. The grounding electrode is bonded to the light base or mounting stake with a 6 AWG solid copper conductor.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Isolation Method of lightning protection.

**c. Common Installation requirements.** When a metallic light base is used, the grounding electrode shall be bonded to the metallic light base or mounting stake with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

When a nonmetallic light base is used, the grounding electrode shall be bonded to the metallic light fixture or metallic base plate with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

Grounding electrodes may be rods, ground dissipation plates, radials, or other electrodes listed in the NFPA 70 (NEC) or NFPA 780.

Where raceway is installed by the directional bore, jack and bore, or other drilling method, the counterpoise conductor shall be permitted to be installed concurrently with the directional bore, jack and bore, or other drilling method raceway, external to the raceway or sleeve.

The counterpoise wire shall also be exothermically welded to ground rods installed as shown on the plans but not more than 500 feet (150 m) apart around the entire circuit. The counterpoise system shall be continuous and terminate at the transformer vault or at the power source. It shall be securely attached to

the vault or equipment external ground ring or other made electrode-grounding system. The connections shall be made as shown on the plans and in the specifications.

Where an existing airfield lighting system is being extended or modified, the new counterpoise conductors shall be interconnected to existing counterpoise conductors at each intersection of the new and existing airfield lighting counterpoise systems.

**d. Parallel Voltage Systems.** Provide grounding and bonding in accordance with NFPA 70, National Electrical Code.

**108-3.7 Counterpoise installation above multiple conduits and duct banks.** Counterpoise wires shall be installed above multiple conduits/duct banks for airfield lighting cables, with the intent being to provide a complete area of protection over the airfield lighting cables. When multiple conduits and/or duct banks for airfield cable are installed in the same trench, the number and location of counterpoise wires above the conduits shall be adequate to provide a complete area of protection measured 45 degrees each side of vertical.

Where duct banks pass under pavement to be constructed in the project, the counterpoise shall be placed above the duct bank. Reference details on the construction plans.

**108-3.8 Counterpoise installation at existing duct banks.** When airfield lighting cables are indicated on the plans to be routed through existing duct banks, the new counterpoise wiring shall be terminated at ground rods at each end of the existing duct bank where the cables being protected enter and exit the duct bank. The new counterpoise conductor shall be bonded to the existing counterpoise system.

**108-3.9 Exothermic bonding.** Bonding of counterpoise wire shall be by the exothermic welding process or equivalent method accepted by the RPR. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the RPR, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer's recommendations and the following:

**a.** All slag shall be removed from welds.

**b.** Using an exothermic weld to bond the counterpoise to a lug on a galvanized light base is not recommended unless the base has been specially modified. Consult the manufacturer's installation directions for proper methods of bonding copper wire to the light base. See AC 150/5340-30 for galvanized light base exception.

**c.** If called for in the plans, all buried copper and weld material at weld connections shall be thoroughly coated with 6 mm of 3M™ Scotchkote™, or approved equivalent, or coated with coal tar Bitumastic® material to prevent surface exposure to corrosive soil or moisture.

**108-3.10 Testing.** The Contractor shall furnish all necessary equipment and appliances for testing the airport electrical systems and underground cable circuits before and after installation. The Contractor shall perform all tests in the presence of the RPR. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the RPR. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase. The Contractor must maintain the test results throughout the entire project as well as during the warranty period that meet the following:

**a.** Earth resistance testing methods shall be submitted to the RPR for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the RPR. All such testing shall be at the sole expense of the Contractor.

**b.** Should the counterpoise or ground grid conductors be damaged or suspected of being damaged by construction activities the Contractor shall test the conductors for continuity with a low resistance ohmmeter. The conductors shall be isolated such that no parallel path exists and tested for continuity. The

RPR shall approve of the test method selected. All such testing shall be at the sole expense of the Contractor.

After installation, the Contractor shall test and demonstrate to the satisfaction of the RPR the following:

- c. That all affected lighting power and control circuits (existing and new) are continuous and free from short circuits.
- d. That all affected circuits (existing and new) are free from unspecified grounds.
- e. That the insulation resistance to ground of all new non-grounded high voltage series circuits or cable segments is not less than 100 megohms. Verify continuity of all series airfield lighting circuits prior to energization.
- f. That the insulation resistance to ground of all new non-grounded conductors of new multiple circuits or circuit segments is not less than 25 megohms.
- g. That all affected circuits (existing and new) are properly connected per applicable wiring diagrams.
- h. That all affected circuits (existing and new) are operable. Tests shall be conducted that include operating each control not less than 10 times and the continuous operation of each lighting and power circuit for not less than 1/2 hour.
- i. That the impedance to ground of each ground rod does not exceed 25 ohms prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81, to verify this requirement. As an alternate, clamp-on style ground impedance test meters may be used to satisfy the impedance testing requirement. Test equipment and its calibration sheets shall be submitted for review and approval by the RPR prior to performing the testing.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the RPR. Where connecting new cable to existing cable, insulation resistance tests shall be performed on the new cable prior to connection to the existing circuit.

There are no approved “repair” procedures for items that have failed testing other than complete replacement.

### **METHOD OF MEASUREMENT**

**108-4.1** The cost of all excavation, backfill, dewatering and restoration regardless of the type of material encountered shall be included in the unit price bid for the work.

**108-4.2** Cable or counterpoise wire installed in trench, duct bank or conduit shall be measured by the number of linear feet (meters) installed and grounding connectors, and trench marking tape ready for operation, and accepted as satisfactory. Separate measurement shall be made for each cable or counterpoise wire installed in trench, duct bank or conduit. The measurement for this item shall not include additional quantities required for slack.

**108-4.3** No separate payment will be made for ground rods.

### **BASIS OF PAYMENT**

**108-5.1** Payment will be made at the contract unit price for trenching, cable and bare counterpoise wire and all ground rods installed in trench (direct-buried), or cable and equipment ground installed in duct bank or conduit, in place by the Contractor and accepted by the RPR. This price shall be full

compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals, including ground rods and ground connectors and trench marking tape, necessary to complete this item.

Payment will be made under:

**Base Bid**

Item L-108-5.1 Fiber Optic Cable In 2" Conduit, Installed Complete In Place Through Turf – Per Linear Foot

Item L-108-5.2 Fiber Optic Cable In 2" Conduit, Installed Complete In Place Through Pavement – Per Linear Foot

Item L-108-5.3 Fiber Optic Cable In Existing 2" Conduit, Installed Complete In Place Mounted on Fence or Underground– Per Linear Foot

Item L-108-5.4 Fiber Optic Cable In Proposed 2" Conduit, Installed Complete In Place Mounted on Fence – Per Linear Foot

Item L-108-5.5 Electric Cable In 4" Conduit, Installed Complete In Place Through Turf – Per Linear Foot

Item L-108-5.6 Electric Cable In 2" Conduit, Installed Complete In Place Through Pavement – Per Linear Foot

Item L-108-5.7 Reconnect/Repair Existing Conduit Mounted on Fence for Fiber Optic Cable Installation (Includes Existing Cable Removal) – Per Allowance

**Add Alternate Bid No. 1**

Item L-108-5.8 Deduct Fiber Optic Cable in Existing 2" Conduit, Installed Complete in Place Mounted on Fence or Underground – Per Linear Foot

Item L-108-5.9 Deduct Fiber Optic Cable in Proposed 2" Conduit, Installed Complete in Place Mounted on Fence – Per Linear Foot

Item L-108-5.10 Deduct Fiber Optic Cable in 2" Conduit, Installed Complete in Place Through Turf – Per Linear Foot

**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.

**Advisory Circulars (AC)**

AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-53	Airport Lighting Equipment Certification Program

**Commercial Item Description**

A-A-59544A	Cable and Wire, Electrical (Power, Fixed Installation)
------------	--

A-A-55809	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic
ASTM International (ASTM)	
ASTM B3	Standard Specification for Soft or Annealed Copper Wire
ASTM B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B33	Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes
ASTM D4388	Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes
Mil Spec	
MIL-PRF-23586F	Performance Specification: Sealing Compound (with Accelerator), Silicone Rubber, Electrical
MIL-I-24391	Insulation Tape, Electrical, Plastic, Pressure Sensitive
National Fire Protection Association (NFPA)	
NFPA-70	National Electrical Code (NEC)
NFPA-780	Standard for the Installation of Lightning Protection Systems
American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)	
ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
Federal Aviation Administration Standard	
FAA STD-019E	Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment

**END OF ITEM L-108**

**PAGE INTENTIONALLY LEFT BLANK.**

## **Item L-110 Airport Underground Electrical Duct Banks and Conduits**

### **DESCRIPTION**

**110-1.1** This item shall consist of underground electrical conduits and duct banks (single or multiple conduits encased in concrete or buried in sand) installed per this specification at the locations and per the dimensions, designs, and details shown on the plans. This item shall include furnishing and installing of all underground electrical duct banks and individual and multiple underground conduits. It shall also include all turfing trenching, backfilling, removal, and restoration of any paved or turfed areas; concrete encasement, mandrelling, pulling lines, duct markers, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables per the plans and specifications. This item shall also include furnishing and installing conduits and all incidentals for providing positive drainage of the system. Verification of existing ducts is incidental to the pay items provided in this specification.

### **EQUIPMENT AND MATERIALS**

#### **110-2.1 General.**

**a.** All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

**b.** Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications and acceptable to the RPR. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the RPR and replaced with materials, that comply with these specifications, at the Contractor's cost.

**c.** All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in project that accrue directly or indirectly from late submissions or resubmissions of submittals.

**d.** The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes specified in this document.

**e.** All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

**110-2.2 Steel conduit.** Rigid galvanized steel (RGS) conduit and fittings shall be hot dipped galvanized inside and out and conform to the requirements of Underwriters Laboratories Standards 6, 514B, and 1242. All RGS conduits or RGS elbows installed below grade, in concrete, permanently wet locations or other similar environments shall be painted with a 10-mil thick coat of asphaltum sealer or shall have a factory-bonded polyvinyl chloride (PVC) cover. Any exposed galvanizing or steel shall be coated with 10 mils of asphaltum sealer. When using PVC coated RGS conduit, care shall be exercised not to damage the factory PVC coating. Damaged PVC coating shall be repaired per the manufacturer's written instructions. In lieu of PVC coated RGS, corrosion wrap tape shall be permitted to be used where RGS is in contact with direct earth."

**110-2.3 Plastic conduit.** Plastic conduit and fittings shall conform to the following requirements:

- UL 514B covers W-C-1094-Conduit fittings all types, classes 1 thru 3 and 6 thru 10.
- UL 514C covers W-C-1094- all types, Class 5 junction box and cover in plastic (PVC).
- UL 651 covers W-C-1094-Rigid PVC Conduit, types I and II, Class 4.
- UL 651A covers W-C-1094-Rigid PVC Conduit and high-density polyethylene (HDPE) Conduit type III and Class 4.

Underwriters Laboratories Standards UL-651 and Article 352 of the current National Electrical Code shall be one of the following, as shown on the plans:

- a. Type I–Schedule 40 and Schedule 80 PVC suitable for underground use either direct-buried or encased in concrete.
- b. Type II–Schedule 40 PVC suitable for either above ground or underground use.
- c. Type III – Schedule 80 PVC suitable for either above ground or underground use either direct-buried or encased in concrete.
- d. Type III –HDPE pipe, minimum standard dimensional ratio (SDR) 11, suitable for placement with directional boring under pavement.

The type of solvent cement shall be as recommended by the conduit/fitting manufacturer.

**110-2.4 Split conduit.** Split conduit shall be pre-manufactured for the intended purpose and shall be made of steel or plastic.

**110-2.5 Conduit spacers.** Conduit spacers shall be prefabricated interlocking units manufactured for the intended purpose. They shall be of double wall construction made of high grade, high density polyethylene complete with interlocking cap and base pads. They shall be designed to accept No. 4 reinforcing bars installed vertically.

**110-2.6 Concrete.** Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

**110-2.7 Precast concrete structures.** Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another RPR approved third party certification program. Precast concrete structures shall conform to ASTM C478.

**110-2.8 Flowable backfill.** Flowable material used to back fill conduit and duct bank trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

**110-2.9 Detectable warning tape.** Plastic, detectable, American Public Works Association (APWA) red (electrical power lines, cables, conduit and lighting cable), orange (telephone/fiber optic cabling) with continuous legend magnetic tape shall be polyethylene film with a metallized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item.

## CONSTRUCTION METHODS

**110-3.1 General.** The Contractor shall install underground duct banks and conduits at the approximate locations indicated on the plans. The RPR shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2 inches (50 mm) inside diameter or comply with the National Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be laid so as to grade toward access points and duct or conduit ends for drainage. Unless shown otherwise on the plans, grades shall be at least 3 inches (75 mm) per 100 feet (30 m). On runs where it is not practicable to maintain the grade all one way, the duct bank and conduit lines shall be graded from the center in both directions toward access points or conduit ends, with a drain into the storm drainage system. Pockets or traps where moisture may accumulate shall be avoided. Under pavement, the top of the duct bank shall not be less than 18 inches (0.5 m) below the subgrade; in other locations, the top of the duct bank or underground conduit shall be not less than 18 inches (0.5 m) below finished grade.

The Contractor shall mandrel each individual conduit whether the conduit is direct-buried or part of a duct bank. An iron-shod mandrel, not more than 1/4 inch (6 mm) smaller than the bore of the conduit shall be pulled or pushed through each conduit. The mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.

The Contractor shall swab out all conduits/ducts and clean base can, manhole, pull boxes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed the light bases, manholes, pull boxes, etc., and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be recleaned at the Contractor's expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

For pulling the permanent wiring, each individual conduit, whether the conduit is direct-buried or part of a duct bank, shall be provided with a 200-pound (90 kg) test polypropylene pull rope. The ends shall be secured and sufficient length shall be left in access points to prevent it from slipping back into the conduit. Where spare conduits are installed, as indicated on the plans, the open ends shall be plugged with removable tapered plugs, designed for this purpose.

All conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminants from entering the conduits. Any conduit section having a defective joint shall not be installed. Ducts shall be supported and spaced apart using approved spacers at intervals not to exceed 5 feet (1.5 m).

Unless otherwise shown on the plans, concrete encased duct banks shall be used when crossing under pavements expected to carry aircraft loads, such as runways, taxiways, taxilanes, ramps and aprons. When under paved shoulders and other paved areas, conduit and duct banks shall be encased using flowable fill for protection.

All conduits within concrete encasement of the duct banks shall terminate with female ends for ease in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

Trenches for conduits and duct banks may be excavated manually or with mechanical trenching equipment unless in pavement, in which case they shall be excavated with mechanical trenching

equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of graders shall not be used to excavate the trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required conduit or duct bank depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill may alternatively be used

Underground electrical warning (Caution) tape shall be installed in the trench above all underground duct banks and conduits in unpaved areas. Contractor shall submit a sample of the proposed warning tape for approval by the RPR. If not shown on the plans, the warning tape shall be located 6 inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared per the manufacturer's recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2 feet (60 cm).

Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using manufactured sweep bends.

Whether or not specifically indicated on the drawings, where the soil encountered at established duct bank grade is an unsuitable material, as determined by the RPR, the unsuitable material shall be removed per Item P-152 and replaced with suitable material. Additional duct bank supports shall be installed, as approved by the RPR.

All excavation shall be unclassified and shall be considered incidental to Item L-110. Dewatering necessary for duct installation, and erosion per federal, state, and local requirements is incidental to Item L-110.

Unless otherwise specified, excavated materials that are deemed by the RPR to be unsuitable for use in backfill or embankments shall be removed and disposed of offsite.

Any excess excavation shall be filled with suitable material approved by the RPR and compacted per Item P-152.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

**a.** Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred

**b.** Trenching, etc., in cable areas shall then proceed with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair.

**110-3.2 Duct banks.** Unless otherwise shown in the plans, duct banks shall be installed so that the top of the concrete envelope is not less than 18 inches (0.5 m) below the bottom of the base or stabilized base course layers where installed under runways, taxiways, aprons, or other paved areas, and not less than 18 inches (0.5 m) below finished grade where installed in unpaved areas.

Unless otherwise shown on the plans, duct banks under paved areas shall extend at least 3 feet (1 m) beyond the edges of the pavement or 3 feet (1 m) beyond any under drains that may be installed alongside the paved area. Trenches for duct banks shall be opened the complete length before concrete is placed so that if any obstructions are encountered, provisions can be made to avoid them. Unless otherwise shown on the plans, all duct banks shall be placed on a layer of concrete not less than 3 inches (75 mm) thick prior to its initial set. The Contractor shall space the conduits not less than 3 inches (75 mm) apart (measured from outside wall to outside wall). All such multiple conduits shall be placed using conduit spacers applicable to the type of conduit. As the conduit laying progresses, concrete shall be placed around and on top of the conduits not less than 3 inches (75 mm) thick unless otherwise shown on the plans. All conduits shall terminate with female ends for ease of access in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Conduits forming the duct bank shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth prior to placing the concrete encasement. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

When specified, the Contractor shall reinforce the bottom side and top of encasements with steel reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor shall supply additional supports where the ground is soft and boggy, where ducts cross under roadways, or where shown on the plans. Under such conditions, the complete duct structure shall be supported on reinforced concrete footings, piers, or piles located at approximately 5-foot (1.5-m) intervals.

All pavement surfaces that are to have ducts installed therein shall be neatly saw cut to form a vertical face. All excavation shall be included in the contract with price for the duct.

Install a plastic, detectable, color as noted, 3 to 6 inches (75 to 150 mm) wide tape, 8 inches (200 mm) minimum below grade above all underground conduit or duct lines not installed under pavement. Utilize the 3-inch (75-mm) wide tape only for single conduit runs. Utilize the 6-inch (150-mm) wide tape for multiple conduits and duct banks. For duct banks equal to or greater than 24 inches (600 mm) in width, utilize more than one tape for sufficient coverage and identification of the duct bank as required.

When existing cables are to be placed in split duct, encased in concrete, the cable shall be carefully located and exposed by hand tools. Prior to being placed in duct, the RPR shall be notified so that he may inspect the cable and determine that it is in good condition. Where required, split duct shall be installed as shown on the drawings or as required by the RPR.

**110-3.3 Conduits without concrete encasement.** Trenches for single-conduit lines shall be not less than 6 inches (150 mm) nor more than 12 inches (300 mm) wide. The trench for 2 or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length.

Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches (100 mm) thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch (6.3 mm) sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively be used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits within the Airport's secured area where trespassing is prohibited are at least 18 inches (0.5 m) below the finished grade. Conduits outside the Airport's secured area shall be installed so that the tops of the conduits are at least 24 inches (60 cm) below the finished grade per National Electric Code (NEC), Table 300.5.

When two or more individual conduits intended to carry conductors of equivalent voltage insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches (150 mm) apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing voltage insulation rating are installed in the same trench without concrete encasement, they shall be placed not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches (150 mm) apart in a vertical direction.

Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

Conduits shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth while backfilling. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

**110-3.4 Markers.** The location of each end and of each change of direction of conduits and duct banks shall be marked by a concrete slab marker 2 feet (60 cm) square and 4 - 6 inches (100 - 150 mm) thick extending approximately one inch (25 mm) above the surface. The markers shall also be located directly above the ends of all conduits or duct banks, except where they terminate in a junction/access structure or building. Each cable or duct run from a line of lights and signs to the equipment vault must be marked at approximately every 200 feet (61 m) along the cable or duct run, with an additional marker at each change of direction of cable or duct run.

The Contractor shall impress the word "DUCT" or "CONDUIT" on each marker slab. Impression of letters shall be done in a manner, approved by the RPR, for a neat, professional appearance. All letters and words must be neatly stenciled. After placement, all markers shall be given one coat of high-visibility orange paint, as approved by the RPR. The Contractor shall also impress on the slab the number and size of conduits beneath the marker along with all other necessary information as determined by the RPR. The letters shall be 4 inches (100 mm) high and 3 inches (75 mm) wide with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep or as large as the available space permits. Furnishing and installation of duct markers is incidental to the respective duct pay item.

**110-3.5 Backfilling for conduits.** For conduits, 8 inches (200 mm) of sand, soft earth, or other fine fill (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted per Item P-152 except that material used for back fill shall be select material not larger than 4 inches (100 mm) in diameter.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during back filling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

**110-3.6 Backfilling for duct banks.** After the concrete has cured, the remaining trench shall be backfilled and compacted per Item P-152 "Excavation and Embankment" except that the material used for backfill shall be select material not larger than 4 inches (100 mm) in diameter. In addition to the requirements of Item P-152, where duct banks are installed under pavement, one moisture/density test per

lift shall be made for each 250 linear feet (76 m) of duct bank or one work period's construction, whichever is less.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during backfilling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

**110-3.7 Restoration.** Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the work shall be restored to its original condition. The restoration shall include seeding and mulching shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. All restoration shall be considered incidental to the respective L-110 pay item. Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

**110-3.8 Ownership of removed cable. Contractor to retain removed cables.**

## METHOD OF MEASUREMENT

**110-4.1** Underground conduits and duct banks shall be measured by the linear feet (meter) of conduits and duct banks installed, including fiber optic cable, encasement, locator tape, trenching and backfill with designated material, and restoration, and for drain lines, the termination at the drainage structure, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes.

## BASIS OF PAYMENT

**110-5.1** Payment will be made at the contract unit price per linear foot for each type and size of conduit and duct bank completed and accepted, including trench and backfill with the designated material, directional boring, and, for drain lines, the termination at the drainage structure. This price shall be full compensation for removal and disposal of existing duct banks and conduits as shown on the plans, furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item per the provisions and intent of the plans and specifications.

Payment will be made under:

### Base Bid

Item L-110-5.1	Directional Boring, Fiber Optic Cable in HDPE Conduit, 1 Way 2-Inch - Per Linear Foot
Item L-110-5.2	Directional Boring, Electrical Cable in HDPE Conduit, 1 Way 4-Inch - Per Linear Foot
Item L-110-5.3	Directional Boring, Electrical Cable in HDPE Conduit, 1 Way 2-Inch - Per Linear Foot

**Add Alternate Bid No. 1**

Item L-110-5.4      Directional Boring, Fiber Optic Cable in HDPE Conduit, 1 Way 2-Inch -  
Per Linear Foot

**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.

Advisory Circular (AC)

AC 150/5340-30      Design and Installation Details for Airport Visual Aids

AC 150/5345-53      Airport Lighting Equipment Certification Program

ASTM International (ASTM)

ASTM A615      Standard Specification for Deformed and Plain Carbon-Steel Bars for  
Concrete Reinforcement

National Fire Protection Association (NFPA)

NFPA-70      National Electrical Code (NEC)

Underwriters Laboratories (UL)

UL Standard 6      Electrical Rigid Metal Conduit - Steel

UL Standard 514B      Conduit, Tubing, and Cable Fittings

UL Standard 514C      Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers

UL Standard 1242      Electrical Intermediate Metal Conduit Steel

UL Standard 651      Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings

UL Standard 651A      Type EB and A Rigid PVC Conduit and HDPE Conduit

**END OF ITEM L-110**

## **Item L-115 Electrical Manholes and Junction Structures**

### **DESCRIPTION**

**115-1.1** This item shall consist of electrical manholes and junction structures (hand holes, pull boxes, junction cans, etc.) installed per this specification, at the indicated locations and conforming to the lines, grades and dimensions shown on the plans or as required by the RPR. This item shall include the installation of each electrical manhole and/or junction structures with all associated excavation, backfilling, sheeting and bracing, concrete, reinforcing steel, ladders, appurtenances, testing, dewatering and restoration of surfaces to the satisfaction of the RPR including removal of existing manholes and junction structures as shown on the plans.

### **EQUIPMENT AND MATERIALS**

#### **115-2.1 General.**

**a.** All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the RPR.

**b.** Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

**c.** All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

**d.** The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

**e.** All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

**115-2.2 Concrete structures.** Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures. Cast-in-place concrete structures shall be as shown on the plans.

**115-2.3 Precast concrete structures.** Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another engineer approved third party certification program. Provide precast concrete structures where shown on the plans.

Precast concrete structures shall be an approved standard design of the manufacturer. Precast units shall have mortar or bitumastic sealer placed between all joints to make them watertight. The structure shall be designed to withstand 200,000 lb aircraft loads, unless otherwise shown on the plans. Openings or knockouts shall be provided in the structure as detailed on the plans.

Threaded inserts and pulling eyes shall be cast in as shown on the plans.

If the Contractor chooses to propose a different structural design, signed and sealed shop drawings, design calculations, and other information requested by the RPR shall be submitted by the Contractor to allow for a full evaluation by the RPR. The RPR shall review per the process defined in the General Provisions.

**115-2.4 Junction boxes.** Junction boxes shall be L-867 Class 1 (non-load bearing) or L-868 Class 1 (load bearing) airport light bases that are encased in concrete. The light bases shall have a L-894 blank cover, gasket, and stainless steel hardware. All bolts, studs, nuts, lock washers, and other similar fasteners used for the light fixture assemblies must be fabricated from 316L (equivalent to EN 1.4404), 18-8, 410, or 416 stainless steel. If 18-8, 410, or 416 stainless steel is utilized it shall be passivated and be free from any discoloration. Covers shall be 3/8-inch (9-mm) thickness for L-867 and 3/4-inch (19-mm) thickness for L-868. All junction boxes shall be provided with both internal and external ground lugs.

**115-2.5 Electrical Handhole.** Electrical handholes shall be precast utility vaults measuring 2'x2' with standard knockout panels manufactured by A.C. Miller Concrete Products or approved equal. Handholes must meet the First Energy Underground Electrical Developers Guide requirements.

**115-2.6 Mortar.** The mortar shall be composed of one part of cement and two parts of mortar sand, by volume. The cement shall be per the requirements in ASTM C150, Type I. The sand shall be per the requirements in ASTM C144. Hydrated lime may be added to the mixture of sand and cement in an amount not to exceed 15% of the weight of cement used. The hydrated lime shall meet the requirements of ASTM C206. Water shall be potable, reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product.

**115-2.7 Concrete.** Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

**115-2.8 Frames and covers.** The frames shall conform to one of the following requirements:

- a. ASTM A48      Gray iron castings
- b. ASTM A47      Malleable iron castings
- c. ASTM A27      Steel castings
- d. ASTM A283, Grade D      Structural steel for grates and frames
- e. ASTM A536      Ductile iron castings
- f. ASTM A897      Austempered ductile iron castings

All castings specified shall withstand a maximum tire pressure of **167** psi and maximum load of **300,000** lbs. **if they are within the Runway Safety Area. All other castings shall be HS-20 rated.**

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings specified.

Each frame and cover unit shall be provided with fastening members to prevent it from being dislodged by traffic, but which will allow easy removal for access to the structure.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A123.

Each cover shall have the word "ELECTRIC" or other approved designation cast on it. Each frame and cover shall be as shown on the plans or approved equivalent. No cable notches are required.

Each manhole shall be provided with a "DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" safety warning sign as detailed in the Contract Documents and in accordance with OSHA 1910.146 (c)(2).

**115-2.9 Ladders.** Ladders, if specified, shall be galvanized steel or as shown on the plans.

**115-2.10 Reinforcing steel.** All reinforcing steel shall be deformed bars of new billet steel meeting the requirements of ASTM A615, Grade 60.

**115-2.11 Bedding/special backfill.** Bedding or special backfill shall be as shown on the plans.

**115-2.12 Flowable backfill.** Flowable material used to backfill shall conform to the requirements of Item P-153, Controlled Low Strength Material.

**115-2.13 Cable trays.** Cable trays shall be of plastic, cable trays shall be located as shown on the plans.

**115-2.14 Plastic conduit.** Plastic conduit shall comply with Item L-110, Airport Underground Electrical Duct Banks and Conduits.

**115-2.15 Conduit terminators.** Conduit terminators shall be pre-manufactured for the specific purpose and sized as required or as shown on the plans.

**115-2.16 Pulling-in irons.** Pulling-in irons shall be manufactured with 7/8-inch (22 mm) diameter hot-dipped galvanized steel or stress-relieved carbon steel roping designed for concrete applications (7 strand, 1/2-inch (12 mm) diameter with an ultimate strength of 270,000 psi (1862 MPa)). Where stress-relieved carbon steel roping is used, a rustproof sleeve shall be installed at the hooking point and all exposed surfaces shall be encapsulated with a polyester coating to prevent corrosion.

**115-2.17 Ground rods.** Ground rods shall be one piece copper clad steel . The ground rods shall be of the length and diameter specified on the plans, but in no case shall they be less than 8 feet (2.4 m) long nor less than 5/8 inch (16 mm) in diameter.

## CONSTRUCTION METHODS

**115-3.1 Unclassified excavation.** It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Damage to utility lines, through lack of care in excavating, shall be repaired or replaced to the satisfaction of the RPR without additional expense to the Owner.

The Contractor shall perform excavation for structures and structure footings to the lines and grades or elevations shown on the plans or as staked by the RPR. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown.

All excavation shall be unclassified and shall be considered incidental to Item L-115. Dewatering necessary for structure installation and erosion per federal, state, and local requirements is incidental to Item L-115.

Boulders, logs and all other objectionable material encountered in excavation shall be removed. All rock and other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped or serrated, as directed by the RPR. All seams, crevices, disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation. Excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

The Contractor shall provide all bracing, sheeting and shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheeting and shoring shall be included in the unit price bid for the structure.

Unless otherwise provided, bracing, sheeting and shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner that will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

After each excavation is completed, the Contractor shall notify the RPR. Structures shall be placed after the RPR has approved the depth of the excavation and the suitability of the foundation material.

Prior to installation the Contractor shall provide a minimum of 6 inches (150 mm) of sand or a material approved by the RPR as a suitable base to receive the structure. The base material shall be compacted and graded level and at proper elevation to receive the structure in proper relation to the conduit grade or ground cover requirements, as indicated on the plans.

**115-3.2 Concrete structures.** Concrete structures shall be built on prepared foundations conforming to the dimensions and form indicated on the plans. The concrete and construction methods shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the RPR before the concrete is placed.

**115-3.3 Precast unit installations.** Precast units shall be installed plumb and true. Joints shall be made watertight by use of sealant at each tongue-and-groove joint and at roof of manhole. Excess sealant shall be removed and severe surface projections on exterior of neck shall be removed.

**115-3.4 Placement and treatment of castings, frames and fittings.** All castings, frames and fittings shall be placed in the positions indicated on the Plans or as directed by the RPR and shall be set true to line and to correct elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

Field connections shall be made with bolts, unless indicated otherwise. Welding will not be permitted unless shown otherwise on the approved shop drawings and written approval is granted by the casting manufacturer. Erection equipment shall be suitable and safe for the workman. Errors in shop fabrication or deformation resulting from handling and transportation that prevent the proper assembly and fitting of parts shall be reported immediately to the RPR and approval of the method of correction shall be obtained. Approved corrections shall be made at Contractor's expense.

Anchor bolts and anchors shall be properly located and built into connection work. Bolts and anchors shall be preset by the use of templates or such other methods as may be required to locate the anchors and anchor bolts accurately.

Pulling-in irons shall be located opposite all conduit entrances into structures to provide a strong, convenient attachment for pulling-in blocks when installing cables. Pulling-in irons shall be set directly into the concrete walls of the structure.

**115-3.5 Installation of ladders.** Ladders shall be installed such that they may be removed if necessary. Mounting brackets shall be supplied top and bottom and shall be cast in place during fabrication of the structure or drilled and grouted in place after erection of the structure.

**115-3.6 Removal of sheeting and bracing.** In general, all sheeting and bracing used to support the sides of trenches or other open excavations shall be withdrawn as the trenches or other open excavations are being refilled. That portion of the sheeting extending below the top of a structure shall be withdrawn, unless otherwise directed, before more than 6 inches (150 mm) of material is placed above the top of the structure and before any bracing is removed. Voids left by the sheeting shall be carefully refilled with selected material and rammed tight with tools especially adapted for the purpose or otherwise as may be approved.

The RPR may direct the Contractor to delay the removal of sheeting and bracing if, in his judgment, the installed work has not attained the necessary strength to permit placing of backfill.

**115-3.7 Backfilling.** After a structure has been completed, the area around it shall be backfilled in horizontal layers not to exceed 6 inches (150 mm) in thickness measured after compaction to the density requirements in Item P-152. Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the RPR.

Backfill shall not be placed against any structure until approval is given by the RPR. In the case of concrete, such approval shall not be given until tests made by the laboratory under supervision of the RPR establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.

Where required, the RPR may direct the Contractor to add, at his own expense, sufficient water during compaction to assure a complete consolidation of the backfill. The Contractor shall be responsible for all damage or injury done to conduits, duct banks, structures, property or persons due to improper placing or compacting of backfill.

**115-3.8 Connection of duct banks.** To relieve stress of joint between concrete-encased duct banks and structure walls, reinforcement rods shall be placed in the structure wall and shall be formed and tied into duct bank reinforcement at the time the duct bank is installed.

**115-3.9 Grounding.** A ground rod shall be installed in the floor of all concrete structures so that the top of rod extends 6 inches (150 mm) above the floor. The ground rod shall be installed within one foot (30 cm) of a corner of the concrete structure. Ground rods shall be installed prior to casting the bottom slab. Where the soil condition does not permit driving the ground rod into the earth without damage to the ground rod, the Contractor shall drill a 4-inch (100 mm) diameter hole into the earth to receive the ground rod. The hole around the ground rod shall be filled throughout its length, below slab, with Portland cement grout. Ground rods shall be installed in precast bottom slab of structures by drilling a hole through bottom slab and installing the ground rod. Bottom slab penetration shall be sealed watertight with Portland cement grout around the ground rod.

A grounding bus of 4/0 bare stranded copper shall be exothermically bonded to the ground rod and loop the concrete structure walls. The ground bus shall be a minimum of one foot (30 cm) above the floor of the structure and separate from other cables. No. 2 American wire gauge (AWG) bare copper pigtailed shall bond the grounding bus to all cable trays and other metal hardware within the concrete structure. Connections to the grounding bus shall be exothermic. If an exothermic weld is not possible, connections to the grounding bus shall be made by using connectors approved for direct burial in soil or concrete per UL 467. Hardware connections may be mechanical, using a lug designed for that purpose.

**115-3.10 Cleanup and repair.** After erection of all galvanized items, damaged areas shall be repaired by applying a liquid cold-galvanizing compound per MIL-P-21035. Surfaces shall be prepared and compound applied per the manufacturer's recommendations.

Prior to acceptance, the entire structure shall be cleaned of all dirt and debris.

**115-3.11 Restoration.** After the backfill is completed, the Contractor shall dispose of all surplus material, dirt and rubbish from the site. The Contractor shall restore all disturbed areas equivalent to or better than their original condition. All sodding, grading and restoration shall be considered incidental to the respective Item L-115 pay item.

The Contractor shall grade around structures as required to provide positive drainage away from the structure.

Areas with special surface treatment, such as roads, sidewalks, or other paved areas shall have backfill compacted to match surrounding areas, and surfaces shall be repaired using materials comparable to original materials.

Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

After all work is completed, the Contractor shall remove all tools and other equipment, leaving the entire site free, clear and in good condition.

**115-3.12 Inspection.** Prior to final approval, the electrical structures shall be thoroughly inspected for conformance with the plans and this specification. Any indication of defects in materials or workmanship shall be further investigated and corrected. The earth resistance to ground of each ground rod shall not exceed 25 ohms. Each ground rod shall be tested using the fall-of-potential ground impedance test per American National Standards Institute / Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81. This test shall be performed prior to establishing connections to other ground electrodes.

**115-3.13 Manhole elevation adjustments.** The Contractor shall adjust the tops of existing manholes in areas designated in the Contract Documents to the new elevations shown. The Contractor shall be responsible for determining the exact height adjustment required to raise or lower the top of each manhole to the new elevations. The existing top elevation of each manhole to be adjusted shall be determined in the field and subtracted/added from the proposed top elevation.

The Contractor shall remove/extend the existing top section or ring and cover on the manhole structure or manhole access. The Contractor shall install precast concrete sections or grade rings of the required dimensions to adjust the manhole top to the new proposed elevation or shall cut the existing manhole walls to shorten the existing structure, as required by final grades. The Contractor shall reinstall the manhole top section or ring and cover on top and check the new top elevation.

The Contractor shall construct a concrete slab around the top of adjusted structures located in graded areas that are not to be paved. The concrete slab shall conform to the dimensions shown on the plans.

**115-3.14 Duct extension to existing ducts.** Where existing concrete encased ducts are to be extended, the duct extension shall be concrete encased plastic conduit. The fittings to connect the ducts together shall be

standard manufactured connectors designed and approved for the purpose. The duct extensions shall be installed according to the concrete encased duct detail and as shown on the plans.

### **METHOD OF MEASUREMENT**

**115-4.1** Electrical manholes and junction structures shall be measured by each unit completed in place and accepted. The following items shall be included in the price of each unit: All required excavation and dewatering;; sheeting and bracing; all required backfilling with on-site materials; restoration of all surfaces and finished grading and turfing; all required connections; temporary cables and connections; and ground rod testing.

**115-4.2** Electrical rack structures shall be measured by lump sum completed in place and accepted. The following items shall be included in the price of each unit: All required excavation all required backfilling with on-site materials; restoration of all surfaces and finished grading and turfing; all required connections; cables and connections; electrical panel; meter socket; disconnects; conduits; Unistrut; hardware; foundations and posts; concrete; grounding and ground rod testing.

**115-4.3** Relocation of the existing transformer structures shall be measured by lump sum completed in place and accepted. The following items shall be included in the price of each unit: All required excavation all required backfilling with on-site materials; restoration of all surfaces and finished grading and turfing; all required connections; cables and connections; utility fees, and ground rod testing.

### **BASIS OF PAYMENT**

**115-5.1** The accepted quantity of electrical handholes and junction structures will be paid for at the Contract unit price per each, complete and in place. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials, furnishing and installation of appurtenances and connections to duct banks and other structures as may be required to complete the item as shown on the plans and for all labor, equipment, tools and incidentals necessary to complete the structure.

**115-5.2** Payment shall be made at the contract unit price for the full electrical rack. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary, including but not limited to, meter boxes, circuit breakers, conduit, grounding rods, wiring, utility service or inspections fees, concrete, rebar, excavating, backfill, topsoil, sodding and pavement restoration, where required, to complete this item as shown in the plans and to the satisfaction of the RPR.

**115-5.3** Payment shall be made at the contract unit price for the relocation of the existing transformer. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary, including but not limited to, conduit, grounding rods, wiring, utility service or inspections fees, concrete, rebar, excavating, backfill, topsoil, sodding and pavement restoration, where required, to complete this item as shown in the plans and to the satisfaction of the RPR.

Payment will be made under:

#### **Base Bid**

Item L-115-5.1                      Electrical Junction Can - Per Each

Item L-115-5.2	Electrical Handhole – Per Each
Item L-115-5.3	Electrical Rack - Per Lump Sum
Item L-115-5.4	Relocate 25kv Transformer- Per Lump Sum

**Add Alternate Bid No. 1**

Item L-115-5.5	Electrical Junction Can - Per Each
----------------	------------------------------------

**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.

American National Standards Institute / Insulated Cable Engineers Association (ANSI/ICEA)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
------------------	---

Advisory Circular (AC)

AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description (CID)

A-A 59544	Cable and Wire, Electrical (Power, Fixed Installation)
-----------	--

ASTM International (ASTM)

ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A123	Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A897	Standard Specification for Austempered Ductile Iron Castings
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C206	Standard Specification for Finishing Hydrated Lime

FAA Engineering Brief (EB)

EB #83	In Pavement Light Fixture Bolts
--------	---------------------------------

Mil Spec

MIL-P-21035

Paint High Zinc Dust Content, Galvanizing Repair

National Fire Protection Association (NFPA)

NFPA-70

National Electrical Code (NEC)

**END OF ITEM L-115**

Page Intentionally Blank

## **Item L-119 Airport Obstruction Lights**

### **DESCRIPTION**

**119-1.1** This item shall consist of furnishing and installing obstruction lights per these specifications. Included in this item shall be the furnishing and installing of wood poles, steel or iron pipes, or other supports as required in the plans or specifications and in accordance with the requirements in advisory circular (AC) 70/7460-1, Obstruction Marking and Lighting

This item shall also include all wire and cable connections, the furnishing and installing of all necessary conduits and fittings, insulators, pole steps, pole cross arms, and the painting of poles and pipes. In addition, it includes the furnishing and installing of all lamps and, if required, the furnishing and installing of insulating transformers, the servicing and testing of the installation and all incidentals necessary to place the lights in operation as completed units to the satisfaction of the RPR including the removal of existing obstruction lights as shown on the plans.

### **EQUIPMENT AND MATERIALS**

#### **119-2.1 General.**

**a.** Airport lighting equipment and materials covered by specifications shall be certified under AC 150/5345-53, Airport Lighting Equipment Certification Program (ALECP) and listed in the ALECP Addendum.

**b.** All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

**c.** Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

**d.** All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in the project that accrue directly or indirectly from late submissions or resubmissions of submittals.

**e.** The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. Submitted electronically in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve 12 months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

**119-2.2 Obstruction lights.** The obstruction lighting assembly shall be Type **L-810 LED** meeting the requirements of AC 150/5345-43, Specification for Obstruction Lighting Equipment.

**119-2.3 Isolation transformers.** Where required for series circuits, the isolation transformers shall conform to the requirements of AC 150/5345-47, Specification for Series to Series Isolation Transformers for Airport Lighting Systems.

**119-2.4 Transformer housing.** Transformer housings, if specified, shall be per AC 150/5345-42, Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories.

**119-2.5 Conduit.** Steel conduit and fittings shall be per Underwriters Laboratories Standards 6, 514B, and 1242.

**119-2.6 Plastic conduit (for use below grade only).** Plastic conduit and fittings shall be per:

- UL 514B covers W-C-1094 - Conduit fittings all types, classes 1 through 3 and 6 through 10
- UL 514C covers W-C-1094 - all types, class 5 junction box and cover in plastic (PVC)
- UL 651 covers W-C-1094 - Rigid PVC Conduit, types I and II, class 4
- UL 651A covers W-C-1094 - Rigid PVC Conduit and high-density polyethylene (HDPE) Conduit type III and class 4

and must be one of the following, as shown on the plans:

- a. Type I—Schedule 40 PVC suitable for underground use either direct-buried or encased in concrete.
- b. Type II—Schedule 40 PVC suitable for either above ground or underground use.

**119-2.7 Electrical wire and cable.** For ratings up to 600 volts, moisture and heat resistant thermoplastic wire conforming to Commercial Item Description A-A-59544A, Type THWN-2, shall be used. The wires shall be of the type, size, number of conductors, and voltage shown in the plans or in the proposal. Overhead line wire from pole to pole, where specified, shall be per American National Standards Institute/Insulated Cable Engineers Association (ANSI/ICEA) S-70-547-2007.

**119-2.8 Miscellaneous.** Paint, poles, pole steps, insulators, and all other miscellaneous materials necessary for the completion of this item shall be new and first-grade commercial products. These products shall be as specified in the plans or specifications.

## CONSTRUCTION METHODS

**119-3.1 Placing the obstruction lights.** The Contractor shall furnish and install single-or double-obstruction lights as specified and shown in the plans. The obstruction lights shall be mounted on poles, buildings, or towers at approximately the location shown in the plans. The exact location shall be approved by the RPR in accordance with AC 70/7460-1, Obstruction Marking and Lighting.

**119-3.2 Installation on poles.** Where obstruction lights are to be mounted on poles, each obstruction light shall be installed with its hub at least as high as the top of the pole. All wiring shall be run in not less than one inch (25 mm) galvanized rigid steel conduit. If specified, pole steps shall be furnished and installed, the lowest step being 5 feet (1.5 m) above ground level. Steps shall be installed alternately on diametrically opposite sides of the pole to give a rise of 18 inches (0.5 m) for each step. Conduit shall be

fastened to the pole with galvanized steel pipe straps and shall be secured by galvanized lag screws. Poles shall be painted as shown in the plans and specifications.

When obstruction lights are installed on existing telephone or power poles, a large fiber insulating sleeve of adequate diameter and not less than 4 feet (1.2 m) long, shall be installed to extend 6 inches (150 mm) above the conductors on the upper cross arm. In addition, the sleeve shall be at least 18 inches (0.5 m) below the conductors on the lower cross arm. The details of this installation shall be per the plans.

**119-3.3 Installation on beacon tower.** Where obstruction lights are installed on a beacon tower, two obstruction lights shall be mounted on top of the beacon tower using one inch (25 mm) conduit. The conduit shall screw directly into the obstruction light fixtures and shall support them at a height of not less than 4 inches (100 mm) above the top of the rotating beacon. If obstruction lights are specified at lower levels, the Contractor shall install not less than one inch (25 mm) galvanized rigid steel conduit with standard conduit fittings for mounting the fixtures. The fixtures shall be mounted in an upright position in all cases. The conduit shall be fastened to the tower members with Wraplock® straps (or equivalent), clamps, or approved fasteners spaced approximately 5 feet (1.5 m) apart. Three coats of international orange paint per Federal Specification 595, Number 12197 shall be applied (one prime, one body, and one finish coat) to all exposed material installed.

**119 3.4 Installation on buildings, towers, smokestacks, etc.** Where obstruction lights are to be installed on buildings or similar structures, the installation shall be made per the details shown in the plans. The hub of the obstruction light shall be not less than one foot (30 cm) above the highest point of the obstruction except in the case of smokestacks where the uppermost units shall be mounted not less than 5 feet (1.5 m), nor more than 10 feet (3 m) below the top of the stack. Conduit supporting the obstruction light units shall be fastened to wooden structures with galvanized steel pipe straps and shall be secured by 1-1/2 inch (38 mm) No. 10 galvanized wood screws. Conduit shall be fastened to masonry structures by the use of expansion shields, screw anchors, or toggle bolts using No. 10, or larger, galvanized wood or machine screws. Conduit fastened to structural steel shall have the straps held with not less than No. 10 roundhead machine screws in drilled and tapped holes. Fastenings shall be approximately 5 feet (1.5 m) apart. Three coats of paint shall be applied (one prime, one body, and one finish coat) with color per Federal Specification 595, international orange, number 12197 paint to all exposed material installed.

**119-3.5 Series isolation transformers.** If it is designed for use in a series lighting circuit, the L-810 series obstruction light does not include a film cutout. Therefore, an isolation transformer is required with each series lamp. Double series units of this type require two isolation transformers. The transformer shall be housed in a light base per paragraph 119-2.4 or buried directly in the earth per the details shown in the plans.

**119-3.6 Wiring.** The Contractor shall furnish all necessary labor and materials. The Contractor shall make complete electrical connections from the underground cable or other source of power per the wiring diagram furnished with the project plans. If underground cable is required for the power feed and if duct is required under paved areas, the cable and duct shall be installed per and paid for as described in Item L-108, Underground Power Cable for Airports, and Item L-110, Airport Underground Electrical Duct Banks and Conduit.

**119-3.7 Lamps.** The Contractor shall furnish and install in each unit one or two lamps that are per the manufacturer's requirements. Provide two lamp sets as spares.

**119-3.8 Tests.** The installation shall be fully tested by continuous operation for not less than 1/2 hour as a completed unit prior to acceptance. These tests shall include the functioning of each control not less than 10 times.

## METHOD OF MEASUREMENT

**119-4.1** The quantity of lights to be paid for under this item shall be the number of single- or double-type obstruction lights installed and accepted as completed units, in place, ready for operation.

## BASIS OF PAYMENT

**119-5.1** Payment will be made at the contract unit price for each completed obstruction light installed, in place by the Contractor, and accepted by the RPR. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item L-119-5.1	Obstruction Lights, Installed Complete in Place Mounted on Fence - per each
----------------	---

## 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.

### Advisory Circulars (AC)

AC 70/7460-1	Obstruction Marking and Lighting
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housing, Junction Boxes, and Accessories
AC 150/5345-43	Specification for Obstruction Lighting Equipment
AC 150/5345-47	Specification for Series to Series Isolation Transformers for Airport Lighting Systems
AC 150/5345-53	Airport Lighting Equipment Certification Program

### American National Standards Institute / Insulated Cable Engineers Association (ANSI/ICEA)

ANSI/ICEA S-70-547	Standards for Weather-Resistant Polyolefin Covered Connectors Commercial Item Description (CID)
A-A-59544A	Cable and Wire, Electrical (Power, Fixed Installation)

### Federal Standard (FED STD)

FED STD 595	Colors used in Government Procurement
-------------	---------------------------------------

### National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)
---------	--------------------------------

### Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit – Steel
---------------	--

UL Standard 514B	Conduit, Tubing, and Cable Fittings Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit
UL Standard 1242	Electrical Intermediate Metal Conduit - Steel

**END OF ITEM L-119**

Page Intentionally Blank

## **Item 02446 Horizontal Directional Drilling**

### **GENERAL DESCRIPTION**

#### **1.1 DESCRIPTION**

- A. The work specified in this section consists of furnishing and installing underground utilities using the horizontal directional drilling (HDD) method of installation for pipes of various sizes, also commonly referred to as directional boring or guided horizontal boring. This work shall include all services, permitting, equipment, materials, and labor for the complete and proper installation, testing, restoration of underground utilities and environmental protection and restoration.
- B. Section includes requirements for Horizontal Directional Drilling (HDD) of High Density Polyethylene (HDPE) pipe.

#### **1.2 QUALITY ASSURANCE**

- A. Experience: Actively engaged in horizontal directional drilling for a minimum of 3 years.
- B. Field supervisory personnel: Experienced in the performance of work and tasks as stated herein for a minimum of 3 years.

#### **1.3 SUBMITTALS**

- A. Submit for information only.
  - 1. Presentation of similar experience in the last 3 years.
  - 2. Include, but not limited to, owner name, address, telephone number, contact person, date and duration of work, location, pipe information, and contents handled by pipeline.
  - 3. Supervisory field personnel and historical information of HDD experience.
    - a. At least one field supervisor listed must be at site when HDD operations are in progress.
- B. Submit the following.
  - 1. Working Drawings and written procedure describing in detail proposed method and entire operation for information only including, but not limited to:
    - a. Size, capacity and arrangement of equipment.
    - b. Location and size of drilling and receiving pits.
    - c. Dewatering and methods of removing spoils material.
    - d. Method of installing detection wire and pipe.
    - e. Method of fusion pipe segment and type of equipment.
    - f. Type of cutting head.
    - g. Method of monitoring and controlling line and grade.
    - h. Detection of surface movement.
    - i. Bentonite drilling mud for information only:
      - 1) Products information, material specifications, and handling procedures.
      - 2) Material safety data sheet and special precautions required.

- 3) Method of mixing and application.
- j. Submit pipe catalog information confirming that pipe, fittings, joints, and other materials conform to the requirements of the specifications
- k. Maximum allowable pipe loading limits
- l. Submit a proposed bore path layout in both plan and profile. The proposed bore path shall conform to the drilling equipment and pipe material constraints.
- m. Design radius of the proposed bore path, including minimum radii for all curves
- n. Quality control and testing procedures
- o. Safety Plan
- p. Potential Problems and remediation plan
- q. Provide as-built documentation. Submit bore logs that clearly indicate the pipe diameter, location (by station), and depth below grade of the installed pipeline, recorded every 10 feet maximum along the pipeline. Submit within 7 days of the completion of each bore.

#### 1.4 PROJECT CONDITIONS

- A. Complete HDD so as not to interfere with, interrupt, or endanger surface and activity thereon.
- B. Do not use HDD in rock stratum or subsoil consisting of boulders and underground obstructions that impede the process.
- C. Follow applicable ordinances, codes, statutes, rules, and regulations of State of Maryland, MSHA, applicable County building codes, and applicable regulations of Federal Government, OSHA 29CFR 1926, and applicable criteria of ANSI A10.16-1995 (R2001), "Safety Requirements for Tunnels, Shafts, and Caissons."

### EQUIPMENT AND MATERIALS

#### 2.1 MATERIALS

- A. Pipe.
  - 1. HDPE: See Section L-110.
  - 2. HDPE Joints:
    - a. Make joints following manufacturer's instructions and ASTM D2657.
    - b. Butt fusion joining technique for joining pipe segments installed by HDD.
    - c. When joining HDPE pipe at ends of directional drilling runs fusion bond to adjacent pipe section.
      - 1) Use butt fusion, socket fusion, or electrofusion coupling joining technique:
    - d. Mechanical Couplings are not permitted for joining of directional drilled pipe sections.
  - 3. Connect to Other Pipe Materials: When connecting to proposed PVC conduit provide transition fitting between PVC to HDPE service connection specified herein.
- B. Drilling Fluid:
  - 1. Bentonite drilling mud compatible with environment.

2. Waste oil or environmentally non-compatible polymers cannot be part of composition.
- C. Detection Wire: TW, THW, THWN, or HMWPE insulated copper, 10 gage or thicker wire.

## CONSTRUCTION METHODS

### 3.1 PREPARATION

- A. Excavate pits at locations following the drawings and P-152.
- B. Provide equipment to guard against electrocution and alarm system on drilling equipment capable of detecting electrical current as it approaches electric lines.
- C. Test pit underground utilities crossing before HDD operation.

### 3.2 OPERATION

- A. General.
  1. Determine drilling length and equipment pull strength for type of soil encountered.
  2. Provide method to control line and grade.
    - a. Provide and maintain instrumentation that accurately locates pilot hole.
    - b. Drill pilot hole along path following Submitted Working Drawings to these tolerances:
      - 1) Vertical alignment plus or minus 0.5 foot. Vertical path of pilot hole must not establish new high points not shown on Drawings.
      - 2) Horizontal alignment plus or minus 1.0 foot.
    - c. Include electronic monitoring of horizontal and vertical drilling head location. Obtain accuracy range within 1 inch of actual position of pipeline. Record position readings at maximum of 10 foot intervals.
    - d. At completion of pilot hole drilling, furnish tabulations of horizontal and vertical alignment to RPR.
  3. When water is encountered.
    - a. Provide and maintain dewatering system of sufficient capacity to remove water.
    - b. Keep excavation free of water until backfill operation is in progress.
    - c. Perform dewatering in manner that removal of soils particles are held to minimum.
  4. Maintain close observation to detect settlement or displacement of surface and adjacent facilities.
    - a. Notify RPR immediately if settlement or displacement is detected.
    - b. Maintain safe conditions and prevent damage.
- B. Drilling Operation.
  1. Drilling Fluids.
    - a. Maintain drilling fluid in bore hole to increase stability of surrounding soil and reduce drag on pulled pipe.
    - b. Dispose of drilling fluid and other spoils at location following laws, ordinances, rules, and regulations of local jurisdiction.

- c. Transport excess fluids and other spoils to disposal site, at no additional cost to the Airport.
- d. Minimize drilling fluid at locations other than entry and exit points. Immediately clean up any drilling fluids that inadvertently surface.
- e. Provide clean water for drilling, at no cost to the Airport, at RPR's requirement.
2. Pilot Hole Drilling.
  - a. Angle entry hole so that curvature of pilot hole does not exceed allowable bending radius of HDPE pipe.
  - b. Be able to make a turn of up to 90 degrees and maintain curvature not to exceed allowable bending radius of HDPE pipe.
  - c. Alignment Adjustment and Restarts.
    - 1) Follow pipeline alignment on submitted drawings within tolerances specified herein. Before adjustments, notify RPR for approval.
    - 2) Notify Engineer when forward motion of operation is stopped by an obstruction.
      - a) Abandon in place with drilling fluid, unless RPR directs otherwise.
      - b) Upon RPR's approval, attempt second installation at approved location or excavate at point of difficulty and install HDPE pipe by trench method following Section L-110.
    - 3) Withdrawals, abandonments, and restarts are at no additional cost to the Airport when HDD is provided as an option of installation of pipe.
    - 4) Exercise caution including, but not limited to, locating underground utilities, drilling downholes (test pits) to observe drill stems or reamer assembly to clear other existing utilities at locations following Drawings.
    - 5) Keep the number of boring pits to a minimum, no closer than following distances, unless otherwise approved by Engineer.
      - a) Equipment must be capable of boring following lengths in a single bore.

<u>Iron Pipe Size (IPS)</u>	<u>Boring Distance (In feet)</u>
1-1/4	400
1-1/2	400
2	350
2-1/2	350
3	300
4	250

### 3.3 INSTALLATION

#### A. Installing HDPE Pipe.

1. Provide a swivel to reaming assembly and pull section of pipe to minimize torsional stress on pull section after drilling pilot hole.
2. Hold reaming diameter to 1.5 times outside diameter of HDPE pipe being installed.
3. Protect pull section as it proceeds during pull back so it moves freely and is not damaged.
4. Pull detection wire along with HDPE pipe. Extend wire into locator station at each end of HDPE pipe.

5. When connecting to adjacent pulled or non-pulled section of HDPE pipe, allow pull section of pipe to extend past termination point. Make tie-ins the next day after pullback of HDPE pipe.
6. Test pit pipe installation to verify horizontal and vertical alignment at Engineer's direction.
  - a. One test pit for every 500 feet along length of pipeline.
  - b. RPR may order an additional test pit for each test pit that reveals pipeline installation is not in compliance with Contract Documents at no additional cost to the Airport.
7. Replace portions of pipeline not in compliance with Contract Documents at RPR's direction and at no additional cost to the Airport.

### 3.4 RESTORATION

- A. After extraction, drill fluids, pits, work areas, staging and storage areas are to be restored to equal or better condition than pre-construction condition.

## MEASUREMENT AND PAYMENT

- 4.1 Payment for HDPE pipe installed by HDD or by open cut trench method measured and paid for following Section L-110.

Page Intentionally Blank

## SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

### PART 1 - GENERAL

#### 1.1 EXECUTION OF THE WORK

- A. The scope of work shown on the drawings and in these specifications, Division 26, 27 and 28 are all a part of this contract and shall be included in the base bid unless otherwise noted.
- B. These Specifications call out certain duties of the Electrical Contractor and/or Subcontractors. They are not intended as a material list of items required by the Contract.
- C. These divisions of the Specifications cover the electrical systems of the project. It includes work performed by the electrical trades as well as trades not normally considered as electrical trades.
- D. Provide all items and work indicated on the Drawings and all items and work called for in the Specifications in accordance with the conditions of Contract (Division 1 General Requirements Documents). This includes all incidentals, equipment, appliances, services, hoisting, scaffolding, supports, tools, supervision, labor, consumable items, fees, licenses, etc., necessary to provide complete systems. Perform start-up and checkout on each item and system to verify the systems are fully operable.
- E. Comply with all provisions of the Contract Documents including Division 1, General Conditions, and Supplementary General Conditions of the Specifications.
- F. Certain terms such as "shall, provide, install, complete, start up" are not used in some parts of these Specifications. This does not indicate that the items shall be less than completely installed or that systems shall be less than complete.
- G. Examine and compare the Electrical Drawings and Specifications with the Drawings and Specifications of other trades, and report any discrepancies between them to the Engineer and obtain written instructions for changes necessary in the work. At time of bid the most stringent requirements must be included in said bid. Install and coordinate the electrical work in cooperation with other trades installing interrelated work. Before installation, make proper provisions to avoid interferences in a manner approved by the Engineer. All changes required in the work of the Contractor caused by neglect shall be corrected at the expense of the Contractor.
- H. It is the intent of the drawings and specifications to provide a complete workable system ready for the Owner's operation. These specifications are equipment and performance specifications. Items described or called out in the specification but not shown on the drawings are considered to be part of the project. Any item not specifically shown on the drawings or called for in the specifications, but normally required to conform to the intent are to be considered a part of the contract. Installation of the equipment shall be in accordance with the N.E.C., manufacturer recommendation, and industry standards.

- I. All material furnished by the Contractor shall be new and unused (temporary lighting and power products are excluded) and free from defects. All materials used shall bear the Underwriters Laboratory, Inc label provided a standard has been established for the material in question.
- J. All products and materials to be new, clean, free of defects and free of damage and corrosion.
- K. No exclusion from, or limitation in, the symbolism used on the Drawings for electrical work or the languages used in the Specifications for electrical work shall be interpreted as a reason for omitting accessories necessary to complete any required system or item of equipment.
- L. The use of words in the singular shall not be considered as limiting where other indications denote that more than one item is referred to.
- M. Except for conduit, conduit fittings, outlet boxes, wire and cable, all items of equipment or material shall be the product of one manufacturer throughout. Multiple manufacturers will not be permitted.

## 1.2 COORDINATION OF THE WORK

- A. Certain materials will be provided by other trades. Examine the Contract Documents to ascertain these requirements.
- B. Carefully check space requirements with other trades and the physical confines of the area to ensure that all material can be installed in the spaces allotted thereto including finished suspended ceilings. Make modifications thereto as required and approved.
- C. Transmit to other trades all information required for work to be provided under their respective sections in ample time for installation.
- D. Wherever work interconnects with work of other trades, coordinate with other trades to ensure that all trades have the information necessary so that they may properly install all the necessary connections and equipment. Identify all items of work that require access so that the ceiling trade will know where to install access doors and panels.
- E. Due to the type of the installation, a fixed sequence of operation is required to properly install the complete systems. Coordinate, project and schedule work with other trades in accordance with the construction sequence.
- F. The locations of lighting fixtures, outlets, panels and other equipment indicated on the Drawings are approximately correct, but they are understood to be subject to such revision as may be found necessary or desirable at the time the work is installed in consequence of increase or reduction of the number of outlets, or in order to meet field conditions or to coordinate with modular requirements of ceilings, or to simplify the work, or for other legitimate causes.
- G. Exercise particular caution with reference to the location of panels, outlets, switches, etc., and have precise and definite locations approved by the Engineer before proceeding with the installation.

- H. The Drawings show only the general run of raceways and approximate location of outlets. Any significant changes in location of outlets, cabinets, etc., necessary in order to meet field conditions shall be brought to the immediate attention of the Engineer and shall receive approval before such alterations are made. All such modifications shall be made without additional cost to the Owner.
- I. Obtain from the Engineer in the field the location of such outlets or equipment not definitively located on the Drawings.
- J. Circuit "tags" in the form of arrows are used where shown to indicate the home runs of raceways to electrical distribution points. These tags show the circuits in each home run and the panel designation. Show the actual circuit numbers on the finished record tracing and on panel directory card. Where circuiting is not indicated, the Electrical Contractor must provide required circuiting in accordance with the loading indicated on the drawings and/or as directed.
- K. The Drawings generally do not indicate the exact number wires in each conduit for the branch circuit wiring of fixtures, and outlets, or the actual circuiting. Provide the correct wire size and quantity as required by the indicated circuiting and/or circuit numbers indicated and control wiring diagrams, if any, specified voltage drop or maximum distance limitations, and the applicable requirements of the NEC.
- L. Adjust locations of conduits, panels, equipment, pull boxes, fixtures, etc. to accommodate the work to prevent interferences, both anticipated and encountered. Determine the exact route and location of each raceway prior to installation.
  - 1. Right of way: lines which pitch to have the right-of-way over those which do not pitch. For example: steam, condensate, and plumbing drains normally have right-of-way. Lines whose elevations cannot be changed to have right-of-way over lines whose elevations can be changed.
  - 2. Make offsets, transitions and changes in direction in raceways and as required to maintain proper head room in pitch of sloping lines whether or not indicated on the Drawings.
- M. Whenever the work is of sufficient complexity, prepare additional Detail Drawings to scale similar to that of the bidding Drawings, prepared on tracing medium of the same size as Contract Drawings. With these layouts, coordinate the work with the work of other trades. Such detailed work to be clearly identified on the Drawings as to the area to which it applies. Submit for review Drawings clearly showing the work and its relation to the work of other trades before commencing shop fabrication or erection in the field.
- N. Contractor shall furnish services of experienced Superintendent, who shall be in constant charge of all work, and who shall coordinate his work with the work of other trades. No work shall be installed before coordinating with other trades.

### 1.3 EXAMINATION OF SITE

- A. Prior to submitting of bids, the Contractor shall visit the site of the job and shall familiarize himself with all conditions affecting the proposed installation and shall make provisions as to the cost thereof. Failure to comply with the intent of this paragraph will in no way relieve the Contractor of performing all necessary work shown on the Drawings.

### 1.4 PROGRESS OF WORK

- A. The Contractor shall order the progress of his work so as to conform to the progress of the work of other trades and shall complete the entire installation as soon as the conditions of the building will permit. Any cost resulting from the defective or ill-timed work performed under this section shall be borne by the Contractor.

### 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Ship and store all products and materials in a manner which will protect them from damage, weather and entry of debris. If items are damaged, do not install, but take immediate steps to obtain replacement or repair. Any such repairs shall be subject to review and acceptance of the Engineer.
- B. Delivery of Materials: Deliver materials (except bulk materials) in manufacturer's unopened container fully identified with manufacturer's name, trade name, type, class, grade, size and color.
- C. Storage of Materials, Equipment and Fixtures: Store materials suitably sheltered from the elements, but readily accessible for inspection by the Engineer until installed. Store all items subject to moisture damage in dry, heated spaces.

### 1.6 EQUIPMENT ACCESSORIES

- A. Establish sizes and location of the various concrete bases required. Coordinate with General Contractor and provide all necessary anchor bolts together with templates for holding these bolts in position.
- B. Provide supports, hangers and auxiliary structural members required for support of the work.
- C. Furnish and set all sleeves for passage of raceways through structural, masonry and concrete walls and floors and elsewhere as will be required for the proper protection of each raceway and passing through building surfaces.
- D. Wall mounted equipment, total weight of 100 pounds or less, may be directly secured to wall by means of steel bolts. Maintain at least 1" air space between equipment and supporting wall. Groups or arrays of equipment, with total weight of more than 100 pounds, shall be mounted on adequately free standing sized steel angles, channels, or bars. Prefabricated steel channels providing a high degree of mounting flexibility, such as those manufactured by Kindorf, Globe-Strutt and Unistrut, may be used for mounting arrays of equipment.

1.7 CUTTING, PATCHING, ETC.

- A. The work shall be carefully laid out in advance. Where Cutting, channeling, chasing or drilling of floors, walls, partitions, ceilings or other surfaces is necessary for the proper installation, support or anchorage of raceway, outlets or other equipment, the work shall be carefully done. Any damage to the building, piping, equipment or defaced finish plaster, woodwork, metalwork, etc. shall be repaired by skilled mechanics of the trades involved at no additional cost to the Owner.
- B. The Contractor shall do no cutting, channeling, chasing or drilling of unfinished masonry, tile, etc., unless he first obtains permission from the Engineer. If permission is granted, the Contractor shall perform this work in a manner approved by the Engineer.
- C. Where conduits, outlet, junction, or pullboxes are mounted on a painted surface, or a surface to be painted, they shall be painted to match the surface. Whenever support channels are cut, the bare metal shall be cold galvanized.
- D. Slots, chases, openings and recesses through floors, walls, ceilings, and roofs will be provided by the various trades in their respective materials. The trade requiring them to properly locate such openings and be responsible for any cutting and patching caused by the neglect to do so.

1.8 NOMINAL VOLTAGES (UNLESS OTHERWISE NOTED)

- A. Primary distribution: 4160V, 3 phase, 3 wire
- B. Secondary distribution: 120/240 volt, 1 phase, 3 wire

1.9 MOUNTING HEIGHTS

- A. Unless otherwise noted, mounting heights for equipment and wiring devices shall be as shown as noted on the drawings.

1.10 CLEANING UP

- A. Contractor shall take care to avoid accumulation of debris, boxes, crates, etc. resulting from the installation of work. Contractor shall remove from the premises each day all debris, boxes, etc., and keep the premises clean, subject to the Architect's instructions, which shall be promptly carried out.
- B. Contractor shall clean all fixtures and equipment at the completion of the project.
- C. All switchboards, panelboards, wireway, trench ducts, cabinets, enclosures, etc. shall be thoroughly vacuumed clean prior to energizing equipment at the completion of the project. Equipment shall be opened for observation by the Architect as required.

#### 1.11 WATERPROOFING

- A. Avoid, if possible, the penetration of any waterproof membranes such as roofs, machine room floors, basement walls, and the like. If such penetration is necessary, perform it prior to the waterproofing and furnish all sleeves or pitch-pockets required. Advise the Architect and obtain written permission before penetrating any waterproof membrane, even where such penetration is shown on the Drawings. Perform work so as to maintain any warranties currently in effect.
- B. If this Contractor penetrates any walls or surfaces after they have been waterproofed, this Contractor shall restore the waterproof integrity of that surface at the expense of this Contractor and as directed by the Architect.

#### 1.12 PRODUCTS

- A. If products and materials are specified or indicated on the drawings for a specific item or system, use those products or materials. Where noted in other sections of this specification, equipment has been specified for a specific performance and substitutions are not permitted. If products and materials are not listed in either of the above, use first class products and materials, subject to approval of Shop Drawings where Shop Drawings are required or as approved in writing where Shop Drawings are not required.

#### 1.13 OMISSIONS FROM THE DRAWINGS

- A. Should a Bidder find discrepancies in or omissions from the drawings or specifications or be in doubt as to their meaning, he shall notify the Architect before submitting his proposal. The Architect will in turn, send written instructions to all Bidders. Neither the Architect nor the Owner will be responsible for oral instructions. If the Contractor fails to comply with this requirement, he shall accept the Engineer's interpretations as to the intended meaning of the drawings and specifications.

#### 1.14 EXECUTION

- A. Follow manufacturer's instructions for installing, connecting, and adjusting all equipment. Provide one copy of such instructions to the Architect before installing any equipment. Provide a copy of such instructions at the equipment during any work on the equipment. Provide all special supports, connections, wiring, accessories, etc.
- B. Use mechanics skilled in their trade for all work.
- C. Clean all items before and after installation. Clean up all debris.
- D. Perform all tests required by local authorities in addition to tests specified herein, such as life safety systems.
- E. Applicable equipment and materials to be listed by Underwriters' Laboratories and manufactured in accordance with ASME, NEMA, ANSI or IEEE standards and as approved by local authorities having jurisdiction.

- F. Before commencing work, examine all adjoining, underlying, etc., work on which this work is in any way dependent for perfect workmanship and report any condition which prevents performance of first class work. Become thoroughly familiar with actual existing conditions to which connections must be made or which must be changed or altered.
- 1.15 VERIFICATION OF ELECTRICAL REQUIREMENTS FOR EQUIPMENT FURNISHED BY OTHERS
- A. Prior to the installation of wiring systems for any equipment furnished by others, this contractor shall verify that the electrical requirements of the equipment match those shown on the electrical drawings by examining the approved shop drawings of that equipment. Any discrepancies shall be immediately reported to the engineer.
- B. If the contractor fails to comply with this requirement, he shall be responsible for any additional costs incurred at no additional cost to the Owner.
- 1.16 PROTECTION OF BUILDING FIRE/SMOKE BARRIERS
- A. Passages of conduit through fire barriers and/or smoke barriers shall be protected as follows:
1. The space between the penetrating item and the fire barrier and/or smoke barrier shall be filled with a material capable of maintaining the fire/smoke resistance of the barrier or be protected by an approved device designed for the specific purpose.
  2. Where the penetrating item uses a sleeve to penetrate the fire and/or smoke barrier the sleeve shall be solidly set in the fire/smoke barrier and the space between the item and the sleeve shall be filled as described above.
  3. Fire barriers shall include 1-hour, 2-hour, and 3-hour rated floors and walls. Refer to architectural plans for location of fire barriers and smoke barriers and provide protection required to maintain ratings in accordance with all codes.
  4. Approved fill material for fire barriers shall be packed mineral wool, with ASTM E-136 rating and 3M Fire Barrier caulk. Coordinate sealing of all openings with requirements of Division 7 of this specification.
  5. Perform work in accordance with the appropriate UL Ratings.
  6. Product Data: Provide manufacturer's specifications, recommendations and installation instructions for each application.
- 1.17 CODES AND FEES
- A. General: Comply with Codes in accordance with the Contract Documents.
- B. The electrical installation shall be in compliance with the requirements of OSHA, NEC and the rules, regulations and requirements of the power company supplying power to the building.
- C. The electrical installation shall comply fully with all township, county and state laws, ordinances and regulations applicable to electrical installations.
- D. All equipment shall be equal to or exceed the minimum requirements of NEMA, IEEE and UL.

- E. Should any change in Drawings or Specifications be required to comply with governmental regulations, the Contractor shall notify Architects prior to execution of the work. The work shall be carried out according to the requirements of such code in accordance with the instruction of the Architect and at no additional cost to the Owner.
- F. The local fees and permits and services of inspection authorities shall be obtained and paid for by the Contractor. The Contractor shall cooperate fully with local utility companies with respect to their services.
- G. Certificate of Inspection and approval shall be procured and paid for by this Contractor from an approved certified inspection agency.

1.18 GUARANTEE

- A. General: Provide a Guarantee in accordance with the Contract Documents.
- B. Submit a single guarantee stating that all portions of the work are in accordance with Contract requirements. Guarantee all work against faulty and improper material and workmanship for a period of one (1) year from date of final acceptance by the Owner, except that where guarantees or warranties for longer terms are specified herein, such longer term to apply. Within 24 hours after notification, correct any deficiencies which occur during the guarantee period at no additional cost to Owner, all to the satisfaction of the Owner and Architect. Obtain similar guarantees from subcontractors, manufacturers, suppliers and subtrade specialists.

1.19 DISPOSAL

- A. All electrical items not designated by the Owner for his use to be properly disposed of according to local, state and Federal regulations.
- B. Items containing polychlorinated biphenyl (PCB) to be removed, transported and disposed of according to Federal Toxic Substances Control Act (TSCA). Contractor to submit certification that these items have been properly disposed.

1.20 EXCAVATION AND TRENCHING

- A. Provide excavation for the work. Excavate all material encountered to the depths indicated on the Drawings or required. Remove from the site excavated materials not required or suitable for backfill. Provide grading as may be necessary to prevent surface water from flowing into trenches or other excavations. Remove any water accumulating therein. Provide sheeting and shoring as may be necessary for the protection of the work and for the safety of personnel.
- B. Provide trenches of widths necessary for the proper execution of the work. Grade bottom of the trenches accurately to provide uniform bearing and support the work on undisturbed soil at every point along its entire length. Where rock excavations are required, excavate rock to a minimum overdepth of 4 inches below the trench depths indicated on the Drawings or required. Backfill overdepths in the rock excavation and unauthorized overdepths with loose, granular, moist earth, thoroughly machine tamped to a compaction level as specified by the Engineer. Whenever unstable soil incapable of properly supporting the work is encountered in the bottom

of the trench as determined by the Engineer, remove soil to a depth required and backfill the trench to the proper grade with coarse sand, fine gravel or other suitable material.

1. Primary electric service: 4 feet (minimum).
2. Secondary electric service: 2 feet (minimum).
3. Telephone service: 2 feet (minimum).

#### 1.21 BACKFILLING OF TRENCHES

- A. Do not backfill trenches until all required tests have been performed and the installation observed by the Engineer. Comply with the requirements of other sections of these Specifications. Deposit backfill in 6 inch layers and thoroughly and carefully tamp until for work has a cover of not less than 1 foot. Backfill and tamp remainder of trench at 12 inch intervals until complete. Uniformly grade the finished surface. Install a 6 inch marking ribbon 12 inches below finished grade.

END OF SECTION 260500

## SECTION 260500.10 – ABBREVIATIONS AND DEFINITIONS

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Utilize the following abbreviations and definitions for discernment within the Drawings and Specifications.

1. Abbreviations

- a. NEC National Electrical Code
- b. OSHA Occupational Safety and Health Act
- c. ANSI American National Standards Institute
- d. NFPA National Fire Protection Association
- e. ASA American Standards Association
- f. IEEE Institute of Electrical and Electronics Engineers
- g. NEMA National Electrical Manufacturers Association
- h. UL Underwriters' Laboratories, Inc.
- i. IES Illuminating Engineering Society
- j. ICEA Insulated Cable Engineers Association
- k. ASTM American Society of Testing Materials
- l. ETL Electrical Testing Laboratories, Inc.
- m. CBM Certified Ballast Manufacturers
- n. EIA Electronic Industries Association
- o. OEM Original Equipment Manufacturer
- p. ADA Americans with Disabilities Act

2. Definitions

- a. "PROVIDE" means to supply, purchase, transport, place, erect, connect, test and turn over to Owner, complete and ready for regular operation, the particular work referred to.
- b. "INSTALL" means to join, unite, fasten, link, attach, set up or otherwise connect together before testing and turning over to Owner, complete and ready for regular operation, the particular work referred to.
- c. "FURNISH" means to supply all materials, labor, equipment, testing apparatus, controls, tests, accessories and all other items customarily required for the proper and complete application for the particular work referred to.
- d. "WIRING" means the inclusion of all raceways fittings, conductors, connectors, tape, junction and outlet boxes, connections, splices, and all other items necessary and/or required in connection with such work.
- e. "CONDUIT" means the inclusion of all fittings, hangers, supports, sleeves, etc.
- f. "AS DIRECTED" means as directed by the Architect or his representative.
- g. "CONCEALED" means embedded in masonry or other construction, installed behind wall furring or within double partitions or installed within hung ceilings.

END OF SECTION 260500.10

## SECTION 260500.15 – WORK INCLUDED

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. General: Provide the work included in accordance with the Contract Documents.
- B. Provide all labor, materials, equipment, tools, appliances, auxiliaries, services, hoisting, scaffolding, support, supervisions, Project Record Documents, and perform all operations noted in the Documents. Perform all operations for the furnishing and installation of the complete electrical system, including, but not limited to, the work described hereinafter. The work shall meet or exceed the latest codes, regulations and requirements of the state and local community.
- C. The electrical work is shown schematically on the Drawings to indicate the general system arrangement and configuration. The work of this Division shall include coordination with the work of other Divisions of the Specifications and the Contract Documents so as to provide complete and operational systems capable of being readily operated and maintained, to the Owner's satisfaction.
- D. The work includes, but is not limited to the following:
  - 1. Alteration and additions to existing 5 KV distribution system.
  - 2. Alterations and additions to existing power distribution system
  - 3. Alterations and addition to existing building facilities
  - 4. Power distribution system
  - 5. Telecommunication system
  - 6. Grounding system
  - 7. Connection to owner furnished equipment
  - 8. CATV raceway system
  - 9. Monitoring system
  - 10. Security system

END OF SECTION 260500.15

## 260500.17 – REVIEWS AND ACCEPTANCES

### PART 1 - GENERAL

#### 1.1 SUBSTITUTION OF MATERIALS OR EQUIPMENT

- A. Reference shall be made to Division 012500 "Substitutions Procedures", for substitution of material or equipment in this Division of the Specifications.

#### 1.2 SHOP DRAWINGS

- A. Prepare and submit detailed shop drawings for materials, systems and equipment as listed herein, including locations and sizes of all openings in floor decks, walls and floors.
- B. The work described in any shop drawing submission shall be carefully checked for all clearances (including those required for maintenance and servicing), field conditions, maintenance of architectural conditions and proper condition with all trades on the job. Each submitted shop drawing shall include a certification that all related job conditions have been checked and that no conflict exists.
- C. All drawings shall be submitted sufficiently in advance of final requirements to allow ample time for checking and resubmittal as may be required. All submittals shall be complete and contain all required and detailed information.
- D. Acceptance of any submitted data or shop drawings for material, equipment apparatus, devices, arrangement and layout shall not relieve Contractor from responsibility of furnishing same of proper dimensions and weight, capacities, sizes, quantity, quality and installation details to efficiently perform the requirements and intent of the contract. Such acceptance shall not relieve contractor from responsibility for errors, omissions or inadequacies of any sort on submitted data or shop drawings.
- E. Each shop drawing shall contain job title and reference to the applicable drawing and specification article.

#### 1.3 SHOP DRAWING SUBMITTALS

- A. Certified Submittals
  - 1. All electrical materials, devices, appliances and equipment shall be labeled and listed by a certified testing laboratory or agency.
- B. Submit for the Architect's approval shop drawings of the following and any other shop drawings requested:
  - 1. Panelboards and switchboard
  - 2. Cabinets

3. Safety switches
4. Wiring devices
5. Surge protective devices
6. Security systems and devices

END OF SECTION 260500.17

## SECTION 260500.22 – EQUIPMENT WIRING

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. General: Provide final connections to equipment and coordinate same in accordance with the Contract Documents.
- B. Equipment to receive final connections shall include, but not be limited to the following:
  - 1. Miscellaneous equipment
  - 2. Owner furnished equipment

#### 1.2 STANDARDS

- A. Except as modified by governing codes and by the Contract Documents, comply with the latest applicable provisions and latest recommendations of the following:
  - 1. American National Standard Safety Code for Elevators, Dumbwaiters and Moving Walks (ANSI A17.2).
  - 2. The National Electric Code (NFPA 70)

#### 1.3 EXAMINATION OF DOCUMENTS

- A. Prior to the submitting of bids, the Contractor shall familiarize himself with all conditions affecting the proposed installation of equipment requiring electrical connections and shall make provisions as to the cost thereof. Failure to comply with the intent of this paragraph shall in no way relieve the Contractor of performing all necessary work required for final electrical connections and equipment.

### PART 2 - PRODUCTS - NOT USED

### PART 3 - EXECUTION

#### 3.1 EQUIPMENT CONNECTIONS

- A. This contractor shall make final connections to all electrical equipment. Coordinate with equipment supplier for size and location of all final connections. Contractor to match receptacle with plugs of equipment supplied by others.

END OF SECTION 260500.22

## SECTION 260508 - TESTING, ACCEPTANCES, AND CERTIFICATIONS

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. General: Complete testing of equipment and systems shall be provided throughout in accordance with the Contract Documents.

#### 1.2 STANDARDS

- A. Except as modified by governing codes and by the Contract Documents comply with the latest applicable provisions and the latest recommendations of the following:

- 1. Industry standards shall apply except as otherwise specified.

#### 1.3 APPLICABLE CODES, STANDARDS AND REFERENCES

- A. All inspections and tests shall be in accordance with the following applicable codes and standards except as provided otherwise herein.

- 1. National Electrical Manufacturer's Association – NEMA
  - 2. American National Standards Institute – ANSI
  - 3. Institute of Electrical and Electronic Engineers – IEEE
  - 4. National Electrical Code – NEC
  - 5. National Fire Protection Association – NFPA
  - 6. American Society for Testing and Materials – ASTM
  - 7. Insulated Power Cable Engineers Association – IPCEA
  - 8. Association of Edison Illuminating Companies – AEIC
  - 9. Occupational Safety and Health Administration – OSHA
  - 10. State and local codes and ordinances
  - 11. Applicable Independent Testing Associations Specifications

- B. All inspections and tests shall utilize the following references:

- 1. Project design specifications
  - 2. Project design drawings
  - 3. Manufacturer's instruction manuals applicable to each particular apparatus.

#### 1.4 SUBMITTALS

- A. The test report shall include the following:

- 1. Summary of project
  - 2. Description of equipment tested

3. Description of test
4. Test results
5. Conclusions and recommendations
6. Appendix, including appropriate test forms
7. List of test equipment used and calibration date
8. Conditions for future access to secured computer database of all Test Data.

- B. Furnish three copies of the completed report to the project engineer no later than 30 days after completion of the project, unless directed otherwise.

## 1.5 SAFETY AND PRECAUTIONS

- A. Safety practices shall include, but are not limited to, the following requirements:
1. Occupational Safety and Health Act of 1970 – OSHA 29CFR 1910.269
  2. National Fire Protection Association – NFPA 70E
  3. Applicable state and local safety operating procedures.
- B. All tests shall be performed with apparatus de-energized except where otherwise specified.
- C. The engineering service testing group's lead test engineer for the project shall be a designated safety representative and shall be present on the project and supervise testing operations and safety requirements.
- D. Power circuits shall have conductors shorted to ground by a hotline grounded device approved for the purpose in accordance with the appropriate test procedures.
- E. In all cases, work shall not proceed until the safety representative has determined that it is safe to do so.
- F. The engineering service testing group shall have available sufficient protective barriers and warning signs, where necessary, to conduct specified tests safely.
- G. The owner's safety procedures shall be reviewed and understood by the engineering service testing group personnel.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Provide all labor, premium labor and materials required by shop and field testing as specified in the Contract Documents and as required by the authorities having jurisdiction.

## 2.2 SYSTEMS

A. The following systems are to be tested, inspected and certified.

### 1. Wire and Cable (600 Volts and Below)

- a. Inspect all splices and terminations and make mechanically and electrically tight during a fifteen (15) day period immediately prior to final acceptance of the work.
- b. Insulation System – To ensure integrity of the cable insulation system after shipping, site storage, and pulling through conduit an insulation resistance test will reveal insulation deformities and moisture in the cable that otherwise might cause an untimely premature cable failure possibly damaging equipment or personnel. Perform the following on all customer power cables to and from main switchboard. This would include cables from utility transformer to MSB and cables from MSB to all secondary switchboards or distribution panels.
- c. Visually inspect visible portion of cables for observable defects.
- d. Ensure all solid-state devices are disconnected from the system prior to meggering. Typically but not all-inclusive would be Meters, trip units with voltage sensing, and SPD units.
- e. Isolate cables by opening breakers. Meggering thru equipment like motors or transformers will produce erroneous readings.
- f. Perform insulation-resistance tests on each line and load cable, phase-to-phase, phase-to-ground, phase-to-neutral and neutral-to-ground in each conduit. Megger at 1000 VDC for 600 volt cable and 500 VDC for 300 volt cable for one minute.
- g. Insulation resistance shall be above 100 ohms and preferably above one megohm.
- h. Ensure cable termination connections are tight after testing.

### 2. Motors

- a. Test all motors under load and verify that motor rotation is correct.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Notify the Architect seven (7) days prior to the testing dates. If the Architect so elects not to witness a specific test a statement of certification must be forwarded to the Architect for his approval.
- B. Conduct tests at a time agreeable to the Architect. Provide premium labor as necessary.
- C. Products which are found defective or do not pass such tests shall be removed and replaced at the Contractor's expense. Tests shall be repeated.
- D. Conduct all test required by the authorities having jurisdiction.

### 3.2 RESTORATION OF EQUIPMENT AND REPORTS

- A. Before Energizing
  - 1. Remove and account for all test equipment, jumper wires, and tools used during testing.
  - 2. Remove and account for safety grounds and tools.
  - 3. Replace all barriers and covers, close all doors, and secure all latches.
  - 4. Remove safety locks and tags.
  - 5. Ensure all adjustable meters, relays and trip devices are properly set in accordance with the coordination study.
  - 6. Apply testing label to equipment
- B. Note corrective actions taken, deficiencies, recommendations and any general comments.
- C. Finish recording data on test forms, completely filling in the blanks. Enter into electronic database as required in section 1.04.E
- D. Turn in 3 copies of report to engineer for approval.

### 3.3 FOLLOW UP TESTING

- A. Included in above cost as part of original project.
- B. One month prior to the expiration of the factory warranty schedule & perform a thermal scan of all breaker to cable, breaker, bus connections, cable to panel chassis. Scope is to include main transformer connections, main switchboard, all secondary switchboards, transformers, and panels. Tests are to be done with building normal loaded for 2 hours, not with partial or unloaded condition.
- C. Thermal scan temperatures shall be evaluated as follows (based on comparable size or adjacent phases and loaded breakers, bus connections, and terminations)
  - 1. 1-3 degrees C rise, Investigate as to the cause of temp rise.
  - 2. 4 – 15 degree C rise, Repair as soon as possible.
  - 3. 16 or higher degree C rise, Repair immediately.
- D. Ensure that all bus and breaker to cable connections are tight.
- E. Note corrective actions taken, deficiencies, recommendations and any general comments.
- F. Finish recording data on test forms, completely filling in the blanks.
- G. Turn in 3 copies of report to engineer for approval.

END OF SECTION 260508

## SECTION 260519 – LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. General: Provide 600 volt wire and cable in accordance with the Contract Documents.

#### 1.3 STANDARDS

- A. Except as modified by governing codes and by the Contract Documents, comply with the latest applicable provisions and latest recommendations of the following:
  - 1. Underwriters Laboratory Standard No. UL 467, UL 486c
    - a. ASTM
    - b. IPECA
  - 2. Terminal Blocks
    - a. UL-1059

### PART 2 - PRODUCTS

#### 2.1 WIRE AND CABLE

##### A. General

- 1. Provide wire with a minimum insulating rating of 600 volts, except for wire used in 50 volts or below applications for control of signal systems use 300 volt minimum or 600 volt where permitted to be incorporated with other wiring systems.

##### B. Conductor

- 1. Electrical grade, annealed copper fabricated in accordance with ASTM standards. Minimum size number 12 for branch circuits; number 14 for control wiring.
- 2. The conductors shown on the drawings are copper, except as noted otherwise.

##### C. Stranding and Number of Conductors

- 1. Number 12 and number 10 solid.

2. Cables larger than number 10, stranded in accordance with ASTM Class B stranding designations.
3. Control wires stranded in accordance with ASTM Class B stranding designations.
4. Cables, multi-conductor unless otherwise noted for low tension systems.

D. Insulation

1. Type THWN/THHN insulation suitable for use in wet locations up to 75 degrees Centigrade. Use for lighting, receptacle and motor circuits and for panel and equipment feeders.
2. Type THHN – Flame retardant: Heat-resistant thermoplastic insulation, nylon jacket rated for 90 degrees Centigrade operation. Use for lighting branch circuit wiring installed and passing through the ballast channels of fluorescent fixtures, wiring in metal roofdecks in or near roof insulation, in attic or joist spaces, or in raceways exposed to the sun.
3. Type XF – Crosslinked polyolefin insulated heat-resistant wire suitable for 150 degrees Centigrade operation. Use for fixture wiring or any wiring within 3 feet horizontally or 10 feet above any furnace, boiler or similar appliance.

E. 2-Hour Fire Rated Wiring System (MI)

1. Cable shall be 2-hour rated, UL rated with copper sheath. Cable shall be factory assembled of one or more conductors insulated with highly compacted magnesium oxide insulation and enclosed in a seamless, liquid- and gas-tight continuous copper sheath.
2. Conductors shall be solid, high electrical conductivity copper with cross section corresponding to the standard N.E.C. AWG sizes.
3. Insulation shall be of highly compressed magnesium oxide that provided proper spacing for the conductors. Thickness of the insulation shall be at least 55 mils for all 600 volt power or control cables.
4. Cable and installation shall comply with N.E.C. Article 332. Cables must be supported per manufacturers recommendations.
5. Cable shall be Pentair System 1850 or approved equal. Provide shop drawings of cable and fittings.

F. Color Coding

1. Provide consistent color coding of all feeders, sub feeders, motor circuits and the likes as follows:

120/208 Volts Code	277/480 Volts Code
Phase A - Black	Phase A - Brown
Phase B - Red	Phase B - Orange
Phase C - Blue	Phase C - Yellow
Neutral - White	Neutral - Gray
Ground - Green	Ground - Green w/Yellow Stripe

2. Color code wiring for control systems installed in conjunction with mechanical and/or miscellaneous equipment in accordance with the wiring diagrams furnished with the equipment. Factory color code wire number 2 and smaller. Wire number 1 and larger may be color coded by color taping of the entire length of the exposed ends.

## 2.2 CONNECTORS

- A. Make connections, splices, taps and joints with solderless devices, mechanically and electrically secure. Protect exposed wires and connecting devices with electrical tape or insulation to provide not less than that of the conductor.
- B. Branch Circuit wires (Number 10 and smaller): Use any of the following types of terminals and connecting devices:
  - 1. Hand Applied
    - a. Coiled tapered, spring wound devices with a conducting corrosion-resistant coating over the spring steel and a plastic cover and skirt providing full insulation for splice and wired ends. Screw connector on by hand.
  - 2. Tool Applied
    - a. Steel cap, with conduction and corrosion resistant metallic plating, open at both ends, fitted around the twisted ends of the wire and compressed or crimped by means of a special die designed for the purpose. Specifically fitted plastic or rubber insulating cover wrap over each connector.

## 2.3 ELECTRICAL TAPE

- A. Specifically designed for use as insulating tape.

## 2.4 LUBRICANT

- A. Use lubricant only where the possibility of damage to conductors exists. Use only a lubricant approved by the cable manufacturer and one which is inert to cable and raceways.

# PART 3 - EXECUTION

## 3.1 WIRE AND CABLE

- A. Provide a complete system of conductors in raceway system. Mount wiring through a specified raceway, regardless of voltage application.
- B. Drawings do not indicate size of branch circuit wiring. For branch circuits whose length from panel to furthest outlet exceeds 100 feet for 120-volt circuits, use number 10 or larger.
- C. Do not install wire in incomplete conduit runs nor until after the concrete work and plastering is completed and moisture is swabbed from conduits. Eliminate splices wherever possible. Where necessary, splice in readily accessible pull, junction, or outlet.
- D. Provide cable supports for all vertical risers where required by code.
- E. Flashover or insulation value of joints to be equal to that of the conductor. Provide Underwriters Laboratories listed connectors rated at 600 volts for general use and 1,000 volts for use between ballasts and lamps or gaseous discharge fixtures.

- F. Use terminating fittings, connectors, etc., of a type suitable for the specified cable furnished. Make bends in cable at termination prior to installing compression device. Make fittings tight.
- G. Extend wire sizing for the entire length of a circuit, feeder, etc. unless specifically noted otherwise.
- H. Provide a separate neutral conductor for each branch circuit. In the event a common neutral conductor is used, such as in furniture systems, the circuit breaker in the panelboard must be common trip for each phase that uses one neutral conductor.

END OF SECTION 260519

## SECTION 260526 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. General: Provide a low impedance grounding system in accordance with the Contract Documents.

#### 1.3 STANDARDS

- A. Except as modified by governing codes and by the Contract Documents, comply with the latest applicable provisions and latest recommendations of the following:
  - 1. Underwriters Laboratory Standard No. UL 467
  - 2. ANSI C-1 1978

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. Furnish and install an electrical grounding system as indicated on the construction documents and as specified herein.
- B. Grounding systems shall be installed in accordance with the requirements of the local authorities, NEC Section 250, and subject to the approval of the Architect.
- C. All ground wires and bonding jumpers shall be stranded copper installed in conduit. All ground wires shall be without joints and splices over its entire length.

#### 2.2 GROUNDING SYSTEMS

- A. The system neutral shall be grounded at the service entrance only, and kept isolated from grounding systems throughout the building.
- B. Each system of continuous metallic piping and ductwork shall be grounded in accordance with the requirements of the NEC Section 250.

- C. Metal conduits and portions of metallic piping and duct systems which are isolated by flexible connections, insulated coupling, etc., shall be bonded to the equipment ground with a flexible bonding jumper, or separate grounding conductor.
- D. All conduits, metal raceways, boxes, cabinets, etc., installed by this Contractor and all motors and equipment connected shall be properly bonded and grounded.
- E. In all feeders and branch circuits install a green colored ground wire to each panel, cabinet, receptacle, motor or piece of control equipment.
- F. The green ground wires shall be extended and connected to the ground bus in the panels or equipment enclosure. Neutral wiring system shall not be used for this purpose. Green ground wire shall be connected to all junction or pull boxes through which they pass and to all cabinet and panel enclosures.
- G. This ground wire shall be run in same conduit as phase and neutral wires feeding equipment, motor or receptacles and conduit size shall be increased if necessary. This conductor shall be installed whether or not shown on the drawings and shall be sized in accordance with NEC but shall not be smaller than #12 AWG. Motors shall be grounded by a grounding terminal in their connection box. Tie all ground wires together in panels and connect to ground bus in panel cabinet.
- H. All electrical equipment including lighting fixtures shall be grounded in the same manner as motors. All equipment shall be solidly grounded to the green covered wire and this Contractor shall furnish grounding lugs as required.

### PART 3 - EXECUTION

#### 3.1 GENERAL

- A. Grounding connections and splices shall be brazed molded exothermic welded, bolted clamp terminal or pressure-connector type. Bolted connections and pressure-connectors shall be used for connections to removable equipment. Brazed connections shall be made where noted on drawings.

END OF SECTION 260526

## SECTION 260529 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Equipment shall be installed on hangers and supports as specified in this section of the specifications.

#### 1.3 SUPPORTS

- A. Support work in accordance with the best industry practice and the following.
- B. Include supporting frames or racks extending from floor slab to ceiling slab for work indicated as being supported from walls where the walls are incapable of supporting the weight. In particular, provide such frames or racks in electric closets.
- C. Include supporting frames or racks for equipment, intended for vertical surface mounting, which is required in a free-standing position.
- D. Supporting frames or racks shall be of standard angle, standard channel or specialty support system steel members. They shall be rigidly bolted or welded together and adequately braced to form a substantial structure. Racks shall be of ample size to assure a workmanlike arrangement of all equipment mounted on them.
- E. Nothing, (including outlet, pull and junction boxes and fittings) shall depend on electric conduits, raceways, or cables for support, except that threaded hub type fittings having a gross volume not in excess of 100 cubic inches may be supported from heavy wall conduit, where the conduit in turn is securely supported from the structure within five inches of the fitting on two opposite sides.
- F. Nothing shall rest on, or depend for support on, suspended ceilings media (tiles, lath, plaster, as well as splines, runners, bars and the like in the plane of the ceiling).
- G. Provide required supports and hangers for conduit, equipment, etc., so that loading will not exceed allowable loadings of structure.

1.4 FASTENINGS

- A. Fasten electric work to building structure in accordance with the best industry practice and the following:
- B. As a minimum procedure, where weight applied to the attachment points is 100 pounds or less, fasten to building elements of:
  - 1. Wood – with wood screws.
  - 2. Concrete and solid masonry – with bolts and expansion shields.
  - 3. Hollow Construction – with toggle bolts.
  - 4. Solid metal – with machine screws in tapped holes or with welded studs.
  - 5. Steel decking or subfloor – with fastenings as specified below for applied weights in excess of 100 pounds.
- C. As a minimum procedure, where weight applied to the attachment points exceeds 100 pounds, but is 300 pounds or less, conform to the following:
  - 1. At concrete slabs utilize 24" x 24" x 1/2" steel fishplates on top with through bolts. Fishplate assemblies shall be chased in and grouted flush with the top of slab screen line, where no fill is to be applied.
  - 2. At steel decking or subfloor for all fastenings, utilize through bolts or threaded rods. The tops of bolts or rods shall be set at least one inch below the top fill screen line and grouted in. Suitable washers shall be used under bolt heads or nuts. In cases where the decking or subfloor manufacturer produces specialty hangers to work with his decking or subfloor such hangers shall be utilized.
- D. Where weight applied to building attachments points exceeds 300 pounds, coordinate with and obtain approval of Architect and conform to the following:
  - 1. Utilize suitable auxiliary channel or angle iron bridging between building structural steel elements to establish fastening points. Bridging members shall be suitably welded or clamped to building steel. Utilize threaded rods or bolts to attach to bridging members.
- E. Floor mounted equipment shall not be held in place solely by its own dead weight. Include floor anchor fastenings in all cases.
- F. For items which are shown as being ceiling mounted at locations where fastening to the building construction element above is not possible, provide suitable auxiliary channel or angle iron bridging tying to the building structural elements.

END OF SECTION 260529

## SECTION 260533 – RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. General: Provide raceways in accordance with the Contract Documents.

#### 1.2 STANDARDS

- A. Except as modified by governing codes and by the Contract Documents, comply with the latest applicable provisions and latest recommendations of the following:
1. Rigid Conduit – RMC
    - a. UL Standard UL-6
    - b. ANSI C80-1
    - c. Federal Specification WW-C-581E
  2. Electrical Metallic Tubing – EMT
    - a. UL Standard UL-797
    - b. ANSI C80-3
    - c. Federal Specification WW-C-563
  3. Flexible Metal Conduit – FMC
    - a. UL Standard UL-1
  4. LiquidTight Flexible Metal Conduit – LFMC
    - a. UL Standard UL-360
  5. Wireways and Auxiliary Gutters
    - a. UL Standard UL-870
  6. Metal Clad Cable – MC
    - a. UL Standard 1581
    - b. Federal Spec J-C-30B

### PART 2 - PRODUCTS

#### 2.1 RACEWAY TYPES

- A. Rigid Steel Conduit – RMC
1. Rigid steel conduit heavy wall galvanized.
- B. Electric Metallic Tubing – EMT
1. Continuous, seamless tubing galvanized or sheradized on the exterior coated on the interior with a smooth hard finish of lacquer, varnish or enamel.
  2. All couplings, connectors, etc., used in conjunction with this raceway which are 2 inch in size and smaller shall be watertight compression type. EMT fittings shall be zinc plated

steel. With conduits of 2-1/2 inch in size and larger, set screw type couplings are permitted.

C. Flexible Metal Conduit – FMC

1. Single strip, continuous, flexible interlocked double-wrapped steel, galvanized inside and outside forming smooth internal wiring channel.
2. Maximum length: 6 feet.
3. Each section of raceway must contain a bonding wire bonded at each end and sized as required. Provide connectors with insulating bushings.

D. LiquidTight Flexible Metal Conduit – LFMC

1. Same as flexible steel conduit except with tough, inert watertight plastic outer jacket.
2. Cast malleable iron body and gland nut cadmium plated with one-piece brass grounding bushings which thread to interior of conduit. Spiral molded vinyl sealing ring between gland nut and busing and nylon insulated throat.

E. Metal Clad Cable – MC

Non Health Care

1. Type MC cable shall be armored galvanized steel sheath cable with copper conductors and THHN 90 ° insulation. Furnish with insulated grounding conductor.

F. Rigid Non-Metallic Conduit – RNC

1. Composed of polyvinyl chloride suitable for 90° C.
2. Raceway, fittings and cement must be produced by the same manufacturer who must have had a minimum of ten (10) years experience in manufacturing the products.
3. Materials must have a tensile strength of 7,000 – 7,200 psi and compressive strength of 9,000 psi.
4. All joints shall be solvent cemented in accordance with the recommendations of the manufacturer. Install expansion fittings per NEC.

G. Wireways and Auxiliary Gutters

1. Of sizes and shapes indicated on the Drawings and as required.
2. Provide all necessary elbows, tees, connectors, adaptors, etc.
3. Hinged cover secured with captive screws.
4. Wire retainers not less than 12 inches on center.

## 2.2 OUTLET, JUNCTION AND PULLBOXES

- A. Provide zinc-coated or cadmium-plated sheet steel outlet boxes not less than 4 inches octagonal or square, unless otherwise noted. Equip fixture outlet boxes with 3/8 inch no-bolt fixture studs where required. Where fixtures are mounted on or in an accessible type ceiling, provide a junction box and extend flexible conduit to each fixture. Fit outlet boxes in finished ceilings or walls with appropriate covers, set flush with the finished surface. Where more than one switch or device is located at one point, use gang boxes and covers unless otherwise indicated.

Sectional switch boxes or utility boxes will not be permitted. Provide Series "GW" (Steel City) tile box, or as accepted, or a 4 inch square box with tile ring in masonry walls which will not be plastered or furred. Where drywall material is utilized, provide plaster ring. Provide outlet boxes of the type and size suitable for the specific application. Where outlet boxes contain two or more 277 volt devices, or where devices occur of different applied voltages, or where normal and emergency devices occur in same box, provide suitable barrier.

- B. Construct junction or pullboxes not over 150 cubic inches in size as standard outlet boxes, and those over 150 cubic inches the same as "cabinets" with screw covers of the same gauge metal.
- C. Plug any open knockouts not utilized.
- D. Provide surface mounted outlet and junction boxes in indoor locations where exposed to moisture and outdoor locations of cast metal with threaded hubs.

### PART 3 - EXECUTION

#### 3.1 APPLICATION OF RACEWAYS

- A. The following applications must be adhered to except as otherwise required by Code. Raceway not conforming to this listing must be removed by this Contractor and replaced with the specified material at this Contractor's expense.

B. Raceway Types	Application
Rigid Conduit RMC	1. Where exposed on outside of building or subjected to exterior temperatures and humidity. 2. Where required by codes. 3. All circuits in excess of 600V.
Electrical Metallic Tubing EMT	Use in every instance except where another material is specified.
Flexible Metal Conduit – FMC	Use in dry areas for connections to lighting fixtures in hung ceilings, connections to equipment installed in removable panels of hung ceilings at all transformer or equipment raceway connections where sound and vibration isolation is required.
LiquidTight Flexible Metal Conduit - LFMC	Use in areas subject to moisture where flexible steel is unacceptable at connections to all motors, and all raised floor areas.
Rigid Non-Metallic Conduit – RNC	1. Schedule 40 – Where raceways are in slab in below grade levels, for raceway duct banks. 2. Schedule 80 – For underground raceways outside of the building which are not encased in concrete
Metal-Clad Cable - MC	Use for branch circuit wiring above suspended ceilings or in metal stud walls. Cable shall not be run exposed. Home run wiring from panelboard to first outlet box shall be installed in conduit. MC cable not permitted for fire alarm wiring systems or emergency lighting.
Wireways and Auxiliary Gutters	Where indicated on the drawings and as otherwise specifically approved.

### 3.2 RACEWAY SYSTEMS IN GENERAL

- A. Provide raceways for all wiring systems unless noted otherwise. 277/480 volt wiring must be kept independent of 120/208 volt wiring. Where non-metallic raceways are utilized, provide sizes as required with the grounding conductor considered as an insulated additional conductor. Minimum size 3/4 inch for home runs and 1 inch minimum for power distribution. Wiring of each type and system must be installed in separate raceways.
- B. Install capped bushings on raceways as soon as installed and remove only when wires are pulled. Securely tie embedded raceway in place prior to embedment. Raceways installed below or in floor slabs must extend a minimum of 4 inches above the finished slab to the first connector. Lay out the work in advance to avoid excessive concentrations or multiple raceway runs.
- C. Locate raceways so that the strength of structural members is unaffected and they do not conflict with the services of other trades. Install 1 inch or larger raceways in or through structural members (beams, slabs, etc.) only when and in the manner accepted by the Architect. Draw up couplings and fittings full and tight. Protect threads from corrosion with one coat zinc chromate after installation.
- D. Above Grade – Defined as the area above finished grade for a building exterior and above top surface of any slabs (or other concrete work) on grade for a building interior. Above-grade raceways to comply with the following:
  - 1. Install raceways concealed except at surface cabinets and for motor and equipment connection in electrical and mechanical rooms. Install a minimum of 6 inches from flues, steam pipes, or other heated lines. Provide flashing and counter-flashing for waterproofing of raceways, outlets, fittings, etc., which penetrate the roof. Route raceways parallel or perpendicular to building lines with right-angle turns and symmetrical bends. Run embedded raceways in a direct line and, where possible, with long sweep bends and offsets. Provide sleeves in forms for new concrete walls, floor slabs and partitions for passage of raceways. Waterproof sleeved raceways where required.
  - 2. Provide raceway expansion joints for exposed and concealed raceways with necessary bonding conductor at building expansion joints and between buildings or structures and where required to compensate for raceway or building thermal expansion and contraction.
  - 3. Provide one empty 3/4 inch raceway for each three spare unused poles or spaces of each flush-mounted panelboard. Terminate empty 3/4 inch conduit in a junction box, which after completion, is accessible to facilitate future branch circuit extension.
  - 4. Provide raceway installation (with appropriate seal-offs, explosion-proof fittings, etc.) in special occupancy area, as required. Provide conduit seal-offs where portions of an interior raceway system pass through walls, ceiling or floors which separate adjacent rooms having substantially different maintained temperatures, as in refrigeration or cold storage rooms.
  - 5. Protect raceway in earth or fill with two coats of asphalt base paint. Touch up abrasions and wrench marks after conduit is in place.
  - 6. In lieu of above, protect raceways with a minimum of 20 mil tape approved for the purpose and overlapped a minimum of 1/2 tape width.
  - 7. Provide drag wire in spare or empty raceways. Tag both ends of wire denoting opposite and termination location with black India ink on flameproof linen tag.

- E. Below Grade: Defined as the area below finished grade for a building exterior and below or within the bottom floor slab for a building interior. Below grade raceways to comply to the following.
1. Project below-grade raceways 2 inches minimum above floor or equipment foundation. Install exterior underground conduits 24 inches minimum below finished grade. Do not penetrate waterproof membranes unless proper seal is provided.
- F. No raceway may be installed in a concrete slab except with the permission of the Structural Engineer and with the written consent of the Owner. Conduits embedded in structural concrete slabs shall have the following minimum thickness and shall conform to the following:

Raceway Sizes	Minimum Thickness of Concrete Slab
3/4"	4 - 1/2"
1"	5"

1. Unless specifically approved in writing, raceways 1-1/4 inch size and larger shall not be installed in structural concrete slabs.
  2. In no case will installation of raceways be permitted to interfere with the proper placement of principal reinforcement.
  3. Raceways in structural slabs shall be placed between the upper and the lower layers of reinforcing steel. This will require careful bending of conduits.
  4. Raceways embedded in concrete slabs shall be spaced not less than 8 inches on centers and as widely spaced as possible where they converge at panels or junction boxes.
  5. Raceways running parallel to slab supports, such as beams, columns and structural walls, shall be installed not less than 12 inches from such supporting elements.
  6. To prevent displacement during concrete pour of lift slab, saddle supports for conduit, outlet boxes, junction boxes, inserts, etc., shall be secured with suitable adhesives.
- G. Rigid non-metallic conduit installations shall conform to the following:
1. All joints are to be made by the solvent cementing method using the material recommended by the raceway manufacturer. Fittings, cement and conduit shall be supplied by the same manufacturer.
  2. Raceway cutoffs shall be square and made by handsaw or other approved means which does not deform the conduit. Raceway shall be reamed prior to solvent cementing to couplings, adapters, or fittings.
  3. Electrical devices which are served by PVC raceways to be grounded by means of ground wire pulled in the raceway.
  4. Male box adapters shall be used for all box or raceway fittings to terminate plastic raceways.
  5. Where separable terminations are required, they shall be made using PVC threaded adapters with locknuts or bushings. If such terminations must be watertight, "O" rings shall be installed.
  6. Bends shall be made by methods that do not deform or damage the conduit. The radii of field bends shall not be less than those established by the NEC.
  7. Raceway expansion fittings shall be provided in accordance with NEC. The position of the expansion fitting shall be adjusted proportional to the temperature at installation.

8. Raceway supports shall be installed in such a manner to allow the PVC conduit to slide through the supports as the temperature changes.
  9. Elbows must be galvanized rigid steel.
  10. Rigid non-metallic conduit is not permitted to be installed within the building.
- H. Raceways in hung ceilings shall be run on and secured to slab or primary structural members of ceiling, not to lathing channels or T-bars or other elements which are the direct supports of the ceiling panels. Secure conduit firmly to steel by clips and fittings designed for that purpose. Install as high as possible, but not less than, 1-0" above hung ceilings.
- I. Exposed raceways shall be run parallel or at right angles with building lines. Secure raceway clamps or supports to masonry materials by toggle bolts, expansion bolts, or steel inserts. Install raceway on steel construction with approved clamps which do not depend on friction or set-screw pressure alone.
- J. Clear raceway of all obstructions and dirt prior to pulling in wires or cables. This shall be done with ball mandrel (diameter approximately 85% of conduit inside diameter) followed by close fitting wire brush and wad of felt or similar material. This assembly may be pulled in together with, but ahead of the cable being installed. All empty raceways shall be similarly cleaned. Clear any raceway which rejects ball mandrel.
- K. Support less than 2 inch trade size, vertically run, raceways at intervals no greater than eight feet. Support such raceways, 2 inch trade size or larger, at intervals no greater than 10 feet.
- L. Support less than 1 inch trade size horizontally run, raceways at intervals not greater than 7 feet. Support such raceways, 1 inch trade size or larger, at intervals no greater than 10 feet.

### 3.3 OUTLET, JUNCTION, AND PULLBOXES

- A. Provide outlet, junction, and pullboxes as indicated on the Drawings and as required for the complete installation of the various electrical systems, and to facilitate proper pulling of wires and cables. J-boxes and pullboxes shall be sized per NEC minimum.
- B. The exact location of outlets and equipment is governed by structural conditions and obstructions or other equipment items. When necessary, relocate outlets so that when fixtures or equipment are installed, they will be symmetrically located according to the room layout and will not interfere with other work or equipment. Verify final location of outlets, panels equipment, etc., with Architect.
- C. Back-to-back outlets in the same wall or "thru-wall" type boxes are not permitted. Provide 12 inch (minimum) spacing for outlets shown on opposite sides of a common wall to minimize sound transmission.

END OF SECTION 260533

## SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Identification for electrical raceways
  - 2. Identification of power and control cables
  - 3. Identification for branch circuit and feeder conductors
  - 4. Underground-line warning tape
  - 5. Warning labels and signs per N.E.C.
  - 6. Instruction signs
  - 7. Identification labels for distribution equipment, junction boxes, cabinets and miscellaneous equipment.

#### 1.3 SUBMITTALS

- A. Product Data: Furnish type of material to be supplied for each electrical identification product indicated.

#### 1.4 STANDARDS

- A. Except as modified by governing codes and by the Contract Documents, comply with the latest applicable provisions and latest recommendations of the following:
  - 1. Comply with ANSI A13.1
  - 2. Comply with NFPA 70
  - 3. Comply with 29 CFR 1910.144 and 29 CFR 1910.145
  - 4. Comply with ANSI Z535.4 for safety signs and labels

#### 1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors and features with requirements in the Contract Documents, shop drawings, manufacturer's wiring diagrams and operation and manual and with those required by codes and standards.

## PART 2 - PRODUCTS

### 2.1 POWER RACEWAY AND METAL CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Raceway Colors for Circuits at 600 V or Less
  - 1. Black letters on an orange field.
  - 2. Legend: Indicate voltage and system or service type.
- C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

### 2.2 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

### 2.3 UNDERGROUND-LINE WARNING TAPE

- A. Description: Permanent, Bright-Colored, Continuous-Printed, Polyethylene Tape
  - 1. Not less than 6 inches wide by 4 mils thick.
  - 2. Compounded for permanent direct-burial service.
  - 3. Embedded continuous metallic strip or core.
  - 4. Printed legend shall indicate type of underground line.

### 2.4 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Warning label and sign shall include, but are not limited to, the following legends:
  - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
  - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."

## 2.5 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. inches and 1/8 inch thick for larger sizes.
  - 1. Engraved legend with black letters on white face.
  - 2. Punched or drilled for mechanical fasteners.
  - 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

## 2.6 EQUIPMENT IDENTIFICATION LABELS

- A. Engraved, Laminated Acrylic or Melamine Label: White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

## 2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 90A: Identify with orange self-adhesive vinyl label.
- B. Accessible Raceways and Cables of Auxiliary Systems: Identify the following systems with color-coded, self-adhesive vinyl tape applied in bands.
  - 1. Security System: Blue and Yellow
  - 2. Mechanical and Electrical Supervisory System: Green and Blue
  - 3. Telecommunication System: Green and Yellow
  - 4. Control Wiring: Green and Red
- C. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- D. Attach signs and plastic labels with mechanical fasteners appropriate to the location and substrate.
- E. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.
- F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 12 inches below finished grade. Use

multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

### 3.2 IDENTIFICATION SCHEDULE

- A. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
  - 1. Power
- B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
  - 1. Color-Coding for Phase Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.
    - a. Colors for 208/120-V Circuits
      - 1) Phase A: Black
      - 2) Phase B: Red
      - 3) Phase C: Blue
      - 4) Neutral: White
      - 5) Ground: Green
    - b. Colors for 480/277-V Circuits
      - 1) Phase A: Brown
      - 2) Phase B: Orange
      - 3) Phase C: Yellow
      - 4) Neutral: White
      - 5) Ground: Green
    - c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- C. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- D. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
  - 1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
  - 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
  - 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- E. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
  - 1. Limit use of underground-line warning tape to direct-buried cables.
  - 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

- F. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install marking tape at flush-mounted panelboards and similar equipment in finished spaces.
- G. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
  - 1. Comply with 29 CFR 1910.145.
  - 2. Identify system voltage with black letters on an orange background.
  - 3. Apply to exterior of door, cover, or other access.
  - 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
    - a. Power transfer switches.
    - b. Controls with external control power connections.
- H. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- I. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
  - 1. Labeling Instructions
    - a. Equipment: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide five lines of text.
      - 1) First Line: 1/2-inch letters on the first line stating equipment name.
      - 2) Second Line (if applicable): 3/8-inch letters stating the existing equipment name in parentheses ( ).
      - 3) Third Line: 3/8-inch letters stating voltage/phase.
      - 4) Fourth Line: 3/8-inch letters stating the breaker number, panel name and room number/name (Owner's room number) from which the equipment is fed.
      - 5) Fifth Line: 3/8-inch letters stating function and/or equipment which it controls.
  - 2. Equipment to be Labeled
    - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.
    - b. Enclosures and electrical cabinets.
    - c. Access doors and panels for concealed electrical items.
    - d. Enclosed switches.
    - e. Enclosed circuit breakers.
    - f. Enclosed controllers.

END OF SECTION 260553

## SECTION 262416 – PANELBOARDS

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. General: Provide panelboards in accordance with the Contract Documents.

#### 1.2 STANDARDS

- A. Except as modified by governing codes and by the Contract Documents, comply with the latest applicable provisions and latest recommendations of the following:
  - 1. Panelboards
    - a. UL Standards #67.
    - b. UL Standard 50 Cabinet and Boxes
    - c. Federal Standard W-P-115.
    - d. NEMA Standard PB-1
    - e. Circuit Breakers – Type 1, Class 1.

#### 1.3 SUBMITTALS

- A. Submittals will be furnished. Submittals failing to meet the following criteria will be returned without a review or acceptance.
- B. With each panelboard drawing the following is required:
  - 1. Show main devices and lug sizes; branch circuit device sizes and arrangement; bus ampacities; withstandability and short circuit rating; dimensions and construction; gutter and backbox dimensions; nameplate and legend; protective coating; and all pertinent details of panel, enclosure, cover, and method of securing cover and lock.

#### 1.4 QUALITY ASSURANCE

- A. Each panelboard as a complete and finished product shall receive a single integrated equipment rating by the manufacturer. The integrated equipment short circuit rating shall certify that all equipment is capable of withstanding the thermal and magnetic stress of a fault equal to the value specified on the Drawings. Such rating shall be established by actual tests by the manufacturer on similar equipment. This certification shall be permanently affixed to each panelboard. Test data shall be submitted to the Engineer at time of submission of Acceptance Drawings.

## PART 2 - PRODUCTS

### 2.1 APPROVED MANUFACTURERS

1. Eaton
2. Square D
3. General Electric
4. Siemens

B. 120/240 volts circuit breaker type panelboards are to be equal to Eaton Pow-R Line 1.

### 2.2 PANELBOARDS IN GENERAL

A. Provide panelboards consisting of an assembly of branch circuit switching and protective devices (circuit breakers, switch and fuse units, or combination thereof) mounted inside a dead front enclosure. Provide the number and size of these branch circuit devices as indicated by the circuiting, on the drawings, and in the schedules.

B. Provide the following modifications and additional equipment as shown on the Drawings:

1. Main circuit breakers.
2. Shunt trip circuit breakers.

C. Interiors

1. Rigid removable assembly of copper bus bars and interchangeable bolted branch circuit devices.
2. Bus bars drilled to permit branch circuit devices of all sizes and number of poles to be interchangeable and installed in any spare space of sufficient size, without disturbing adjacent units; without removing main bus or branch circuit connectors and without machining, drilling, or tapping in the field.
3. Arrange bus in sequence or distributed phasing so that multipole circuit breaker can replace any group of single circuit breakers of the same size.
4. Provide copper neutral bus in each panelboard.
5. Provide copper ground bus in each panelboard.

D. Enclosure

1. Code gauge steel box galvanized.
2. Provide a bolt-on ground connector to inside of enclosure.
3. Flush mounted in finished areas and where indicated. Surface mount elsewhere.

E. Front

1. Doors must be provided on all lighting and power distribution panels. On switch and fuse panelboards, doors for overcurrent devices are not to be provided.
2. Heavy code gauge steel as required to maintain panel face flat.
3. Hold front closed with trim clamps.

4. Factory finished in medium gray enamel or two coats of air-drying lacquer over a rust inhibitor.
5. Provide directory for total number of poles.
6. Provide approved lock. All panels keyed alike. Furnish 4 sets of matching keys to the Owner.
7. Welded angle rest at the bottom of the door to facilitate cover installation.
8. Doors over 48" in height shall have auxiliary fasteners at top and bottom of door in addition to lock and catch.
9. Door-in-door construction.

F. Terminal lugs

1. Bolted type, labeled for either copper or aluminum conductors.
2. Locate main lugs properly at top or bottom, depending where main feeder enters.

G. Electrical Ratings

1. Panelboards are to be rated 120/208 or 277/480 volts 3 phase, 4 wire, full neutral with ampacities as indicated on the Drawings (unless otherwise noted).
2. Short circuit withstand ratings shall be as indicated on the Drawings. Panelboards shall be fully rated. Series rated not acceptable.
3. Where indicated, provide panelboards having a "service entrance" Type UL label with neutrals factory bonded to frame or enclosure.

H. Circuit Breaker Devices

1. Plastic molded case. Completely sealed enclosure. Toggle type operating handle. Trip ampere rating and ON/OFF indication clearly visible.
2. Thermal-magnetic trip-free, trip-indicating, quick-make, quick-break, with inverse time delay characteristics. Single-handle and common tripping multipole breakers.
3. Silver alloy contacts with auxiliary arc-quenching devices.
4. Panelboard must be of the type which will accept the field installation of shunt trip devices of 60 amperes or less on the branch devices.
5. Interrupting capacities shall be as indicated on the Drawings. In general, 120/208 volt devices shall be not less than (10,000 AIC). And 277/480 not less than (14,000 AIC).
6. Arc Fault Circuit Breaker Devices shall be equipped with 5mA ground fault protection integrated design capability. Provide arc fault breakers (AFCI) for all bedroom lighting and power 15-ampere and 20-ampere single pole 120Volt circuits indicated on the plans.
7. For lighting circuits that are controlled at panel, provide devices labeled "SWD" for switching purposes.
8. Bolted type terminals UL listed for either aluminum or copper 75 degrees C cables.
9. Provide main breakers in panels served from transformers.
10. Locate next to each breaker or space unit an individual number.
11. Circuit breakers serving kitchen equipment beneath cooking hoods shall include a shunt trip coil.
12. Panelboard shall accept circuit breakers from 15 ampere to 100 ampere.

2.3 SURGE PROTECTIVE DEVICES

- A. Provide surge protective devices as specified in Section 264313.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Mount panel 4 feet to panel center but with maximum height of 6 feet 6 inches to handle of topmost switching device.
- B. Mount surface type panels a minimum of 1 inch off wall on channels.
- C. Connect feed-through panels to main feeder by insulated parallel gutter taps. Full-size tap for two panels on a common feeder. Increase cabinet width to accommodate gutter tap.
- D. Where flush mounted, the fire integrity of the wall in which it is installed must be maintained.
- E. Neatly arrange branch circuit wires and tie together in each gutter with Thomas & Betts nylon "Ty-Raps", or approved equal at minimum 4 inch intervals.
- F. Plug all knockouts removed and not utilized.

#### 3.2 TOUCH UP AND CLEANING

- A. Vacuum all backboxes clean of debris after installation and prior to final payment.
- B. Touch up scratch marks, etc. with matching paint.

END OF SECTION 262416

## SECTION 264313 - SURGE PROTECTIVE DEVICES

### PART 1 - GENERAL

#### 1.1 SCOPE

- A. The Contractor shall furnish and install the Surge Protective Device (SPD) equipment having the electrical characteristics, ratings, and modifications as specified herein and as shown on the contract drawings. To maximize performance and reliability and to obtain the lowest possible let-through voltages, the ac surge protection shall be integrated into electrical distribution equipment such as switchboards and panelboards. Refer to related sections for surge requirements in:

#### 1.2 RELATED SECTIONS

- A. Section 262416 – Panelboards

#### 1.3 REFERENCES

- A. SPD units and all components shall be designed, manufactured, and tested in accordance with the latest applicable UL standard (ANSI/UL 1449 3<sup>rd</sup> Edition).

#### 1.4 SUBMITTALS – For Review/Approval

- A. The following information shall be submitted to the Engineer:
  - 1. Provide verification that the SPD complies with the required ANSI/UL 1449 3rd Edition listing by Underwriters Laboratories (UL) or other Nationally Recognized Testing Laboratory (NRTL). Compliance may be in the form of a file number that can be verified on UL's website or on any other NRTL's website, as long as the website contains the following information at a minimum: model number, SPD Type, system voltage, phases, modes of protection, Voltage Protection Rating (VPR), and Nominal Discharge Current ( $I_n$ ).
  - 2. For sidemount mounting applications (SPD mounted external to electrical assembly), electrical/mechanical drawings showing unit dimensions, weights, installation instruction details, and wiring configuration.
- B. Where applicable the following additional information shall be submitted to the engineer:
  - 1. Descriptive bulletins
  - 2. Product sheets

#### 1.5 SUBMITTALS – FOR CONSTRUCTION

- A. The following information shall be submitted for record purposes:
  - 1. Final as-built drawings and information for items listed in Section 1.4 and shall incorporate all changes made during the manufacturing process.

## 1.6 QUALIFICATIONS

- A. The manufacturer of the assembly shall be the manufacturer of the major components within the assembly.
- B. For the equipment specified herein, the manufacturer shall be ISO 9001 or 9002 certified.
- C. The manufacturer of this equipment shall have produced similar electrical equipment for a minimum period of five (5) years. When requested by the Engineer, an acceptable list of installations with similar equipment shall be provided demonstrating compliance with this requirement.
- D. The SPD shall be compliant with the Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

## 1.7 DELIVERY, STORAGE AND HANDLING

- A. Equipment shall be handled and stored in accordance with manufacturer's instructions. One (1) copy of manufacturer's instructions shall be included with the equipment at time of shipment.

## 1.8 OPERATION AND MAINTENANCE MANUALS

- A. Operation and maintenance manuals shall be provided with each SPD shipped.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Eaton Cutler-Hammer
- B. Square D
- C. GE
- D. The listing of specific manufacturers above does not imply acceptance of their products that do not meet the specified ratings, features, and functions. Manufacturers listed above are not relieved from meeting these specifications in their entirety. Products in compliance with the specification and manufactured by others not named will be considered only if pre-approved by the Engineer ten (10) days prior to bid date.

## 2.2 VOLTAGE SURGE SUPPRESSION – GENERAL

- A. Electrical Requirements
  - 1. Unit Operating Voltage – Refer to drawings for operating voltage and unit configuration.
  - 2. Maximum Continuous Operating Voltage (MCOV) – The MCOV shall not be less than 115% of the nominal system operating voltage.

3. The suppression system shall incorporate thermally protected metal-oxide varistors (MOVs) as the core surge suppression component for the service entrance and all other distribution levels. The system shall not utilize silicon avalanche diodes, selenium cells, air gaps, or other components that may crowbar the system voltage leading to system upset or create any environmental hazards.
4. Protection Modes – The SPD must protect all modes of the electrical system being utilized. The required protection modes are indicated by bullets in the following table:

	Protection Modes			
Configuration	L-N	L-G	L-L	N-G
Wye	•	•	•	•
Delta	N/A	•	•	N/A
Single Split Phase	•	•	•	•
High Leg Delta	•	•	•	•

5. Nominal Discharge Current ( $I_n$ ) – All SPDs applied to the distribution system shall have a 20kA  $I_n$  rating regardless of their SPD Type (includes Types 1 and 2) or operating voltage. SPDs having an  $I_n$  less than 20kA shall be rejected.
6. ANSI/UL 1449 3rd Edition Voltage Protection Rating (VPR) – The maximum ANSI/UL 1449 3rd Edition VPR for the device shall not exceed the following:

MODES	208Y/120	480Y/277
L-N; L-G; N-G	700	1200
L-L	1200	2000

#### B. SPD Design

1. Maintenance Free Design – The SPD shall be maintenance free and shall not require any user intervention throughout its life. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.
2. Balanced Suppression Platform – The surge current shall be equally distributed to all MOV components to ensure equal stressing and maximum performance. The surge suppression platform must provide equal impedance paths to each matched MOV. Designs incorporating replaceable SPD modules shall not be accepted.
3. Electrical Noise Filter – Each unit shall include a high-performance EMI/RFI noise rejection filter. Noise attenuation for electric line noise shall be up to 50 dB from 10 kHz to 100 MHz using the MIL-STD-220A insertion loss test method. Products unable able to meet this specification shall not be accepted.
4. Internal Connections – No plug-in component modules or printed circuit boards shall be used as surge current conductors. All internal components shall be soldered, hardwired with connections utilizing low impedance conductors.
5. Monitoring Diagnostics – Each SPD shall provide the following integral monitoring options:

- a. Protection Status Indicators - Each unit shall have a green / red solid-state indicator light that reports the status of the protection on each phase.
    - 1) For wye configured units, the indicator lights must report the status of all protection elements and circuitry in the L-N and L-G modes. Wye configured units shall also contain an additional green / red solid-state indicator light that reports the status of the protection elements and circuitry in the N-G mode. SPDs that indicate only the status of the L-N and L-G modes shall not be accepted.
    - 2) For delta configured units, the indicator lights must report the status of all protection elements and circuitry in the L-G and L-L modes.
    - 3) The absence of a green light and the presence of a red light shall indicate that damage has occurred on the respective phase or mode. All protection status indicators must indicate the actual status of the protection on each phase or mode. If power is removed from any one phase, the indicator lights must continue to indicate the status of the protection on all other phases and protection modes. Diagnostics packages that simply indicate whether power is present on a particular phase shall not be accepted.
  - b. Remote Status Monitor – The SPD must include Form C dry contacts (one NO and one NC) for remote annunciation of its status. Both the NO and NC contacts shall change state under any fault condition.
  - c. Audible Alarm and Silence Button – The SPD shall contain an audible alarm that will be activated under any fault condition. There shall also be an audible alarm silence button used to silence the audible alarm after it has been activated.
6. Overcurrent Protection
- a. The unit shall contain thermally protected MOVs. These thermally protected MOVs shall have a thermal protection element packaged together with the MOV in order to achieve overcurrent protection of the MOV. The thermal protection element shall disconnect the MOV(s) from the system in a fail-safe manner should a condition occur that would cause them to enter a thermal runaway condition.
7. Fully Integrated Component Design – All of the SPD's components and diagnostics shall be contained within one discrete assembly. SPDs or individual SPD modules that must be ganged together in order to achieve higher surge current ratings or other functionality shall not be accepted.
8. Safety Requirements
- a. The SPD shall minimize potential arc flash hazards by containing no user serviceable / replaceable parts and shall be maintenance free. SPDs containing items such as replaceable modules, replaceable fuses, or replaceable batteries shall not be accepted. SPDs requiring any maintenance of any sort such as periodic tightening of connections shall not be accepted. SPDs requiring user intervention to test the unit via a diagnostic test kit or similar device shall not be accepted.
  - b. SPDs designed to interface with the electrical assembly via conductors shall require no user contact with the inside of the unit. Such units shall have any required conductors be factory installed.
  - c. Sidemount SPDs shall be factory sealed in order to prevent access to the inside of the unit. Sidemount SPDs shall have factory installed phase, neutral, ground and remote status contact conductors factory installed and shall have a pigtail of conductors protruding outside of the enclosure for field installation.

## 2.3 SYSTEM APPLICATION

- A. The SPD applications covered under this section include distribution and branch panel locations and switchboard assemblies as indicated on drawings. All SPDs shall be tested and demonstrate suitability for application within ANSI/IEEE C62.41 Category C, B, and A environments.
- B. Surge Current Capacity – The minimum surge current capacity the device is capable of withstanding shall be as shown in the following table:

Minimum surge current capacity based on ANSI / IEEE C62.41 location category			
CATEGORY	Application	Per Phase	Per Mode
C	Service Entrance Locations (Switchboards, Switchgear, MCC, Main Entrance)	250 kA	125 kA
B	High Exposure Roof Top Locations (Distribution Panelboards)	160 kA	80 kA
A	Branch Locations (Panelboards, MCCs, Busway)	120 kA	60 kA

- C. SPD Type - All SPDs installed on the load side of the service entrance disconnect shall be Type 1 or Type 2 SPDs.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

NOT USED

#### 3.2 FACTORY TESTING

- A. Standard factory tests shall be performed on the equipment under this section. All tests shall be in accordance with the latest version of NEMA and UL standards.

#### 3.3 INSTALLATION

- A. The Contractor shall install all equipment per the manufacturer's recommendations and the contract drawings.

#### 3.4 WARRANTY

- A. The manufacturer shall provide a full ten (10) year warranty from the date of shipment against any SPD part failure when installed in compliance with manufacturer's written instructions and any applicable national or local code.

END OF SECTION 264313

## SECTION 28 05 00 - COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceways and cables.
2. Sleeve seals.
3. Grout.
4. Common electronic safety and security installation requirements.

#### 1.2 SUBMITTALS

A. Product Data: For sleeve seals.

### PART 2 - PRODUCTS

#### 2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

#### 2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
1. Manufacturers: Subject to compliance with requirements,
  2. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
    - a. Advance Products & Systems, Inc.
    - b. Calpico, Inc.
    - c. Metraflex Co.
    - d. Pipeline Seal and Insulator, Inc.
  3. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.

## 2.3 GROUT

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

## PART 3 - EXECUTION

### 3.1 COMMON REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electronic safety and security equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

### 3.2 SLEEVE INSTALLATION FOR ELECTRONIC SAFETY AND SECURITY PENETRATIONS

- A. Electronic safety and security penetrations occur when raceways, pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry

1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
  - I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
  - J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
  - K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
  - L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
  - M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.
- 3.3 SLEEVE-SEAL INSTALLATION
- A. Install to seal exterior wall penetrations.
  - B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- 3.4 FIRESTOPPING
- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electronic safety and security installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 28 05 00

## SECTION 280513 – CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Coaxial cabling.
2. RS-232 cabling.
3. RS-485 cabling.
4. Low-voltage control cabling.
5. Control-circuit conductors.
6. Identification products.

#### 1.2 SUBMITTALS

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

1. For coaxial cable, include the following installation data for each type used:

- a. Nominal OD.
- b. Minimum bending radius.
- c. Maximum pulling tension.

B. Shop Drawings: Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements.

C. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

D. Source quality-control reports.

E. Field quality-control reports.

F. Maintenance data.

#### 1.3 QUALITY ASSURANCE

A. 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: 50 or less.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## PART 2 - PRODUCTS

### 2.1 PATHWAYS

- A. Support of Open Cabling: NRTL labeled for support of cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
1. Support brackets with cable tie slots for fastening cable ties to brackets.
  2. Lacing bars, spools, J-hooks, and D-rings.
  3. Straps and other devices.
- B. Cable Trays:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Cable Management Solutions, Inc.
    - b. Cablofil Inc.
    - c. Cooper B-Line, Inc.
    - d. Cope - Tyco/Allied Tube & Conduit.
    - e. GS Metals Corp.
  2. Cable Tray Materials: Metal, suitable for indoors, and protected against corrosion by electroplated zinc galvanizing, complying with ASTM B 633, Type 1, not less than **0.000472 inch (0.012 mm)** thick
    - a. Basket Cable Trays: **12 inches (150 mm)** wide and **2 inches (50 mm)** deep <Insert Wire mesh spacing shall not exceed **2 by 4 inches (50 by 100 mm)**.
- C. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems."
1. Outlet boxes shall be no smaller than **2 inches (50 mm)** wide, **3 inches (75 mm)** high, and **2-1/2 inches (64 mm)** deep.

### 2.2 COAXIAL CABLE

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
1. Alpha Wire Company.
  2. Belden CDT Inc.; Electronics Division.
  3. Coleman Cable, Inc.
  4. CommScope, Inc.
  5. Draka USA.
- B. General Coaxial Cable Requirements: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 75-ohm nominal impedance with a return loss of 20 dB maximum from 7 to 806 MHz.

C. RG-11/U: NFPA 70, Type CATV.

1. No. 14 AWG, solid, copper-covered steel conductor.
2. Gas-injected, foam-PE insulation.
3. Double shielded with 100 percent aluminum polyester tape and 60 percent aluminum braid.
4. Jacketed with sunlight-resistant, black PVC or PE.
5. Suitable for outdoor installations in ambient temperatures ranging from minus 40 to plus 85 deg C.

D. RG59/U: NFPA 70, Type CATVR.

1. No. 20 AWG, solid, silver-plated, copper-covered steel conductor.
2. Gas-injected, foam-PE insulation.
3. Triple shielded with 100 percent aluminum polyester tape and 95 percent aluminum braid; covered by aluminum foil with grounding strip.
4. Color-coded PVC jacket.

E. RG-6/U: NFPA 70, Type CATV or CM.

1. No. 16 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
2. Double shielded with 100 percent aluminum-foil shield and 60 percent aluminum braid.
3. Jacketed with black PVC or PE.
4. Suitable for indoor installations.

F. RG59/U: NFPA 70, Type CATV.

1. No. 20 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
2. Double shielded with 100 percent aluminum polyester tape and 40 percent aluminum braid.
3. PVC jacket.

G. RG59/U (Plenum Rated): NFPA 70, Type CMP.

1. No. 20 AWG, solid, copper-covered steel conductor; foam fluorinated ethylene propylene insulation.
2. Double shielded with 100 percent aluminum-foil shield and 65 percent aluminum braid.
3. Copolymer jacket.

H. NFPA and UL compliance, listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1655, and with NFPA 70 "Radio and Television Equipment" and "Community Antenna Television and Radio Distribution" Articles. Types are as follows:

1. CAT6A

2.3 COAXIAL CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

1. Aim Electronics; a brand of Emerson Electric Co.
2. Leviton Voice & Data Division.
3. Simon Co. (The).

B. Coaxial-Cable Connectors: Type BNC, 75 ohms.

## 2.4 RS-232 CABLE

A. Standard Cable: NFPA 70, Type CM.

1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Polypropylene insulation.
3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
4. PVC jacket.
5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with UL 1581.

B. Plenum-Type Cable: NFPA 70, Type CMP.

1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Plastic insulation.
3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
4. Plastic jacket.
5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with NFPA 262.

## 2.5 RS-485 CABLE

A. Standard Cable: NFPA 70, Type CM[ or CMG].

1. Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

B. Plenum-Type Cable: NFPA 70, Type CMP.

1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. Flame Resistance: NFPA 262, Flame Test.

## 2.6 LOW-VOLTAGE CONTROL CABLE

A. Paired Lock Cable: NFPA 70, Type CMG.

1. 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

B. Plenum-Type, Paired Lock Cable: NFPA 70, Type CMP.

1. 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with NFPA 262.

C. Paired Lock Cable: NFPA 70, Type CMG.

1. 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

D. Plenum-Type, Paired Lock Cable: NFPA 70, Type CMP.

1. 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Plastic jacket.
5. Flame Resistance: NFPA 262, Flame Test.

## 2.7 CONTROL-CIRCUIT CONDUCTORS

- A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, in raceway complying with UL 83.
- B. Class 2 Control Circuits: Stranded copper, [Type THHN-THWN, in raceway] [power-limited cable, concealed in building finishes] [power-limited tray cable, in cable tray] complying with UL 83.
- C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or TF, complying with UL 83.

## 2.8 IDENTIFICATION PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Brady Corporation
  2. HellermannTyton.

3. Kroy LLC.
4. Panduit Corp.

- B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- C. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

## 2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response, or attenuation over frequency, of a cable by generating a voltage whose frequency is varied through the specified frequency range and graphing the results.
- C. Cable will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF PATHWAYS

- A. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.
- B. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
- C. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." for installation of conduits and wireways.
- D. Install manufactured conduit sweeps and long-radius elbows whenever possible.
- E. Pathway Installation in Equipment Rooms:
  1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
  2. Install cable trays to route cables if conduits cannot be located in these positions.
  3. Secure conduits to backboard when entering room from overhead.
  4. Extend conduits 3 inches (75 mm) above finished floor.
  5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- F. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

### 3.2 INSTALLATION OF CONDUCTORS AND CABLES

#### A. Comply with NECA 1.

#### B. General Requirements for Cabling:

1. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets or terminals.
2. Cables may not be spliced. Secure and support cables at intervals not exceeding **30 inches (760 mm)** and not more than **6 inches (150 mm)** from cabinets, boxes, fittings, outlets, and terminals.
3. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
4. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
5. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
6. Pulling Cable: Do not exceed manufacturer's instructions as to allowable pulling tension. Monitor cable pull tensions.

#### C. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend copper cable not in a wireway or pathway a minimum of **8 inches (200 mm)** above ceilings by cable supports not more than [**60 inches (1525 mm)**] <Insert dimension> apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

#### D. Outdoor Coaxial Cable Installation:

1. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
2. Attach antenna lead-in cable to support structure at intervals not exceeding **36 inches (915 mm)**.

### 3.3 CONTROL-CIRCUIT CONDUCTORS

#### A. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits, No. 14 AWG.
2. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

### 3.4 CONNECTIONS

- A. Comply with requirements in Division 28 Section "Perimeter Security Systems" for connecting, terminating, and identifying wires and cables.
- B. Comply with requirements in Division 28 Section "Intrusion Detection" for connecting, terminating, and identifying wires and cables.
- C. Comply with requirements in Division 28 Section "Access Control" for connecting, terminating, and identifying wires and cables.
- D. Comply with requirements in Division 28 Section "Video Surveillance" for connecting, terminating, and identifying wires and cables.
- E. Comply with requirements in Division 28 Section "PLC Electronic Detention Monitoring and Control Systems" for connecting, terminating, and identifying wires and cables.
- F. Comply with requirements in Division 28 Section "Fire Detection and Alarm" for connecting, terminating, and identifying wires and cables.
- G. Comply with requirements in Division 28 Section "Refrigerant Detection and Alarm" for connecting, terminating, and identifying wires and cables.

### 3.5 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping."

### 3.6 GROUNDING

- A. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems."

### 3.7 IDENTIFICATION

- A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

### 3.8 FIELD QUALITY CONTROL

- A. Tests and Inspections:
  - 1. Visually inspect cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding.
  - 2. Visually inspect cable placement, cable termination, grounding, and bonding.
  - 3. Coaxial Cable Tests: Comply with requirements in Division 27 Section "Master Antenna Television System."

- B. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- C. Prepare test and inspection reports.

END OF SECTION 280513

## Part 1 General

### 1.1 Background

The Old Fire Station is the subject of planned demolition of the structure in Hagerstown, Maryland; abatement of all known accessible Asbestos Containing Materials (ACMs) that will be impacted by the demolition work is planned in conjunction with the demolition.

An existing Limited Hazardous Materials Survey Report and a Limited Supplemental Asbestos-Containing Materials Survey Report, both prepared by Froehling and Robertson (F&R) for Airport Design Consultants, Inc. (the Owner) as part of F&R projects 72W-0019 (dated May 15, 2018) and 59C-0111 (dated June 6, 2024), respectively are available upon request from the Owner. The F&R survey documents were used in preparation of this section and, based on the report, the following building materials were identified as ACM (or with trace, <1% concentrations of asbestos) in the areas of demolition; the Contractor shall be familiar with the report and the homogeneous areas (HA) where ACM were identified and where presumed ACM (PACM) are possible. Note that the Location included in the table simply reflects the location(s) where representative materials were identified and may not describe all locations of the material at the facility. The following building materials are confirmed to be ACM in the within the Old Fire Station scheduled for demolition:

**ASBESTOS CONTAINING MATERIALS INVENTORY**

HA	Material Description	Location(s)	Asbestos Content	EPA/NESH AP Category	Estimated Quantity <sup>1</sup>
3	White Roof Flashing with Black Backing	Perimeter of the Equipment Shed roof	40/8% Chrysotile	Category I Non-friable	21.5 SF
4	White Flashing Caulk	Perimeter of the Equipment Shed roof	2-3% Chrysotile	Category II Non-friable	21.5 SF
9	Beige/Grey Exterior Window Caulk	Exterior perimeter of all windows	2-3% Chrysotile	Category II Non-friable	36 SF
10	Grey Interior Window Caulk	Interior perimeter of all windows	2% Chrysotile	Category II Non-friable	36 SF
11	Grey Door Caulk	Interior/Exterior Perimeter of doorways	2-3% Chrysotile	Category II Non-friable	1.2 SF
12	White Door Caulk	Perimeter of the two end garage doors	2% Chrysotile	Category II Non-friable	3 SF
15	Grey Cementitious Ceiling	Bathroom and Laundry room ceiling	20% Chrysotile	Category II Non-friable	60 SF
18	Black Adhesive at Vent Pipe Penetration	Upper Main Roof at North Center Area at Vent Pipe	2% Chrysotile	Category II Non-friable	1.5 SF
19	Tarry Material at Exhaust Vent Pitch Fan	Upper Main Roof at North Center Area at Exhaust Pipe including beneath where material has migrated through roof decking at exhaust vent	8-10% Chrysotile	Category II Non-friable	2 SF
20 <sup>2</sup>	Membrane, Rigid Fiber Board, and Cellulose-like Board	~4-foot Wall at Roof Elevation Change between Western Low Main Roof and Upper Main Roof	20% Chrysotile	Category II Non-friable	360 SF

<sup>1</sup>Estimated Quantity: SF = Square Feet, LF = Linear Feet, Units = Number of Units, TBD = To Be Determined

<sup>2</sup>HA #20: The laboratory reports several layers of this material as Trace <1% Chrysotile. The “Transite” layer was identified to contain 20% Chrysotile and is presumed by the laboratory to have possibly contaminated these other material layers. Based on the confirmed concentration of asbestos in the “Transite” layer and the presumed contamination of other layers, the entire HA should be treated as ACM.

<sup>3</sup>Other ACMs may be present in the building which are not documented here but which, if present, will be impacted as part of the demolition. If work is performed that will impact presumed or other newly discovered materials that have not been sampled, F&R recommends that work that would impact that material would cease or that the material be treated as asbestos in accordance with this document. Samples of suspect materials should be collected by a Maryland accredited asbestos inspector and submitted to a NVLAP accredited laboratory for analysis and handled accordingly prior to disturbance.

This asbestos guidance document does not address lead related regulations, guidance, or work plans.

### **1.1.1 Document Intent**

The intent of this document is to provide guidance with regard to the abatement of known ACMs which will be impacted by the demolition of the structure known as the Old Fire Station. Demolition is anticipated to impact all of the ACMs in the project area.

### **1.1.2 Consultant Contact and Signatures**

This section was prepared under F&R project number 59C-0111 by:

**FROEHLING & ROBERTSON, INC.**  
1734 Seibel Drive, N.E.  
Roanoke, Virginia 24012  
(540) 344-7939

Brian K. Burger  
Industrial Hygienist

Jesse D. Phillips, CIH  
Industrial Hygiene Practice Leader  
MD Asbestos Designer # 240001168

### **1.1.3 Work Included**

- A. The work includes the furnishing of all labor, materials, equipment, insurance and services necessary for the completion of asbestos removal and related work.
- B. Comply with all governing regulations which this Plan supplements.
- C. Comply with applicable contract documents and any additional Washington County, MD, City of Hagerstown, MD, or Airport Design Consultants, Inc. Requirements.

#### **1.1.3.1 Scope of Work**

The Abatement Contractor has the responsibility for determining actual quantities of materials to be removed and reviewing the scope of work; the values described below are for budgetary purposes and may not accurately reflect the values encountered in the field. The contractor shall provide lump sum costs for abatement of the ACMs at the quantities identified in the table above, (section 1.1). Unit rates shall also be provided for each of the noted materials to be abated and for each of the materials identified in other areas of the building in the event that values greater than those anticipated are encountered during site work. Unit rates should also be provided for the noted presumed materials in the event that they are encountered during work.

The Contractor should allow under their base bid for the removal of all materials as described in the survey report and referenced in this specification. All mobilizations and permit notifications shall be the Abatement Contractor's responsibility. The base lump sum value will be reduced or expanded by the respective unit rates based on the actual quantity of materials encountered during the abatement work.

We note that this document is specific to the asbestos abatement and that the asbestos abatement contractor and other site personnel are responsible for developing and implementing protective measures for their respective personnel and compliance with all federal and state requirements for asbestos abatement activities, including exposure monitoring.

A. The Scope of Work includes, but is not necessarily limited, to the following:

- 1) The Abatement Contractor shall be responsible for removal of all asbestos containing materials (currently identified as PACMs, and referred to interchangeably as either ACM or PACM throughout this document) noted above as required by the Building Owner or Architect.
- 2) All mobilizations permits, and notifications shall be the Abatement Contractor's responsibility.
- 3) This section includes all work necessary to prevent air concentrations of asbestos above the specified level and maintain the specified asbestos control limits during the life of the contract. It also contains procedures for removal, containment, and disposal of ACMs. The work specified in this document consists of the provision of services for the removal and disposal of ACMs present in materials identified at the site.
- 4) All ACM abatement and cleanup work will be performed by competent, licensed (by MDE) asbestos workers and/or supervisors trained, qualified, and knowledgeable in the techniques of abatement, handling, and disposal of ACMs and materials contaminated by asbestos, in accordance with pertinent local, state, and federal regulations.
- 5) The Contractor is responsible for verifying quantities of ACM for abatement and providing unit rates, as applicable. Alternate cost estimates as acceptable to the Building Owner and/or his representative(s) may be arranged.

Requirements regarding the execution of the abatement are specified below, in Part 4.

#### **1.1.3.2 Bidding**

The Abatement Contractor shall submit unit costs for abatement of the following items, based on the specified execution methods for each item:

- A. All identified ACMs at the site constitute Category I or II, nonfriable ACM; therefore, ACMs may be removed as follows:
  - a. Removal utilizing hand-held tools, a HEPA vacuum and wet methods within a regulated area. The regulated work area shall be the area from which asbestos containing materials are being removed and shall extend 25 feet from the perimeter of the removal area. A Decontamination Room or a Decontamination Corridor shall be provided for Decontamination Procedures as detailed below in Section 4.1.1.4.
    - i. Where materials are present associated with roofing:
      1. Work shall be performed specifically in accordance with 29 CFR 1926.1101(g)(8)(ii).

2. The decontamination corridor may be at the roof edge or at the ground level; if the decontamination area is at ground level, the access corridor shall include ladders or mobile elevating work platform (MEWP) which has been adequately plasticized and is treated as part of the "corridor" with respect to engineering controls.
- b. Removal of the materials shall be effected using hand-held tools and techniques that do not sand, grind, or abrade the materials.
- c. Where materials are removed from existing building materials which will remain in place and will be demolished (those ACMs that are not on the roof), drop cloths will be placed beneath and adjacent to the abatement work to collect material as it is dislodged.
- d. For some materials (such as caulks), it may be necessary to chip the concrete and mortar substrate to completely remove all of the material.
- e. If it becomes necessary to sand, grind, or abrade any of the ACMs, then removal will take place using wet methods within a negative pressure containment consisting of critical barriers on openings with a minimum pressure differential of -0.02" water column as detailed below in Section 4.1.1.1 or 4.1.1.4.
- f. Removed material shall be containerized as at each work station as well as the drop cloth.

Abatement may also be completed in accordance with Sections 4.1.1.1, 4.1.1.2, or 4.1.1.5, if desired.

## 1.2 Regulations

- A. All work shall conform to the requirements of the U.S. Environmental Protection Agency (EPA), U.S. Department of Labor - Occupational Safety and Health Administration (OSHA), National Institute of Occupational Safety and Health (NIOSH) and applicable State of Maryland regulations relating to asbestos and the specification contained herein. Where a conflict exists between these regulations and the project specifications, the most stringent shall apply. It is the intent of these specifications to apply requirements over and above those minimum requirements of the listed regulations.
- B. The contractor shall comply with all EPA and OSHA Regulations, and shall follow EPA workplace guidelines unless they are shown not to be applicable. Pertinent OSHA standards are the applicable sections of 29 CFR 1910 and 29 CFR 1926 including, but not limited to, 1910.1001, 1910.134 and 1926.1101. EPA workplace guidelines include those pertinent sections of Part I and II, EPA guideline document 560/5-85-024, "Guidance for Controlling Asbestos Containing Materials in Buildings", and include but are not limited to EPA regulations 40 CFR Part 61 Subparts A and B. Also include all documents incorporated by reference herein.
- C. The contractor shall remove, transport and dispose of the asbestos from the job site in compliance with 40 CFR Appendix D to Subpart E of Part 763 of the EPA regulation, the Maryland Department of the Environment Regulations and these specifications. The contractor shall be responsible for obtaining the approval document for a waste disposal site in compliance with 40 CFR Appendix D to Subpart E of Part 763 of the EPA regulations and other governing regulations.
- D. The contractor shall be accredited in accordance with the provision of Title 26 DEPARTMENT OF THE ENVIRONMENT Subtitle 11 AIR QUALITY Chapter 21 Control of Asbestos (26.11.21) and Chapter 23 Asbestos Accreditation of Individuals, and Approval of Training Courses (26.11.23). The contractor shall provide a copy of their current, valid license with submittals.
- E. The EPA and OSHA regulations shall be posted or shall be readily available digitally at the job site for the duration of the work; posting shall be in a location clearly visible or accessible to employees and others in the area.

### 1.3 Definitions

Definitions and explanations here are neither complete nor exclusive of all terms used in the contract documents, but are general for the work to the extent they are not stated more explicitly in another element of the contract documents. Any drawings must be recognized as diagrammatic in nature and not completely descriptive of the requirements indicated therein.

- A. Abatement: Procedures to control fiber release from ACMs. Includes removal, encapsulation, enclosure, demolition, and renovation activities related to ACM.
- B. Accredited/Accreditation: When referring to a person, Contractor or laboratory, means that such person is accredited in accordance with Section 206 of Title II of the Toxic Substances Control Act (AHERA Regulations).
- C. Adequately wet: Sufficiently mixed or penetrated with liquid to prevent the release of particulates. If visible emissions are observed coming from the ACM, then that material has not been adequately wetted.
- D. Aerosol: A system consisting of particles, solid or liquid, suspended in air.
- E. Aggressive Sampling: High-activity level air sampling which results in settled asbestos remaining airborne and uniformly disturbed through the use of special entrainment and mixing techniques. This makes any settled asbestos fibers accessible to the sampling filters for subsequent detection. The technique is described in 40 CFR 763.90, Appendix A to Subpart E; and Guidance for Controlling ACM in Buildings, Appendix M.
- F. Air Filtration Device (AFD): Air filtration device (AFD) is part of the pressure differential system in which the air is filtered. The AFD is to be equipped with HEPA filters.
- G. Airlock: shall mean a system for permitting entrance and exit while restricting air movement between a contaminated area and an uncontaminated area.
- H. Air monitoring: The process of measuring the fiber content of a known volume of air collected over a specified period of time. The NIOSH 7400 Method, Issue 2 is used to determine the fiber levels in air. For personal samples and clearance air testing using Phase Contrast Microscopy (PCM) analysis. NIOSH Method 7402 can be used when it is necessary to confirm fibers counted by PCM as being asbestos. The AHERA TEM analysis may be used for background, area samples and clearance samples when required by this specification, or at the discretion of the IH as appropriate.
- I. Air sample filter: The filter used to collect fibers which are then counted. The filter is made of mixed cellulose ester membrane with a 0.8 micrometer ( $\mu\text{m}$ ) pore size for PCM (Phase Contrast Microscopy) analysis and a 0.45  $\mu\text{m}$  pore size for TEM (Transmission Electron Microscopy) analysis; polycarbonate may also be used for sampling for TEM analysis.
- J. Amended Water: Water to which a surfactant has been added to increase the penetrating ability of the liquid.
- K. Approve: Where used in conjunction with the QP's response to submittals, requests, applications, inquiries, reports, and claims by the Contractor, "approved" will be held to limitations of QP's responsibilities and duties and does not release the Contractor from responsibilities to fulfill requirements of the Contract Documents. Approved shall also mean consent by U.S. EPA of training programs and the like.

- L. Asbestos: The asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthophyllite, actinolite, and/or tremolite minerals. Both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered to be asbestos.
- M. Asbestos-Containing Material (ACM): Any material containing more than 1% by weight of asbestos of any type or mixture of types. In this document, ACM includes PACM or materials with trace (<1%) concentrations of asbestos, unless otherwise.
- N. Asbestos-Containing Waste Material: Any material which is or is suspected of being or any material contaminated with an asbestos-containing material which is to be removed from a Work Area for disposal.
- O. Air Lock: A system for permitting ingress or egress without permitting air movement from a contaminated area into an uncontaminated area, typically consisting of two curtained doorways at least 3 feet apart.
- P. Authorized Visitor: Personnel authorized by the Project Officer, testing lab personnel, or a representative of any Federal, State or local regulatory agency having authority over the project are considered authorized visitors.
- Q. Barrier: Any surface that seals off the Work Area to inhibit the movement of fibers.
- R. Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.
- S. Ceiling Concentration: The concentration of an airborne substance that shall not be exceeded.
- T. Certified Industrial Hygienist (CIH): An industrial hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene or Board for Global Credentialing.
- U. Critical Barrier: Two layers of 6 mil polyethylene sheeting on walls or three layers on floors; spray foam, or duct tape used to completely seal off the Work Area to prevent spread of fibers to surrounding areas.
- V. Containment: A Negative Pressure Enclosure with a pressure differential such that the air pressure within interior of the enclosure is less than that outside. This is achieved by application of Critical Barriers at windows, doors, ducts, or other similar openings in order to reduce communication between the interior and the exterior of the space. Pressure differential shall be at least 0.02 with the negative pressure within the work area.
- W. Decontamination (Decon) Area: An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, air lock, shower room, air lock, and a clean room which is used for the decontamination of workers, materials and certain equipment contaminated with asbestos. This shall serve as the only entrance or exit to the Work Area.
- X. Demolition: The wrecking or taking out of any building component, system, finish or assembly of a facility together with any related handling operations.
- Y. Disposal Bag: A 6 mil thick, leak-proof polyethylene bag used for transporting asbestos waste from the work area to the disposal site. Each is labeled in compliance with OSHA 1926.1101 as follows:

**DANGER  
CONTAINS ASBESTOS FIBERS  
MAY CAUSE CANCER  
CAUSES DAMAGE TO LUNGS  
DO NOT BREATHE DUST  
AVOID CREATING DUST**

and U.S. DOT ORM-E label for Asbestos-Hazardous Material (including Asbestos Waste Manifest) and statements as required.

Z. Disturbance: means activities that disrupt the matrix of ACM or PACM, crumble or pulverize ACM or PACM, or generate visible debris from ACM or PACM, including cutting away small amounts of ACM and PACM.

AA.Encapsulant: A material that surrounds or embeds asbestos fibers in an adhesive matrix to prevent release of fibers.

- a. Bridging Encapsulant: An encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.
- b. Penetrating Encapsulant: An encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.
- c. Removal Encapsulant: A penetrating encapsulant specifically designed for removal of ACMs rather than for in situ encapsulation.
- d. Lockdown Encapsulant: An encapsulant that is applied following removal which is applied in an aerosol form in order to capture and "lockdown" the microscopic airborne asbestos fibers to substrates (including poly sheeting) by the formation of a flexible resinous barrier.

BB.Encapsulation: Treatment of ACM with an encapsulant.

CC.Enclosure: The construction of an air-tight, impermeable, permanent barrier around asbestos-containing material to control the release of asbestos fibers into the air.

DD.Filter: A media component used in respirators to remove solid or liquid particles from the respired air.

EE. Friable Asbestos Containing Material: Material that contains more than 1.0% asbestos by Polarized Light Microscopy (PLM), and that can be crumbled, pulverized, or reduced to powder by hand pressure when dry. This includes previously non-friable material which becomes damaged to the extent that, when dry, may be crumbled, pulverized or reduced to powder by hand pressure.

FF. Furnish: Except as otherwise defined in greater detail, the term "furnish" is used to mean supply and deliver to project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

GG.General Supervisor: Site Superintendent, Foreman: is the Contractor's representative at the work site. This person can be the Competent Person required by OSHA, 29 CFR 1926.1101.

HH.Glovebag: A sack (typically constructed of 6 mil transparent polyethylene) with two inward projecting long sleeve gloves, which are designed to enclose an object from which ACM is to be removed.

- II. HEPA Filter: A high efficiency particulate air (HEPA) filter that removes from air 99.97% or more of monodispersed dioctylphthalate (DOP) or dioctylsebacate (DOS) particles having a mean particle diameter of 0.3 microns.
- JJ. HEPA Filter Vacuum Collection Equipment (or vacuum cleaner): HEPA filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall be 99.97% efficiency for retaining fibers with an aerodynamic diameter of 0.3 microns.
- KK. Indicated: The term "Indicated" is a cross-reference for Notes or Schedules on Drawings, to other paragraphs or Schedules in the Specifications, and to similar means of recording requirements in Contract Documents.
- LL. Install: Unless defined in greater detail, "install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working on dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.
- MM. Installer: The "installer" is defined as the entity (person or firm) engaged by the Contractor or Sub-Contractor to perform a particular trade at the work site, including installation, erection, application and similar required operations. Such entities (installers) shall be experts in operations they perform.
- NN. Landfill Receipt: Document signed by a landfill operator acknowledging the receipt of ACM waste.
- OO. Manifest: A document detailing chain of custody for ACM waste hauled.
- PP. Negative Pressure Glovebag: A glovebag which is composed of flexible plastic that can be subjected to negative pressure without collapsing.
- QQ. Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.
- RR. Owner: Hagerstown Regional Airport; Washington County, Maryland
- SS. Permissible Exposure Limit (PEL): The Contractor shall ensure that no employee is exposed to an airborne fiber concentration of asbestos in excess of the PEL expressed as an 8-hour TWA as determined by the OSHA Reference Method of 29 CFR 1926.1101 (Current PEL for asbestos is 0.1 fiber/cc.).
- TT. Personal Sampling Monitoring: Air samples taken in the breathing zone of workers as required by OSHA 29 CFR 1926.1101.
- UU. Pressure Differential: Air pressure lower than surrounding areas, caused by exhausting air from a sealed space (Work Area).
- VV. Pressure Differential System: A local exhaust system, utilizing HEPA filtration, capable of maintaining a negative pressure differential inside the Work Area and a constant airflow from adjacent areas into the Work Area and exhausting that filtered air outside the Work Area.
- WW. Project Manager (Contractor): The asbestos Contractor's employee responsible for the total oversight of the project.

XX. Plasticize: Means to cover floors and walls with polyethylene sheeting as herein specified and in accordance with the temporary Enclosure Section.

YY. Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.

ZZ. Provide: Except as otherwise defined in greater detail, the term "provide" means furnish and install, complete and ready for intended use, as applicable in each instance.

AAA. Qualified Person (QP)/Project Monitor (PM): A Registered Architect, Professional Engineer, or Industrial Hygienist who has successfully completed training and is therefore accredited under a legitimate State Model Accreditation Plan as described in 40 CFR 763 as a Building Inspector, Management Planner, Project Monitor, or Asbestos Project Designer. The QP must be qualified to perform visual inspections as indicated in ASTM E 1368. The QP shall be appropriately accredited in the State of Maryland as a Project Designer. For this project, Froehling & Robertson, Inc. (F&R) personnel may serve as the QP.

BBB. Regulated ACM: Means friable ACM, non-friable ACM that has become friable, non-friable ACM that will be or has been subjected to sanding, grinding, cutting or abrading or non-friable ACM that has a high probability of becoming or has become crumbled, pulverized or reduced to powder by the forces expected to act on the ACM during renovation or demolition.

CCC. Regulated Area: An area where asbestos removal operations are performed which is isolated by physical boundaries to prevent entry of unauthorized persons or the spread of asbestos dust, fibers or debris. Within this area, the airborne concentration of asbestos could reasonably be expected to exceed the PEL. Critical barriers shall be applied within each Regulated Area.

DDD. Removal: The taking out or stripping of all ACM from a damaged area or associated area or space.

EEE. Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.

FFF. Short-Term Exposure Limit (STEL): A "ceiling" concentration, identified in OSHA regulations, of an airborne substance that shall not be exceeded for a duration of any 30-minute period (Current STEL for asbestos is 1.0 fiber/cc and is typically referred to as the excursion limit.).

GGG. Submittal: Items which are required to be presented to the Project Officer and/or the QP for review, consideration, or decision.

HHH. Surfacing Material: Material in a building that is sprayed-on, troweled-on or otherwise applied to surfaces or structural members for acoustical, fireproofing or other purposes.

III. Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

JJJ. Testing Laboratory: The "testing laboratory" is an independent entity to perform specific air sampling and analysis at the work site and associated areas, to report and (if required) interpret results. Analysis shall be performed by a laboratory accredited by the American Industrial Hygiene Association (AIHA) and having demonstrated a proficient rating in AIHA's Proficiency Analytical Testing (PAT)

Program. The laboratory shall be licensed or accredited as an Asbestos Analytical Laboratory, as required. The laboratory shall also be accredited by the National Institute of Standards and Technology (NIST) through the National Voluntary Laboratory Accreditation Program (NVLAP) for bulk sample analysis and air sample analysis by TEM (TEM Method of 40 CFR 763, Subpart E, Appendix A).

KKK. Time Weighted Average (TWA): The average concentration of a contaminant in air during a specific time period.

LLL. Visible Emissions: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed water vapor.

MMM. Waste Shipment Record: Means the original shipping document, originated and signed by the waste generator (Abatement Contractor) used to track and substantiate the disposal of ACM waste as described in 40 CFR Part 61.

NNN. Waste Generator: Means the licensed Asbestos Abatement Contractor removing ACM waste from the property.

OOO. Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils that have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos-containing waste.

PPP. Work Area: The area where asbestos-related work or removal operations are performed; the Work Area is defined and/or isolated to prevent the spread of asbestos dust, fibers, or debris, and entry by unauthorized personnel. The Work Area is a Regulated Area as defined by 29 CFR 1926.1101.

QQQ. Work Site: The term "work site" is defined as the space available to the Contractor for performance of the work either exclusively or in conjunction with others performing other work as part of the project. The extent of the project site is shown on the Drawings, and may or may not be identical with the description of land upon which the project is to be built.

#### 1.4 Abbreviations and names

The following acronyms or abbreviations referenced in Contract Documents are defined to mean the associated names. Both names and addresses are subject to change and are believed to be, but are not assured to be, accurate and up-to-date as of the date of the Contract Documents:

ACM	Asbestos Containing Material
AIA	American Institute of Architects 1735 New York Avenue, N.W. Washington, D.C. 20006 (800) 242-3837
ANSI	American National Standards Institute 25 West 43 <sup>rd</sup> Street 4 <sup>th</sup> Floor New York, NY 10036 (212) 642-4900

## SECTION 028213-ASBESTOS ABATEMENT

ASTM	American Society for Testing and Materials 100 Barr Harbor Drive West Conshohocken, PA 19428 (610) 832-9500
CFR	Code of Federal Regulations Available from Government Printing Office Washington, D.C 20402 (Usually first published in Federal Register)
EPA	Environmental Protection Agency 1650 Arch Street Philadelphia, PA 19103 (800) 438-2474
f/cc	fibers per cubic centimeter
MDE	Maryland Department of the Environment 1800 Washington Boulevard Suite 725 Baltimore, MD 21230 (410) 537-3000
NIOSH	National Institute for Occupational Safety and Health Patriots Plaza 1 395 E Street, SW, Suite 9200 Washington, DC 20201 (800) 232-4636
NIST	National Institute of Standards and Technology (U.S. Department of Commerce) 100 Bureau Drive Gaithersburg, MD 20899 (301) 975-2000
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor) 200 Constitution Avenue, NW Washington, DC 20210 (800) 321-6742
TEM	Transmission Electron Microscopy
TSI	Thermal Systems Insulation
UL	Underwriters Laboratories 333 Pfingsten Road Northbrook, IL 60062 (847) 272-8800

### 1.5 Quality Controls

- A. The asbestos removal Contractor's Supervisor shall be on the job each day during removal and he shall be knowledgeable, experienced and competent in this type of work and shall enforce the use of all safety procedures and equipment. He shall be knowledgeable of relevant EPA, OSHA and NIOSH requirements and guidelines.
- B. The Supervisor shall have a current, valid asbestos supervisor's license issued by the MDE in accordance with the provisions of MD Code 26.11.23.
- C. The asbestos removal Contractor shall be responsible for any damage to the building and its contents resulting from leakage or spillage of water.
- D. Authorities of the MDE Air and Radiation Management Administration shall be notified of the asbestos removal project by the asbestos removal Contractor, if required, as detailed in MD Code 26.11.21.03. Notifications shall be maintained and all work will be conducted within the specific notification times and dates specified on the notification or amendments. All amendments will be the responsibility of the Abatement Contractor and said contractor shall furnish copies of amendments and related documentation illustrating submission to MDE to the QP/Project Monitor.
- E. The Owner reserves the right to halt the project work until hazardous or potentially hazardous conditions are corrected.
- F. The Owner reserves the right to independently perform such analysis and tests at any time as he deems necessary to ensure and protect safety of the project.

## **1.6 Worker Protection**

- A. Comply with all EPA and OSHA Regulations, and follow EPA workplace guidelines.
- B. Provide and maintain negative air systems for all work areas when necessary, for the duration of asbestos removal work.

### **1.6.1 Respirators**

- A. Workers shall wear properly fitted respirators in the work area. Respirator selection shall be based on personal air monitoring as required by 29 CFR 1926.1101 and OSHA 1910.134, as suitable for the asbestos exposure in the work area. Long sideburns, beards etc., which interfere with proper fit are unacceptable. The Contractor shall provide sufficient filters for replacement of disposable type filters.
- B. All work involving the removal of friable ACMs requires the use of Type "C" supplied air respirators. Supplied air quality shall be C.G.A. grade D breathing air or better from a certified air source. Copies of these certificates will be supplied to the Owner or its representative. OSHA compliance is the responsibility of the Contractor; initial exposure assessments shall be conducted in order to document that the respiratory protection used is adequate for potential exposures or to document a negative exposure assessment in accordance with Section 1.6.6, below.
- C. Supplied air respirator systems must include a back-up provision approved for maintaining air flow long enough for escape and decontamination from a contaminate atmosphere in the event of loss of the primary source of breathing air.
- D. All workers shall be instructed in and be knowledgeable of the following:

- 1) The hazards of asbestos exposure.

- 2) Use of respirators and protective clothing.
- 3) Use of personal air monitoring equipment.
- 4) Use of decontamination facilities and designated showers.

#### **1.6.2 Respiratory Protection Program**

Provide a copy of a Written Respiratory Protection Program on the job site at all times. The Contractor shall develop and implement a written Respiratory Protection Program (RPP) which is in compliance with the OSHA requirements found at 29 CFR 1926.1101 and 29 CFR 1910.134. ANSI Standard Z88.2 provides excellent guidance for developing a respiratory protection program. All respirators used must be NIOSH approved for asbestos abatement activities. The written RPP shall, at a minimum, contain the basic requirements found at 29 CFR 1910.134 (c)(1)(i - ix) - Respiratory Protection Program.

#### **1.6.3 Respirator Fit Check**

The Competent Person shall assure that the positive/negative pressure user seal check is performed each time the respirator is donned by an employee. Head coverings must cover respirator head straps. Any situation that prevents an effective face piece to face seal as evidenced by failure of a user seal check shall preclude that person from wearing a respirator inside the regulated area until resolution of the problem.

#### **1.6.4 Training of Abatement Personnel**

Prior to beginning any abatement activity, all personnel shall be trained in accordance with OSHA 29 CFR 1926.1101 (k)(9) and any additional State/Local requirements. Training must include, at a minimum, the elements listed at 29 CFR 1926.1101 (k)(9)(viii). Training shall have been conducted by a third party, EPA/State approved trainer meeting the requirements of EPA 40 CFR 763 Appendix C (AHERA MAP). Initial training certificates and/or current refresher and accreditation proof must be submitted for each person working at the site PRIOR TO the trained individual performing work.

#### **1.6.5 Medical Examinations**

Medical examinations meeting the requirements of 29 CFR 1926.1101 (m) shall be provided for all personnel working in the regulated area, regardless of exposure levels. A current (dated within the preceding 12 months) physician's written opinion as required by 29 CFR 1926.1101 (m)(4) shall be provided for each person and shall include in the medical opinion the person has been evaluated for working in a heat and cold stress environment while wearing personal protective equipment (PPE) and is able to perform the work without risk of material health impairment. Documentation of current medical evaluation allowing the use of PPE onsite must be submitted for each person working at the site PRIOR TO the trained individual performing work.

#### **1.6.6 Personnel Air Monitoring**

The abatement contractor shall provide air monitoring in the work areas throughout all asbestos stripping, removal and cleaning operations to ensure that the workers are adequately protected at all times. All personal air monitoring for OSHA compliance shall be the responsibility of the Contractor. In lieu of air monitoring, a negative exposure assessment (NEA) developed in conjunction with an initial exposure assessment (IEA) that is not older than 12 months old will be accepted. The IEA must represent the same conditions as will be encountered during this abatement activity. If an IEA is not available, the contractor can utilize the results of personal air monitoring on the first full day of abatement to develop the NEA, for each similar exposure group present (SEG) onsite; this would require testing for each material type and removal method combination used.

Samples for air monitoring shall be collected by a competent person in accordance with methods prescribed in Chapter 1 of Section II of the Federal OSHA Technical Manual or by equivalent procedures. Air monitoring shall be in compliance with 1910.1001 (g) of the OSHA standards. Air samples must be analyzed by NIOSH method 7400 by a laboratory that participates in the AIHA administered PAT Round program and is currently rated as proficient.

Air monitoring (protection of the Contractor's employees) shall be provided throughout the removal and cleaning operations. Air monitoring shall be conducted and evaluated by a testing laboratory employed by the asbestos removal Contractor to ensure that the Contractor is complying with applicable EPA and OSHA regulations.

#### **1.6.6.1 Personal Monitoring Results**

When necessary, all personal monitoring (Personnel breathing zone samples) results shall be made by the asbestos removal Contractor on a daily basis for determination of both 8-hour time weighted average (TWA) and ceiling concentrations of employee exposures and are to be received within 24 hours and retained at the work site where they may be reviewed by the Owner's representative. Submit copies of these results at the completion of the project.

The sampling schedule may be posted outside of the containment area showing sample frequency, duration of the sample, and pump flow rates. Posted results should include a synopsis of work activities of which the results are representative.

#### **1.6.7 Ambient Air Monitoring**

QP representation is not required based on the current project but may be engaged by the Owner or Contractor to reduce risk and liability.

1. Environmental samples outside of containment/regulated area and clearance sampling may be performed by the QP, if engaged.
2. Area samples shall be collected outside the containment/regulated area in areas of highest risk of contamination or in areas of concern based on the professional experience and judgment of the QP.
3. When glove bag activities are occurring, air samples shall be collected on a daily basis within the area where the glove bag(s) are located.
4. All analytical results shall be presented as signed "Certificates of Analysis". The form shall state:
  - i. A specific sample ID for each sample
  - ii. Date sampling and analysis occurred.
  - iii. Volume of air collected for each sample.
  - iv. The number of fibers and fields counted during each analysis.
  - v. Concentration of fibers in fibers per square millimeter and cubic centimeters of air.
  - vi. Specific area/individual sampled.
  - vii. Signature of Analyst and reviewer.
5. Analytical results shall be available at the job site within 48 hours of sample analysis (excluding non-working days).
6. The Owner and Abatement Contactor shall be informed immediately of any area samples outside the containment or regulated work area results in excess of 0.1 fibers/cc. The Contractor shall be informed

immediately of any area samples outside the containment or regulated work area with concentrations in excess of 0.01 f/cc. Work may be halted at the discretion of the QP.

7. Copies of the results of all samples made in areas where Owner's employees are or may be exposed shall be given to the Owner to assure maintenance of records in compliance with OSHA standard 1926.1101 (n).
8. Operations shall be discontinued immediately at any time visible emissions are observed emanating from the containment/regulated area or from any glovebag.
9. For this project, full-time daily project monitoring may be performed at the discretion of the Owner.

## Part 2 Submittals

Immediately upon award of the Contract and before any work is commenced, Contractor shall submit the following to the Owner and QP in quantity to allow the Owner to retain two copies and the QP to retain one copy (or digitally). The provided information shall show compliance with the requirements of the Contract Documents and governing regulations. **Failure to comply with this request will cause delays and complications associated with the MDE permit. The Contractor will not be allowed to begin any abatement-associated activity until such time that ALL requested submittals have been received, reviewed, and any discrepancies resolved. Requested submittals are summarized as follows and greater detail is provided in the following sections:**

- A Written Asbestos Abatement Plan
- A copy of the permit notification to the MDE, if required
- Name and other relevant information of the laboratory used for personal air sample analysis
- Copies of Safety Data Sheets (SDS) for chemicals and other materials that will be on site
- The name and address of the landfill where containerized asbestos materials and waste will be transported to for disposal. Additional information for the landfill where contaminated soil will be disposed of if different than the asbestos landfill
- ANSI Z9.2 certificates of compliance for equipment used during the project
- Qualifications of supervisor and workers to include:
  - Current MDE accreditation
  - Proof of initial or most recent training course not older than 12 months
  - Proof of fit test not older than 12 months
  - Proof of training for procedures in the event of an emergency
- Copy of a medical surveillance program to include physician's statement that employees that will don respirators have been medically cleared
- A copy of the company Written Respiratory Protection Program
- An example of the daily log and visitor log that the abatement supervisor will maintain during the project
- Previous sampling data representative of planned work and supporting documentation (if relaxed respiratory protection requirements will be practiced).

### 2.1 Pre-Start Contractor Submittals

The following items shall be submitted and approved by the Building Owner with the exception being the landfill manifest receipt, logs, and air monitoring results for review prior to mobilization. This requirement may be waived by the Building Owner; however, these items must be provided and maintained at the job site

prior to beginning work and maintained onsite during all work with other materials or documentation, as noted elsewhere herein.

### **2.1.1 Asbestos Plan**

Submit a detailed abatement plan of the work procedures to be used in the removal of the materials containing asbestos. Such plans shall include the location of the asbestos work areas, change rooms, layout of change rooms, interface with other trades involved in this project if applicable, sequencing of asbestos related work (method and means of removal and encapsulation of ACMs and containment and shrouding procedures, including unusual conditions), disposal plan, type of wetting agent, asbestos sealer, air monitoring (sampling plan), and detailed description of the methods to be employed in order to control air pollution.

Should the contractor subsequently desire to vary from this plan, he shall submit a written request to do so. Work shall not commence until the abatement plan is approved by the Owner and the QP.

### **2.1.2 Notification**

Submit a copy of the required notification which will be submitted to the MDE, as warranted. The following is excerpted from the MDE Website: "Prior to removing regulated asbestos-containing materials, written notification must be submitted to MDE (10 working days in advance for projects subject to the NESHAP). Prior to the demolition of any regulated facility, whether asbestos is present or not, written notification must be submitted to MDE at least 10 working days in advance." A notification form can be obtained online from MDE at:

<https://mde.maryland.gov/programs/air/Asbestos/Documents/Asbestos%20Project%20Notification%20MDE%20259.pdf> or by contacting the Department in writing at the address below:

Maryland Department of the Environment  
Air & Radiation Management Administration  
Attention: Division of Asbestos Licensing & Enforcement  
1800 Washington Boulevard, Suite 725  
Baltimore, Maryland 21230-1720

In accordance with a December 22, 2021 EPA Memorandum, notifications are no longer required by the Region 3 of the EPA. As noted in the document, "Complete and timely notifications must be sent to the state or local authority where the work is occurring, but they do not need to be sent to EPA. This applies to any demolition or renovation work occurring in Pennsylvania, including Allegheny County and Philadelphia; Delaware; Maryland; West Virginia; and Virginia. For any demolition or renovation work occurring in the District of Columbia, asbestos notifications are still required to be sent to both DC and EPA Region 3."

Based on the anticipated quantities and types of ACM, notification to MDE may not be required. However, if methods are used which will render category I or II materials into RACM, the notification would have to be submitted.

### **2.1.3 Testing Laboratory**

Submit the name, address, and telephone number of the testing laboratory selected for the monitoring of airborne concentrations of asbestos fibers along with evidence that the laboratory is accredited to analyze airborne asbestos fibers counts. Provide a copy of the American Industrial Hygiene Association (AIHA) accreditation.

#### **2.1.4 SDS**

Submit the manufacturer's technical Safety Data Sheets (SDS) on proposed surfactant, encapsulant, mastic removers, water amendments, etc.

#### **2.1.5 Landfill**

When friable materials are abated, submit written evidence (copy of permit) that the landfill for disposal is approved for disposal of friable asbestos materials by the US EPA and state or local regulatory agencies and where the landfill site is located. Manifest documentation of disposal at landfills accepting non-friable ACM shall also be provided and shall clearly document the designation of the material as ACM. Within thirty-five days of the deposit of a load of waste from this project at the designated landfill, the contractor shall submit a copy of the waste system record to the Owner. The Owner shall have received all acceptable waste manifests prior to making any payments to the contractor.

#### **2.1.6 Certificate of Compliance**

A copy of the manufacturer's certificate of compliance with ANSI Z9.2 for each brand and model of vacuum, ventilation and other equipment used by the contractor to contain or remove asbestos fibers.

#### **2.1.7 Qualifications**

Prior approval by the owner is required of all proposed asbestos removal personnel. Approval shall be based on review and acceptance of contractor's written submittals that all of its personnel working in this asbestos project:

1. Have a current, valid asbestos Worker's or Supervisor's license issued by MDE in accordance with applicable regulations.
2. Have taken an initial training course for the particular discipline and license, annual refresher training on an on-going basis as required to maintain accreditation, and completed a refresher course in the last twelve months.
3. Have been provided with a respirator fit test in accordance with 29 CFR 1926.134 at the time of the initial fitting, when facial conditions change, and at least every twelve months thereafter for each employee wearing a negative-pressure respirator.
4. Documentation of compliance with part 1.6.5, above, requiring annual medical evaluation in order to demonstrate ability to perform the scope of work safely using the required PPE.
5. Have been trained in the proper procedures to follow in the event of an emergency.

#### **2.1.8 Medical Requirements**

Submit certification that contractor has an established medical surveillance program in compliance with OSHA regulations 29 CFR 1926.1101. This submittal shall include copies of the physician's statement that each employee (working on this project) is able to perform his duties while wearing a respirator.

#### **2.1.9 Respirator Program**

Submit a copy of a Written Respiratory Protection Program that complies with OSHA regulation 29 CFR 1910.134.

### **2.1.10 Logs**

Copies of daily progress log and visitor's log.

## **Part 3 Products**

### **3.1 Products and Equipment**

Prior to the start of work, the contractor shall provide and maintain a sufficient quantity of materials and equipment to assure continuous and efficient work throughout the duration of the project.

- A. Protective plastic (polyethylene) sheeting of minimum 6 mil thickness and size to provide protection to all equipment, floors, walls, and all other exposed areas (as necessary), with minimum frequency of joints, where required. Plastic shall not be moved and reused between work areas but shall be containerized for disposal as ACM waste in accordance with Section 4.2. However, for areas where a Modified Containment will be established, plastic will not be required on ceilings or full wall height.
- B. Seal tape shall be glass fiber reinforced or other type capable of sealing joints of adequate sheets of plastic for the attachment of plastic sheeting to finished or unfinished surfaces of dissimilar materials under either dry or wet conditions, including use of amended water.
- C. Disposal Containers: Bags and drums to be used for disposal of asbestos waste shall be suitable to receive and retain any asbestos-containing or contaminated materials until disposal at an EPA approved and certified waste disposal site. Bags shall be 6 mil thicknesses. If using drums, the material must be double bagged or lined before being placed in the drum. Drums entering the work area must be covered with poly and upon exiting the work area to the load out area the poly is to be removed and the drum is to be wet-wiped.

- a. Disposal bags – 2 layers of 6 mil poly for asbestos waste shall be pre-printed with labels, markings, and the Facility's address as required by OSHA, EPA and DOT regulations.

Note that the Contractor may use a burlap bag on the interior to reduce tears or breakage of outer bags but this does NOT preclude the need to double bag as noted above.

- D. Installation and plumbing hardware, showers, hoses, drain pans, sump pumps, and waste water filtration system shall be provided by the Contractor.
- E. An adequate number of HEPA vacuums, scrapers, sprayers, nylon brushes, disposable mops, rags, sponges, staple guns, shovels, ladders and scaffolding of suitable height and length as well as meeting OSHA requirements, fall protection devices, water hose to reach all areas in the regulated area, airless spray equipment, and any other tools, materials or equipment required to conduct the abatement project shall be provided by the contractor. All electrically operated hand tools, equipment, electric cords shall be connected to ground fault circuit interrupter (GFCI) protection.
- F. Special protection for objects in the regulated area shall be detailed (e.g., plywood over electrical panels or intact non-ACM pipe TSI to prevent damage from ladders, water and falling material).
- G. The owner and QP shall be provided an advance copy of the SDS as required for all hazardous chemicals under OSHA 29 CFR 1910.1200 - Hazard Communication in the pre-start submittal. Chlorinated compounds shall not be used with any spray adhesive, mastic remover, or other product. Appropriate encapsulant(s) shall be provided.

- H. OSHA DANGER demarcation signs, as many and as required by OSHA 29 CFR 1926.1101(k)(7) shall be provided and placed by the Competent Person. All other posters and notices required by Federal and State regulations shall be posted or shall be readily available digitally in the Clean Room.
- I. Adequate and appropriate PPE for the project and number of personnel/shifts shall be provided. All personal protective equipment issued must be based on a written hazard assessment conducted under 29 CFR 1910.132(d). The Contractor shall furnish disposable coveralls to visitors or QP personnel sufficient to inspect work areas as needed.
- J. Surfactant (wetting agent for amended water): Acceptable surfactant manufactured for that purpose.
- K. Encapsulant: Acceptable encapsulant manufactured for that purpose. When remaining ACM is present and it is acceptable by the Owner, the bridging encapsulant shall be appropriately tinted with pigment to readily indicate adequate coverage.
- L. Solvent: The contractor shall confirm with the Owner that solvents, if used, are compatible with future finishes and associated adhesives. Failure to comply with this requirement would result in the Contractor being responsible for resolution due to incompatibility. Alternate treatment schemes to denature solvents, if required, shall be approved by the Owner prior to performance.

### **3.1.1 Equipment**

- A. All protective equipment requires the approval of the Owner. Workers shall wear disposable, full body coveralls (including foot coverings), disposable head covers, and disposable footwear in the work area. Required protective equipment also includes goggles or safety glasses if half-faced masks are used, and disposable gloves taped to the sleeves of the suit. If heavy reusable gloves are necessary, they shall be of a type approved by the Owner. Such gloves shall be rinsed at the end of each day. Prior to disposal, contaminated water shall be filtered to retain particles 5.0 microns or larger or disposed of as asbestos waste. Removal of coverall foot coverings shall NOT be allowed unless non-porous boots are donned prior to entering the work area and the legs of coveralls are taped to boots.
- B. Make available to the owner's representative complete sets of personal protective equipment as required herein for entry to the asbestos control area at any time for inspection of the asbestos control area.
- C. Air Handling Equipment: Equipment shall be high-efficiency particulate air (HEPA) absolute filtration system, equipped with filtration equipment in compliance with ANSI Z9.2. No air movement system or air equipment shall discharge asbestos fibers outside the work area.

### **3.1.2 Warning Signs and Labels**

- A. Warning Signs: As required by OSHA Regulation 29 CFR 1926.1101 (k)(7). Provide warning signs at all approaches to the asbestos control areas containing concentrations of airborne asbestos fibers. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos materials, scraps, waste, debris and other products contaminated with asbestos. Signage shall be in English and the predominant language of the asbestos workers are required.
  - a. Warning sign: The sign shall bear the following information:

DANGER  
ASBESTOS  
MAY CAUSE CANCER  
CAUSES DAMAGE TO LUNGS  
AUTHORIZED PERSONNEL ONLY

In addition, where the use of respirators and protective clothing is required in the regulated area the warning sign shall include the following:

WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA

- b. Container Label: provide labels of sufficient size to be clearly legible conforming to requirements of 1926.1101.

**3.1.3 Decontamination Areas**

- A. The contractor shall set up a decontamination area(s) including an equipment room, clean room, and a shower/decon chamber outside the work area(s). These areas shall include a clean room connected by a double barrier to a walk through shower which is also connected by a double barrier to an equipment room. Adequate storage containers shall be provided for each worker's street clothes. The equipment, clean room and shower areas shall be cleaned daily.
  - a. In lieu of a shower, and assuming that all asbestos abatement constitutes removal of non-friable Category I or II ACM in a regulated area in accordance with Section 4.1.1.3 or 4.1.1.4 (not within a negative pressure containment), the contractor, upon approval by the QP, can construct a decontamination (decon) chamber within which will be placed a CLEAN HEPA filtered vacuum, disposable cloths and a source of water for worker decontamination.
  - b. In lieu of a shower, and assuming that all asbestos abatement of non-friable Category I or II ACM is performed within a negative pressure mini-containment in accordance with Section 4.1.1.5, the contractor can, upon approval by the QP, construct a decontamination (decon) chamber within which will be placed a CLEAN HEPA filtered vacuum, disposable cloths and a source of water for worker decontamination.
  - c. As noted in Section 1.1.3.2, for roofing materials, the decontamination corridor may be at the roof edge or at the ground level; if the decontamination area is at ground level, the access corridor shall include ladders or mobile elevating work platform (MEWP) which has been adequately plasticized and is treated as part of the "corridor" with respect to engineering controls. The remainder of the decontamination area requirements remain applicable.
- B. The clean room, shower/decon chamber, and equipment room must be sealed completely to ensure that the sole source of airflow through these areas originate from uncontaminated areas outside the asbestos removal, demolition, or renovation enclosure. The shower, if used for decontamination, must be drained and filtered to retain particles 5.0 microns or larger after each use to ensure that contaminated water is not released to uncontaminated areas; alternatively, the water can be collected for disposal. If waste water is inadvertently released, it shall be cleaned up as soon as possible to prevent any asbestos in the water from drying and becoming airborne in areas outside the work area. The contractor will be responsible for the required water source.
- C. In all cases, except removal of Category I or II ACM removed in a regulated area where rooms are not present (not within a negative pressure containment), access between contaminated and uncontaminated rooms or area shall be through an airlock.

## **3.2 Monitoring, Inspection, and Testing**

### **3.2.1 General**

- A. The QP will perform monitoring, inspection and testing inside and around the regulated area in accordance with the OSHA requirements and these specifications throughout abatement work to include visual inspections and final air clearance testing. The QP shall monitor conditions to document compliance with these specifications, as warranted.
- B. If fiber counts are detected outside the regulated area during abatement work utilizing the NIOSH 7400 air monitoring method that exceed the specified respective limits, the Contractor shall stop work. The Contractor may request confirmation of the results by analysis of the samples by TEM. The request for TEM analysis must be in writing and submitted to the Client's representative. The cost for the confirmation of results will be borne by the Contractor for both the collection and analysis of samples and for the time delay that may/does result for this confirmation. Work may resume upon correction of cause of elevations upon authorization by the QP.

### **3.2.2 Scope of Services of the QP Consultant**

The purpose of the work of the QP is to: document adherence to the specification; facilitate resolution of problems; check for the spread of contamination beyond the regulated area and, when noted recommend and document corrective measures; collect supplemental samples of newly discovered or previously unrepresented suspect ACM and submit to a testing laboratory for analysis; and document clearance at the end of the project, as warranted. In addition, their work includes performing the final inspection and testing to determine whether the regulated area(s) have been adequately decontaminated. All air monitoring sample analysis will be performed via PCM. The QP will perform the following tasks:

- a. Task 1: Perform as needed air monitoring, inspection, and testing outside the regulated area during actual abatement work to detect faults in the regulated area isolation and check for adverse impact on the surroundings from regulated area activities.
- b. Task 2: Perform visits to spot check overall compliance of work with the contract/specifications. These visits may include any inspection, monitoring, and testing inside and outside the regulated area and all aspects of the operation except personnel monitoring.
- c. Task 3: Perform final inspection and testing of a decontaminated regulated area at the conclusion of the abatement to document general compliance with all applicable regulations. If all asbestos abatement is performed using glovebag technology, area air samples will be collected continuously during abatement. At the end of the shift and/or completion of abatement in a regulated area all area air samples will be analyzed. If the area air samples are at or less than 0.01 f/cc and the area is cleared with a visual inspection, then the regulated area will be considered clear.
- d. Task 4: Provide documentation of abatement and "clearance," as needed.
- e. Task 5: Document quantities of asbestos removed based on the applicable units. Documentation assumes quantities will be recorded by the abatement contractor and presented daily to QP for corroboration.

- f. Task 6: Field modify requirements included in this specification, as warranted and reasonable based on the determination and professional opinion of the QP.

#### **Part 4            Execution**

This section includes all work necessary to reduce air concentrations of asbestos to the specified level and maintain the specified asbestos control limits during the life of the contract. The work specified in this document consists of the provision of services for the containment, removal and disposal of ACMs identified at the site.

All asbestos abatement work will be performed using wet methods, within established Regulated Area(s) by competent, licensed (by MDE) persons trained, qualified, and knowledgeable in the techniques of abatement, handling, and disposal of ACMs and materials contaminated by asbestos, in accordance with pertinent local, state, and federal regulations. Regulated work shall NOT be conducted by unlicensed individuals even if the removal does not constitute a "Project" as defined by MDE.

The Abatement Contractor shall coordinate with the Mechanical, Electrical, Plumbing, and General Contractors and/or the site representative to ensure that all appropriate systems that will be impacted by the abatement have been properly decommissioned prior to the start of any work.

The Abatement Contractor shall coordinate with the site representative for this project to verify that the structures will support the planned activities and comply with local building codes and OSHA requirements.

This scope of work includes, but is not limited to, the abatement of the all identified ACMs at the site constitute Category I or II, nonfriable ACM; therefore, ACMs may be removed as follows:

- A. Removal utilizing hand-held tools, a HEPA vacuum and wet methods within a regulated area. The regulated work area shall be the area from which asbestos containing materials are being removed and shall extend 25 feet from the perimeter of the removal area. A Decontamination Room or a Decontamination Corridor shall be provided for Decontamination Procedures as detailed below in Section 4.1.1.4.
  - a. Where materials are present associated with roofing:
    - i. Work shall be performed specifically in accordance with 29CFR1926.1101(g)(8)(ii).
    - ii. The decontamination corridor may be at the roof edge or at the ground level; if the decontamination area is at ground level, the access corridor shall include ladders or mobile elevating work platform (MEWP) which has been adequately plasticized and is treated as part of the "corridor" with respect to engineering controls.
- B. Removal of the materials shall be effected using hand-held tools and techniques that do not sand, grind, or abrade the materials.
- C. Where materials are removed from existing building materials which will remain in place and will be demolished ( those ACMs that are not on the roof), drop cloths will be placed beneath and adjacent to the abatement work to collect material as it is dislodged.
- D. For some materials (such as caulks), it may be necessary to chip the concrete and mortar substrate to completely remove all of the material.
- E. If it becomes necessary to sand, grind, or abrade any of the ACMs, then removal will take place using wet methods within a negative pressure containment consisting of critical barriers on openings with a minimum pressure differential of -0.02" water column as detailed below in Section 4.1.1.1 or 4.1.1.4.
- F. Removed material shall be containerized as at each work station as well as the drop cloth.

Abatement may also be completed in accordance with Sections 4.1.1.1, 4.1.1.2, or 4.1.1.5, if desired.

During all containment work (if any), air filtration devices (AFD) shall be employed and should be in place during work area preparation and maintained in use until clearance is issued, if warranted. At no point during abatement (following approval of containment(s) until clearance is issued or the space is visually approved as cleared, as warranted) shall the pressure differential fall below 0.02" water column (wc) where containments are in place. In addition (as noted below), filtration units shall be sized to provide a minimum of four air changes per hour in the containment area. **Provide continuous, direct-read instrumentation to document pressure differential (manometer). The instrument must be calibrated daily with documentation provided to the IH.**

**Fiber concentrations immediately outside any regulated area are not to exceed 0.01 fibers per cubic centimeter of air (f/cc). If this limit is exceeded, further removal shall be suspended until appropriate actions are taken to reduce the fiber concentration.** If other trades or work is being completed in the work area which may result in elevations of fibers that are not likely to constitute asbestos AND if the ambient areas remain unoccupied by casual visitors, owner employees, or other unrelated persons, the acceptable threshold may be modified to 0.1 f/cc, at the discretion of the QP.

Before start of work, the Contractor shall submit the design and layout of the regulated areas and the negative air machines. The submittal shall indicate the number of, location of and size of negative air machines. The point(s) of exhaust, air flow within the regulated area, anticipated negative pressure differential, and supporting calculations for sizing shall be provided.

#### 4.1 Preparation of Work Area: Installation

- A. Establish each work area as a regulated area and place warning signs as discussed in OSHA Regulation 29 CFR 1926.1101 (k) (7) at the regulated area perimeters to prevent entrance by non-authorized personnel. All personnel in the regulated area shall not be allowed to eat, drink, smoke, chew tobacco or gum, apply cosmetics, or in any way interfere with the fit of their respirator. Place barricade tape at the regulated area perimeter as a physical barrier to prevent access by unauthorized persons. Critical barriers shall be placed over all openings to regulated areas.
- B. Clean the proposed work areas using HEPA filtered vacuum equipment or wet cleaning methods as appropriate. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters, shall not be used. Preliminary cleaning may be omitted at the discretion of the Contractor with the permission of the Owner; however, elevations in airborne fibers resulting from failure to pre-clean may result in later requirements for additional dust mitigation measures.
- C. If abatement will take place in a containment of the type detailed in 4.1.1.2, the following actions will be taken. Seal off all openings before covering walls and ceilings, including, but not limited to: corridors, access ways, skylights, ducts, grilles, diffusers, and any other penetrations of the work area, with one layer of 6 mil plastic sheeting sealed with tape. Access ways and corridors which will not be used for passage during work must be also sealed. For modified containments, only critical barriers and drop cloths are required, with splash guards where solvent based removal of floor mastic is performed; covering walls and ceilings are not necessary for work performed in accordance with 4.1.1.1, 4.1.1.3, or 4.1.1.4.
  - a. For work areas that require complete enclosure:
    - i. Cover floor, wall and ceiling surfaces that are to remain with plastic sheeting sealed with tape such that a continuous seal is maintained. Use a minimum of two layers (three in carpeted areas) of 6 mil plastic on floor and walls. Cover floors first so plastic extends at least 12 inches up the wall, then cover the walls with minimum of 6

- mil plastic sheeting to the floor level, thus overlapping the floor materials by a minimum of 12 inches, then continuously tape edges to provide a complete seal.
- ii. Cover entire ceiling surface that are to remain with one layer (overlapping 12" at any seams) of 6 mil plastic sheeting extending 12" down walls and sealed with tape, thus creating a second layer over penetrations previously sealed.
  - iii. Cover all wall surfaces that are to remain with one layer (overlapping 12" at any seams) of 6 mil plastic and sealed with tape at ceiling and floor or baseboard levels, thus creating a second layer over penetrations previously sealed.
  - iv. Maintain emergency and fire exits from the work area or establish alternative exits satisfactory to the applicable fire officials.
- D. For enclosed areas where only whole component removal or non-friable exterior abatement utilizing wet methods will be conducted:
- a. Cover all surfaces in the immediate area with one layer of 6 mil plastic and sealed with tape at overlapped areas (minimum of 3 feet overlap) and at walls, and ensure creation of a second layer over any penetrations. Place barrier tape and signage to delineate Regulated Area. Regulated area shall be a minimum of 25 feet from work area in all directions, unless wall barrier is present.
- E. For mini-containments where asbestos removal associated with non-friable category I or II materials is to be completed:
- a. Construct a containment structure which completely encloses the work area using a minimum of two layers of 6 mil plastic on floor and walls.
  - b. Place an access/decon chamber at one side with a negative air machine on the opposite side such that air is pulled across the work area from the exterior of the mini-containment.
  - c. In all cases where abatement does not include flooring removal, placement of drop clothes under work is required.
- F. Isolate the work areas for the duration of the work by completely sealing off all openings and fixtures, including HVAC and other ducts or air movement systems in the work area with plastic sheeting taped and glued securely. Ensure HVAC system is nonfunctional prior to covering system openings. Cover all critical barriers with two layers of 6 mil plastic sheeting. As abatement requires removal of materials which decreases continuity of the containment, barrier installation must be performed in order to maintain containment system.
- G. Maintain enclosures and regulated work areas in tidy conditions. Ensure that barriers and plastic linings are effectively sealed and taped and that the regulated area is effectively demarcated such that physical boundaries are maintained intact for the duration of the project. Repair damaged barriers and remedy defects immediately upon discovery. Visually inspect enclosures at the beginning and end of each work period. Use smoke methods, as necessary, to test effectiveness of barriers, where applicable.
- H. If equipment or processes are used during the removal resulting in creation of RACM, the removal shall be conducted within a negative pressure containment including polyethylene sheeting on walls and ceilings in accordance with 4.1.1.1.

- I. Each unit of asbestos filtration systems shall consist of a blower filter system, equipped with HEPA inline filtration which, as a minimum, continuously captures particles with an aerodynamic diameter of 0.3 microns at 99.97% efficiency. Each unit shall be equipped with the following minimum controls:
  - 1) A warning light and audible alarm to indicate reduced air flow due to dirty filters.
  - 2) Automatic shutdown, with warning light, to ensure against continued operation of units in event of clogged or damaged filters.
- J. The asbestos filtration system shall be in operation during all removal operations, until final clearance air samples are received or approved by the QP. An adequate number of filtration units shall be used to assure maintenance of pressure differential of 0.02" water column (wc). In addition, filtration units shall be sized to provide a minimum of four air changes per hour in the containment area. Provide continuous, direct-read instrumentation to document pressure differential.
- K. Maintain the EPA and OSHA regulations or any applicable state and local government regulations at the job site in locations accessible to employees and others. Attention is directed to all requirements of the Contract Documents concerning precautionary procedures mandated thereby and by OSHA and EPA for the protection of personnel, the public, and the environment from exposure to or possible contamination by asbestos fibers.
- L. In addition to requirements for asbestos protection, comply with all other applicable requirements of 29 CFR 1910 and 1926 or others, as applicable.
- M. Provide hard hats, eye protection, and foot protection in those areas where such protective measures are required by OSHA regulations.
- N. Workers shall always wear a respirator properly fitted on the face while in the work area unless a Negative Exposure Assessment in accordance with Section 1.6.6 has been completed and is applicable to this abatement effort. Instruct and train workers to use respirators properly in accordance with the requirements of the American National Standards Practices for Respiratory Protection (ANSI Z88.2). Ensure that workers wear the appropriate respirator at all times while in the work area. Each employee shall be tested for respirator fit in accordance with the cited ANSI standard.
- O. Workers shall wear disposable full body coveralls and disposable head and foot coverings in the work area. If non-disposable footwear such as protective shoes are required and disposal foot coverings are not suitable, the non-disposable protective footwear shall be left in the work area at all times until disposal at job completion, then disposed of as asbestos contaminated waste. Employees shall not modify suits to allow ambient air to the interior of the suit by cutting off feet unless legs are taped to non-porous boots which are decontaminated prior to exiting the regulated area. This requirement may be modified upon approval by the QP for certain non-friable Cat I or Cat II materials.

#### **4.1.1 Access Areas (Decontamination)**

##### **4.1.1.1 Modified Containment Areas**

For the removal of Category I and II non-friable materials which will NOT be rendered friable during the abatement effort. If work WILL result in liberation of fibers above the OSHA PEL, work shall be performed in accordance with 4.1.1.2, below.

- A. Contractor shall provide the Outside Clean Room, Decontamination Room, and Equipment Room prior to start of work within building work areas. Personnel lockers or equivalent in the Clean Room and facilities for disposal of contaminated clothing in the Equipment or Decontamination Rooms shall be provided. Egress openings shall consist of a minimum of two sheets of plastic taped across the opening head and down opposite jambs, one leaf shall be taped on one side of the jamb, the other on the opposite jamb.
- a. Containment partitions separating a contaminated area from a clean area shall be constructed of wood studs (or similar) and two sheets of minimum 6 mil polyethylene plastic. The inner plastic barrier shall face the contaminated area, the outer barrier, the clean area.
- B. The Contractor shall establish decontamination procedures for each work area. All persons without exception shall pass through these decontamination areas for any purpose. Procedures shall, as a minimum, consist of the following:
- 1) Outside Clean room Area: In this room, the worker or individual may remove normal street clothing and replace with clean work clothing, including disposable coveralls, respiratory protective equipment, and all other protective gear. No asbestos contaminated items shall enter this room with the exception of reusable respirators which are to be placed in a bin or other suitable receptacle approved by the Contractor's technical representative. Provide suitable lockers or other secure storage areas for the employee's clothing. The outside clean room may consist of the ambient space outside the work area and does not require walled enclosure. At this facility, the covered walkway may be used as an open-air clean room provided adequate space for storage and activities is available.
  - 2) Equipment Room: Provide an area in which work equipment, footwear and contaminated work clothing can be placed in suitable receptacles for reuse or disposal prior to entry into the shower room and thence to the outside clean room. The equipment room may comprise a single stage pop up on the clean room side of the decontamination area. If all disposable materials are discarded in the decontamination room, then an equipment room is not required.
  - 3) Decontamination Room: In this room, which may comprise a single stage pop-up, decontamination procedures detailed below shall be implemented such that contaminated clothing or materials are safely discarded as asbestos-contaminated or adequately cleaned prior to removal or doffing. A HEPA vacuum as well as materials for wet wiping exposed skin and equipment shall be available in this space.
  - 4) Decontamination Procedures: Maintain a protection program to ensure that workers and others follow an established decontamination sequence utilizing the aforementioned facilities. They shall ensure that gross contamination and debris is removed from protective clothing and equipment prior to egress from the work area. Respiratory protective equipment shall be removed last, during shower, to prevent inhalation of fibers during removal of contaminated clothing. The Contractor shall provide a plan for receipt, inspection, cleaning and storage of respiratory protective equipment in such a manner as to avoid contamination of clean areas. Suggested decontamination sequencing is as follows:
    - a. Still wearing respirators, proceed to decontamination room. Doff disposable coveralls and place in asbestos disposal bag.
    - b. With respirator still in place thoroughly vacuum exposed skin, respirator face piece, all exterior parts of the respirator, and all equipment.
    - c. Wet wipe equipment or skin exhibiting contamination and dispose of wipe materials in asbestos disposal bag.

- d. Take a deep breath, hold it and/or exhale slowly. While still holding breath, move out of decontamination room, remove respirator and hold it away from face before starting to breathe.
- e. Carefully clean face piece of respirator inside and out.
- f. Vacuum debris on room walls and floor prior to exit.
- g. Proceed to changing (clean) room and change into street clothes or new disposable work items.

After decontamination, each employee shall inspect, clean and repair his respirator as needed. The respirator shall be dried, placed in a suitable storage bag and properly stored.

- C. Bag Out Area: A dedicated structure (including an airlock) for removal of bagged and labelled bags from the containment may be utilized for transferring abated asbestos materials from the work area to an appropriate disposal container. Alternate methods may be reviewed and approved by the QP.

#### **4.1.1.2 Full Containment Areas**

If Class I work is performed or if Class II work is performed which will render non-friable materials into friable RACM, full containment is required.

- A. Contractor shall provide the Outside Clean Room, Shower Room, and Equipment Room prior to start of work within building work areas. Personnel lockers or equivalent in the Clean Room and facilities for disposal of contaminated clothing in the Equipment Room shall be provided. Egress openings shall consist of a minimum of two sheets of plastic taped across the opening head and down opposite jambs, one leaf shall be taped on one side of the jamb, the other on the opposite jamb.
  - a. Containment partitions separating a contaminated area from a clean area shall be constructed of wood studs (or similar) and two sheets of minimum 6 mil polyethylene plastic. The inner plastic barrier shall face the contaminated area, the outer barrier, the clean area.
- B. The Contractor shall establish decontamination procedures for each work area. All persons without exception shall pass through these decontamination areas for any purpose. Procedures shall, as a minimum, consist of the following:
  - 1) Outside Clean room Area: In this room, the worker or individual may remove normal street clothing and replace with clean work clothing, including disposable coveralls, respiratory protective equipment, and all other protective gear. No asbestos contaminated items shall enter this room with the exception of reusable respirators which are to be placed in a bin or other suitable receptacle approved by the Contractor's technical representative. Provide suitable lockers or other secure storage areas for the employee's clothing.
  - 2) Showers: A shower room or similar facility shall be provided for transit by cleanly dressed workers entering the work area from the outside clean room, or by workers headed for the showers after undressing in the contaminated equipment room or area. Except in cases of emergency, no person shall leave the work area without first having taken a shower. Water from the showers shall be passed through 5 micron water filters and then piped into the building floor drain or collected and disposed of by the Contractor. Provide water for the showers. Cold water supply from existing system may be tapped by use of garden hoses, clamps and control valves. The taps and extensions shall be provided by the Contractor. The change facility shall be equipped with adequate water heating capacity to provide for hot water showers. The decontamination facility shall be equipped with thermostatically controlled heating system for the clean room and equipment room.

- 3) Equipment Room: Provide an area in which work equipment, footwear and contaminated work clothing can be placed in suitable receptacles for reuse or disposal prior to entry into the shower room and thence to the outside clean room.
- 4) Decontamination Procedures: Maintain a protection program to ensure that workers and others follow an established decontamination sequence utilizing the aforementioned facilities. They shall ensure that gross contamination and debris is removed from protective clothing and equipment prior to egress from the work area. Respiratory protective equipment shall be removed last, during shower, to prevent inhalation of fibers during removal of contaminated clothing. The Contractor shall provide a plan for receipt, inspection, cleaning and storage of respiratory protective equipment in such a manner as to avoid contamination of clean areas. Suggested decontamination sequencing is as follows:

Still wearing respirators, proceed to showers. Showering is mandatory. Care must be taken to follow reasonable procedures in removing the respirator to avoid asbestos fibers while showering. The following procedure is required as a minimum:

- h. Thoroughly wet body including hair and face.
- i. With respirator still in place thoroughly wash body, hair, respirator face piece, and all exterior parts of the respirator.
- j. Take a deep breath, hold it and/or exhale slowly, completely wet hair, face and respirator. While still holding breath, remove respirator and hold it away from face before starting to breathe.
- k. Carefully wash face piece of respirator inside and out.
- l. Shower completely with soap and water; rinse thoroughly.
- m. Rinse shower room walls and floor prior to exit.
- n. Proceed from shower to changing (clean) room and change into street clothes or new disposable work items.

After showering, each employee shall inspect, clean and repair his respirator as needed. The respirator shall be dried, placed in a suitable storage bag and properly stored.

- C. Bag Out Area: A dedicated structure (including an airlock) for removal of bagged and labelled bags from the containment may be utilized for transferring abated asbestos materials from the work area to an appropriate disposal container. Alternate methods may be reviewed and approved by the QP.

#### **4.1.1.3 Component Removal Areas**

- A. Contractor shall provide a Single Stage Decontamination Room or a Decontamination Corridor prior to start of work within building work areas where whole component removal is to be conducted. Egress openings in a Decontamination Room shall consist of a minimum of two sheets of plastic taped across the opening head and down opposite jambs, one leaf shall be taped on one side of the jamb, the other on the opposite jamb. The Decontamination Corridor shall comprise a minimum of 6 mil poly sheeting on the floor, partitioned from the work area and the outside of the regulated area and equipped with a HEPA vacuum, and disposable cloths and a source of water provided for worker decontamination. Disposal containers shall be maintained for disposal of contaminated PPE in a manner which prevents release of contamination.
  - a. Containment partitions separating a contaminated area from a clean area shall be constructed of wood studs (or similar) and two sheets of minimum 6 mil polyethylene plastic. The inner plastic barrier shall face the contaminated area, the outer barrier, the clean area.

- B. Decontamination Procedures: Work in this area shall be conducted utilizing double suit decontamination procedures; double suit use may be avoided by using a shower. Maintain a protection program to ensure that workers and others follow an established decontamination sequence utilizing the aforementioned facilities. They shall ensure that gross contamination and debris is removed from the outer layer of protective clothing and equipment first and then remove the underlying layer of protective clothing prior to egress from the work area. Respiratory protective equipment shall be removed last, to prevent inhalation of fibers during removal of contaminated clothing. The Contractor shall provide a plan for receipt, inspection, cleaning and storage of respiratory protective equipment in such a manner as to avoid contamination of clean areas. Protective clothing shall be left within the regulated area and disposed of as asbestos contaminated.

#### **4.1.1.4 Category I and II Non-Friable ACM Abatement Areas**

- A. Contractor shall provide a Decontamination Room or a Decontamination Corridor prior to start of work in areas on building exteriors only wet methods and HEPA Vacuums will be conducted. The Decontamination Corridor shall comprise a minimum of 6 mil poly sheeting on the floor, partitioned from the work area and the outside of the regulated area and equipped with a HEPA vacuum, and disposable cloths and a source of water provided for worker decontamination. Disposal containers shall be maintained for disposal of contaminated PPE in a manner which prevents release of contamination. All removal shall be conducted in a way which prevents release of fibers or generation of Regulated (friable) ACM. Materials should be sliced or snipped, rather than cut using abrasive methods.
- B. Decontamination Procedures: Work in this area shall be conducted utilizing double suit decontamination procedures. Maintain a protection program to ensure that workers and others follow an established decontamination sequence utilizing the aforementioned facilities. They shall ensure that gross contamination and debris is removed from the outer layer of protective clothing and equipment first and then remove the underlying layer of protective clothing prior to egress from the work area. Respiratory protective equipment shall be removed last, to prevent inhalation of fibers during removal of contaminated clothing. The Contractor shall provide a plan for receipt, inspection, cleaning and storage of respiratory protective equipment in such a manner as to avoid contamination of clean areas. Protective clothing shall be left within the regulated area and disposed of as asbestos contaminated. If boots or gloves are used within the regulated area, they must be left in the decontamination area/corridor unless and until they are appropriately decontaminated or disposed of as asbestos waste. Porous materials which cannot be decontaminated shall be disposed of as asbestos at the end of the job and may not be allowed outside the regulated area.

#### **4.1.1.5 Mini-Containment Abatement Areas**

- A. Contractor shall provide a Single Stage Decontamination Room or a Decontamination Corridor prior to start of work within building work areas where mini-containments are to be used. For RACM removal within a mini-containment, the decontamination area shall be enclosed, contiguous with, and sealed against the containment space. Egress openings in a Decontamination Room shall consist of a minimum of two sheets of plastic taped across the opening head and down opposite jambs, one leaf shall be taped on one side of the jamb, the other on the opposite jamb. The Decontamination Corridor shall comprise a minimum of 6 mil poly sheeting on the floor, partitioned from the work area and the outside of the regulated area and equipped with a HEPA vacuum, and disposable cloths and a source of water provided for worker decontamination. Disposal containers shall be maintained for disposal of contaminated PPE in a manner which prevents release of contamination.

- b. Containment partitions separating a contaminated area from a clean area shall be constructed of wood studs (or similar) and two sheets of minimum 6 mil polyethylene plastic. The inner plastic barrier shall face the contaminated area, the outer barrier, the clean area.
- B. Decontamination Procedures: Work in these areas shall be conducted utilizing double suit decontamination procedures. Maintain a protection program to ensure that workers and others follow an established decontamination sequence utilizing the aforementioned facilities. They shall ensure that gross contamination and debris is removed from the outer layer of protective clothing and equipment first and then remove the underlying layer of protective clothing prior to egress from the work area. Respiratory protective equipment shall be removed last, to prevent inhalation of fibers during removal of contaminated clothing. The Contractor shall provide a plan for receipt, inspection, cleaning and storage of respiratory protective equipment in such a manner as to avoid contamination of clean areas. Protective clothing shall be left within the regulated area and disposed of as asbestos contaminated. If boots or gloves are used within the regulated area, they must be left in the decontamination area/corridor unless and until they are appropriately decontaminated or disposed of as asbestos waste. Porous materials which cannot be decontaminated shall be disposed of as asbestos at the end of the job and may not be allowed outside the regulated area.

#### 4.2 Method of Removal

- A. A low pressure fine spray of amended water shall be applied to reduce fiber release preceding removal. The asbestos shall be saturated sufficiently to retard emission of airborne fibers. If the asbestos containing material is thick and detaches in chunks having dry bottoms, amended water shall be sprayed over the material as it is loosened and removed.
- B. For vermiculite, if encountered, once the negative pressure containment is approved by the QP, an opening may be created in a shell at the bottom of the CMU wall with a HEPA vacuum placed immediately and the inlet hose sealed against the wall. An opening may then be created at the top of the wall, vertically in line with the bottom to allow air movement through the CMU cores from the top to the bottom and vacuuming of the filler material. The face shells may be removed from top to bottom and residual vermiculite gently brushed from top to bottom to encourage capture with the HEPA vacuum. In no case shall vermiculite be permitted to flow from the concealed space without immediate capture.

This process shall be continued horizontally to allow each core to be evacuated and the face of the CMU wall removed to expose the cores. CMU elements shall be placed in accordance with section 4.2.3. Materials to remain shall be subjected to application of a penetrating encapsulant to the exposed elements where vermiculite was removed. Visual approval of the removal shall be granted by the QP, after which a tinted bridging encapsulant shall be applied to readily indicate proper removal and sealing has occurred.

- C. Remove material and immediately place in plastic disposable bags, 6-mil minimum. Remove asbestos containing material in a gradual manner, with continuous application of the amended water or wetting agent in such a manner that no asbestos material is disturbed prior to being adequately wetted. All disposed ACMs shall be in two discrete bags, the first one sealed closed and placed in a second bag, and then the second bag sealed. Where unusual circumstances prohibit the use of 6 mil plastic bags, alternative methods may be used. For example, in the case where large sections of carpet are removed, the carpet can be placed on two layers of 6 mil polyethylene sheeting, sealed individually, such that each layer comprises a watertight barrier, with the ends and seems sealed with tape. Asbestos containing material shall be containerized while wet and containerized within two discrete 6 mil plastic layers, individually applied, taped, and sealed. At no time shall asbestos material be allowed to accumulate or become dry. Lower and otherwise handle asbestos containing material as indicated in

40 CFR 61-SUBPART M. Submit any alternate proposal for containment of asbestos fibers to the Owner for approval. Pre-printed labels, markings and address as required by OSHA, EPA and DOT regulation shall be affixed to all containers prior to disposal. Use of trash chutes shall not be used.

- a. For whole component removal: containerize component in accordance with 4.2 C. (above) and 4.2.3 (below).
- D. After completion of stripping work, all surfaces from which asbestos has been removed or contaminated shall be wire brushed and/or wet sponged or cleaned by an equivalent method to remove all visible material. During this work, the surfaces being cleaned shall be kept wet.
- E. All containers shall be cleaned and thoroughly decontaminated before leaving the work area by being passed through the shower or bag out area, or through the airlock and container cleaning assembly, as follows:
  - 1) Containers shall first be gross-cleaned by vacuuming and then damp-wiped, before being placed into shower container or cleaning airlock and removed from the work area. .
  - 2) If a container being transferred from the work area via a shower has dried, it shall be wet-wiped again before being transferred past the shower.
- F. Transport the sealed container or skips to an EPA approved and certified waste disposal site. The Contractor shall provide the Owner with a signed certificate listing the quantity of materials delivered to the disposal site, a description of the location of the site, and a statement attesting to the fact that the site is an EPA and State approved disposal location. The signatures of the asbestos removal Contractor, transporter, and site operator must appear on the certificate. The Contractor shall ensure that the operator leaves damaged bags in the delivery containers and that the entire contaminated container is buried; however, sealed plastic bags may be dumped from the containers into the burial site and uncontaminated containers may be reused. The Contractor shall certify that any reused containers have not contained damaged or broken bags of asbestos or other asbestos-contaminated material.
- G. Disposal of all asbestos waste shall be at a prearranged disposal site in accordance with regulations of the Maryland Department of the Environment-Waste Division (or the regulations governing the eventual location of disposal) and OSHA Regulation 29 CFR 1910.1001 as well as section 2.1.5 of this Section. Documentation of disposal shall be provided to the Owner.
- H. Following removal of asbestos-containing material, all plastic sheeting, tape, cleaning material, clothing and all other disposal materials or items used in the work area shall be packed into sealable plastic bags (6 mil minimum), sealed and placed into a second sealed plastic bag or into metal or fiber containers or skips for transport. The containers or skips shall be labeled as prescribed by OSHA Specifications 29 CFR 1910.1001 (g). Plastic sheeting shall not be reused in other containment(s).
- I. If present, seal edges of ACM exposed by removal work which is inaccessible, such as a sleeve, wall penetration, etc., with bridging encapsulant. Prior to sealing, permit the exposed edges to dry completely to permit penetration of the bridging encapsulant.

#### **4.2.1 Building Demolition Debris**

Should the owner approve the demolition of the building with Category I or II non-friable ACMs left in place, during demolition of the building, engineering controls should be used to prevent the visible release of dust

emissions. These controls include but are not limited to adequate use of water to wet the building materials, prior to and during demolition and during waste loading into dumpsters.

F&R recommends consultation with the local fire department prior to use of a fire hydrant as a water source. Controls should be taken to keep excess water from running off the demolition site. Dumpsters for waste material should be lined with two layers of 6-mil polyethylene sheeting and sealed (made leak tight) in a manner to avoid release during transportation to an appropriate landfill. Placement of waste material into dumpsters should be done in a manner to avoid a dust emissions release. Additionally, mechanical methods shall not be used to compress debris within the dumpsters. If dumpsters are filled, or partially filled, they must be sealed if work ceases (e.g. at the end of the day, for meal breaks, etc.) and the dumpsters are not immediately removed from the site.

#### **4.2.1.1 Demolition Debris**

For the building debris which contains non-friable asbestos materials, the material shall be placed in poly-lined trucks and covered for transport to the landfill facility. The material shall be labeled as noted below. The poly liner shall be sealed to prevent release of dust during transport or drying of materials prior to ultimate disposal.

#### **4.2.2 Sealing Contaminated Items Designated for Disposal**

Remove contaminated architectural, mechanical, and electrical appurtenances such as full-height partitions, duct work, pipes and fittings, radiators, light fixtures, conduit, panels, and other contaminated items designated for removal by completely coating the items with an asbestos lock-down encapsulant at the demolition site before removing the items from the asbestos control area. The asbestos lock-down encapsulant shall be tinted a contrasting color. It shall be spray-applied by airless method. Thoroughness of the sealing operation shall be visually gauged by the extent of colored coating on exposed surfaces. Lock-down encapsulants shall comply with the performance requirements specified herein.

#### **4.2.3 Packaging Waste For Disposal**

The abatement contractor will place the asbestos waste into appropriately labeled 6-mil thick impermeable polyethylene plastic disposal bags. The bags should not be filled more than 40 percent by volume to avoid tearing. The ACM waste must be wetted with sufficient water to insure that it is adequately wet. Prior to gooseneck sealing, the bag should be collapsed to remove any trapped air that may later contribute to bursting. After the exterior of the sealed bag is wet cleaned to remove any gross material, it is then double bagged and sealed by goose necking and taping. The bagged and labeled ACM waste will then be stored in a secured container to await transport to the disposal site. Asbestos waste cannot be mixed with any other type of construction waste from the site. Personnel handling ACM waste outside of the containment must wear, as minimum, protective clothing and a HEPA equipped half-mask, air-purifying respirator.

#### **4.2.4 OSHA Warning Labels**

In compliance with the OSHA Asbestos Standard, 29 CFR 1926.1101, the OSHA Hazard Communication Standard, 29 CFR 1926.59, and the EPA NESHAP Standard, all of which require each employer to ensure that all containers of hazardous chemicals in the workplace are labeled, tagged, or marked with the identity of the hazardous chemical contained therein, and an appropriate warning of the hazards of the chemical, all asbestos-containing waste disposal bags utilized by the abatement contractor will be appropriately marked as follows:

**DANGER**  
**CONTAINS ASBESTOS FIBERS**  
**MAY CAUSE CANCER**  
**CAUSES DAMAGE TO LUNGS**  
**DO NOT BREATHE DUST**  
**AVOID CREATING DUST**

These labels must be at least three (3) inches high by five (5) inches wide and conform to the requirements specified in 29 CFR 1910.145 for danger labels or signs.

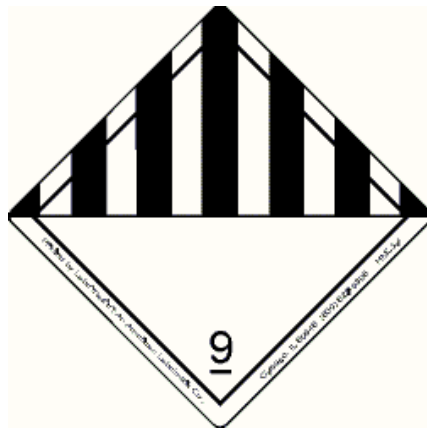
F&R acknowledges that section 1926.1101(k)(8)(vi) and 1926.1101(k)(8)(vi)(B) state that labeling is NOT required for concentrations of <1% asbestos. This exemption can be applied to waste stream comprising ONLY materials with concentrations of <1% asbestos. However, best practices would be to label the materials to inhibit unintentional exposure.

### 4.2.5 Generator Labels

NESHAP requires that each bag of asbestos-containing material that is to be transported off of the facility site, contain a visible label identifying the name of the waste generator (owner) and the location at which the waste was generated. This generator label must either be printed on the outside of the bag or it must be a separate label attached to the bag, or it can be a separate label that is inserted between the two poly bags if the outside bag is a clear bag that would allow the label to be read without opening the bag. Labels must be applied prior to transport from the site and shall be of sufficient quality to prevent detachment during handling.

### 4.2.6 DOT Transportation Labels

In addition to the warning labels required by both OSHA and the EPA, the United States Department of Transportation (DOT) requires a “CLASS 9” warning label on each bag of ACMs that is transported away from the removal site. The label should be as follows:



The “CLASS 9” (Miscellaneous Hazardous Materials) label should be approximately 100 mm by 100 mm in size and in addition to complying with 49 CFR 172.407; the background on the CLASS 9 label must be white with seven black vertical stripes on the top half. The black vertical stripes must be spaced, so that, visually, they appear equal in width to the six white spaces between them. The lower half of the label must be white with the class number “9” underlined and centered at the bottom.

Collect asbestos waste, asbestos contaminated water, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers and place in sealed fiber-proof, waterproof, non-returnable containers (e.g. double plastic bags 6 mils thick, cartons, drums or cans). Wastes within the containers must be adequately wet in accordance with 40 CFR 61-SUBPART M. Affix a warning and Department of Transportation (DOT) label to each container including the bags or use at least 6 mils thick bags with the approved warnings and DOT labeling preprinted on the bag. The name of the waste generator and the location at which the waste was generated shall be clearly indicated on the outside of each container. Prevent contamination of the transport vehicle (especially if the transport vehicle is a rented truck likely to be used in the future for non-asbestos purposes). These precautions include lining the vehicle cargo area with plastic sheeting (similar to work area enclosure) and thorough cleaning of the cargo area after transport and unloading of asbestos debris is complete. Dispose of waste asbestos material at an Environmental Protection Agency (EPA) or State-approved asbestos landfill per waste disposal contract requirement. For temporary storage, store sealed impermeable bags in asbestos waste drums or skips.

#### 4.3 Bag Out Procedures

- A. All containers shall be cleaned and thoroughly decontaminated before leaving the work area by being passed through the airlock and container cleaning assembly (or decon area), as follows:
  - 1) Containers shall first be gross-cleaned by vacuuming and then damp-wiped, before being placed in the single stage decontamination unit and removed from the work area.
  - 2) If a container being transferred from the work area via a shower has dried, it shall be wet-wiped again before being transferred past the decontamination unit.
- B. Transport the sealed container or skips to an EPA approved and certified waste disposal site. The Contractor shall provide the Owner with a signed certificate listing the quantity of materials delivered to the disposal site, a description of the location of the site, and a statement attesting to the fact that the site is an EPA and State approved disposal location, as applicable. The signatures of the asbestos removal Contractor, transporter, and site operator must appear on the certificate. The Contractor shall ensure that the operator leaves damaged bags in the delivery containers and that the entire contaminated container is buried; however, sealed plastic bags may be dumped from the containers into the burial site and uncontaminated containers may be reused. The Contractor shall certify that any reused containers have not contained damaged or broken bags of asbestos or other asbestos-contaminated material.
- C. Disposal of all asbestos waste shall be at a prearranged disposal site in accordance with regulations of the Maryland Department of the Environment-Waste Division (or the applicable regulations of the state where eventual disposal is completed) and OSHA Regulation 29 CFR 1910.1001. Documentation of disposal shall be provided to the Owner.
- D. Following removal of ACM, all plastic sheeting, tape, cleaning material, clothing and all other disposal materials or items used in the work area shall be packed into sealable plastic bags (6 mil minimum), sealed and placed into a second sealed plastic bag or into metal or fiber containers or skips for transport. The containers or skips shall be labeled as prescribed by OSHA Specifications 29 CFR 1910.1001 (f). Plastic sheeting shall not be reused in other containment(s) or work areas.
- E. Seal edges of ACM exposed by removal work which is inaccessible, such as TSI within wall cavities at the perimeter of the work area, etc., with penetrating and/or bridging encapsulant. Prior to sealing, permit the exposed edges to dry completely to permit penetration of the bridging encapsulant. Bridging encapsulant shall be tinted to provide visible confirmation of completion.

#### 4.4 Decontamination of Work Area

All removed ACM shall be containerized and each regulated area shall be gross cleaned on a daily basis. Removed material will not remain on the floor overnight or during any non-work period.

##### 4.4.1 General

Essential parts of asbestos dust control are housekeeping and clean-up procedures. Maintain surfaces of the asbestos control area free of accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris; keep waste from being distributed over the general area. Use HEPA filtered vacuum cleaners. **DO NOT BLOW DOWN THE SPACE WITH COMPRESSED AIR.** When asbestos removal is complete, all asbestos waste is removed from the work-site, and final clean-up is completed, the Project Monitor and Contractor will attest that the area is safe before the signs can be removed. After final clean-up and acceptable airborne concentrations are attained but before the HEPA unit is turned off and the enclosure removed, remove all pre-filters on the building HVAC system and provide new pre-filters. Dispose of filters as asbestos contaminated materials. Reestablish HVAC mechanical, and electrical systems in proper working order.

- A. If applicable, replace pre-filter and the intermediate filter in the Air Filtration Device. Clean all surfaces of the Work Area, including the outside surface of critical barrier sheeting, tools, scaffolding and/or staging, by HEPA-filtered vacuuming, then damp cleaning and mopping. Do not dry-dust or dry-sweep. Continue cleaning until there is no visible dust, debris or residue on polyethylene sheeting and other surfaces.
- B. Perform a complete visual inspection of all Work Area surfaces and contents. If any debris or residue is found, repeat the first cleaning and continue decontamination procedure from that point. For glovebag operations a visual inspection will be performed subsequent to the removal of each glovebag.
- C. Prior to removal, decontaminate all equipment and materials which are no longer required in the space. Enclosure within goose necked and taped waste bags is permitted provided they are cleaned prior to bagging and prior to removal from the work area.
- D. If applicable, allow sufficient time for the Work Area to completely dry while operating HEPA filtered fan units. Maintain operation of negative pressure differential system in operation during the drying period.
- E. If applicable, the QP shall conduct a visual inspection of the Work Area when the abatement and decontamination is complete and when the Contractor's supervisor requests such inspection.
- F. If applicable, after the visual inspection, an approved lock down encapsulant shall be applied to all the surfaces in the Work Area. The encapsulant used shall not impede installation of new materials. After sufficient drying time, determined by the QP, the final clearance can take place. If an opaque bridging encapsulant is used, the QP shall be afforded the opportunity to review the removal prior to and following application.
- G. Additional cleaning required after the first final cleaning will be performed at the expense of the contractor. Additional hours required by the QP will also be an expense paid for by the Contractor, as well as necessary repeat final air clearance analyses.
- H. Area air samples will be continuously collected within the regulated area in the vicinity of the whole component removal or uncontained outdoor abatement, if conducted. The air samples will be analyzed

at the end of each shift and/or upon completion of abatement in a regulated area. If area air samples are found to meet clearance criteria, the contractor will remove and dispose of critical barriers and completely dismantle and remove Decontamination Area. If area air samples exceed the clearance criteria a visual inspection will be performed and additional cleaning will occur as necessary. An additional set of air samples will be collected and analyzed on site using PCM.

- I. While they are operating, seal HEPA filtered AFDs with 6 mil polyethylene sheeting and duct tape to form a tight seal at intake and before unit is wet wiped and moved from the Work Area.

#### 4.5 Final Inspection and Testing

- A. If abatement is performed within a containment or a mini-containment, after cleaning and decontamination of the workspace has been conducted, and if a high degree of cleanliness has been achieved, notify the QP that the workspace is ready for inspection and final testing. The QP will visually inspect each Work Area where such activity was conducted to determine whether the clean-up has been properly completed and to detect any visible asbestos dust or contamination. The QP shall conduct a visual inspection of the Work Area when the abatement and decontamination is complete and when the Contractor's supervisor requests such inspection. The visual inspection will be conducted in general compliance with ASTM E 1368-11, Standard Practice for Visual Inspection of Asbestos Abatement Projects.
- B. If the visual inspection does not reveal any dust or other visible signs of contamination, the final air monitoring will take place.
- C. Final air clearance testing may be conducted by the IH using aggressive air sampling techniques or modified aggressive air sampling techniques in the Work Area. F&R will collect a minimum of two clearance samples per work area. For larger containment areas, additional samples may be conducted. If the space will not be reoccupied prior to demolition and work consists of non-friable removal, the QP may omit clearance sampling; reoccupation would include other trades entering regulated work areas prior to demolition following abatement, for any period, and would trigger need for clearance testing.
- D. For abatement areas which are not conducted within negative pressure enclosures, area monitoring samples collected during abatement shall serve as proxy provided they are below 0.01 fibers/cubic centimeter (f/cc). If area sampling in the regulated area or along the regulated area perimeter exceeds 0.01 fibers/cubic centimeter (f/cc), clearance sampling shall be conducted.
- E. Phase Contrast Microscopy (PCM) analysis will be performed in accordance with NIOSH Method 7400. Final test results shall show contamination levels not to exceed 0.01 fibers/cubic centimeter (f/cc). Air samples shall have a minimum volume of 1,200 liters per sample but may vary depending on size of Work Area and other variables. If PCM sample results exceed the 0.01 f/cc threshold, the Contractor shall re-clean the containment and re-testing will be performed. The cost of re-testing failed clearance shall be the responsibility of the Contractor. Alternatively, at the request and expense of the Contractor, the Consultant may submit the samples to a qualified laboratory for TEM analysis.
  - a. Transmission electron microscopy (TEM) analysis will be performed in accordance with NIOSH Method 7402 at the Owner's request. Final test results shall show contamination levels not to exceed 70 structures per square mm. Air samples shall have a minimum volume of 1,200 liters per sample but may vary depending on size of Work Area and other variables.
- F. The number of air samples required for clearances is as follows, generally:

Square feet of Enclosure	Number of Samples
Less than 100	2
100-500	3
500-1,000	4
1,000-10,000*	5

\*For areas greater than 10,000 square feet, the number of inside air samples to be obtained will increase by one sample for each 5,000 square feet over 10,000 square feet.

Within mini containments, a single clearance sample may be collected at the discretion of the QP.

- G. For areas where abatement is performed using glovebag technology, where whole component removal is effected, or where work is conducted outside in a regulated area using wet methods and HEPA Vacuum(s), air samples will be continuously collected within the regulated area established for the work. Air samples will be analyzed at the end of the shift, and/or when all abatement is complete in a regulated area. The area air samples will be analyzed by PCM in general conformity to the NIOSH Method 7400. If analysis indicates fiber concentrations at or less than 0.01 f/cc air testing will be considered completed. If all pipe surfaces and surfaces beneath and adjacent to the glovebag work are clean and free of any visible TSI then the area will be considered clear for re-occupancy. If, during periods where other trades are performing work which generated significant amounts of dust and debris, concentrations are above 0.01 f/cc but below the OSHA 0.1 f/cc PEL, the space will be considered completed, at the discretion of the QP. If warranted, following abatement work, a limited clearance sampling event may be completed to demonstrate that airborne concentrations are less than 0.01 f/cc.

#### 4.6 Abatement Completion

After thorough decontamination, seal negative air machines with 2 layers of 6 mil poly and duct tape to form a tight seal at the intake/outlet ends before removal from the regulated area in accordance with section 4.4.1. H. Complete asbestos abatement work upon meeting the regulated area visual and air clearance criteria and fulfilling the following:

- A. If the project involves RACM, within 24 hours after receiving final written monitoring results, the Contractor shall submit to MDE a record of the air monitoring required by §B(3)(b)(iii) of this regulation. The record shall indicate the asbestos concentration monitored in the work area after it is cleaned and before barriers are removed.
- B. Remove remaining decontaminated equipment and materials from the project area.
- C. Dispose of all packaged ACM waste as required, to include poly sheeting from the containment. All ACM and containment poly sheeting shall be disposed of as ACM at a permitted facility.
- D. Repair or replace all interior finishes damaged during the abatement work, as required.
- E. Fulfill other project closeout requirements as required in this specification including furnishing waste manifest, logs, and other documentation outlined in section 2.1.
- F. Place warning labels on ACM to remain which will be concealed by to-be-installed finish materials

-End of Section 028213-

# LEAD DISTURBANCE GUIDANCE PLAN

FORMER HAGERSTOWN REGIONAL AIRPORT FIREHOUSE – DEMOLITION  
AIRPORT DESIGN CONSULTANTS, INC.

F&R PROJECT NO. 59C-0111

## DISTURBANCE OF LEAD-CONTAINING PAINT AND ASSOCIATED DEBRIS RELATED TO GENERAL DEMOLITION ACTIVITIES

### 1.0 PART 1 GENERAL

#### 1.1 SCOPE OF WORK

This Lead Disturbance Guidance Plan (Plan) the removal and disposal of building materials with lead-based or lead-containing paint (LBP or LCP) and/or surface coatings to be impacted by demolition activities at the Former Hagerstown Regional Airport Firehouse located at in Hagerstown, Maryland.

An existing *Asbestos and Lead-Containing Paint Survey Report* was issued to Airport Design Consultants, Inc. on May 15, 2018 by Froehling and Robertson (F&R) as part of F&R project 72W-0019. F&R survey documents were utilized in preparation of this section and based on the reports. Identified building materials with Lead-Based Paint and/or Coatings greater than or equal to the action level of 0.7 mg/cm<sup>2</sup> associated with the aforementioned scope of work include the following:

LEAD-BASED PAINT MATERIALS INVENTORY			
Component	Substrate	Color	Location*
Interior			
Door/Door Casing	Steel	White	Exterior entrances to the firehouse
Window Sash/Casing	Steel	White	Windows around perimeter of the building
Horizontal I-Beam	Steel	White	Large support beam through center of the Main Garage
Pump/Pump Base	Steel	Red	Equipment Shed
Exterior			
Garage Door Casing	Steel	White	Casing around garage doors on south side of building
Door/Door Casing	Steel	White	Exterior entrances to the firehouse
Window Sash/Casing	Steel	White	Windows around perimeter of the building
Equipment Shed Door/Door Casing	Steel	White	South portion of Equipment Shed

The above table details only those building materials with painted and/or coated surfaces with a reported lead concentration greater than or equal to 0.7 mg/cm<sup>2</sup>. However, readings of other painted or coated surfaces indicated a lead content between 0.1 mg/cm<sup>2</sup> and 0.6 mg/cm<sup>2</sup>. The Designer is available to verify lead content utilizing existing data of specific materials should the Contractor require it.

- A. The Contractor shall be aware of all conditions of the Project and is responsible for verifying quantities and locations of all Work to be performed. Failure to do so shall not relieve the Contractor of its obligation to furnish all labor and materials necessary to perform the Work.
- B. This Plan indicates minimum requirements for the removal and disposal of lead-based and/or lead-containing paint and/or coatings on building materials at the subject site. The below requirements detailed in this Plan are intended as a guide and shall not supersede applicable Federal, State, or Local regulations. Requirements are generally based upon applicable Federal and State Regulations, as well as generally accepted industry standards. Where more stringent requirements exist, such procedures shall be followed.
- C. Working hours shall be as required and approved by the Owner. Removal activities may need to be performed during 'off-hours' (including nights and weekends). In addition, multiple mobilizations may be required to perform the work identified in this project. The Contractor shall coordinate and schedule all Work with the facility and Owner's representative.
- D. Other LBP may be present in the buildings which are not documented here but which are not anticipated to be impacted as part of the planned demolition work. If during demolition, work

is performed that will impact suspect materials that have not been sampled, F&R recommends all work to cease, or that materials be presumed to be coated with LBP. Testing of suspect materials should be performed and/or samples collected and analyzed; the material should be handled accordingly prior to disturbance.

## **1.2 DEFINITIONS**

### **1.2.1 Abatement**

a set of measures designed to eliminate or reduce lead-based paint hazards in residential, public, or commercial buildings, bridges, or other structures or superstructures in accordance with standards established by the Department, which may include:

- (a) The removal of lead-based paint and lead-contaminated dust, the containment or encapsulation of lead based paint, the Replacement or demolition of lead-painted surfaces or fixtures, and the removal or covering of lead contaminated soil; and
- (b) All preparation, cleanup, disposal, and post-abatement clearance testing activities associated with these measures.

### **1.2.2 Action Level**

Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter ( $\mu\text{g}/\text{M}^3$ ) of air averaged over an 8 hour period in an occupational/industrial environment.

### **1.2.3 Area Sampling**

Sampling of lead concentrations within the lead control area and inside the physical boundaries that is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel. This sampling will be conducted by the Environmental Consultant, if required.

### **1.2.4 Building Component**

Specific design or structural elements or fixtures of a building that are distinguished from each other by form, function, and location. (Doors, door trim, window, window trims, baseboards, etc.)

### **1.2.5 Building Component Removal**

Building components that will permanently be removed and disposed off.

### **1.2.6 Certified Contractor**

Certified under 40 CFR 745.226 to inspect, assess or remove lead-based paint, dust or soil. Certification as required to provide notification to the Environmental Protection Agency prior to the commencement of lead-based paint abatement activities in residential dwellings and child occupied facilities. The subject facility does not constitute target housing or a child occupied facility; consequently, alternative certification demonstrating appropriate training and certification in the recognition and control of lead hazards in accordance with current federal, State, and local regulations is acceptable. Consequently, RRP certification is not required but is acceptable.

### **1.2.7 Competent Person (CP)**

As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations.

**1.2.8 Contaminated Room**

Room for removal of contaminated personal protective equipment (PPE).

**1.2.9 Decontamination Shower Facility**

That facility that encompasses a clean clothing storage room, and a contaminated clothing storage and disposal rooms, with a shower facility in between.

**1.2.10 Eight-Hour Time Weighted Average (TWA)**

Airborne concentration of lead to which an employee is exposed, averaged over an 8 hour workday as indicated in 29 CFR 1926.62.

**1.2.11 Encapsulant**

A substance that forms a barrier between lead-based paint and the environment using a liquid-applied coating (with or without reinforcement materials) or an adhesively bonded covering material.

**1.2.12 Encapsulation**

The application of an encapsulant.

**1.2.13 High Efficiency Particulate Air (HEPA) Filter Equipment**

HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. A high efficiency particulate filter means 99.97 percent efficient against 0.3 micron or larger size particles.

**1.2.14 Lead**

Metallic lead, inorganic lead compounds, and organic lead soaps.

**1.2.15 Lead-Based Paint (LBP)**

Paint or other surface coating that contains lead greater than or equal to 0.7 milligram per centimeter squared (mg/cm<sup>2</sup>) or 0.5 percent by weight.

**1.2.16 Lead-Based Paint Hazard (LBP Hazard)**

Any condition that causes exposure to lead from lead-contaminated dust, lead-contaminated soil, lead-based paint that is deteriorated or present in accessible surfaces, friction surfaces, or impact surfaces that would result in adverse human health effects.

**1.2.17 Lead-Containing Paint (LCP)**

Surface coating containing lead or lead compound in excess of 0.009 percent by weight of the total nonvolatile content of the paint, or a detectable concentrations less than 0.7 mg/cm<sup>2</sup> or 0.5% by weight.

**1.2.18 Lead Control Area**

An enclosed area or structure, constructed as a temporary containment equipped with HEPA filtered local exhaust, which prevents the spread of lead dust, paint chips, or debris existing as a condition of

lead-based paint removal operations. The lead control area is also isolated by physical boundaries to prevent unauthorized entry of personnel.

## 1.2.19 Lead Permissible Exposure Limit (PEL)

Fifty (50)  $\mu\text{g}/\text{M}^3$  of air as an 8 hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than eight hours in a workday, the PEL shall be determined by the following formula:

$$\text{PEL (micrograms/cubic meter of air)} = 400/\text{No. Hours worked per day}$$

## 1.2.20 Owner

Hagerstown Regional Airport, Washington County, MD

## 1.2.21 Paint Removal

The separation of the paint from the substrate using heat guns, chemicals, or certain abrasive measures, either onsite or offsite.

## 1.2.22 Personal Sampling

Sampling of airborne lead concentrations within the breathing zone of an employee to determine the 8 hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples shall be representative of the employees' work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and centered at the nose or mouth of an employee. The sampling, conducted by the Contractor, shall provide information to complete the required exposure assessment to identify the level of exposure a worker would be subject to without respiratory protection. Whenever there has been a change of equipment, process, control, personnel or a new task has been initiated, the Contractor shall conduct additional personal sampling.

## 1.2.23 Physical Boundary

Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area but inside boundary."

## 1.2.24 Project Monitor

A Registered Architect, Professional Engineer, or Industrial Hygienist who is qualified to perform visual inspections as indicated in ASTM E 2255. The PM may be licensed in the State of Virginia as a Lead Inspector or Lead Risk Assessor. For this project, Froehling & Robertson, Inc. (F&R) personnel will serve as the PM. This person may also fulfill the role of Qualified Person (QP) for the site.

## 1.2.25 Project Supervisor (PS):

As used in this section, refers to a person employed by the Contractor who is trained and certified in the recognition and control of lead hazards in accordance with current federal, State, and local regulations. The PS shall be trained and certified to inspect, assess or remove lead based paint, dust or soil.

## 1.3 PERMITS AND COMPLIANCE

- A. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local laws, rules, and regulations pertaining to Work practices, protection of Workers, authorized visitors to the site, persons, and property adjacent to the Work.
- B. The Contractor shall complete all demolition work in accordance with the requirements found in 29 CFR 1926.62 and this Plan. Submit documentation of compliance with this standard to the Owner prior to start-up of work, including an air monitoring plan, dust control measures, etc. All compliance sampling and other control measures for potential lead dust shall be addressed within the exposure control and monitoring plan prepared by the Contractor. All compliance sampling shall be performed by individuals working under the direction of the Contractor's Competent Person. Following completion of work, submit all monitoring documentation to the Contracting Officer. The Owner may elect to do independent sampling.
- C. The Contractor shall pay all fees, royalties, and other costs necessary for the use of any copyrighted or patented product, design, invention, or processing the performance of the job specified in this Section. The Contractor shall be solely responsible for costs, damage or losses resulting from any infringement of these patent rights or copyrights. The Contractor shall hold the Owner, Architect and the Consultant harmless from any costs, damages, and losses resulting from any infringement of these patent rights or copyrights.
- D. The Contractor shall be responsible for securing all necessary permits for work under this Section, including hauling, removal, and disposal, fire, and materials usage, or any other permits required to perform the specified work.
- E. The Contractor shall make all applicable and necessary notifications to relevant federal, state, and local authorities and shall obtain and comply with the provisions of all permits or applications required by the work specified. The Contractor shall indemnify the Owner, Architect, and Consultant from, and pay for all claims resulting from failure to adhere to these provisions. The costs for all permits, applications, and the like, are to be assumed by the Contractor.
- F. The Contractor assumes the responsibility of proceeding in such a manner that employees are offered a workplace free of recognized hazards which may cause or are likely to cause death or serious injury. The Contractor shall be responsible for performing the abatement and disposal of LBP in a manner to prevent visible emissions or otherwise cause a fiber release episode.
- G. The Contractor shall be responsible for security of the Subject site and areas.
- H. Alcohol, drugs, or any other controlled substance are strictly prohibited at the subject site.
- I. The Contractor is responsible for the behavior of workers within their employment. If at any time employees are judged to exhibit unfitting or nuisance behavior by the Owner or the Owner's representative, the Contractor shall immediately remove that employee.

#### **1.4 PRE-CONSTRUCTION CONFERENCE**

- A. Prior to start of Work under this Contract, the Contractor shall attend a pre-construction conference attended by Owner, Facility Personnel, and Environmental Consultant. This requirement may be waived by the Owner under the assumption that the noted agenda items are discussed prior to mobilization and that the above noted submittals have been received by the Owner.

- B. Agenda for this conference shall include but not necessarily be limited to:
1. Contractor's scope of Work, Work plan, and schedule to include number of workers and shifts.
  2. Contractor's safety and health precautions including protective clothing and equipment and decontamination procedures.
  3. Environmental Consultant's duties, functions, and authority.
  4. Contractor's Work procedures including:
    - a. Methods of job site preparation and removal methods.
    - b. Respiratory protection.
    - c. Disposal procedures.
    - d. Cleanup procedures.
    - e. Fire exits and emergency procedures.
  5. Contractor's required pre-work and on-site submittals, documentation, and postings.
  6. Contractor's plan for twenty-four (24) hour Project security both for prevention of theft and for barring entry of unauthorized personnel into Work Areas.
  7. Temporary utilities.
  8. Storage of removed materials.
  9. Waste disposal requirements and procedures.
- C. In conjunction with the conference, the Contractor shall accompany the Owner and Environmental Consultant on a pre-construction walk-through reviewing the overall Work plan, location of fire exits, fire protection equipment, water supply and electric tie-in.

## **1.5 SELECT APPLICABLE STANDARDS AND REGULATIONS**

- A. The Contractor shall comply with the following codes and standards, except where more stringent requirements are shown or specified:
- B. Federal Regulations:
1. 29 CFR 1926.62 "Lead In Construction" (OSHA)
  2. 29 CFR 1926.21 "Safety Training and Education (OSHA)
  3. 29 CFR 1926.33 "Access to Employee Exposure and Medical Records" (OSHA)
  4. 29 CFR 1926.55 "Gasses, Vapors, Fumes, Dusts, and Mists" (OSHA)
  5. 29 CFR 1926.59 "Hazard Communication" (OSHA)
  6. 29 CFR 1926.65 "Hazardous Waste Operations and Emergency Response" (OSHA)
  7. 29 CFR 1926.103 "Respiratory Protection" (OSHA)
  8. 40 CFR 260 "Hazardous Waste Management Systems: General" (EPA)
  9. 40 CFR 261 "Identification and Listing of Hazardous Waste (EPA)
  10. 40 CFR 262 "Generators of Hazardous Waste (EPA)
  11. 40 CFR 263 "Transporters of Hazardous Waste (EPA)
  12. 40 CFR 264 "Owners and Operators of hazardous Waste Treatment, Storage, and Disposal Facilities" (EPA)
  13. 40 CFR 265 "Interim Status Standard for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities" (EPA)
  14. 40 CFR 268 "Land Disposal Restrictions" (EPA)
  15. 40 CFR 172 "Hazardous Materials, Tables, and Hazardous Materials Communications Regulations" (DOT)
  16. 49 CFR 171-178 "Transportation Standards" (DOT)
- C. Maryland Regulations:
1. MDE Title 6, Subtitle 8, of the Environment Article, Annotated Code of Maryland

**D. Standards and Guidance Documents:**

1. American National Standard Institute (ANSI) Z88.2-80, Practices for Respiratory Protection
2. ANSI Z9.2-79, Fundamentals Governing the Design and Operation of Local Exhaust Systems

**1.6 NOTICES**

- A. The Contractor shall be responsible for maintaining current project filings with regulatory agencies for the duration of the project, as required.

**1.7 PROJECT MONITORING AND AIR SAMPLING**

- A. The Owner may engage the services of an Environmental Consultant (the Consultant) who shall serve as the Owner's Representative and Project Monitor with regard to the performance of the Project and provide guidance as required throughout the entire abatement Project period.
- B. The Contractor is required to ensure cooperation of its personnel with the Consultant for the Project monitoring functions described in this section. The Contractor shall comply with these contract documents and all applicable regulations during the course of the Project.
- C. The Consultant may provide the following administrative services:
1. Review and approve or disapprove all submittals, shop drawings, and samples.
  2. Document that all notifications to governmental agencies by the Contractor are submitted, as applicable, in a timely manner and are correct in content.
- D. The Consultant may staff the Project with a trained and competent person(s) to act on the Owner's behalf at the job site. This individual shall be designated as the Project Monitor (PM).
1. The PM, if engaged, shall be on-site at all times the Contractor is on-site during disturbance or abatement activities associated with LBP or LCP.
  2. The PM shall have the authority to direct the actions of the Contractor verbally and in writing, if necessary, to ensure compliance with the Project documents and all applicable regulations. The PM shall have the authority to Stop Work when gross work practice deficiencies or unsafe practices are observed.
    - a. Such Stop Work order shall be effective immediately and remain in effect until corrective measures have been taken and the situation has been corrected.
    - b. Standby time required to resolve the situation shall be at the Contractor's expense.
  3. The PM, if engaged, shall provide the following services:
    - a. Inspection of the Contractor's work, practices, and procedures, including temporary protection requirements, for compliance with all regulations and Project specifications, as applicable.
    - b. Provide final visual assessment of work areas for the absence of debris.
    - c. Monitor the progress of the Contractor's Work, and report any deviations from the schedule to the Owner.
    - d. Monitor, verify, and document all waste load-out operations.
    - e. The PM shall maintain a log on site that documents all project related and Consultant and Contractor actions, activities, and occurrences.
  4. The following minimum inspections shall be conducted by the PM. Additional inspections shall be conducted as required by Project conditions.

- a. Pre-Construction Inspection: The purpose of this inspection is to verify the existing conditions of the Work Areas and to document these conditions.
- c. Work Inspections: The purpose of this inspection is to monitor the Work practices and procedures employed. Visual monitoring of work performed may be augmented by air sample collection for laboratory analysis. Results would be compared to OSHA thresholds or others.
- d. Visual Clearance Inspection: The purpose of this inspection is to verify that: all materials in the scope of work have been properly removed and the absence of visible debris/residue. Visual clearance inspection may be augmented by collection of dust wipe samples for laboratory analysis.
- e. Punch List Inspection: The purpose of this inspection is to verify the Contractor's certification that all Work has been completed as contracted and the existing condition of the area prior to its release to the Owner.

## **1.8 SPECIFIC CONTRACTOR RESPONSIBILITIES**

### **1.8.1 Fees, Applications, and Permits**

- A) The Contractor shall pay all fees, royalties, and other costs necessary for the use of any copyrighted or patented product, design, invention, or processing used in the performance of the job specified in this Section. The Contractor shall be solely responsible for costs, damage or losses resulting from any infringement of these patent rights or copyrights. The Contractor shall hold the Owner, Architect and the Consultant harmless from any costs, damages, and losses resulting from any infringement of these patent rights or copyrights.
- B) The Contractor shall make all applicable and necessary notifications to relevant federal, state, and local authorities and shall obtain and comply with the provisions of all permits or applications required by the work specified. The Contractor shall indemnify the Owner, Architect, and Consultant from, and pay for all claims resulting from failure to adhere to these provisions. The costs for all permits, applications, and the like, are to be assumed by the Contractor.
- C) The Contractor shall be responsible for securing all necessary permits for work under this Section, including hauling, removal, and disposal, fire, and materials usage, or any other permits required to perform the specified work.

### **1.8.2 Coordination/Cooperation**

At the request of the owner, the Contractor shall meet with the Architect, Owner, and Consultant for a Pre-Construction meeting prior to commencing work on the project. At the meeting, the Contractor shall be represented by the superintendent who shall run the project on a daily basis, and shall present evidence that all requirements for initiation of the work have been met. The minimum agenda for the meeting shall be:

- Channels of communications;
- Construction schedule, including sequence of critical work;
- Designation of responsible personnel;
- Procedures for safety, security, quality control, housekeeping, and related matters;
- Use of premises, facilities, and utilities;
- Review of "Pre-Job Submittals"; and
- Discussion of a detailed Project Compliance Program.

If a Pre-Construction meeting does not take place, the above noted agenda items shall be included as part of the Pre-Job Submittal package specified below in section 1.8.3.

1.8.3 Documentation/Submittals

- A) Pre-Job Submittals. The Contractor shall provide five (5) copies of the following Pre-Job Submittals at the Pre-Construction meeting for the acceptance of the Owner or Owners representative (e.g., the QP)
1. Copies of all fees, permits, applications and like documents required by federal, state, or local regulations obtained or submitted in proper fashion.
  2. Appropriate documentation of OSHA-required medical evaluation.
  3. Copies of OSHA Lead in Construction training as specified in 29 CFR 1926.62.
  4. Copies of respiratory fit test(s) (if applicable).
  5. Copies of Respiratory Protection Program
  6. A detailed Project Compliance Program as described in 29 CFR 1926.62(e)(2)
  7. Written plan, for the Owner's review and acceptance, of all proposed procedures, methods, and equipment to be utilized to fulfill the testing and work requirements of the Contract Specification.
  8. Proposed worker orientation plan which at a minimum includes a description of lead hazards and demolition methodologies, review of worker protection requirements, and the outline of safety procedures.
  9. List of workers intended to be assigned to the project.
  10. The name and address of Contractor's personal air monitoring and waste disposal lead testing laboratory including certification of accreditation for lead in the EPA National Lead Laboratory Accreditation Program.
  11. Material Safety Data Sheets (MSDS) on all materials and chemicals to be used on the project.
- B) During Job: Refer to Part 3.2.C for all submittals, documentation, and postings required to be maintained on-site during removal activities. The Contractor is required to submit to the Owner and Consultant, a weekly status report including:
1. Areas completed in the buildings.
  2. Results from personal air monitoring.
  3. Results from other testing.
  4. Medical, OSHA Lead in Construction training, and Respiratory Fit Test(s) (if applicable) 24 hours in advance of any new employees starting on the project.
- C) Post-Job. Within 30 days of the completion of work, the Contractor shall submit copies of the documents listed below. One set of the documents shall be transmitted to the Owner and one set to the Owner's representative for review and approval.
1. Waste disposal manifests, as warranted.
  2. OSHA compliance air monitoring records conducted during the Work, as applicable.
  3. Daily progress log.
  4. A list of all Workers used in the performance of the Project.
  5. Project notifications, if required.
  6. Visit Logs
  7. Incident Investigation Reports

1.8.4 Contractor Air Sampling

- A. The Contractor should make allowances in the bid price for the cost of all environmental and personnel monitoring, along with costs for provision of all other related services, monitoring, and/or equipment needed to comply with requirements found within 29 CFR 1926.62. The Contractor shall be required to conduct personnel air monitoring to establish personal

exposure levels, as applicable. This monitoring information will be used by the Contractor to determine the levels of personnel protection and environmental controls (*if necessary*) required to be used by the Contractor for this contract. Monitoring shall be performed under the direction of the Competent Person. The costs for PPE, monitoring, decontamination facilities, etc. shall be borne by the Contractor. Recent (less than 12 months prior) air monitoring establishing exposure levels is acceptable in the case that the materials and disturbance processes/procedures are *substantially equivalent* to those associated with this project. If significant changes in processes, control equipment, personnel, or work practices that could result in different exposures are anticipated, additional monitoring would be required regardless of a previous negative exposure assessment for a specific job.

- B. The Contractor's laboratory analysis of air samples shall be conducted by an appropriate laboratory accredited under the EPA National Lead Laboratory Accreditation Program (NLLP) by either the American Association for Laboratory Accreditation or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program to perform sample analysis.
- C. Results of personnel air sample analyses shall be available, verbally, within twenty-four (24) hours of sampling and shall be posted upon receipt. Written laboratory reports shall be delivered and posted at the Subject site within five (5) days. Failure to comply with these requirements may result in all work being stopped until compliance is achieved.

#### 1.8.5 Project Supervisor

- A. The Contractor shall designate a full-time Project Supervisor who shall meet the following qualifications:
  - 1. The Project Supervisor shall meet the requirements of a "Competent Person" as defined by OSHA 1926.62.
  - 2. The Project Supervisor must be able to speak, read, and write English fluently, as well as communicate in the primary language of the Workers.
- B. If the Project Supervisor is not on-site at any time whatsoever, all Work which impacts known LBP shall be stopped. The Project Supervisor shall remain on-site until the Project is complete. The Project Supervisor cannot be removed from the Project without the written consent of the Owner and the Environmental Consultant. The Project Supervisor shall be removed from the Project if so requested by the Owner.
- C. The Project Supervisor shall maintain the Daily Project Log that also includes the requirements of Section 2.4 of the Plan.
- D. The Project Supervisor shall be responsible for the performance of the Work and shall represent the Contractor in all respects at the Project site. The Supervisor shall be the primary point of contact for the Project Monitor.

#### 1.8.6 Medical Requirements

- A. Medical Examinations: Initial medical surveillance as required by 29 CFR 1926.62 shall be made available to all employees exposed to lead at any time (1 day) above the action level. Full medical surveillance shall be made available to all employees on an annual basis who are or may be exposed to lead in excess of the action level for more than 30 days a year or as

required by 29 CFR 1926.62. Adequate records shall show that employees meet the medical surveillance requirements of 29 CFR 1926.33, 29 CFR 1926.62, and 29 CFR 1926.103.

1. Medical Records: Maintain complete and accurate medical records of employees for a period of at least 30 years or for the duration of employment plus 30 years, whichever is longer.
2. Medical Surveillance: Provide medical surveillance to all personnel exposed to lead as indicated in 29 CFR 1926.62.

#### 1.8.7 Training

- A. As required by applicable regulations, prior to assignment to the Work, instruct each employee with regard to the hazards of lead, safety and health precautions, and the use and requirements of protective clothing and equipment.

#### 1.8.8 Respiratory Protection

The Contractor shall provide adequate personal protective equipment (PPE) to any employees working on lead coated surfaces if there is a potential for generation of airborne lead dust or fumes (e.g., through scraping, striping, grinding, cutting, sanding, removal, demolition, etc.) above the Permissible Exposure Limit (29 CFR 1926.62). Note: The standard does not reference a specific level of lead in paint at which a hazard exists. Rather, OSHA defines airborne concentrations, and references specific types of work practices and operations from which a lead hazard may be generated (29 CFR 1926.62, paragraph d).

- A. As required, establish and implement a respiratory protection program as required by ANSI Z88.2, 29 CFR 1926.103, 29 CFR 1926.62, and 29 CFR 1926.55.
- B. As required, select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH).
- C. Respirators shall be individually fit-tested to personnel under the direction of an Industrial Hygienist on a yearly basis. Fit-tested respirators shall be limited to the use of the individual fitted. Fit-test records shall be maintained on site for each employee.
- D. No respirators shall be issued to personnel without such personnel participating in a respirator training program.
- E. High Efficiency Particulate Air (HEPA) respirator filters shall be approved by NIOSH and shall conform to OSHA requirements.
- F. The Contractor shall provide and make available a sufficient quantity of respirator filters so that filter changes can be made as necessary during the work day. Filters must be changed if breathing becomes difficult. Appropriate respirator filters for authorized visitors and the PM shall be made available by the Contractor.
- G. Filters used with negative pressure air purifying respirators shall not be used any longer than one eight (8) hour work day, or they must be used in accordance with the Contractor's respiratory protection plan.
- H. Any authorized visitor, Worker, or supervisor found in the Work Area not wearing the required respiratory protection shall be removed from the Project site and not be permitted to return.

1.8.9 Delivery and Storage

- A. Deliver all materials to the job site in original packages with containers bearing manufacturer's name and label.
- B. Store all materials at the job site in a suitable and designated area.
  - 1. Store materials subject to deterioration or damage away from wet or damp surfaces and under cover.
  - 2. Protect materials from unintended contamination and theft.
  - 3. Storage areas shall be kept clean and organized.
- C. Remove damaged or deteriorated materials from the job site.

**2.0 PART 2 PRODUCTS**

**2.1 INTRODUCTION**

2.1.1 Materials, Tools, and Equipment for Selective Removal of Recyclable Components

- A. Deliver all materials in the original packages, containers, or bundles bearing the name of the manufacturer and the brand name and product technical description.
- B. Damaged or deteriorating materials shall not be used and shall be removed from the premises.
- C. Impermeable containers are to be used to receive and retain any lead-containing or contaminated materials until disposal at an acceptable disposal site.
- D. All caustics shall be labeled and containerized in leak-tight containers.
- E. Provide suitable tools for all demolition operations.
- F. The Contractor shall have available sufficient inventory of dated purchase orders for materials necessary for the job.
- G. Provide HEPA Vacuums of suitable size and capacities.

**2.2 PROTECTIVE CLOTHING**

- A. The Contractor shall provide adequate personal protective equipment (PPE) to any employees working on lead coated surfaces if there is a potential for generation of airborne lead dust or fumes (e.g., through scraping, striping, grinding, cutting, sanding, removal, demolition, etc.) above the Permissible Exposure Limit (29 CFR 1926.62). Note: The standard does not reference a specific level of lead in paint at which a hazard exists. Rather, OSHA defines airborne concentrations, and references specific types of work practices and operations from which a lead hazard may be generated (29 CFR 1926.62, paragraph d).
- B. Provide sufficient quantities of protective clothing to assure a minimum of four (4) complete disposable outfits per day for each individual performing the Work.
- C. Eye protection and hard hats shall be provided and made available for all personnel entering any Work Area.
- D. Authorized visitors shall be provided with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the Work Area.

## 2.3 SIGNS AND LABELS

- A. Provide bilingual (i.e., English-Spanish) warning signs and barrier tapes at all approaches to Work Areas. At a minimum, signs should be provided in English and in the predominant language of personnel. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the area.



## 2.4 DAILY PROJECT LOG

- A. Provide a Daily Project Log. The log shall contain on the title page the Project name, name, address and phone number of Owner; name, address and phone number of the Environmental Consultant; name, address and phone number of the Contractor; emergency numbers including, but not limited to local Fire/Rescue department and all other requirements.
- B. All entries into the log shall be made in non-washable, permanent ink and such a pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted.

## 2.5 SCAFFOLDING AND LADDERS

- A. The Contractor shall provide all scaffolding and/or staging as necessary to accomplish the Work of this Contract. Scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. All scaffolding shall be designed and constructed in accordance with OSHA, and any other applicable federal, state and local government regulations. Whenever there is a conflict or overlap of the above references the most stringent provisions are applicable. Daily inspection of the scaffolding shall be conducted by a competent person.
- B. The Contractor shall provide scaffolding and ladders as required by the Environmental Consultant for the purposes of performing required inspections.

## 2.6 HEPA VACUUM EQUIPMENT

- A. All dry vacuuming performed under this contract shall be performed with High Efficiency Particulate Air (HEPA) filter equipped industrial vacuums conforming to ANSI Z9.2.
- B. Provide tools and specialized equipment including scraping nozzles with integral vacuum hoods connected to a HEPA vacuum with flexible hose.

## 2.7 POWER TOOLS

- A. Any power tools used to drill, cut into, or otherwise disturb LBP material shall be manufacturer equipped with HEPA filtered local exhaust ventilation.

## **2.8 POLYETHYLENE SHEETING**

- A. All polyethylene (plastic) sheeting used on the Project shall be at least 6 mil fire retardant sheeting in accordance with applicable federal and state regulations.

## **2.9 SUBSTITUTION OF MATERIALS AND/OR METHODS**

- A. Any substitution in materials or methods to those specified shall be approved by the Consultant and Owner prior to use. Any requests for substitution shall be provided in writing to the Consultant and the Owner. The request shall clearly state the rationale for the substitution.
- B. Submit to the Consultant and the Owner product data and samples of all materials to be considered as an alternate.
- C. Product data shall consist of manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, safety data sheets (SDS), and other standard descriptive data. Submittal data shall be clearly marked to identify pertinent materials, products or models and show performance characteristics and capacities. Samples shall be of sufficient size and quantity to clearly illustrate the functional characteristics of the product or material with integrally related parts and attachment devices.
- D. No work shall begin which requires submittal for approval until the Consultant has "approved" or "approved as noted" the submittal.

## **3.0 PART 3 EXECUTION**

### **3.1 LOCATION AND WORK STATEMENT**

This Lead Disturbance Guidance Plan covers the disturbance or removal and disposal of building materials with lead-based paint to be impacted by demolitions at the Former Hagerstown Regional Airport Firehouse in Hagerstown, Maryland. Work may also include removal and segregation of select recyclable components.

### **3.2 BUILDING COMPONENTS RECYCLING AND SCOPE OF WORK**

The Contractor shall be required to comply with the project specifications concerning LBP and all applicable regulations when disturbing any painted surface.

The Contractors shall complete all demolition work in accordance with the requirements found in 29 CFR 1926.62 and this Plan. Submit documentation of compliance with this standard to The Owner prior to start-up of work, including an air monitoring plan, dust control measures, etc. All compliance sampling and other control measures for potential lead dust shall be addressed within exposure control and monitoring plan prepared by the Contractor. All compliance sampling shall be performed by individuals working under the direction of the Contractor's Competent Person. Following completion of work, submit all monitoring documentation to the Contracting Officer. The Owner may elect to do independent sampling.

The Contractor shall submit means and methods for removal or segregation of recyclable components.

- A. Should visible emissions be observed outside the Work Area, immediately stop Work and correct procedures as necessary. All costs incurred in decontaminating such non-Work Areas and the contents thereof shall be borne by the Contractor, at no additional cost to the Owner.

- B. Medical approval and fit test reports shall be on site prior to admittance of any Contractor's employees to the Work Area where respiratory protection is required.
- C. The following submittals, documentation, and postings shall be maintained on-site by the Contractor during removal activities at a location approved by the Project Monitor:
  - 1. Accreditation, Worker Training, Medical Surveillance:
    - b. Evidence that Workers have received appropriate training required by OSHA 1926.62.
    - c. Documentation that Workers have been fit tested specifically for respirators used on the Project.
  - 2. Daily OSHA personal air monitoring results, as necessary.
  - 3. Project documents (specifications and drawings.)
  - 4. Applicable regulations.
  - 5. Safety Data Sheets of supplies/chemicals used on the Project.
  - 6. List of emergency telephone numbers.
  - 7. Daily Project Log.
- D. The following documentation shall be maintained on-site by the Project Monitor during removal activities:
  - 1. Project Monitor Daily Log.
  - 2. Survey Report.

### **3.3 PERSONNEL DECONTAMINATION ENCLOSURE**

- A. The Contractor shall provide clean and contaminated changing rooms and shower facilities in accordance with this Plan and 29 CFR 1926.62.

### **3.4 WORK AREA ENTRY AND EXIT PROCEDURES**

- A. Access to and from the Work Area is permitted only through the personnel decontamination enclosure. Note that, for the purposes of this document, the Work Area is limited to only those areas where disturbance of building materials containing lead at concentrations which are anticipated to approach or exceed the OSHA Action Level or PEL is conducted.
- B. The following procedures shall be followed when entering the Work Area:
  - 1. Before entering the Work Area, Workers shall proceed to the clean room, remove all street clothes, and don protective clothing, equipment, and respirators.
  - 2. Workers shall proceed from the clean room through the shower room and the equipment room and into the Work Area.
- C. The following procedures shall be followed when exiting the Work Area:
  - 1. Before leaving the Work Area, gross contamination will be removed by HEPA vacuuming.
  - 2. In the equipment room, Workers shall remove disposable clothing and shall place clothing in plastic disposal bags for disposal as contaminated debris prior to entering the shower room.
  - 3. Workers shall shower thoroughly with soap and water.
  - 4. Upon exiting the shower, Workers shall don new disposable clothing if the Work shift is to continue or street clothes to exit area. Under no circumstances shall Workers enter public non-Work Areas in disposable protective clothing.

### **3.5 REMOVAL OF LEAD-BASED PAINT OR LEAD CONTAINING MATERIALS**

- A. The Project consists of planned demolitions of the Former Hagerstown Regional Airport Firehouse. Work may also include removal and segregation of select recyclable components. The Contractor shall be required to comply with the project specifications concerning LBP and all applicable regulations when disturbing any painted surface. The Contractor shall complete all demolition work in accordance with the requirements found in 29 CFR 1926.62 and this Plan.
- B. Lead Control Area Requirements:
  - 1. If LBP will be removed by means which will not likely create airborne, lead-containing dust (such as careful wet scraping or chemical stripping), establish a lead control area by situating critical barriers and physical boundaries around the area or structure where LBP/LCP removal operations will be performed.
  - 2. If removal practice will create airborne, lead-containing dust (such as sanding, abrasive blasting, thermal cutting, demolition, or needle gun use), utilize full containment procedures - Contain removal operations by the use of critical barriers and HEPA filtered exhaust or a negative pressure enclosure system with decontamination facilities and with HEPA filtered exhaust if required by the PS, as directed.
- C. Boundary Requirements:
  - 1. Physical Boundary: Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that airborne concentrations of lead will not reach 30 micrograms per cubic meter of air outside of the lead control area.
  - 2. Warning Signs: Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.
- D. Confirm that the building heating, ventilating, and air conditioning systems and electrical systems and circuits have been shut down in the work area prior to initiation of work. Provide temporary electric power and lighting as specified herein.
- E. All surfaces and objects within the Work Area shall be pre-cleaned using HEPA vacuuming and/or wet-wiping methods. Dry sweeping and any other methods that raise dust shall be prohibited. ACM shall not be disturbed during pre-cleaning.
- F. Mechanical Ventilation System:
  - 1. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.62, as applicable.
  - 2. To the extent feasible, and as applicable, use fixed local exhaust ventilation connected to HEPA filters or other collection systems. Local exhaust ventilation systems shall be designed, constructed, installed, and maintained in accordance with ANSI Z9.2.
  - 3. Vent local exhaust outside the building only, as feasible, and away from building ventilation intakes.

### **3.6 WORK AREA DECONTAMINATION AND CLEARANCE PROCEDURES**

- A. Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to clean up the area. At the end of each shift and when the component removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner. Re-clean areas showing dust or residual paint chips or debris. If adjacent areas become contaminated at any time during the work, clean and visually inspect the area. The Supervisor shall certify in writing that the area has been cleaned of lead contamination before restarting work.
- B. The Contractor, as applicable, shall document in writing and provide analytical documentation to certify that the employee exposure to an airborne concentration of lead were below the required action level, respiratory protection used for the employees was adequate; the work procedures were performed in accordance with 29 CFR 1926.62; and that there were no visible accumulations of material and dust containing lead left in the subject site. Do not remove the lead control area or roped off boundary and warning signs prior to the Owner's or Owner's representative's acknowledgement of the PM's visual assessment.
- C. The Environmental Consultant shall determine that work areas have been sufficiently cleaned by conducting a visual assessment of the work area. If requested by the owner, wipe samples may be collected to verify cleanliness of interior work and soil samples for exterior work. Clearance criteria of work areas shall be in general accordance with HUD Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (Second Edition, July 2012). As a standard, current EPA and HUD guidance indicates that lead hazards exist when lead in dust meets or exceeds 10 micrograms per square foot ( $\mu\text{g}/\text{ft}^2$ ) for interior floors, 100  $\mu\text{g}/\text{ft}^2$  for interior window sills and troughs, and 40  $\mu\text{g}/\text{ft}^2$  for porch floors. Alternately, a Best Management Practice threshold of 200  $\mu\text{g}/\text{ft}^2$  may be used based on OSHA interpretation letter 2003-01-13-1 from Richard E. Fairfax, Director of Compliance Programs.
- D. As a result of any visual inspection by the PM or should collected samples indicate elevated levels of lead, the Contractor will clean or re-clean the affected areas at no additional expense to the Owner.

### **3.7 RESTORATION OF UTILITIES, FIRESTOPPING, AND FINISHES**

- A. After final visual clearance, remove locks and restore electrical and HVAC systems, as applicable. All temporary power shall be disconnected, power lockouts removed and power restored. All temporary plumbing shall be removed.
- B. Finishes and penetrations damaged by removal activities shall be restored prior to final payment, as applicable. As the structure subject to this work is scheduled to be demolished, restoration of finishing materials is not expected. However, access points made to the structure to facilitate the work may need to be restored to maintain building security and/or weatherization.

## **4.0 PART 4 DISPOSAL OF WASTE**

### **4.1 TRANSPORTATION AND DISPOSAL SITE**

- A. The Contractor's Hauler and Disposal Site shall be approved by the Owner and/or Owner's Representative.
- B. The Contractor shall give twenty-four (24) hour notification prior to removing any waste from the site. Waste shall be removed from the site only during normal working hours unless

otherwise specified. No waste may be taken from the site unless the Contractor and Environmental Consultant are present and the Environmental Consultant authorizes the release of the waste as described herein.

- C. All waste generated as part of the Project shall be removed from the site in accordance with applicable regulations and this Plan.
- D. The Hauler, with the Contractor and the Environmental Consultant, shall inspect all material in the transport container prior to taking possession and signing the Waste Manifests, as applicable.
- E. Unless specifically approved by the Owner, the Contractor shall not permit any off-site transfers of the waste or allow the waste to be transported or combined with any other off-site material. The Hauler must travel directly to the disposal site as identified on the notifications with no unauthorized stops.

#### **4.2 DISPOSAL**

- A. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing, which may produce airborne concentrations of lead particles. Label the containers in accordance with 29 CFR 1926.62 and 40 CFR 261. Dispose of lead-contaminated waste material at an EPA or State approved hazardous waste treatment, storage, or disposal facility, if required, based on section 4.3, below.
- B. Store waste materials in U.S. Department of Transportation (49 CFR 178) approved containers. Properly label each container to identify the type of waste (49 CFR 172) and the date the container was filled. Do not store hazardous waste containers in interim storage longer than 90 calendar days from the date affixed to each container.
- C. Handle, store, transport, and dispose lead or lead-contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. The Contractor shall provide documentation the transporter is authorized to transport the waste, authorized to deliver the waste to the treatment, storage, or disposal facility and the treatment, storage, or disposal facility is authorized to accept the waste. Comply with land disposal restriction notification requirements as required by 40 CFR 268.
- D. All material, whether hazardous or non-hazardous shall be disposed in accordance with laws and provisions and federal, State, or local regulations. Ensure waste is properly characterized or assumed to constitute Characteristic Hazardous Waste due to lead content. The result of each waste characterization (TCLP for RCRA materials) will dictate disposal requirements.
- E. Submit written evidence the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA and State or local regulatory agencies. Submit one copy of the completed manifest, signed and dated by the initial transporter in accordance with 40 CFR 262 if the material is found to be Characteristic Hazardous Waste.
- F. The cost of disposal is the responsibility of the Contractor.
- G. Some lead coated materials may be recycled. Confirmation of such materials shall be made by the Owner's Representative.

#### **4.3 CHARACTERIZATION OF WASTE**

## LEAD DISTURBANCE GUIDANCE PLAN

**FORMER HAGERSTOWN REGIONAL AIRPORT FIREHOUSE – DEMOLITION**  
**AIRPORT DESIGN CONSULTANTS, INC.**

**F&R PROJECT NO. 59C-0111**

- A. Metal that will be recycled and is coated with LBP/LCP will be properly handled and transported to the recycling facility. The recycling facility will be notified of the presence of lead in the recycled waste stream. This notification will be documented either on the waste manifest or in a separate written document.
- B. The Contractor shall arrange to conduct Toxicity Characteristic Leaching Procedure (TCLP) testing to characterize the waste stream with regards to lead shall be performed in accordance with EPA hazardous waste disposal requirements found in 40 CFR 260-264. Alternatively, the materials can be assumed to constitute Characteristic Hazardous Waste for lead content.
- C. Sample collection for testing shall be performed in situ and will consider the aggregate of all materials within the waste stream at proportions representative of their volume. Composite samples shall be obtained by taking sub-samples of each building component, which will then be proportionately combined into one composite sample for the TCLP analysis. Sample selection of waste stream debris shall be performed in accordance with ASTM Designation E 1908-03 Standard Guide for Sample Selection of Debris Waste From A Building Project for Toxicity Characteristic Leaching Procedures (TCLP) Testing for Leachable Lead (Pb).

Alternately, the known LBP coated components may be segregated for disposal. In this case, TCLP Sampling of only this waste may be conducted or assumed to constitute Characteristic Hazardous Waste. Waste scheduled for recycling should not be included in the TCLP waste stream testing.

- D. TCLP Testing Results:
  - 1. If TCLP testing results indicate that the concentration of lead in the materials in the aggregate of the waste stream is less than 5 mg/L (milligram per Liter), below the threshold for determination of hazardous lead waste, then all of the debris generated during demolition activities can be disposed of as general construction waste.
  - 2. If TCLP testing results indicate that the concentration of lead in the materials in the aggregate of the waste stream is 5 mg/L or greater, at or above the threshold for determination of hazardous lead waste, then segregation of materials shall performed for appropriate disposal or the entire waste stream shall be considered to be disposed of as hazardous wastes.

-- End of Section --

## **APPENDIX A – CONSTRUCTION SAFETY AND PHASING PLAN (CSPP)**

**PAGE HAS BEEN INTENTIONALLY LEFT BLANK**

---

---

# ARFF Building Demolition; AOA Fence/Access Gate Realignment

## Construction Safety and Phasing Plan (CSPP)

---



April 2025



## Table of Contents

<b>0. Project Overview .....</b>	<b>3</b>
<b>1. Coordination .....</b>	<b>4</b>
<b>2. Phasing .....</b>	<b>5</b>
<b>3. Areas and Operations Affected by Construction .....</b>	<b>7</b>
<b>4. Navigational Aid (NAVAID) Protection .....</b>	<b>8</b>
<b>5. Contractor Access .....</b>	<b>9</b>
<b>6. Wildlife Management.....</b>	<b>11</b>
<b>7. Foreign Object Debris (FOD) Management.....</b>	<b>12</b>
<b>8. Hazardous Material (HAZMAT) Management.....</b>	<b>13</b>
<b>9. Notification of Construction Activities.....</b>	<b>13</b>
<b>10. Inspection Requirements.....</b>	<b>13</b>
<b>11. Underground Utilities.....</b>	<b>14</b>
<b>12. Penalties .....</b>	<b>14</b>
<b>13. Special Conditions .....</b>	<b>15</b>
<b>14. Runway and Taxiway Visual Aids .....</b>	<b>15</b>
<b>15. Markings and Signs for Access Routes.....</b>	<b>15</b>
<b>16. Hazard Marking and Lighting .....</b>	<b>15</b>
<b>17. Work Zone Lighting for Nighttime Construction.....</b>	<b>16</b>
<b>18. Protection of Areas, Zones, and Surfaces .....</b>	<b>16</b>
<b>19. Other Limits of Construction.....</b>	<b>17</b>
<b>20. Safety Plan Compliance Document (SPCD) – Contractor’s Responsibility.....</b>	<b>17</b>

## Appendices

Appendix A.	Safety and Phasing Plan Checklist
Appendix B.	Construction Safety and Phasing Drawings
Appendix C.	Sample Contractor’s Safety Plan Compliance Document (SPCD)
Appendix D.	Construction Project Daily Safety Inspection Checklist

# ARFF Demolition; AOA Fence/Access Gate Realignment

AIP No. 3-24-0019-071-0024 (Design/Construction)

Hagerstown Regional Airport (HGR)

Hagerstown, Maryland

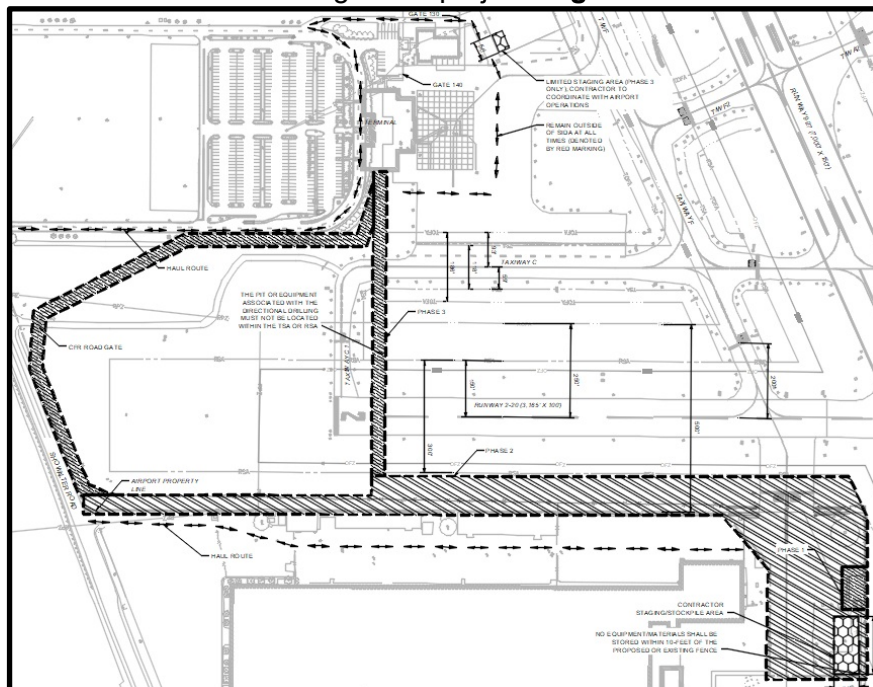
## 0. Project Overview

Runway Line of Sight (LOS) standards reduce conflicts among aircraft, and between aircraft and vehicles operating along active runways. A clear runway LOS allows pilots on the runway to visually verify the location and actions of other aircraft and vehicles on the ground. Because HGR has two intersecting runways, Runways 9-27 & 2-20, the Airport is required to meet Runway Visibility Zone (RVZ) criteria in accordance with Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5300-13B, Airport Design. The present RVZ for the intersection of Runways is compromised by an abandoned Aircraft Rescue and Fire Fighting (ARFF) station and airport security fencing. To mitigate this, the airport has acquired land that includes the Fairchild Property and a portion of Parcel F8. The total area acquired is approximately 2.88 acres. This project includes the demolition of the old fire station, as well as removal and re-installation of the AOA fence and Gates to meet RVZ Requirements.

This project includes:

- Demolition of the existing ARFF Building. Existing floor slab and foundations to remain.
- Demolition of the existing Airport Security Fence.
- Demolition of the existing 160' aircraft access gate.
- Construction of a new realigned Airport Security Fence.
- Construction of a new aircraft access gate, vehicle/man gate, gate controllers, and monitoring/controls.
- Construction/installation of new power and control ducts and cables from the terminal security room to the proposed gates.

This narrative discusses the elements of the Construction Safety and Phasing Plan for the ARFF Demolition; AOA Fence/Access Gate Realignment project. **Figure 1** shows the limits of construction.



**Figure 1 – ARFF Demolition; AOA Fence/Access Gate Realignment: Limits of Construction**

## 1. Coordination

On behalf of the Board of County Commissioners for Washington County MD, the airport sponsor, HGR will host pre-bid and pre-construction coordination meetings to ensure the Sponsor, the Construction Manager, the Designer, the Contractor, the FAA, tenants, and all other interested parties are aware of design, safety, and construction requirements and have an understanding of their individual responsibilities, as well as the technical and legal requirements of the contract.

### 1.1 Pre-Bid Meeting:

The pre-bid coordination meeting will include discussion of the project's scope of work, construction phasing, schedule, unique construction items, bid forms to be submitted, Disadvantaged Business Enterprise (DBE) requirements, and question and answer session. The meeting will clarify and explain project construction methods, procedures, and safety measures. The Construction Safety and Phasing Plan (CSPP) will be reviewed and discussed with key attendees.

- Key Attendees: HGR Operations/Management (*Sponsor*)  
Washington County Commissioners (*Sponsor*)  
Resident Project Representative (RPR) (*Sponsor's Representative*)  
ADCI (*Designer*)  
Bidding Contractors (*Contractor*)

## 1.2 Pre-Construction Meeting

The pre-construction coordination meeting will include discussion of project scope, staging, phasing, operational safety, security, environmental factors, DBE compliance and other project-specific issues. The CSPP and Safety Plan Compliance Document (SPCD) will be reviewed and discussed.

- Key Attendees:
  - HGR Airport Director
  - HGR Maintenance
  - HGR Operations and Security
  - FAA Airports District Office (Washington)
  - FAA Air Traffic Control Tower (ATCT)
  - RPR
  - ADCI - Designers
  - Testing Laboratory representative
  - Contractor and Subcontractor representative(s)
  - Tenants
  - Airlines
  - Federal, State, and local agencies affected by the proposed construction

### 1.3 Weekly Progress Meetings

Throughout the duration of the project, weekly progress meetings will be held. Construction phasing and operational safety will be a standing agenda item at the weekly progress meeting.

- Key Attendees:
  - HGR Airport Director
  - HGR Operations and Security
  - HGR Maintenance
  - ARFF Representative
  - RPR
  - ADCI - Designers
  - Superintendent and Foreman of Prime Contractor
  - Project foreman for each subcontractor with work occurring during current period
  - Contractor Safety Officer
  - Contractor Security Officer

## **1.4 Daily Safety Meeting**

The General Contractor is responsible to host Daily Safety Meetings prior to the start of each construction day with all workers to review and discuss daily project scope and appropriate safety equipment and measures.

At the end of each construction day, the General Contractor is responsible to maintain a clean and safe construction site. The General Contractor is responsible for daily monitoring and routine maintenance of safety devices and equipment. The Contractor is responsible for immediately repairing malfunctioning safety devices and equipment to the satisfaction of the Airport.

## **1.5 Scope or Schedule Changes**

Changes in project scope or schedule may require revisions to the CSPP. Changes to the CSPP would need to be reviewed and approved by HGR Operations/Management and the FAA. The approved changes shall also be reflected in the SPCD.

## **1.6 FAA ATO Coordination**

Coordination with FAA ATO has occurred throughout the design process. Closures of airfield pavements and issuing NOTAMS will be closely coordinated with the FAA ATCT. Construction activity was modeled by ADCI to determine any impacts or restrictions during construction.

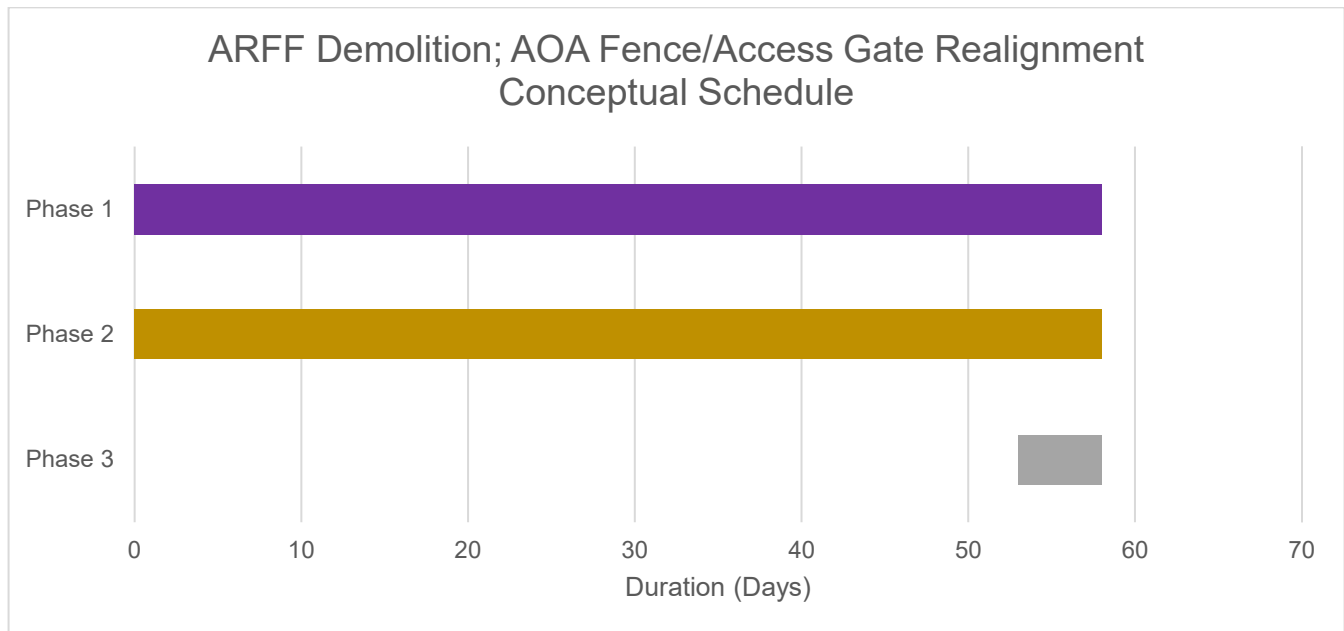
The Contractor will provide a two-week look ahead schedule at every weekly progress meeting. HGR Operations/Management will maintain coordination with the FAA ATCT and inform the FAA ATCT of any changes to the project scope or schedule.

# **2. Phasing**

The construction phasing has been developed to minimize the impact of construction operations on the airport and its tenants while promoting construction efficiency and overall safety. The project is broken into three (3) phases. Phase 1 includes the demolition of the existing ARFF building. Phase 2 includes installation of the new fence and gate, as well as demolition of the existing fence and gates. Security must be maintained at all times while working in Phase 2. Phase 3 includes installation of fiber optic cable mounted on the fence from the terminal building to the proposed gate (or directional drilled conduit underneath Runway 2 for Add Alternate No. 1). A conceptual construction schedule is shown for reference.

**Estimated Start Date:** Fall 2025

**Estimated Completion Date:** Fall 2025



### Conceptual Construction Schedule

#### 2.1 Mobilization Phase

- May overlap with the start of construction if determined by Contractor's Schedule to be feasible and if approved by the RPR.
- Establish site access, haul routes, and Contractor staging area.
- Access: Hagerstown Aviation Museum entrance along Showalter Road for Phases 1 and 2, Gate 130 for Phase 3
- Haul Route: Same as Access route
- Staging Area: East of the abandoned ARFF building, as shown on the plans.
- Submittals, Shop Drawings and approval of Gate Designs.
- Requests for Information (RFI).
- Ordering of Materials.
- Trailer/Temporary Construction Setup (if Required by Contractor).
- Construction Schedule development and approval.
- Coordination with HGR Operations to schedule taxiway closures.
- Contractor will not impact any part of the airfield as part of the Mobilization phase unless otherwise authorized by the RPR.

#### 2.2 Phase 1 (58 days)

The scope of work for Phase 1 includes but is not limited to:

- Demolish abandoned ARFF Building
- Removal all materials from airport property (other than those designated to be retained)

Phase 1 consists of the demolition of the abandoned ARFF Building.

Airfield Impacts:

- No airfield impacts, but closure of the pavement surrounding the existing ARFF Building.

Phase 1 will be completed as day work with no time restrictions.

### 2.3 Phase 2 (58 days)

The scope of work for Phase 2 includes but is not limited to:

- Demolish the remainder of the eastern fence (non-secure airfield fence)
- Install the proposed fence and gate.
- Demolish the western fencing (secure airfield fence).

Phase 2 includes demolition of the existing fence and installation of the proposed fence.

Airfield Impacts:

- Closure of the apron/taxilane pavement north and east of the aviation museum.

Phase 2 will be completed as day work with no time restrictions, however, access via the taxilane and 160' gate opening must be available all day for the Hagerstown Aviation Museum during Open Airplane Days. Additionally, the largest event held at the museum is the Wings and Wheels Expo which is held in September. Access via the taxilane and 160' gate opening must be available at all times during the Wings and Wheels Expo.

### 2.4 Phase 3 (5 days)

The scope of work for Phase 3 includes but is not limited to:

- Install fiber optic cable on fence (Base Bid)
- Install directional drilled conduit under runway and taxiway (Add Alternate No. 1).
- Install fiber in conduit and connect to terminal building.

Phase 3 includes the installation of fiber optic cable and its associated connections.

Airfield Impacts:

- None.

When working inside the movement Area boundary the RPR and Contractor shall monitor and utilize Aviation band radios to communicate With ATCT during daytime and CTAF at Night (if night work is needed).

Phase 3 will be completed as day work with no time restrictions.

Phases 1 and 2 shall be completed concurrently with all other phases.

## 3. Areas and Operations Affected by Construction

The main area of the airport that will be affected by the project includes the portion of pavement surrounding the abandoned ARFF building and the pavement surrounding the proposed 160' gate. This area will be closed to aircraft and vehicles (and later fenced in) during construction.

Due to the construction work remaining outside of the designated safety areas, there are no anticipated taxiway or runway closures. No runway or taxiway closures will be permitted without advanced approval from HGR Operations.

The Contractor will not enter into any safety area of any active runway without an appropriately badged escort and approval from the ATCT. In addition, there will be no construction activities, placement of stockpiles, storage of materials, or fueling in the approach protection area of any active runway.

### 3.1 Runway Safety Areas

The Contractor will not enter the safety area of any active Runway without an appropriately badged escort. **Table 3-1** shows Runway Safety Area dimensions in the project work areas.

**Table 3-1. Runway Safety Areas**

Runway	Aircraft Approach Category	Airplane Design Group	Runway Safety Area Width Divided by 2
09-27	C	III	250 feet
02-20	B	II	75 feet

Contractor shall install survey stakes at limits of RSA and TSA to delineate these areas during construction.

### 3.2 Runway Approach Protection Areas

Unless otherwise shown, the Contractor will not enter, conduct fueling, place stockpiles, or store materials in the approach protection area of any active Runway. **Table 3-2** shows Runway Approach Protection Areas.

**Table 3-2. Runway Approach Protection Areas**

Runway End	Aircraft Approach Category	Airplane Design Group	Safety Area Prior to Threshold	Minimum Distance to Threshold on Approach Slope	
9	C	III	1,000 feet	200 feet	34:1
27	C	III	1,000 feet	200 feet	50:1
2	B	II	300 feet	200 feet	20:1
20	B	II	300 feet	200 feet	20:1

## 4. Navigational Aid (NAVAID) Protection

Aircraft navigational aids (NAVAIDS) provide visual and electronic information which are used by pilots who operate and land aircraft at the airport. Construction activities may have negative impacts on the functionality and serviceability of NAVAIDS. The Contractor must coordinate their work effort and limit their operations in NAVAID critical areas to minimize NAVAID impacts.

The Contractor will be required to restrict and limit operations so that material, equipment, and personnel do not enter NAVAID critical areas or disturb power to NAVAID facilities without prior coordination with HGR Operations and FAA Tech Ops personnel. All construction activity has been modeled by ADCI to determine any impacts or restrictions during construction. It is anticipated that there will be no impacts or restrictions to NAVAID facilities during this project.

The Contractor is required to provide notice to HGR Operations and FAA Tech Ops personnel at least 72 hours prior to disturbing power supply or removing a NAVAID from service. FAA Tech Ops Office – (410) 859-7936.

No impacts to NAVAIDs are anticipated during construction.

## 5. Contractor Access

### 5.1 Location of Stockpiled Construction Material

No stockpiled materials or staged equipment may be placed outside of the designated staging areas unless approved by the RPR. There will be no stockpiles or staged equipment within the ROFA.

- *Height restrictions:* Stockpiles shall not exceed the heights shown on the Contract Drawings and will not be located within any area (TOFA, TLOFA, TSA, RSA, ROFA, RPZ, etc.) that is required for the operation of the aircraft.
- *Wildlife attractant:* Contractor to manage stockpiles so that they do not attract wildlife. Refer to Section 6 of this document.
- *Foreign Object Debris (FOD):* Contractor to manage material stockpiles and trash so that they do not create FOD. Refer to Section 7 of this document.
- *Marking and Lighting of Stockpiles:* Contractor will not be required to mark or light material stockpiles.

### 5.2 Vehicle and Pedestrian Operations

#### 5.2.1 Access to AOA

The airport operations area is defined by the perimeter fence surrounding the airfield. Access onto the AOA is through any number of gates along the fence or doors through buildings. Contractor access onto the AOA is limited to the gates shown on the CSPP drawings. No person shall enter the AOA, or any other restricted area, except authorized personnel assigned to duty therein escorted by an appropriately badged escort.

Contractor access will be through Gate 170 (Phase 1&2) Gate 140 (Phase 3) as shown in the Contract Drawings, and/or approved by the RPR. Gate 170 is located on the Eastside of Runway 2, near the Hagerstown Aviation Museum. Gate 140 is located on to the Northwest of the terminal building.

#### 5.2.2 Mechanisms to Prevent Improper Movement

Contractor operations within the AOA are limited to the areas shown on the CSPP. A visual boundary will be installed by the Contractor around all areas of work, consisting of low-profile barricades on pavement surfaces as well as grassed areas. The project phasing plans show locations of work area and sub-area boundaries. Construction vehicles and personnel must not cross boundaries at any time without an appropriately badged escort and approval from the ATCT, if required.

The Contractor shall provide enclosures, fences, barricades, or other devices where necessary to prevent access to the site or danger to the public, as approved by the RPR.

#### 5.2.3 Parking Areas for Personal Vehicles and Equipment

Contractor employee personal vehicles may not be parked or driven in the AOA. Personal vehicles instead must be parked outside the AOA.

#### 5.2.4 Haul Routes

The GC110 series drawings illustrate the proposed access points, haul routes, and staging area. The Contractor will not be permitted to use any access or haul roads other than those designated

on the Contract Drawings and will be required to submit a detailed Staging Area and Haul Route Plan prior to the start of construction.

Contractor access and hauling operations are strictly limited to the haul routes shown. Contractor is responsible for any improvements and maintenance to haul routes as needed to efficiently perform construction activities.

#### 5.2.5 Airport Rules for Ground Vehicle Operations

Rules for vehicular and equipment travel on the airport are located on GC500. These rules must be followed at all times when driving on the airport.

#### 5.2.6 Contractor Vehicle Marking and Lighting

Only Contractor owned vehicles will be permitted to enter the AOA. Each Contractor owned vehicle must display a company logo on both sides of the vehicle, as well as a yellow/amber rotating beacon affixed to the uppermost part of the vehicle that is visible from any direction, day and night. Contractor vehicle marking and lighting is the sole responsibility of the Contractor; the Airport will not provide marking or lights. Marking and lighting of vehicles must comply with AC 150/5210-5, latest edition, *Painting, Marking and Lighting of Vehicles Used on an Airport*. Additional vehicle marking and signage guidelines can also be found on Sheet GC500.

#### 5.2.7 Contractor Construction Equipment Parking

Any unused equipment shall not be parked any closer than 85.5 feet from the centerline of an active taxiway and no closer than 250 feet from an active runway unless noted or shown otherwise on the phasing plans. The ROFA for Runway 2-20 is 500 feet, and the ROFA for Runway 9-27 is 800 feet.

### **5.3 Radio Communications**

#### 5.3.1 Two-way Radios

Contractors may utilize two-way radios on the project provided that they do not interfere with existing Airport or FAA communication equipment and frequencies.

#### 5.3.2 Air Traffic Control Tower (ATCT) Radio Communications

Vehicle operations on the movement area require contact with the ATCT. The Contractor will not communicate directly with the ATCT unless trained by HGR Operations. If no Contractor personnel are trained by HGR Operations, the Contractor must contact HGR Operations for an escort onto any movement area.

#### 5.3.3 Personnel Required to Communicate with ATCT

All communications with the ATCT will be made by persons trained and approved by HGR Operations.

#### 5.3.4 Training

All training of Contractor personnel for communication with the ATCT will be completed by HGR Operations.

#### 5.3.5 Procedure for Communicating

Radio types: Airband radios capable of transmitting and receiving on frequencies used by the ATCT.

Light signals: FAA ATCT will use light signals if you are not responding to radio requests in accordance with FAA Order JO 7110.65AA - Air Traffic Control

Color and Type of Signal	Ground Vehicle Movement
<b>Steady Green</b>	Cleared to cross; proceed; go
<b>Flashing Green</b>	N/A
<b>Steady Red</b>	Stop
<b>Flashing Red</b>	Clear the taxiway/runway
<b>Flashing White</b>	Return to the starting point on airport
<b>Alternating Red and Green</b>	General Warning; exercise extreme caution

## 5.4 Airport Security

Hagerstown Regional Airport maintains an active security program, which is of primary importance. The project will take place within the Airport's Security Identification Display Area (SIDA), which requires specific security protocol be followed. General project security requirements include the following:

- The project plans show the entry point(s), barricades, Contractor's staging area, and work area. The Contractor shall provide security for these areas. The Contractor is to provide to the Airport, for review and approval, all security measures, barricades, and other means to be taken to secure scheduled openings between the secure and non-secure areas, prior to creating the opening.
- No Contractor employee may tamper or interfere with, compromise, modify, attempt to circumvent, or cause a person to tamper or interfere with, compromise, modify, or attempt to circumvent any security system, measure, or procedure implemented at the Airport.
- Each Contractor employee must immediately notify the Airport when security-related facilities and equipment within the Contractor's area are malfunctioning or no longer adequate to perform the control function.
- No Contractor employee may enter or be present within a secured area, SIDA, AOA, or Sterile Area without complying with the systems, measures, or procedures being applied in such areas.
- The project will require AOA badges for all Contractor personnel, and the Contractor will be required to maintain a list of all badged employees and badged subcontractor employees.

Additional details about the Airport's security procedures can be found on Sheets GI004.

## 6. Wildlife Management

### 6.1 Trash

Food scraps must be collected from construction personnel activity.

### 6.2 Standing Water

Any activity taking place that creates a standing body of water must be resolved immediately. Standing water will not be permitted and must drain within 48 hours.

### 6.3 Poorly Maintained Fencing and Gates

Periodic perimeter fence inspections are conducted by HGR Security to ensure the fence is secured. These inspections also include identifying any animal digs that are located under the fence and ensuring that perimeter gates and drainage gates are tightly secured to prevent animal access. In addition, HGR Operations will take appropriate actions to reduce any other observed wildlife activity.

The Contractor should also be vigilant in observing the security fence for areas that may not be secured and report any problems immediately to HGR Operations.

### 6.4 Disruption of Existing Wildlife Habitat

Contractor personnel should immediately notify HGR Operations of a wildlife sighting.

## 7. Foreign Object Debris (FOD) Management

Foreign object debris at airports includes any object found in an inappropriate location that can damage aircraft, equipment, or airport personnel. Foreign object debris on construction sites is typically comprised of things such as loose gravel, blowing sand, wire bristles from sweeper heads, food wrappers, and material packaging. The presence of FOD on an airport's air operations area (AOA) poses a significant threat to the safety of air travel. FOD has the potential to damage aircraft during critical phases of flight, which can lead to catastrophic loss of life and airframe, and at the very least increased maintenance and operating costs. As such, FOD shall not be allowed near active aircraft movement areas, and FOD shall be continuously removed by the Contractor during the construction project. The construction area shall be kept clean at all times of debris that may blow onto the airfield.

### 7.2 Methods of FOD Control

- *Sweeper Equipment:* The Contractor shall have a sweeping machine and operator on site at all times. The sweeper will operate full time to keep haul routes and work areas clean at all times.
- *Dust Control Equipment:* The Contractor shall maintain a water truck on site for dust control purposes.
- *Training:* Contractor shall provide training to all employees working within the AOA on effective FOD management. Training shall include description and consequences of FOD, FOD awareness, and housekeeping procedures.
- *Housekeeping:* Preventing FOD from occurring is the most effective form of FOD management. Contractor must monitor construction activities and proactively develop a plan to prevent FOD from occurring. Typical FOD prevention measures include the use of covered trash containers, covered loads, zero tolerance of littering, and tying down items which may be easily windblown.
- *Ground Vehicle Tire Inspections:* Prior to crossing active airfield pavement the Contractor must perform a vehicle tire check for any loose rocks that may be in the tread. Tires covered in mud must be cleaned prior to crossing active pavement in order to prevent tracking of dirt.
- *Pavement Sweeps:* Prior to opening sections of pavement within a work area to aircraft traffic, the Contractor will be required to sweep the entire pavement surface (including shoulders). Metal bristled brooms are known to create FOD, and the Contractor will be required to clean all bristles from the pavement. Compressed air and vacuums can be used to clean pavement surfaces as well.
- *FOD Inspections:* Refer to Section 10 of this document for FOD inspection requirements.

## **8. Hazardous Material (HAZMAT) Management**

HAZMAT procedures to be developed by the Contractor prior to the issuance of the notice to proceed include, but are not limited to:

- Fuel Storage Locations and Handling Procedures
- Spill Response Procedures
- Safety Data Sheets (SDS)

The Contractor shall not introduce explosives or any other hazardous materials or equipment without the prior written consent of the RPR.

## **9. Notification of Construction Activities**

### **9.1 List of Responsible Representatives**

Persons who have questions concerning policies, procedures, or requirements of the Airport Security Program, should contact HGR Security. Persons who observe a security violation, suspicious act or any serious act that may endanger persons or property, should immediately contact HGR Security, HGR Operations, Police, and Fire Departments. For this project, all communications with the ATCT will be made by persons trained and approved by HGR Operations. Important telephone numbers are listed below:

- Police Department – (301) 790-3700 (Dispatch)
- Fire Department – (301) 790-2476 (Watch Desk)
- Airport Communication Center – (240) 313-2200
- FAA Tech Ops Office – (410) 859-7636
- FAA TRACON – (410) 859-7252/7255
- FAA ATCT Manager – (240) 217-4967 (Todd Johnson, [todd.johnson@midwestatcs.com](mailto:todd.johnson@midwestatcs.com))

### **9.2 Notices to Air Missions (NOTAMs)**

Contractor shall coordinate with the RPR and HGR Operations personnel 7 days in advance for the issuance of all NOTAMs related to the project construction. HGR Operations will generate and issue NOTAMs based on Contractor construction schedule and facility impacts.

### **9.3 Emergency Notification Procedures**

In the case of a life-threatening situation, dial 911 and the Airport's Emergency Number (240-313-2777) immediately thereafter. HGR Operations will coordinate any emergency response.

### **9.4 Coordination with ARFF**

Weekly construction progress meetings will be held throughout the duration of the project and prior to commencement of phasing changes. During these weekly meetings, ARFF will be notified of re-routing, blocking, and restoration of emergency access routes. Contractor is required to adjust haul routes and hauling activities as necessary to accommodate ARFF operations.

### **9.5 Notification to the FAA**

If the Contractor needs use of cranes, equipment, or other items on or near the airport taller than the allowable elevations shown on the Drawings, the Contractor must submit a new 7460-1 to the FAA for airspace review and approval. FAA approval could take up to ninety (90) calendar days.

## **10. Inspection Requirements**

### **10.1 FOD Inspection**

The Contractor shall keep the project site and vehicles clean, employing a “clean as you go” approach

throughout the project.

## **10.2 Airport Operations Daily Inspection**

Airport staff and HGR Operations personnel conduct daily airfield inspections. These inspections include an inspection of all open/active airfield-paved areas and safety areas to ensure compliance with FAR Part 139.327.

## **10.3 Contractor Inspection**

Prior to opening work areas and pavement to aircraft traffic, the Contractor must coordinate with the RPR and HGR Operations for inspection of the work area. Pavements must be free of all dirt, sand, gravel, wire bristles, or any other objects that could cause damage to aircraft. All turf/soil areas must be free of dirt clods, ruts, or surface irregularities that could damage an aircraft should it leave the pavement. Daily inspections must be completed to assure all traffic control devices are in proper location and in working order.

## **10.4 Final Inspection**

The Contractor will be required to coordinate with the RPR and Airport to schedule a final inspection.

# **11. Underground Utilities**

It is not expected that there are any FAA utilities in the project vicinity. The location of the underground utilities and FAA cables shown on the plans has been obtained from available records and field checks and are believed to be correct. Locations of existing and proposed underground utilities and facilities shown on the Contract Drawings have been developed from available information. Completeness and accuracy of the location and depth of utilities and facilities cannot be guaranteed.

Prior to beginning any excavating operations, the Contractor is to use hand excavation, as required, to verify the depth and location of all utilities and facilities and clear them. Any underground utilities located which do not appear on the plans shall be brought to the attention of the RPR and shown on the Contractor mark-ups.

If FAA cables are damaged during construction, repairs shall be done from point to point in accordance with FAA requirements and in the presence of a FAA Representative. Maintenance and protection of underground utilities and infrastructure shall be the responsibility of the Contractor. If the Contractor damages any existing utilities during construction, he/she shall immediately repair the damaged item to the RPR's satisfaction, at the sole expense of the Contractor.

# **12. Penalties**

The following penalties will be administered by the Airport, FAA and TSA as allowed per the requirements of the Construction Safety and Phasing Plan and HGR, FAA and TSA Rules and Regulations. If a fine is levied upon the Airport for a Contractor's violation, the fine amount will be paid by the Airport and deducted from the Contractor's monthly payment.

If a discrepancy or violation occurs, the Owner will allow construction work to resume only when the discrepancy is corrected to the Owner's satisfaction. The Owner may permanently prohibit any Consultant or Contractor Employee acting in violation with airport rules and regulations from entering or working on airport property.

## **12.1 Vehicle Operations**

Stiff penalties exist to punish those who violate airport driving regulations. Prosecution can be a fine, imprisonment, lease violation, or impoundment of vehicle.

## **12.2 Security Violations**

Individuals who violate Airport Security rules may be subject to prosecution. Penalties may be a fine, imprisonment, lease violation or impoundment of vehicle. The TSA can levy fines of up to \$11,000 per security incident. In addition to these penalties, the Airport reserves the right to remove or eject from the airport premises and suspend the contract of any person who violates any Airport Security rules or regulations. These violations include entering the AOA outside of the designated work area and the unescorted operation of a vehicle on any active AOA surface.

## **12.3 FOD**

The airport has a zero-tolerance approach to FOD, and the Contractor may be subject to fines from the Airport, FAA, or other agencies for failure to properly manage FOD during construction activities.

## **13. Special Conditions**

The Contractor may be required to halt construction activities during periods of low visibility conditions, snow removal, emergency situations, or VIP movements. In all cases the Contractor shall follow instructions from HGR Operations. See Section 5 of this document for airport safety and security measures and radio communications procedures. See Section 9 of this document for emergency notification procedures.

## **14. Runway and Taxiway Visual Aids**

### **14.1 General**

All lighting and signs that are located within an Object Free Area will be frangible.

### **14.2 Markings**

Markings must be in compliance with the standards of AC 150/5340-1M, *Standards for Airport Markings*.

The existing taxiway centerline markings will be removed during the shift and transition of the taxiway centerline and will be permanently marked in the new location.

### **14.3 Lighting and Visual NAVAIDs**

Lighting shall conform to the requirements in AC 150/5340-30, *Design and Installation Details for Airport Visual Aids*; AC 150/5345-50, *Specification for Portable Runway and Taxiway Lights*; and AC 150/5345-53, *Airport Lighting Certification Program*. There is no lighting and visual NAVAID work within this project.

### **14.4 Signs**

There is no lighted signage work within this project.

## **15. Markings and Signs for Access Routes**

The pavement markings and signs for construction personnel conform to AC 150/5340-18F, and to the extent practicable, with Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD). Signs placed adjacent to areas used by aircraft must comply with the frangibility requirements of AC 150/5220-23. Access routes for Contractor are shown in the CSPP drawings.

## **16. Hazard Marking and Lighting**

Low-profile barricades with flashing red lights will be used for all pavement closures. Cones may be utilized to establish limits of construction haul routes. Barricades will be placed end to end with no space in between except to allow ARFF access or as directed by the RPR. A Contractor's representative will be

on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades.

Hazard marking and lighting of excavation areas are to be in accordance with the Occupational Safety and Health Organization (OSHA) requirements. Open trenches, excavations, open manholes, small areas under repair, stockpiled material, and waste areas shall be prominently marked with barricades and orange flags and illuminated by flashing red light units during hours of restricted visibility and darkness, as directed by the RPR.

For work that is scheduled to be conducted at night, the contractor will provide lighting units to complete this work. The contractor will coordinate with the RPR for the location and aiming. Lights will not be aimed towards the ATCT or toward active taxiways/runways.

## **17. Work Zone Lighting for Nighttime Construction.**

Nighttime work is not anticipated for this project; however, it is not being prohibited. There, if required all Construction lighting shall be directed away from the approach of any active runway and/or any aircraft operators and the Air Traffic Control Tower. The Contractor shall provide a proposed lighting plan for approval by the RPR. During construction, the Contractor shall relocate, re-position or shield any construction lighting that interferes with the operation of the airport as directed by the RPR.

## **18. Protection of Areas, Zones, and Surfaces**

All Safety Areas, Object Free Areas, and Obstacle Free Zones will be protected from construction activity. Open trenches and excavations are not permitted within the RSA or TSA while the Runway or Taxiway is open. All trenches and excavations within an RSA or TSA must be backfilled prior to opening a runway or taxiway for aircraft use. Any pavement construction related drop-offs shall be covered by at least one lift of asphalt prior to opening adjacent pavements to aircraft use. Pavement shall be brought up to RSA/TSA grading standards as defined by FAA AC 150/5300-13B. No non-frangible obstructions or drop-offs greater than three inches in height will be permitted within active runway or taxiway object free areas. If a runway or taxiway must be opened before excavations are backfilled, they must be covered appropriately, as approved by the RPR.

For work on and adjacent to active taxiways, runways, and aprons, the following conditions apply:

- *Runway Safety Area (RSA)*: An area within 200 feet of the Runway 9-27 centerline, and an area within 75 feet of the Runway 2-20 centerline.
- *Runway Object Free Area (ROFA)*: An area within 400 feet of the Runway 9-27 centerline, and an area within 250 feet of the Runway 2-20 centerline. Any equipment that is not in use (no operator available to move equipment for more than 15 minutes) must be completely removed from the ROFA.
- *Taxiway Safety Area (TSA)*: an area within 59 feet of ADG III taxiway centerlines, unless otherwise noted on the plans.
- *Taxiway Object Free Area (TOFA)*: an area within 85.5 feet of ADG III taxiway centerlines, unless otherwise noted on the plans.
- *Obstacle Free Zone (OFZ)*: Personnel, Construction equipment and stockpiles shall not penetrate the OFZ when the runway is open.

All construction activity within the RSA will require an applicable NOTAM and the closure of that runway. All construction activity within a TSA or TOFA will require an applicable NOTAM and the closure of that taxiway, or a designated portion thereof, or a restriction to the aircraft which will be permitted to use that taxiway during construction. The Contractor shall request through the RPR a NOTAM for the closure or restriction of the required portion of the taxiway or runway. The request shall include the times requested and the Contractor's proposed detailed schedule of this operation within the area utilizing only the requested closure times. NOTAMs require a 7-day notice and are subject to Airport approval.

If RSA or TSA dimension is adjusted, the airport operator will coordinate the change with the ATCT and the appropriate FAA Airports Regional or District Office and issue a local NOTAM.

## 19. Other Limits of Construction

Certain work areas and sub-areas may be made available to the Contractor with advanced notice and coordination with the RPR and HGR Operations. The specific sequence of work within each phase will be determined by the Contractor. Additional limitations include but are not limited to:

- Runways 9-27 and 2-20 shall not be closed at any time without advance approval from HGR Operations.
- The Contractor will be required to halt construction activities when required by emergency crews at the airport.
- The Contractor may be required to halt construction activities in the event of VIP movements on the airport.
- The Contractor shall not use tall equipment (cranes, concrete pumps, etc.) that exceeds the allowable elevations shown on the drawings, unless a 7460-1 determination letter is issued for such equipment.
- Blasting and the use of electrical blasting caps is prohibited on this project.
- The use of flare pots is prohibited within the AOA.
- Open flame, welding, or torch-cutting operations are prohibited.
- No debris burning will be allowed unless authorized by the RPR.

## 20. Safety Plan Compliance Document (SPCD) – Contractor's Responsibility

Contractor shall be responsible for meeting all of the requirements contained in this CSPP including the requirements shown in the Safety and Phasing drawings. In addition, the Contractor will be required to submit a Safety Plan Compliance Document (SPCD) to the RPR and Airport for review in time for an approval prior to Notice to Proceed. The requirements for the SPCD are stated in AC 150/5370-2G. A sample SPCD is included in Appendix C.

No work may commence until the schedule and SPCD is approved. The SPCD shall include but not be limited to:

- A plan for controlling construction equipment, personnel and vehicular movements in the AOA. The plan must include material haul routes. The plan shall detail the general requirements contained in the CSPP.
- The SPCD shall complete any details and discuss any deviations or topics that could not be addressed during the preparation of the CSPP. Should the SPCD include substantive changes to the CSPP requested by the Contractor, the SPCD must be submitted 45 days prior to the start of work in order for the Airport to obtain approval of such changes from the FAA.
- The SPCD shall include a general statement by the construction Contractor that he/she has read and will abide by the CSPP, the approval date of the CSPP, and a reference to any supplemental information (that is, "I [**Name of Contractor**], have read the [**Title of Project**] CSPP, approved on [**Date**], and will abide by it as written and with the following additions as noted:"). The supplemental information in the SPCD should be written to match the format of the CSPP indicating each subject by corresponding CSPP subject number and title. If no supplemental information is necessary for any specific subject, the statement, "No supplemental information," should be written after the corresponding subject title.

**PAGE INTENTIONALLY LEFT BLANK**

**APPENDIX A. SAFETY AND PHASING PLAN CHECKLIST**

PAGE INTENTIONALLY LEFT BLANK

**APPENDIX A. SAFETY AND PHASING PLAN CHECKLIST**

AC 150/5370-2G (12/13/2017)

This appendix is keyed to Chapter 2. In the electronic version of this AC, clicking on the paragraph designation in the Reference column will access the applicable paragraph. There may be instances where the CSPP requires provisions that are not covered by the list in this appendix.

This checklist is intended as an aid, not a required submittal.

**Table C-1. CSPP Checklist**

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
General Considerations					
Requirements for predesign, pre-bid, and preconstruction conferences to introduce the subject of airport operational safety during construction are specified.	<u>2.5</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pages 4 & 5 Sections 1.1, 1.2, 1.3, and 1.4
Operational safety is a standing agenda item for construction progress meetings.	<u>2.5</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 4 Section 1.3
Scheduling of the construction phases is properly addressed.	<u>2.5.3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pages 5-7 Section 2
Any formal agreements are established.	<u>2.6</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No Formal Agreements
Areas and Operations Affected by Construction Activity					
Drawings showing affected areas are included.	<u>2.7.1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plan Sheets GC110, GC111,GC 112, GC113
Closed or partially closed runways, taxiways, and aprons are depicted on drawings.	<u>2.7.1.1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plan Sheet GC112
Access routes used by ARFF vehicles affected by the project are addressed.	<u>2.7.1.2</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	To be addressed at Weekly Construction Progress Meeting
Access routes used by airport and airline support vehicles affected by the project are addressed.	<u>2.7.1.3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	To be addressed at Weekly Construction Progress Meeting
Underground utilities, including water supplies for firefighting and drainage.	<u>2.7.1.4</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 13, Section 11

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Approach/departure surfaces affected by heights of temporary objects are addressed.	<u>2.7.1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plan Sheet VS100 Maximum Equipment Height Table
Construction areas, storage areas, and access routes near runways, taxiways, aprons, or helipads are properly depicted on drawings.	<u>2.7.1.5</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	General Project Layout GC100
Temporary changes to taxi operations are addressed.	<u>2.7.2.1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Closed Taxiways are depicted and noted on Sheet GC112
Detours for ARFF and other airport vehicles are identified.	<u>2.7.2.2</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	To be addressed at Weekly Construction Progress Meeting
Maintenance of essential utilities and underground infrastructure is addressed.	<u>2.7.2.3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 13 Section 11
Temporary changes to air traffic control procedures are addressed.	<u>2.7.2.4</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No Changes to air traffic control procedures are expected
<b>NAVAIDs</b>					
Critical areas for NAVAIDs are depicted on drawings.	<u>2.8</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	NAVAID critical areas are not near project area, and are not within construction document viewports.
Effects of construction activity on the performance of NAVAIDS, including unanticipated power outages, are addressed.	<u>2.8</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Construction activity will not impact NAVAIDS
Protection of NAVAID facilities is addressed.	<u>2.8</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Construction activity will not impact NAVAIDS
The required distance and direction from each NAVAID to any construction activity is depicted on drawings.	<u>2.8</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Construction activity will not impact NAVAIDS
Procedures for coordination with FAA ATO/Technical Operations, including identification of points of contact, are included.	<u>2.8, 2.13.1, 2.13.5.3.1, 2.18.1</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Construction activity will not impact NAVAIDS
<b>Contractor Access</b>					
The CSPP addresses areas to which contractor will have access and how The area will be accessed.	<u>2.9</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 9 Section 5

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
The application of 49 CFR Part 1542 Airport Security, where appropriate, is addressed.	<u>2.9</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 10 Section 5.4
The location of stockpiled construction materials is depicted on drawings.	<u>2.9.1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sheets GC100, GC110, GC 111, GC 112, AND GC 113
The requirement for stockpiles in the ROFA to be approved by FAA is included.	<u>2.9.1</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	There will be no stockpiles within the ROFA
Requirements for proper stockpiling of materials are included.	<u>2.9.1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 8 Section 5.1
Construction site parking is addressed.	<u>2.9.2.1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 9 Section 5.2.3
Construction equipment parking is addressed.	<u>2.9.2.2</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 10 Section 5.2.7
Access and haul roads are addressed.	<u>2.9.2.3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 9 Section 5.2
A requirement for marking and lighting of vehicles to comply with <u>AC 150/5210-5, Painting, Marking and Lighting of Vehicles Used on an Airport</u> , is included.	<u>2.9.2.4</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 9 Section 5.2.6
Proper vehicle operations, including requirements for escorts, are described.	<u>2.9.2.5, 2.9.2.6</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plan Sheet GI003 Contractor Safety Requirements Note D
Training requirements for vehicle drivers are addressed.	<u>2.9.2.7</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Plan Sheet GI003 Contractor Safety Requirements Note D
Two-way radio communications procedures are described.	<u>2.9.2.9</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 10 Section 5.3.1
Maintenance of the secured area of the airport is addressed.	<u>2.9.2.10</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 10 Section 5.4
<b>Wildlife Management</b>					
The airport operator's wildlife management procedures are addressed.	<u>2.10</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 11 Section 6

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
<b>Foreign Object Debris Management</b>					
The airport operator's FOD management procedures are addressed.	<u>2.11</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 11 Section 7
<b>Hazardous Materials Management</b>					
The airport operator's hazardous materials management procedures are addressed.	<u>2.12</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 12 Section 8
<b>Notification of Construction Activities</b>					
Procedures for the immediate notification of airport user and local FAA of any conditions adversely affecting the operational safety of the airport are detailed.	<u>2.13</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 12 Section 9
Maintenance of a list by the airport operator of the responsible representatives/points of contact for all involved parties and procedures for contacting them 24 hours a day, seven days a week is specified.	<u>2.13.1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 12 Section 9.1
A list of local ATO/Technical Operations personnel is included.	<u>2.13.1</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	OPS to coordinate with ATCT
A list of ATCT managers on duty is included.	<u>2.13.1</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Contractor to coordinate with RPR
A list of authorized representatives to the OCC is included.	<u>2.13.2</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Contractor to coordinate with RPR
Procedures for coordinating, issuing, maintaining and cancelling by the airport operator of NOTAMS about airport conditions resulting from construction are included.	<u>2.8, 2.13.2, 2.18.3.3.9</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 12 Section 9.2
Provision of information on closed or hazardous conditions on airport movement areas by the airport operator to the OCC is specified.	<u>2.13.2</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No hazardous conditions will occur in airport movement areas
Emergency notification procedures for medical, firefighting, and police responses are addressed.	<u>2.13.3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 12 Section 9.1 and Section 9.3

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Coordination with ARFF personnel for non-emergency issues is addressed.	<u>2.13.4</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 12 Section 9.4
Notification to the FAA under 14 CFR parts 77 and 157 is addressed.	<u>2.13.5</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 13 Section 9.5
Reimbursable agreements for flight checks and/or design and construction for FAA owned NAVAIDs are addressed.	<u>2.13.5.3.2</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No NAVAID impacts are expected
<b>Inspection Requirements</b>					
Daily and interim inspections by both the airport operator and contractor are specified.	<u>2.14.1, 2.14.2</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pages 13 Section 10.1-10.3
Final inspections at certificated airports are specified when required.	<u>2.14.3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 13 Section 10.4
<b>Underground Utilities</b>					
Procedures for protecting existing underground facilities in excavation areas are described.	<u>2.15</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 13 Section 11
<b>Penalties</b>					
Penalty provisions for noncompliance with airport rules and regulations and the safety plans are detailed.	<u>2.16</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 13 Section 12
<b>Special Conditions</b>					
Any special conditions that affect the operation of the airport or require the activation of any special procedures are addressed.	<u>2.17</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 13
<b>Runway and Taxiway Visual Aids - Marking, Lighting, Signs, and Visual NAVAIDs</b>					
The proper securing of temporary airport markings, lighting, signs, and visual NAVAIDs is addressed.	<u>2.18.1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 14.1-14.4
Frangibility of airport markings, lighting, signs, and visual NAVAIDs is specified.	<u>2.18.1, 2.18.3, 2.18.4.2, 2.20.2.4</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 14.1

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
The requirement for markings to be in compliance with <u>AC 150/5340-1M</u> , <i>Standards for Airport Markings</i> , is specified.	<u>2.18.2</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 14.2
Detailed specifications for materials and methods for temporary markings are provided.	<u>2.18.2</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 14.2
The requirement for lighting to conform to <u>AC 150/5340-30</u> , <i>Design and Installation Details for Airport Visual Aids</i> ; <u>AC 150/5345-50</u> , <i>Specification for Portable Runway and Taxiway Lights</i> ; and <u>AC 150/5345-53</u> , <i>Airport Lighting Certification Program</i> , is specified.	<u>2.18.3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 14.3
The use of a lighted X is specified where appropriate.	<u>2.18.2.1.2</u> , <u>2.18.3.2</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No Runway closures within this project
The requirement for signs to conform to <u>AC 150/5345-44</u> , <i>Specification for Runway and Taxiway Signs</i> ; <u>AC 150/5340-18</u> , <i>Standards for Airport Sign Systems</i> ; and <u>AC 150/5345-53</u> , <i>Airport Lighting Certification Program</i> , is specified.	<u>2.18.4</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 14.4
<b>Marking and Signs for Access Routes</b>					
The CSPP specifies that pavement markings and signs intended for construction personnel should conform to <u>AC 150/5340-18</u> and, to the extent practicable, with the MUTCD and/or State highway specifications.	<u>2.18.4.2</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 15
<b>Hazard Marking and Lighting</b>					
Prominent, comprehensible warning indicators for any area affected by construction that is normally accessible to aircraft, personnel, or vehicles are specified.	<u>2.20.1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 16

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
Hazard marking and lighting are specified to identify open manholes, small areas under repair, stockpiled material, and waste areas.	<u>2.20.1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 16
The CSPP considers less obvious construction-related hazards.	<u>2.20.1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 16
Equipment that poses the least danger to aircraft but is sturdy enough to remain in place when subjected to typical winds, prop wash and jet blast is specified.	<u>2.20.2.1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 16
The spacing of barricades is specified such that a breach is physically prevented barring a deliberate act.	<u>2.20.2.1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 16
Red lights meeting the luminance requirements of the State Highway Department are specified.	<u>2.20.2.2</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 16
Barricades, temporary markers, and other objects placed and left in areas adjacent to any open runway, taxiway, taxi lane, or apron are specified to be as low as possible to the ground, and no more than 18 inch high.	<u>2.20.2.3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sheet G500 Detail 5
Barricades are specified to indicate construction locations in which no part of an aircraft may enter.	<u>2.20.2.3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 16
Highly reflective barriers with lights are specified to barricade taxiways leading to closed runways.	<u>2.20.2.5</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 16
Markings for temporary closures are specified.	<u>2.20.2.5</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	No temporary closure markings are proposed.
The provision of a contractor's representative on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades is specified.	<u>2.20.2.7</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 14 Section 16

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
<b>Work Zone Lighting for Nighttime Construction</b>					
If work is to be conducted at night, the CSPP identifies construction lighting units and their general locations and aiming in relationship to the ATCT and active runways and taxiways.	<u>2.21</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 15 Section 17 Contractor to provide lighting plan for RPR approval.
<b>Protection of Runway and Taxiway Safety Areas</b>					
The CSPP clearly states that no construction may occur within a safety area while the associated runway or taxiway is open for aircraft operations.	<u>2.22.1.1,</u> <u>2.22.3.1</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 15 Section 18
The CSPP specifies that the airport operator coordinates the adjustment of RSA or TSA dimensions with the ATCT and the appropriate FAA Airports Regional or District Office and issues a local NOTAM.	<u>2.22.1.2,</u> <u>2.22.3.2</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 15 Section 18
Procedures for ensuring adequate distance for protection from blasting operations, if required by operational considerations, are detailed.	<u>2.22.3.3</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Blasting is not permitted
The CSPP specifies that open trenches or excavations are not permitted within a safety area while the associated runway or taxiway is open, subject to approved exceptions.	<u>2.22.1.4</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 15 Section 18
Appropriate covering of excavations in the RSA or TSA that cannot be backfilled before the associated runway or taxiway is open is detailed.	<u>2.22.1.4</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 15 Section 18
The CSPP includes provisions for prominent marking of open trenches and excavations at the construction site.	<u>2.22.1.4</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 15 Section 18
Grading and soil erosion control to maintain RSA/TSA standards are addressed.	<u>2.22.3.5</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 15 Section 18

Coordination	Reference	Addressed?			Remarks
		Yes	No	NA	
The CSPP specifies that equipment is to be removed from the ROFA when not in use.	<u>2.22.2</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 15 Section 18
The CSPP clearly states that no construction may occur within a taxiway safety area while the taxiway is open for aircraft operations.	<u>2.22.3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 15 Section 18
Appropriate details are specified for any construction work to be accomplished in a taxiway object free area.	<u>2.22.4</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 15 Section 18
Measures to ensure that personnel, material, and/or equipment do not penetrate the OFZ or threshold siting surfaces while the runway is open for aircraft operations are included.	<u>2.22.4.3.6</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 15 Section 18
Provisions for protection of runway approach/departure areas and clearways are included.	<u>2.22.6</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 15 Section 18
<b>Other Limitations on Construction</b>					
The CSPP prohibits the use of open flame welding or torches unless adequate fire safety precautions are provided, and the airport operator has approved their use.	<u>2.23.1.2</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 16 Section 19
The CSPP prohibits the use of electrical blasting caps on or within 1,000 ft. (300m) of the airport property.	<u>2.23.1.3</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Page 16 Section 19

**THIS PAGE HAS BEEN INTENTIONALLY LEFT BLANK**

**APPENDIX B. CONSTRUCTION SAFETY AND PHASING DRAWINGS \***

1. GI003\_General Construction & Safety Notes 1
2. GI004\_General Construction & Safety Notes 2
3. GC100\_General Project Layout
4. GC101\_Survey Control and Baseline Plan
5. VS100\_Maximum Equipment Height Plan
6. GC110\_Overall Construction and Phasing Plan
7. GC111\_Construction Safety and Phasing Plan 1
8. GC112\_Construction Safety and Phasing Plan 2
9. GC113\_Construction Safety and Phasing Plan 3
10. GC500\_Construction Safety Phasing Notes and Details

\* Construction Safety and Phasing Drawings provided in this CSPP are for CSPP submittal to FAA only. In the event of any discrepancy between these drawings and the bid set of plans, the bid set of plans shall govern.

**PAGE INTENTIONALLY LEFT BLANK**

GENERAL CONSTRUCTION NOTES:

1.

THIS PROJECT SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS AND ANY RULES, REGULATIONS, STANDARDS OR SPECIFICATIONS REFERENCED THEREIN. THE PROJECT IS SUBJECT TO INSPECTION BY REPRESENTATIVES OF WASHINGTON COUNTY (THE AIRPORT SPONSOR), THEIR AUTHORIZED REPRESENTATIVES, THE FEDERAL AVIATION ADMINISTRATION (FAA), AND OTHER GOVERNING AGENCIES.
2.

THE PROJECT SHALL BE CONSTRUCTED IN A TIMELY MANNER IN ACCORDANCE WITH THE CONTRACTOR'S APPROVED PROJECT SCHEDULE. THE SCHEDULE SHALL PROVIDE FOR COMPLETION OF THE PHASES AS SHOWN ON THE PLANS AND DESCRIBED IN THE CONTRACT SPECIFICATIONS.
3.

THE CONTRACTOR IS EXPECTED TO COMPLETE THE ENTIRE PROJECT ON TIME. THE IMPORTANCE OF THIS IS STRESSED BY THE INCLUSION OF LIQUIDATED DAMAGES IN THE SPECIFICATIONS.
4.

HAGERSTOWN REGIONAL AIRPORT (HGR) WILL BE IN OPERATION DURING THE CONSTRUCTION OF THIS PROJECT. COORDINATION OF WORK WITH THE AIRPORT AND AIRLINES (THROUGH THE AIRPORT DIRECTOR) IS MANDATORY SO AS TO MINIMIZE IMPACTS ON AIRPORT OPERATIONS.
5.

CONSTRUCTION AND MAINTENANCE OPERATIONS BY OTHERS WILL OCCUR CONCURRENTLY AND AT TIMES IN THE VICINITY OF CONSTRUCTION ASSOCIATED WITH THIS PROJECT. THE CONTRACTOR SHALL COORDINATE HIS OPERATIONS AND COOPERATE WITH MAINTENANCE CREWS AND OTHER CONTRACTORS WORKING ON THE AIRPORT. COORDINATION WITH APPROPRIATE GOVERNMENT AND UTILITY AGENCIES IS ALSO REQUIRED.
6.

THE CONTRACTOR'S ACCESS POINTS TO THE SITE ARE SHOWN ON THE GENERAL PROJECT LAYOUT PLAN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL VEHICLES AND PERSONNEL WHO ENTER THE AIRPORT PROPERTY. THE CONTRACTOR SHALL CONSULT WITH THE MAINTENANCE DEPARTMENT AT THE BEGINNING AND ENDING OF EACH WORK PERIOD.
7.

THE CONTRACTOR'S ON-AIRPORT HAUL ROUTES ARE SHOWN ON THE GENERAL PROJECT LAYOUT. ANY DEBRIS (WHETHER CAUSED BY THE CONTRACTOR OR NOT) SHALL BE REMOVED IMMEDIATELY.

IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE OFF-SITE HAUL ROUTES (STATE HIGHWAYS, COUNTY ROADS, OR CITY STREETS) WITH THE APPROPRIATE OWNER WHO HAS JURISDICTION OVER THE AFFECTED ROUTE. ON-SITE PAVEMENTS USED AS HAUL ROUTES SHALL BE MAINTAINED BY THE CONTRACTOR AND SHALL BE RESTORED AT THE CONTRACTOR'S EXPENSE TO THEIR PRE-CONSTRUCTION CONDITION UPON COMPLETION OF BEING USED AS A HAUL ROUTE. THE BEFORE AND AFTER CONDITION OF ON-SITE HAUL ROUTES SHALL BE JOINTLY INSPECTED AND DETERMINED BY THE CONTRACTOR AND THE RESIDENT PROJECT REPRESENTATIVE(RPR).

FENCING, DRAINAGE, GRADING AND OTHER MISCELLANEOUS CONSTRUCTION REQUIRED TO CONSTRUCT TEMPORARY HAUL ROUTES OR ACCESS POINTS ON THE AIRPORT WILL BE THE CONTRACTOR'S TOTAL RESPONSIBILITY AND SHALL BE APPROVED BY THE RPR PRIOR TO COMMENCING THE WORK. THIS WORK IS CONSIDERED INCIDENTAL TO WORK AND NO SEPARATE PAYMENT WILL BE MADE. ALL ON-SITE ACCESS TO AIRPORT FACILITIES SHALL REMAIN OPEN AND MAINTAINED AT ALL TIMES.
8.

AREAS ARE AVAILABLE FOR CONTRACTOR'S MOBILIZATION AND STORAGE. THESE AREAS ARE SHOWN ON THE GENERAL PROJECT LAYOUT AND PHASING PLANS. THE CONTRACTOR'S STAGING AREAS SHALL BE GRADED, TOPSOILED, SEEDED, AND MULCHED UPON COMPLETION OF USE.
9.

ALL MATERIALS THAT ARE SALVAGEABLE AND ARE DESIRED BY AIRPORT MAINTENANCE SHALL BE TURNED OVER TO THE AIRPORT. REFER TO APPENDIX B, SITE HEALTH AND SAFETY PLAN, AND APPENDIX C, LIMITED SUPPLEMENTAL ASBESTOS-CONTAINING MATERIALS SURVEY REPORT, IN THE PROJECT MANUAL FOR DISPOSAL INFORMATION. A DISPOSAL AREA FOR THE NONSALVAGEABLE MATERIAL WILL NOT BE AVAILABLE ON AIRPORT PROPERTY. THE CONTRACTOR'S WASTE MATERIALS, SHALL BE DISPOSED OF OFF AIRPORT PROPERTY. WASTE MATERIALS INCLUDE THOSE ITEMS WHICH ARE A DIRECT RESULT OF CONSTRUCTION. TRASH, (I.E. CUPS, CANS, ETC.) SHALL BE DISPOSED OF THROUGH PROPER SANITARY METHODS.

CONTRACTORS SAFETY REQUIREMENTS DURING CONSTRUCTION:

- A.

FEDERAL AVIATION ADMINISTRATION (FAA) ADVISORY CIRCULARS (AC), ORDERS AND FEDERAL AVIATION REGULATIONS (FAR).

THE FOLLOWING PUBLICATIONS CONTAIN DEFINITIONS/DESCRIPTIONS OF CRITICAL AIRPORT OPERATING AREAS. THE AREAS DEFINED BELOW PERTAIN TO AIRFIELD SAFETY REQUIREMENTS AND ARE REFERENCED THROUGHOUT THE CONTRACT DOCUMENTS. COPIES OF THESE PUBLICATIONS ARE AVAILABLE ONLINE AT [HTTPS://WWW.FAA.GOV/](https://www.faa.gov/).

1.

AC 150/5370-2G, "OPERATIONAL SAFETY ON AIRPORTS DURING CONSTRUCTION", CURRENT EDITION, SETS FORTH GUIDELINES TO ASSIST AIRPORT OPERATORS IN COMPLYING WITH FAR PART 139, "CERTIFICATION AND OPERATION: LAND AIRPORTS SERVING CERTAIN AIR CARRIERS" AND WITH THE REQUIREMENTS OF FEDERALLY FUNDED CONSTRUCTION PROJECTS.

2.

FAR PART 77 "OBJECTS AFFECTING NAVIGABLE AIRSPACE, CURRENT EDITION

(A)

ESTABLISHES STANDARDS FOR DETERMINING OBSTRUCTIONS TO NAVIGABLE AIRSPACE. CIVIL AIRPORT IMAGINARY SURFACES ARE DEFINED IN THE PUBLICATION AND ARE SHOWN ON THE SAFETY/PHASING NOTES AND DETAILS.

(B)

SETS FORTH REQUIREMENTS FOR NOTICE OF CERTAIN PROPOSED CONSTRUCTION OR ALTERATION. NOTICE OF CONSTRUCTION PROVIDES A BASIS FOR RECOMMENDATIONS FOR IDENTIFYING THE CONSTRUCTION OR ALTERATION IN ACCORDANCE WITH AC 70/7460-1L "OBSTRUCTION MARKING AND LIGHTING," CURRENT EDITION.

3.

AC 150/5300-13B, "AIRPORT DESIGN", CURRENT EDITION, ESTABLISHES DESIGN, OPERATIONAL, AND MAINTENANCE STANDARDS FOR AIRPORTS. STANDARD TERMS DEFINED IN THIS AC AND USED IN THE CONTRACT PLANS AND SPECIFICATIONS ARE DEFINED BELOW:

(A)

OBSTACLE FREE ZONE (OFZ) - A VOLUME OF SPACE WHICH IS FREE OF ALL FIXED OBJECTS AND CLEAR OF VEHICLES IN THE PROXIMITY OF AN AIRPLANE CONDUCTING AN APPROACH, MISSED APPROACH, LANDING, TAKEOFF, OR DEPARTURE. AN OFZ TYPICAL SECTION IS SHOWN ON THE SAFETY/PHASING NOTES AND DETAILS SHEET.

(B)

RUNWAY PROTECTION ZONE (RPZ): A TRAPEZOIDAL AREA CENTERED ON THE RUNWAY BEGINNING AT A POINT 200 FEET BEYOND THE END OF THE AREA USABLE FOR TAKEOFF OR LANDING. THE RPZ IS SHOWN ON THE GENERAL PROJECT LAYOUT PLAN.

(C)

OBJECT FREE AREA (OFA): A TWO DIMENSIONAL GROUND AREA SURROUNDING RUNWAYS, TAXIWAYS, AND TAXILANES WHICH IS CLEAR OF OBJECTS EXCEPT FOR OBJECTS WHOSE LOCATION IS FIXED BY FUNCTION.

(D)

SAFETY AREA - THE SURFACE ADJACENT TO RUNWAYS, TAXIWAYS, AND TAXILANES OVER WHICH AIRCRAFT SHOULD, IN DRY WEATHER, BE ABLE TO CROSS AT NORMAL SPEEDS WITHOUT INCURRING SIGNIFICANT DAMAGE. A SAFETY AREA IS GRADED, DRAINED AND COMPACTED. IT IS FREE OF ANY HOLES, TRENCHES, BUMPS OR OTHER SIGNIFICANT SURFACE VARIATIONS OR OBJECTS OTHER THAN THOSE WHICH MUST BE THERE BECAUSE OF THEIR ESSENTIAL AERONAUTICAL FUNCTION. THE SAFETY AREA REQUIRES THE CAPABILITY OF SUPPORTING MAINTENANCE VEHICLES AND AIRCRAFT RESCUE AND FIRE FIGHTING VEHICLES UNDER NORMAL (DRY) CONDITIONS.

B.

GENERAL SAFETY REQUIREMENTS

1.

THE CONTRACTOR SHALL ACQUAINT HIS SUPERVISORS AND EMPLOYEES WITH THE AIRPORT ACTIVITY AND OPERATIONS THAT ARE INHERENT TO HAGERSTOWN REGIONAL AIRPORT AND SHALL CONDUCT HIS CONSTRUCTION ACTIVITIES TO CONFORM TO ALL ROUTINE AND EMERGENCY AIR TRAFFIC REQUIREMENTS AND GUIDELINES FOR SAFETY SPECIFIED HEREIN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL SAFETY DEVICES AS REQUIRED FOR THE PROTECTION OF HIS PERSONNEL.

2.

PROTECTION OF ALL PERSONS SHALL BE PROVIDED THROUGHOUT THE PROGRESS OF THE WORK. THE WORK SHALL PROCEED IN SUCH A MANNER AS TO PROVIDE SAFE CONDITIONS FOR ALL WORKERS AND GOVERNMENT PERSONNEL. THE SEQUENCE OF OPERATION SHALL BE SUCH THAT MAXIMUM PROTECTION IS AFFORDED TO INSURE THAT PERSONNEL AND WORKERS IN THE WORK AREA ARE NOT SUBJECT TO ANY DANGEROUS CONDITIONS. THE CONTRACTOR MUST PROVIDE SAFETY MEASURES TO GUARD AGAINST INJURY.

3.

DURING PERFORMANCE OF THIS CONTRACT, THE AIRPORT RUNWAYS, TAXIWAYS, AND AIRCRAFT PARKING APRONS SHALL REMAIN IN USE BY AIRCRAFT TO THE MAXIMUM EXTENT POSSIBLE. ALL AIRCRAFT TRAFFIC ON THESE AREAS SHALL HAVE PRIORITY OVER CONTRACTOR'S TRAFFIC. THE OWNER RESERVES THE RIGHT TO ORDER THE CONTRACTOR AT ANY TIME TO VACATE ANY AREA NECESSARY TO MAINTAIN SAFE AIRCRAFT OPERATIONS. USE OF AREAS NEAR THE CONTRACTOR'S WORK WILL BE CONTROLLED TO MINIMIZE DISTURBANCE TO THE CONTRACTOR'S OPERATION. THE CONTRACTOR SHALL NOT ALLOW EMPLOYEES, SUBCONTRACTORS, SUPPLIERS, OR ANY OTHER UNAUTHORIZED PERSON TO ENTER OR REMAIN IN ANY AIRPORT AREA WHICH WOULD BE HAZARDOUS TO PERSONS OR TO AIRCRAFT OPERATIONS.

C.

CONSTRUCTION AND FACILITIES MAINTENANCE

1.

THE CONTRACTOR SHALL BE AWARE OF AND PREVENT THE FOLLOWING TYPES OF SAFETY PROBLEMS AND/OR HAZARDS:

(A)

TRENCHES, HOLES, OR EXCAVATION ON OR ADJACENT TO ANY OPEN RUNWAY OR IN SAFETY AREAS.

(B)

UNMARKED/UNLIGHTED HOLES OR EXCAVATION IN ANY APRON, OPEN TAXIWAY, OPEN TAXILANE, OR RELATED SAFETY AREA.

(C)

MOUNDS OR PILES OF EARTH, CONSTRUCTION MATERIALS, TEMPORARY STRUCTURES, OR OTHER OBJECTS IN THE VICINITY OF THE OPEN RUNWAY, TAXIWAYS, TAXILANES, OR IN A RELATED SAFETY APPROACH OR DEPARTURE AREA.

(D)

VEHICLES OR EQUIPMENT, WHETHER OPERATING OR IDLE, ON ANY OPEN RUNWAY, TAXIWAY, TAXILANE, OR IN ANY RELATED SAFETY APPROACH OR DEPARTURE AREA.

(E)

VEHICLES, EQUIPMENT, EXCAVATION, STOCKPILES, OR OTHER MATERIALS WHICH COULD DEGRADE OR OTHERWISE INTERFERE WITH ELECTRONIC SIGNALS FROM RADIOS OR ELECTRONIC NAVIGATIONAL AIDS (NAVAIDS).

(F)

PAVEMENT DROP-OFFS OR PAVEMENT TURF-LIPS (EITHER PERMANENT OR TEMPORARY) WHICH COULD CAUSE DAMAGE TO AIRCRAFT IF CROSSED AT NORMAL OPERATING SPEEDS. THE NORMAL MAXIMUM DROP-OFF OR LIP IS 1-1/2 INCHES.

(G)

UNMARKED UTILITY, NAVAID, WEATHER SERVICE, RUNWAY LIGHTING, OR OTHER POWER OR SIGNAL CABLES THAT COULD BE DAMAGED DURING CONSTRUCTION.

(H)

OBJECTS, WHETHER OR NOT MARKED OR FLAGGED, OR ACTIVITIES ANYWHERE ON OR IN THE VICINITY OF AIRPORT WHICH COULD BE DISTRACTING, CONFUSING, OR ALARMING TO PILOTS DURING AIRCRAFT OPERATIONS.

(I)

UNFLAGGED/UNLIGHTED LOW VISIBILITY ITEMS SUCH AS TALL CRANES, DRILLS, AND THE LIKE ANYWHERE IN THE VICINITY OF ACTIVE RUNWAYS, OR IN ANY APPROACH OR DEPARTURE AREAS.

(J)

MISLEADING OR MALFUNCTIONING OBSTRUCTION LIGHTS OR UNLIGHTED/UNMARKED OBSTRUCTIONS IN THE APPROACH TO ANY ACTIVE RUNWAY.

(K)

INADEQUATE APPROACH/DEPARTURE SURFACES (THESE SURFACES ARE NEEDED TO ASSURE ADEQUATE LANDING/TAKEOFF CLEARANCE OVER OBSTRUCTIONS, OR WORK OR STORAGE AREAS).

(L)

INADEQUATE, CONFUSING OR MISLEADING (TO USER PILOTS) MARKING/LIGHTING OF RUNWAYS, TAXIWAYS, OR TAXILANES (INCLUDING DISPLACED OR RELOCATED THRESHOLDS).

(M)

WATER, SNOW, DIRT, DEBRIS, OR OTHER TRANSIENT ACCUMULATION WHICH TEMPORARILY OBSCURES PAVEMENT MARKINGS OR PAVEMENT EDGES, OR REDUCES VISIBILITY OF RUNWAY/TAXIWAY MARKINGS OR LIGHTING.

(N)

INADEQUATE OR IMPROPER METHODS OF MARKING, BARRICADING, AND LIGHTING OF TEMPORARILY CLOSED PORTIONS OF THE AIRPORT OPERATIONS AREA.

(O)

TRASH OR OTHER MATERIALS WITH FOREIGN OBJECT DAMAGE (FOD) POTENTIAL; WHETHER ON RUNWAYS, TAXIWAYS, OR APRONS; OR IN RELATED SAFETY AREAS.

(P)

INADEQUATE BARRICADING OR OTHER MARKING WHICH IS PLACED TO SEPARATE CONSTRUCTION OR MAINTENANCE AREAS FROM OPEN AIRCRAFT OPERATING AREAS.

(Q)

FAILURE TO CONTROL UNAUTHORIZED VEHICLE AND HUMAN ACCESS FROM ACTIVE AIRCRAFT OPERATING AREAS.

(R)

FAILURE TO MAINTAIN RADIO COMMUNICATION BETWEEN CONSTRUCTION/MAINTENANCE VEHICLES AND AIR TRAFFIC CONTROL TOWER.

(S)

CONSTRUCTION/MAINTENANCE ACTIVITIES OR MATERIALS WHICH COULD HAMPER THE RESPONSE OF AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF) OR OTHER EMERGENCY EQUIPMENT FROM REACHING AIRCRAFT. ALL OR ANY PART OF THE RUNWAY/TAXIWAY SYSTEM, RUNWAY APPROACH AND DEPARTURE AREAS AND TO AIRCRAFT PARKING LOCATIONS.

(T)

BIRD ATTRACTANTS ON AIRPORT SUCH AS: EDIBLES (FOOD SCRAPS, ETC.), MISCELLANEOUS TRASH, OR PONDED WATER.

2.

THE CONTRACTOR SHALL CONDUCT ACTIVITIES SO AS NOT TO VIOLATE ANY SAFETY STANDARDS CONTAINED HEREIN. THE CONTRACTOR SHALL INSPECT ALL CONSTRUCTION AND STORAGE AREAS AS OFTEN AS NECESSARY AND PROMPTLY TAKE ALL STEPS NECESSARY TO PREVENT/REMEDY ANY UNSAFE OR POTENTIALLY UNSAFE CONDITIONS OR ACTIVITIES DISCOVERED.

3.

BEFORE ACTUAL COMMENCEMENT OF CONSTRUCTION ACTIVITY, THE CONTRACTOR SHALL NOTIFY, IN WRITING, AT LEAST 48 HOURS IN ADVANCE, THE AIRPORT DIRECTOR OF HIS INTENTIONS OF CONSTRUCTION, STATING THE PROPOSED TIME, DATE, AND AREA OF WHICH COMMENCEMENT IS TO OCCUR.

4.

UPON COMPLETION OF WORK AND RETURN OF ALL RELATED AREAS TO STANDARD CONDITIONS, THE CONTRACTOR SHALL AGAIN NOTIFY THE AIRPORT DIRECTOR, IN WRITING, AND DESCRIBE THE AREA THAT IS COMPLETE AND AVAILABLE FOR NORMAL AIRPORT OPERATIONS.

5.

THE ISSUANCE OF NOTICE TO AIR MISSIONS (NOTAM) SHALL BE REQUIRED FOR ALL AIRFIELD IMPACTS (I.E. RUNWAY CLOSURES, TAXIWAY CLOSURES, NAVAID IMPACTS, BLASTING, ETC.). THE CONTRACTOR SHALL COORDINATE THE NECESSARY NOTAMS FOR ALL AIRFIELD IMPACTS WITH THE RESIDENT PROJECT REPRESENTATIVE (RPR) AND THE OWNER A MINIMUM OF 72 HOURS IN ADVANCE OF THE DESIRED CLOSURE. IN ACCORDANCE WITH THE CONTRACTORS ACCEPTED SCHEDULE, THE CONTRACTOR SHALL ALSO PROVIDE A MINIMUM OF TWO (2) WEEKS PRIOR WRITTEN NOTIFICATION, TO THE RPR, OF ANTICIPATED AIRFIELD IMPACTS

6.

THE AIRPORT DIRECTOR WILL BE RESPONSIBLE FOR ISSUING APPROPRIATE NOTICE TO AIR MISSIONS (NOTAM) CONCERNING CONSTRUCTION ACTIVITY ON THE AIRFIELD.

D.

MOTORIZED VEHICLES

1.

THIS PROJECT INCLUDES WORK WITHIN THE AIRFIELD OPERATIONS AREA (AOA) (I.E.), THE SECURE PORTION OF THE AIRPORT. ALL PERMITTED VEHICLES SHALL DISPLAY IN FULL VIEW ABOVE THE VEHICLE A 3-FOOT X 3-FOOT OR LARGER, ORANGE AND WHITE CHECKERBOARD, PLASTIC FLAG. EACH CHECKERBOARD COLOR SHALL BE ONE FOOT SQUARE. IN LIEU OF FLAGS, VEHICLES MAY DISPLAY A FLASHING AMBER (YELLOW) DOME-TYPE LIGHT, MOUNTED ON TOP OF THE VEHICLE AND OF SUCH INTENSITY TO CONFORM TO LOCAL CODES FOR MAINTENANCE AND EMERGENCY VEHICLES. THESE LIGHTS SHALL REMAIN FLASHING AT ALL TIMES WHEN THE VEHICLE IS IN THE AOA, EVEN IF PARKED.

2.


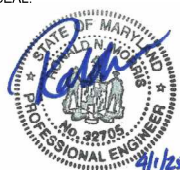

ANY VEHICLE OPERATING IN THE AOA DURING THE HOURS OF DARKNESS SHALL BE EQUIPPED WITH A FLASHING AMBER (YELLOW) DOME-TYPE LIGHT, MOUNTED ON TOP OF THE VEHICLE AND OF SUCH INTENSITY TO CONFORM TO LOCAL CODES FOR MAINTENANCE AND EMERGENCY VEHICLES. DARKNESS SHALL BE DEFINED AS ONE HOUR BEFORE OFFICIAL SUNSET UNTIL ONE HOUR AFTER SUNRISE.

3.

ALL VEHICLES OPERATING WITHIN THE AIRFIELD BOUNDARY SHALL BE IDENTIFIED WITH A SIGN ON EACH SIDE OF THE VEHICLE BEARING THE CONTRACTOR'S NAME. THE MINIMUM SIZE FOR LETTERING ON THE VEHICLE SIGNS IS 12 INCHES. IN ADDITION ALL CONSTRUCTION VEHICLES OPERATING IN THE AIRFIELD MUST BE ISSUED AND DISPLAY AN AIRPORT VEHICLE ID TAG.

4.

VEHICLES MAKING ONLY OCCASIONAL VISITS TO THE JOB SITE ARE EXEMPT FROM THE IDENTIFICATION REQUIREMENTS CONTAINED HEREIN PROVIDED THAT THEY ARE ESCORTED INTO, THROUGH, AND OUT OF THE AOA BY A PROPERLY IDENTIFIED VEHICLE.

CONSULTANT: <div><p><b>ADCI</b> AIRPORT DESIGN CONSULTANTS 6031 UNIVERSITY BLVD, SUITE 330 ELLICOTT CITY, MD 21043 TEL: 410.465.9600 FAX: 410.465.9602</p></div>		SEAL: <div></div>	PROFESSIONAL CERTIFICATION: <p>"I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND"</p> <p>LICENSE NO. 32706</p> <p>EXPIRATION DATE: 02/21/2026</p>	DESIGNED: B.J.D.	REVISION NO.	REVISION DATE	DESCRIPTIONS	<div><p><b>HAGERSTOWN REGIONAL AIRPORT</b> Washington County, MD</p></div>		PROJECT TITLE: <p>ARFF BUILDING DEMOLITION; AOA FENCE/ACCESS GATE REALIGNMENT</p>		FAA AIP No.: 3240019071-2024 Bid No.: PUR-1744 Grading Permit No.: SGP-24-040		
										SHEET TITLE: <p>GENERAL CONSTRUCTION AND SAFETY NOTES 1</p>		SHEET NO.: <p>G1003</p>		
										SCALE: <p>N.A.</p>	DATE: <p>APRIL 2025</p>		3 OF 48	

FILE NAME: O:\HGR\Projects\2023-1307 ARFF Demo-Fence\CAD\SHEETS\G1003\_GENERAL CONSTRUCTION AND SAFETY NOTES 1.dwg LAYOUT NAME: G1003 USER: jarden PLOTTED: Tuesday, April 01, 2025 - 1:04pm

E. RADIO COMMUNICATIONS

1. RADIO COMMUNICATIONS MAY BE REQUIRED BETWEEN THE CONTRACTOR'S REPRESENTATIVE AND THE AIR TRAFFIC CONTROL TOWER (ATCT). RADIO CONTACT IS REQUIRED AT ALL TIMES WHILE THE CONTRACTOR HAS PERSONNEL AND EQUIPMENT ON THE PROJECT SITE AND WHILE THEY ARE IN AN ACTIVE AIR OPERATIONS AREA (AOA) OF THE AIRPORT. RADIOS SHALL BE FURNISHED BY THE CONTRACTOR AND SHALL BE CAPABLE OF TRANSMITTING AND RECEIVING AT A GROUND CONTROL FREQUENCY OF 120.8 MHZ. THIS FREQUENCY IS TO BE UTILIZED WHEN CROSSING ACTIVE FACILITIES. SUFFICIENT RADIOS SHALL BE ON SITE AND OPERATING AT ALL TIMES SO THAT INSTRUCTIONS OR COMMUNICATIONS MAY BE DISPATCHED TO ALL CREWS AND/OR EQUIPMENT WORKING IN AN ACTIVE AOA IMMEDIATELY AFTER RECEIPT FROM THE ATCT. HAGERSTOWN REGIONAL AIRPORT IS SERVED BY PART-TIME ATCT. DURING CERTAIN PHASES OF CONSTRUCTION, THE ATCT MAY BE CLOSED (CURRENTLY BETWEEN 2200 AND 0700 EST). DURING THOSE PERIODS WHEN THE ATCT IS CLOSED, THE CONTRACTOR SHALL MAINTAIN CONTACT WITH AIRCRAFT USING THE AIRPORT BY MONITORING THE CTAF FREQUENCY OF 120.3 MHZ AND UNICOM FREQUENCY OF 122.95 MHZ.

F. DEBRIS

1. DEBRIS, WASTE, AND LOOSE MATERIAL (INCLUDING DUST AND DIRT) CAPABLE OF CAUSING DAMAGE TO AIRCRAFT LANDING GEAR OR PROPELLERS, OR BEING INGESTED IN JET ENGINES, SHALL NOT BE ALLOWED ON ACTIVE AIRCRAFT MOVEMENT AREAS OR ADJACENT GRASSED AREAS. MATERIALS OBSERVED TO BE WITHIN THESE AREAS SHALL BE REMOVED IMMEDIATELY AND/OR CONTINUOUSLY BY THE CONTRACTOR. THE CONTRACTOR SHALL HAVE A SWEEPING MACHINE AND OPERATOR ON SITE AND READY AT ALL TIMES DURING CONSTRUCTION ACTIVITY WHERE TRAVEL ON OR ACROSS RUNWAYS, RAMP AREAS, TAXIWAYS, OR AIRCRAFT APRONS IS REQUIRED. THE CONTRACTOR SHALL PROVIDE ADEQUATE PERSONNEL AND EQUIPMENT TO KEEP SUCH SURFACES CLEAR OF DEBRIS. THE CONTRACTOR SHALL ALSO MAINTAIN A WATER TRUCK ON SITE FOR DUST CONTROL PURPOSES.

G. FLAGMEN

1. IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS, THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, FURNISH FLAGMEN AS NECESSARY TO CONTROL HIS TRAFFIC (UNLESS OTHERWISE DIRECTED BY THE RPR).
2. ALL CONTRACTOR VEHICLES THAT ARE REQUIRED TO CROSS ACTIVE RUNWAYS, TAXIWAYS AND APRONS SHALL DO SO UNDER THE DIRECT CONTROL OF A COMPETENT FLAGMAN WHO IS IN DIRECT RADIO CONTACT WITH GROUND CONTROL OR MONITORING THE REQUIRED FREQUENCIES WHEN THE ATCT IS CLOSED. ALL AIRCRAFT TRAFFIC ON RUNWAYS, TAXIWAYS, AND APRONS SHALL HAVE PRIORITY OVER CONTRACTOR'S TRAFFIC. AT NO TIME SHALL THE CONTRACTOR'S VEHICLES OR PERSONNEL BE ALLOWED TO ENTER OR CROSS ACTIVE RUNWAYS, TAXIWAYS, SAFETY AREAS, OBJECT FREE AREAS, OR RUNWAY PROTECTION ZONES WITHOUT PROPER AUTHORIZATION OBTAINED THROUGH GROUND CONTROL UNLESS AN APPROPRIATE NOTAM HAS BEEN ISSUED AND THE PAVEMENT HAS BEEN CLOSED TO AIRCRAFT OPERATIONS.

H. MISCELLANEOUS

1. OPEN FLAME, WELDING OR TORCH CUTTING OPERATIONS ARE PROHIBITED UNLESS ADEQUATE FIRE AND SAFETY PRECAUTIONS HAVE BEEN TAKEN AND THE PROCEDURE PREVIOUSLY APPROVED BY THE RPR.
2. EQUIPMENT AND STOCKPILED MATERIAL SHALL BE CONSTRAINED IN A MANNER TO PREVENT MOVEMENT RESULTING FROM AIRCRAFT JET BLAST OR WIND CONDITIONS IN EXCESS OF 10 KNOTS.
3. THE CONTRACTOR SHALL PROVIDE POLYETHYLENE CONSTRUCTION BARRIERS WITH FLASHING RED LIGHTS AS SHOWN ON THE DRAWINGS TO DELINEATE THE WORK AREAS WHEN CLOSED TO AIRPORT TRAFFIC. OPEN TRENCHES, EXCAVATIONS AND STOCKPILED MATERIAL LOCATED IN THE AOA SHALL BE PROMINENTLY MARKED WITH ORANGE FLAGS AND LIGHTED BY APPROVED LIGHT UNITS DURING HOURS OF LIMITED VISIBILITY AND DARKNESS.
4. ALL MATERIALS AND EQUIPMENT WHEN NOT IN USE SHALL BE PLACED IN APPROVED AREAS WHERE THEY WILL NOT CONSTITUTE A HAZARD TO AIRCRAFT OPERATIONS AND NOT PENETRATE CLEARANCE SURFACES DEFINED PREVIOUSLY AND SHOWN ON THE CONSTRUCTION SAFETY PHASING NOTES AND DETAILS SHEET. EQUIPMENT SHALL BE PARKED AT THE STAGING AREA WHEN NOT IN USE.
5. UPON COMPLETION OF ANY STAGE/PHASE OF WORK, THE RPR WILL ARRANGE A PHYSICAL INSPECTION OF THE AREA WITH AIRPORT OPERATIONS PERSONNEL PRIOR TO OPENING ANY PORTION OR WHOLE RUNWAY, TAXIWAY, OR

RAMP AREA THAT HAS BEEN CLOSED FOR WORK OR USED FOR A CROSSING POINT OR HAUL ROUTE BY THE CONTRACTOR.

6. ENTRANCE TO THE AIRFIELD IS SUBJECT TO STRICT SECURITY REGULATIONS. ALL PERSONNEL ENTERING THE AIRFIELD MAY BE SUBJECT TO A BACKGROUND CHECK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ASSURING THAT ALL OF HIS EMPLOYEES WHO NEED TO HAVE ACCESS TO THE AIRFIELD, HAVE INFORMATION AVAILABLE FOR A BACKGROUND CHECK TO BE PERFORMED, DATING BACK TEN (10) YEARS VERIFYING REPRESENTATIONS MADE BY THE EMPLOYEE RELATING TO EMPLOYMENT.
7. THE CONTRACTOR SHALL PROVIDE THE RPR AND AIRPORT DIRECTOR A CURRENT LIST OF ALL EMPLOYEES WORKING ON THE AIRPORT. THE LIST SHALL BE MAINTAINED CURRENT BY THE CONTRACTOR AND APPLIES TO BOTH THE CONTRACTOR AND SUBCONTRACTORS.
8. THE CONTRACTOR SHALL FAMILIARIZE HIS PERSONNEL WITH CLEARANCES NEEDED TO PROVIDE FOR THE SAFE OPERATION OF RUNWAYS AND TAXIWAYS AS SHOWN IN THE PLANS.
9. EXCEPT FOR EMERGENCIES, ALL CONTACT WITH AIRPORT PERSONNEL SHALL BE MADE THROUGH THE RPR. FOR EMERGENCIES INVOLVING SAFETY (INJURIES, FIRES, SECURITY BREACHES, ETC.) THE CONTRACTOR SHALL MAKE DIRECT CONTACT WITH AIRPORT OPERATIONS MANAGER FOLLOWED BY NOTIFICATION TO THE RPR AS SOON AS POSSIBLE.
10. AS REQUIRED IN THE CONTRACTORS SAFETY PLAN COMPLIANCE DOCUMENT (SPCD), THE CONTRACTOR SHALL PROVIDE THE PHONE NUMBERS OF THREE PERSONNEL, INCLUDING THE PROJECT SUPERINTENDENT, WHO MAY BE CONTACTED IN AN EMERGENCY. PERSONNEL SHALL BE ON CALL 24 HOURS PER DAY FOR MAINTAINING AIRPORT HAZARD LIGHTING AND BARRICADES.
11. IN ACCORDANCE WITH THE FEDERAL CONTRACT PROVISIONS CONTAINED IN THE PROJECT MANUAL, ALL REQUIRED POSTERS AND FEDERAL WAGE RATES SHALL BE POSTED OUTSIDE THE SITE FIELD OFFICE(S) IN A WEATHERPROOF ENCLOSURE.

I. UTILITIES

1. THE LOCATIONS OF THE UNDERGROUND UTILITIES SHOWN ON THE PLANS ARE CONSIDERED TO BE ONLY APPROXIMATE LOCATIONS. ALL UTILITY LOCATIONS SHALL BE FIELD VERIFIED BY CONTRACTOR PRIOR TO COMMENCING CONSTRUCTION. IN THE EVENT ANY UTILITY IS DAMAGED, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PAYING FOR INCURRED COSTS OF REPAIRS.
2. THE CONTRACTOR SHALL NOTIFY "MISS UTILITY" AT 1-800-257-7777. THE COST ASSOCIATED WITH CONTACTING MISS UTILITY SHALL BE BORNE BY THE CONTRACTOR.
3. AT LEAST TWO WORKING DAYS PRIOR TO COMMENCING CONSTRUCTION OPERATIONS IN AN AREA WHICH MAY INVOLVE UNDERGROUND UTILITY FACILITIES, THE CONTRACTOR SHALL NOTIFY THE RPR AND THE OWNER OF EACH UNDERGROUND UTILITY FACILITY AFFECTED. KNOWN UTILITY OWNERS ARE IDENTIFIED BELOW AND ARE TO BE VERIFIED WITH MISS UTILITY:

POTOMAC EDISON  
WORK ORDER NO.: 770171399  
10435 DOWNSVILLE PIKE  
HAGERSTOWN, MARYLAND 21740  
301-790-3400

VERIZON  
120 WEST ANTIETAM STREET  
HAGERSTOWN, MARYLAND 21740  
301-797-9930

ANTIETAM CABLE TV  
1000 WILLOW CIRCLE  
HAGERSTOWN, MARYLAND 21740  
301-797-5000

HAGERSTOWN WATER DEPARTMENT  
51 WEST MEMORIAL BOULEVARD  
HAGERTOWN, MARYLAND 21740  
301-739-8577

WASHINGTON COUNTY WATER AND SEWER DEPARTMENT  
16232 ELLIOTT PARKWAY  
WILLIAMSPORT, MARYLAND 21795  
240-313-2600

COLUMBIA GAS OF MARYLAND  
55 SYCAMORE STREET  
HAGERSTOWN, MARYLAND 21740  
888-460-4332

MISS UTILITY OF MARYLAND  
TICKET# 24341751  
TICKET# 24341732  
TICKET# 24341716  
TICKET# 24341683  
TICKET# 24341682

J. SECURITY

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FAMILIARIZE HIMSELF/HERSELF WITH THE VARIOUS ASPECTS OF TRANSPORTATION SECURITY ADMINISTRATION (TSA) SECTION 1542 "AIRPORT SECURITY". ANY VIOLATION OF TSA SECTION 1542 BY THE CONTRACTOR AND ANY SUBSEQUENT FINES IMPOSED DUE TO THE VIOLATION WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.

2. ALL VEHICLES TO BE USED ON THE AIRPORT SHALL BE REGISTERED WITH THE AIRPORT OPERATIONS MANAGER. REGISTRATION CONSISTS OF LICENSE PLATE NUMBER AND OWNER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT VEHICLES ARE REGISTERED IN A TIMELY MANNER SO AS NOT TO DELAY THE PROJECT. VISITING VEHICLES ARE EXEMPT FROM THE REGISTRATION REQUIREMENTS SO LONG AS THEY ARE ESCORTED BY A REGISTERED VEHICLE AT ALL TIMES WHEN ON THE AOA.

3. THE AIRPORT WILL NOT PROVIDE AIRFIELD OPERATIONS AREA ESCORTS. THE CONTRACTOR MUST PROVIDE HIS OWN RADIO, ACQUAINT HIMSELF AND ANY OTHER PERSONNEL THAT ARE ANTICIPATED TO USE THE RADIO WITH THE PROPER PROCEDURES IN COMMUNICATING WITH GROUND CONTROL. THE CONTRACTOR WILL NEED TO ATTEND SECURITY/GROUND VEHICLE OPS TRAINING.




4. THE PROJECT SUPERVISORS SHALL HAVE WITH THEM AT ALL TIMES THE TELEPHONE NUMBERS FOR THE FOLLOWING PERSONS. IN THE EVENT OF AN EMERGENCY THESE PERSONNEL SHOULD BE CONTACTED IN DESCENDING ORDER:

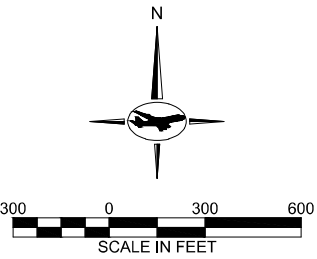
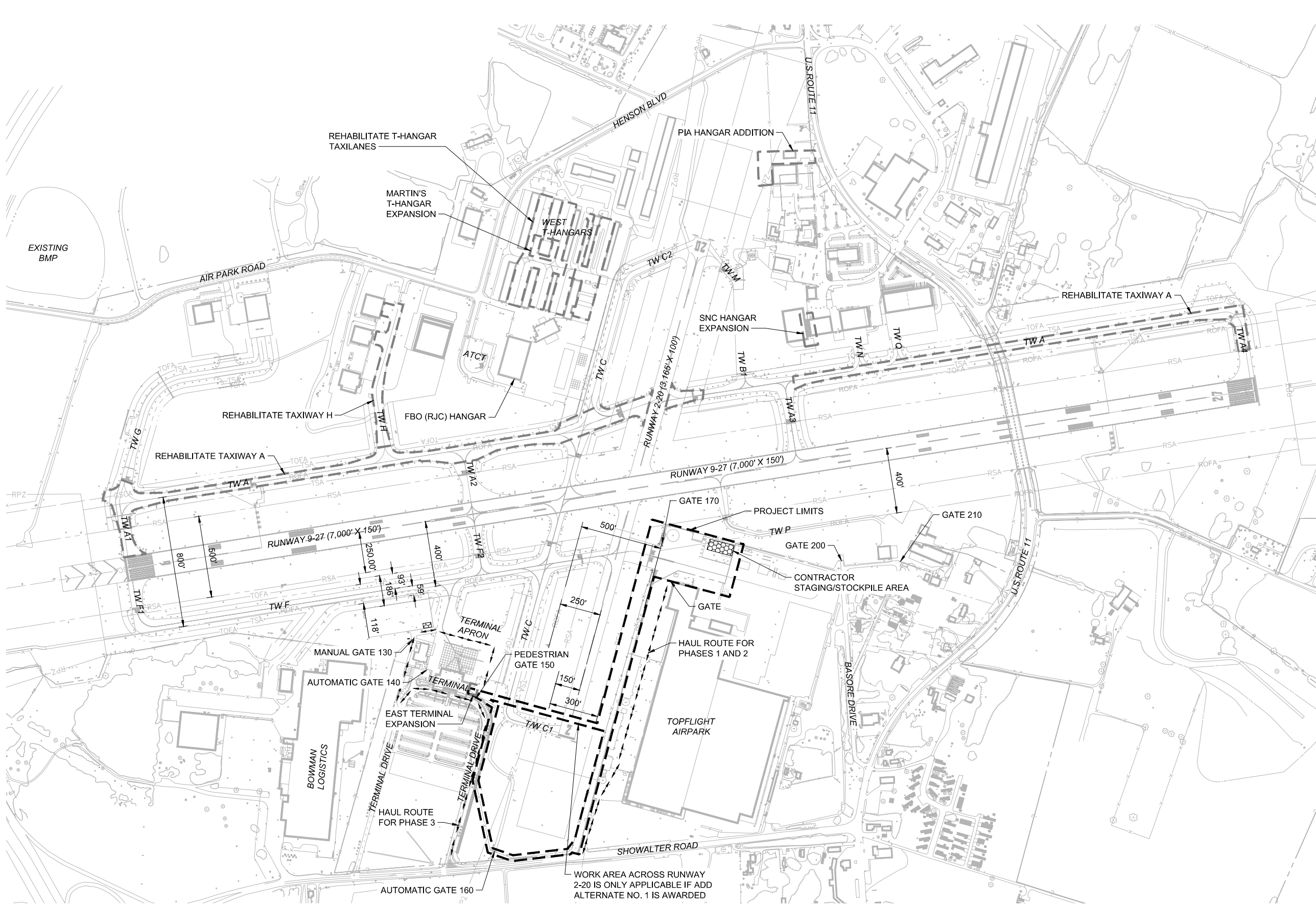
MR. NEIL DORAN, AIRPORT DIRECTOR  
MR. TERRY STOUFFER, MAINTENANCE SUPERVISOR  
MR. GENE BOLANOWSKI, OPERATIONS MANAGER  
MR. DANNY SHIRLEY, AIRPORT FIRE CHIEF

5. TELEPHONE NUMBERS WILL BE PROVIDED TO THE CONTRACTOR AT THE PRE-CONSTRUCTION MEETING. ADDITIONAL CONTACTS MAY BE PROVIDED TO THE CONTRACTOR AT THAT TIME.

6. WHEN CONSTRUCTION ACTIVITY IS CONDUCTED IN THE AOA, KEY PROJECT SITE SUPERVISORY PERSONNEL OF THE CONTRACTOR AND ITS SUBCONTRACTORS (INCLUDING CONSTRUCTION GATE GUARD PERSONNEL) SHALL BE ISSUED AIRPORT IDENTIFICATION (ID) BADGES. ALL INDIVIDUALS WHO RECEIVE AN AIRPORT BADGE ARE REQUIRED TO ATTEND A SECURITY TRAINING CLASS PROVIDED BY THE AIRPORT. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN APPLICATIONS AND MAKE ALL NECESSARY ARRANGEMENTS TO ENABLE ITS PERSONNEL TO OBTAIN ID BADGES. THE CONTRACTOR IS ALSO RESPONSIBLE FOR ENSURING THAT IT HAS SUFFICIENT SUPERVISORY AND CONSTRUCTION GATE PERSONNEL ON THE PROJECT SITE WHENEVER WORK IS OCCURRING TO FULFILL THE RESPONSIBILITIES.

7. PROJECT SITE SUPERVISORY PERSONNEL ARE SUBJECT TO FEDERAL CRIMINAL RECORDS CHECKS AND MUST PROVIDE EMPLOYMENT VERIFICATION FORMS THAT COVER THE LAST TEN (10) YEARS OF EMPLOYMENT AND EDUCATION. INFORMATION ON THESE FORMS WILL BE VERIFIED BY THE AIRPORT.

CONSULTANT: <div><p><b>ADCI</b> AIRPORT DESIGN CONSULTANTS 6031 UNIVERSITY BLVD, SUITE 330 ELLICOTT CITY, MD 21043 TEL: 410-465-9600 FAX: 410-465-9602</p></div>		SEAL: <div></div>	PROFESSIONAL CERTIFICATION: <p>"I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND"</p> <p>LICENSE NO. 32705</p> <p>EXPIRATION DATE: 02/21/2026</p>	DESIGNED: B.J.D. DRAWN: J.A.A. CHECKED: V.J.D. APPROVED: R.N.M.	REVISION NO. REVISION DATE	DESCRIPTIONS	<div><p><b>HAGERSTOWN REGIONAL AIRPORT</b> Washington County, MD</p></div>		PROJECT TITLE: <p>ARFF BUILDING DEMOLITION; AOA FENCE/ACCESS GATE REALIGNMENT</p>		FAA AIP No.: 3240019071-2024 Bid No.: PUR-1744 Grading Permit No.: SGP-24-040	
								SHEET TITLE: <p>GENERAL CONSTRUCTION AND SAFETY NOTES 2</p>		SHEET NO.: <p>G1004</p>		
								SCALE: <p>N.A.</p>		DATE: <p>APRIL 2025</p>		



- NOTES:**
- CONTRACTOR WILL NOT BE PERMITTED TO ENTER/ACCESS AOA WITHOUT PROPER CLEARANCES (SEE SHEETS G1003 AND G1004).

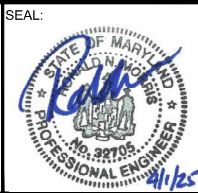
- EXISTING LEGEND:**
- EXISTING AOA FENCE
  - RPZ RUNWAY PROTECTION ZONE
  - RSA RUNWAY SAFETY AREA
  - ROFA RUNWAY OBJECT FREE AREA
  - TOFA TAXIWAY OBJECT FREE AREA
  - GSCA GLIDESLOPE CRITICAL AREA
  - LCA LOCALIZER CRITICAL AREA
  - AIRPORT PROPERTY BOUNDARY

- PROPOSED LEGEND:**
- HAUL ROUTE
  - PROJECT WORK LIMITS
  - CONTRACTOR STAGING / STOCKPILE AREA
  - POTENTIALLY CONCURRENT PROJECT

CONSULTANT:

**ADCI**

AIRPORT DESIGN CONSULTANTS  
6031 UNIVERSITY BLVD, SUITE 330  
ELLICOTT CITY, MD 21043  
TEL: 410.465.9600  
FAX: 410.465.9602



PROFESSIONAL CERTIFICATION:  
"I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND"

LICENSE NO. 32705  
EXPIRATION DATE: 02/21/2026

DESIGNED:	REVISION NO.	REVISION DATE	DESCRIPTIONS
B.J.D.			
DRAWN:			
J.A.A.			
CHECKED:			
V.J.D.			
APPROVED:			
R.N.M.			

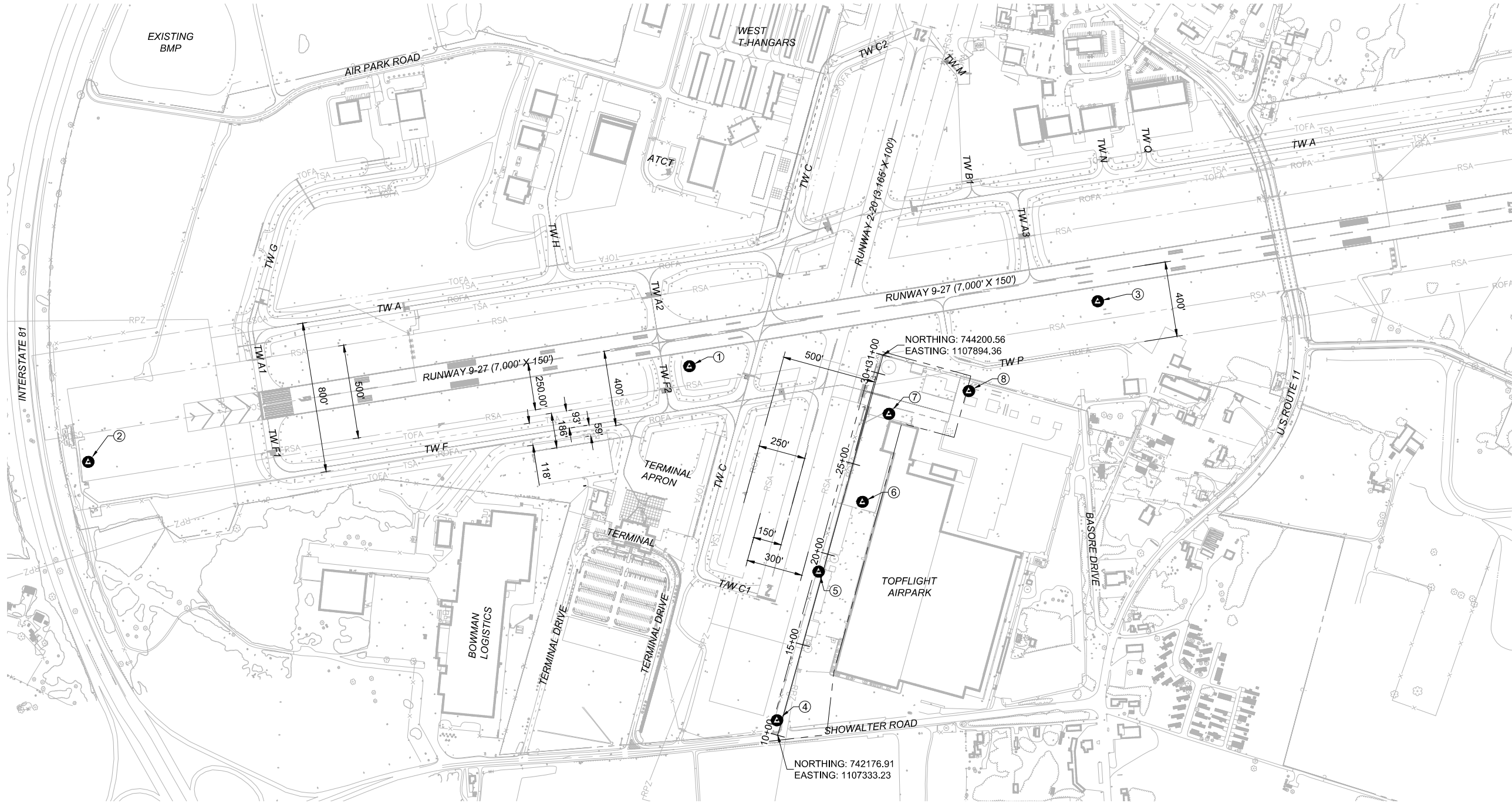
**HGR**

**HAGERSTOWN REGIONAL AIRPORT**  
Washington County, MD

PROJECT TITLE:	ARFF BUILDING DEMOLITION; AOA FENCE/ACCESS GATE REALIGNMENT
SHEET TITLE:	GENERAL PROJECT LAYOUT
SCALE:	AS SHOWN
DATE:	APRIL 2025

FAA AIP No.: 3240019-071-2024  
Bid No.: PUR-1744  
Grading Permit No.: SGP-24-040

SHEET NO.:  
**GC100**  
5 OF 48



NOTES:

- CONTROL POINTS ARE RELATIVE TO THE HORIZONTAL DATUM NORTH AMERICAN DATUM OF 1983 (NAD83), MARYLAND STATE PLANE, AND THE VERTICAL DATUM OF 1988 (NAVD88).
- THE SURVEY WORK WAS PERFORMED BY FOX AND ASSOCIATES, INC. IN OCTOBER 2020 AND SUPPLEMENTED WITH RECORD INFORMATION OBTAINED BY THE OWNER. NO SNOW ACCUMULATION WAS VISIBLE DURING THE TIME OF SURVEY.
- VERIFY ALL CONTROL POINTS AND ELEVATIONS PRIOR TO CONSTRUCTION AND NOTIFY THE RPR OF ANY DISCREPANCIES AND/OR DAMAGED MONUMENT.
- CONTRACTOR ACCESS TO SURVEY CONTROL MONUMENTS REQUIRES DOA ESCORT, AND MUST BE SCHEDULED WITH RPR AT LEAST 14 DAYS IN ADVANCE.
- THE CONTRACTOR SHALL PROTECT EXISTING CONTROL MONUMENTS AT ALL TIMES.
- ANY SURVEY CONTROL MONUMENT DAMAGED DURING CONSTRUCTION SHALL BE RESET PER FAA ADVISORY CIRCULAR 150/5300-16 (CURRENT VERSION), AND CONTRACTOR SHALL SUBMIT AND OBTAIN APPROVAL OF NATIONAL GEODETIC SURVEY (NGS) FOR THE RE-SET MONUMENT AT NO ADDITIONAL COST TO THE OWNER.
- TEMPORARY CONSTRUCTION CONTROL AND LAYOUT STAKING SHALL BE ACCOMPLISHED BY QUALIFIED CONTRACTOR HIRED SURVEYOR LICENSED IN THE STATE OF MARYLAND.
- REFER TO SPECIFICATION ITEM M-150 FOR ADDITIONAL SURVEY REQUIREMENTS.
- DIMENSIONS SHOWN FOR REQUIRED TAXIWAY SEPARATIONS ARE TYPICAL OR WORST CASE FOR ALL TAXIWAYS.

EXISTING LEGEND:

- EXISTING AOA FENCE
- RPZ RUNWAY PROTECTION ZONE
- RSA RUNWAY SAFETY AREA
- ROFA RUNWAY OBJECT FREE AREA
- TOFA TAXIWAY OBJECT FREE AREA
- GSCA GLIDESLOPE CRITICAL AREA
- LCA LOCALIZER CRITICAL AREA
- AIRPORT PROPERTY BOUNDARY


PROPOSED LEGEND:

- SURVEY LIMITS
- SURVEY CONTROL POINT

SURVEY CONTROL TABLE						
POINT #	LATITUDE	LONGITUDE	ELEVATION **	NORTHING *	EASTING *	DESCRIPTION
1	N039° 42' 27.34"	W077° 43' 48.90"	687.00	744141.2190	1106864.9930	SECONDARY AIRPORT CONTROL STATION (SACS) HGR ARP (NGS PID JV7051)
2	N039° 42' 22.06"	W077° 44' 29.79"	653.80	743632.2986	1103664.8033	PRIMARY AIRPORT CONTROL STATION (PACS) HGR AP ST B (NGS PID JV7053)
3	N039° 42' 30.93"	W077° 43' 21.12"	697.60	744487.1713	1109039.2373	SECONDARY AIRPORT CONTROL STATION (SACS) HGR AP STA A (NGS PID AA9254)
4	N039° 42' 08.75"	W077° 43' 42.74"	687.88	742256.3500	1107331.3200	TRVRCs (REBAR & CAP SET)
5	N039° 42' 16.59"	W077° 43' 39.99"	690.43	743048.3400	1107553.0400	TRVRCs (REBAR & CAP SET)
6	N039° 42' 20.28"	W077° 43' 37.04"	693.49	743419.3700	1107786.3100	TRVMNS (MAG NAIL SET)
7	N039° 42' 24.92"	W077° 43' 35.29"	695.60	743887.6000	1107927.1800	TRVMNS (MAG NAIL SET)
8	N039° 42' 26.15"	W077° 43' 29.85"	697.90	744009.1900	1108352.7800	TRVMNS (MAG NAIL SET)

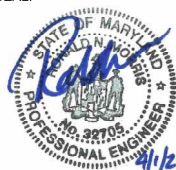
\* HORIZONTAL DATUM: NAD83 MARYLAND STATE PLANE COORDINATE SYSTEM, US FOOT  
\*\* VERTICAL DATUM: NAVD88 (POINTS 1-3 HAVE ACCURACY OF ONE TENTH OF A FOOT)

CONSULTANT:



AIRCRAFT DESIGN CONSULTANTS  
6031 UNIVERSITY BLVD, SUITE 330  
ELLICOTT CITY, MD 21043  
TEL: 410.465.9600  
FAX: 410.465.9602

SEAL:



PROFESSIONAL CERTIFICATION:

"I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND"

LICENSE NO. 32705

EXPIRATION DATE: 02/21/2026

DESIGNED:

B.J.D.

DRAWN:

J.A.A.

CHECKED:

V.J.D.


APPROVED:

R.N.M.

REVISION NO.

REVISION DATE

DESCRIPTIONS



HAGERSTOWN  
REGIONAL AIRPORT  
Washington County, MD

PROJECT TITLE:

ARFF BUILDING DEMOLITION;  
AOA FENCE/ACCESS GATE REALIGNMENT

SHEET TITLE:

SURVEY CONTROL AND BASELINE  
PLAN

SCALE:

AS SHOWN

DATE:

APRIL 2025

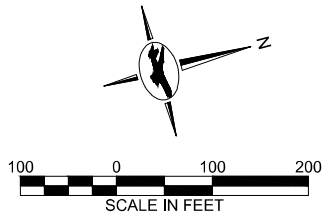
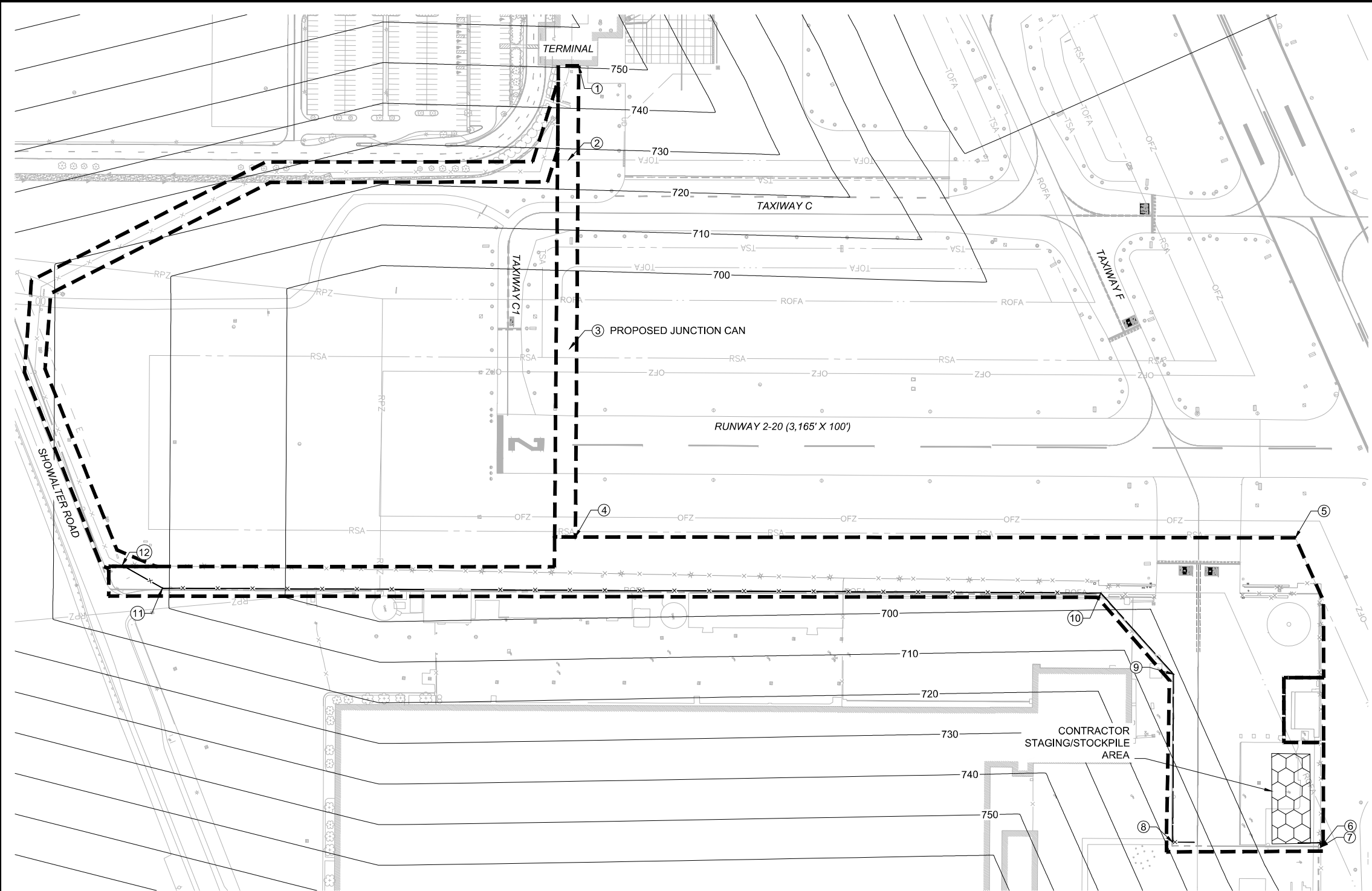
FAA AIP No.: 3240019-071-2024  
Bid No.: PUR-1744  
Grading Permit No.: SGP-24-040

SHEET NO.:

GC101

6 OF 48

FILE NAME: O:\HGR\Projects\2023-1307 ARFF Demo-Fence\CAD\SHEETS\0006\_GC101\_SURVEY CONTROL AND BASELINE PLAN.dwg LAYOUT NAME: GC100 USER: jarden PLOTTED: Tuesday, April 01, 2025 - 1:14pm



**NOTES:**

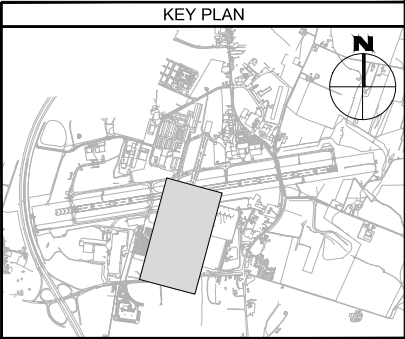
- EQUIPMENT (WITHOUT OPERATORS), MATERIALS, AND TEMPORARY STOCKPILES MUST NOT PENETRATE THE PART 77 HEIGHT RESTRICTIONS. NO EQUIPMENT SHALL PENETRATE OFZ ELEVATIONS. CONFIRM THAT FORM 7460 AND NOTAMS HAVE BEEN FILED AND APPROVED BEFORE WORKING IN AREAS THAT VIOLATE MAXIMUM ALLOWABLE EQUIPMENT HEIGHT.
- ALL ELEVATIONS ARE PROVIDED IN NAVD88 DATUM.
- ALL HEIGHTS SHOWN ON THIS PLAN ARE ABOVE GROUND LEVEL (AGL) WITH RESPECT TO THE MAXIMUM EQUIPMENT HEIGHT TABLE.
- THIS PLAN WAS COORDINATED WITH THE FEDERAL AVIATION ADMINISTRATION (FAA). ANY REQUEST FOR EQUIPMENT HIGHER THAN PERMITTED ON THIS PLAN SHALL BE RESUBMITTED BY THE CONTRACTOR (APPROVAL PERIOD UP TO 90 DAYS). THE PLAN IS INTENDED AS A GUIDE. CONTRACTOR TO CONFIRM WORK LIMITS WITH THE RPR.
- EXISTING GROUND AND OFZ CONTOURS ARE NOT SHOWN FOR CLARITY.
- OFZ ELEVATIONS SHOWN ARE RELATIVE TO RUNWAY 9-27.
- ACTIVE CONSTRUCTION ACTIVITIES WILL BE SUBJECT TO OFZ RESTRICTIONS ONLY. PERMANENT OBSTRUCTIONS (EQUIPMENT NOT IN USE, STOCKPILES, BOOMS, ETC) SHALL BE SUBJECT TO FAR PART 77 RESTRICTIONS.
- ANY BOOMS AND CONSTRUCTION EQUIPMENT SHALL BE LOWERED TO THE RESPECTIVE EQUIPMENT MINIMUM HEIGHT WHEN NOT IN USE AND/OR AT THE END OF EACH WORK SHIFT. NOT IN USE IS DEFINED AS NO OPERATOR BEING AVAILABLE TO MOVE A PARTICULAR PIECE OF EQUIPMENT FOR 15 MINUTES OR MORE.
- SEE CONSTRUCTION SAFETY AND PHASING PLANS FOR SPECIAL CONSIDERATIONS WHEN WORK OCCURS WITHIN THE PROTECTED SURFACES ON THE AIRFIELD.
- FOR TYPICAL SECTIONS OF THE PART 77 IMAGINARY SURFACES AND OFZ, SEE SHEET GC500.

**LEGEND:**


- WORK AREA
- EXISTING AOA FENCE
- POINT #
- 710 — FAR PART 77 CONTOUR

MAXIMUM EQUIPMENT HEIGHT								
POINT #	NORTHING	EASTING	LATITUDE (N)	LONGITUDE (W)	SITE ELEV.	PART 77 ELEV.	OFZ ELEV.	MAX. ALLOWABLE HEIGHT (AGL)
1	743,203.87	1,106,676.82	39° 42' 18.06"	77° 43' 51.21"	690.3	750.6	853.1	162.8'
2	743,144.55	1,106,828.96	39° 42' 17.49"	77° 43' 49.26"	687.2	728.1	853.1	165.9'
3	743,062.20	1,107,143.94	39° 42' 16.70"	77° 43' 45.22"	689.9	703.1	853.1	163.2'
4	742,988.01	1,107,460.19	39° 42' 15.99"	77° 43' 41.17"	691.1	703.1	853.1	162.0'
5	744,186.14	1,107,782.72	39° 42' 27.86"	77° 43' 37.17"	695.6	703.1	760.2	64.6'
6	744,090.28	1,108,309.38	39° 42' 26.95"	77° 43' 30.42"	696.6	703.1	789.6	93.0'

MAXIMUM PERMANENT HEIGHT								
POINT #	NORTHING	EASTING	LATITUDE (N)	LONGITUDE (W)	SITE ELEV.	PART 77 ELEV.	OFZ ELEV.	MAX. ALLOWABLE HEIGHT (AGL)
7	744,090.27	1,108,309.40	39° 42' 26.95"	77° 43' 30.42"	696.6	703.1	789.6	6.5'
8	743,846.13	1,108,235.06	39° 42' 24.53"	77° 43' 31.34"	696.4	719.3	828.7	22.9'
9	743,922.50	1,107,955.68	39° 42' 25.26"	77° 43' 34.93"	695.7	705.4	808.4	9.7'
10	743,837.79	1,107,787.97	39° 42' 24.41"	77° 43' 37.06"	694.1	703.1	818.0	9.0'
11	742,277.81	1,107,361.23	39° 42' 08.96"	77° 43' 42.36"	689.6	711.8	853.1	22.2'
12	742,221.03	1,107,305.00	39° 42' 08.40"	77° 43' 43.08"	687.9	714.6	853.1	26.7'




CONSULTANT:



AIRPORT DESIGN CONSULTANTS  
6031 UNIVERSITY BLVD, SUITE 330  
ELLICOTT CITY, MD 21043  
TEL: 410.465.9600  
FAX: 410.465.9602

SEAL:



PROFESSIONAL CERTIFICATION:

I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND.  
LICENSE NO. 32705  
EXPIRATION DATE: 02/21/2026

DESIGNED:

B.J.D.

DRAWN:

J.A.A.

CHECKED:

V.J.D.

APPROVED:


R.N.M.

REVISION NO.

REVISION DATE

DESCRIPTIONS

BID DOCUMENTS



HAGERSTOWN REGIONAL AIRPORT  
Washington County, MD

PROJECT TITLE:

ARFF BUILDING DEMOLITION;  
AOA FENCE/ACCESS GATE REALIGNMENT

SHEET TITLE:

MAXIMUM EQUIPMENT HEIGHT PLAN

SCALE:

AS SHOWN

DATE:

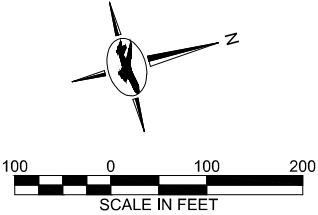
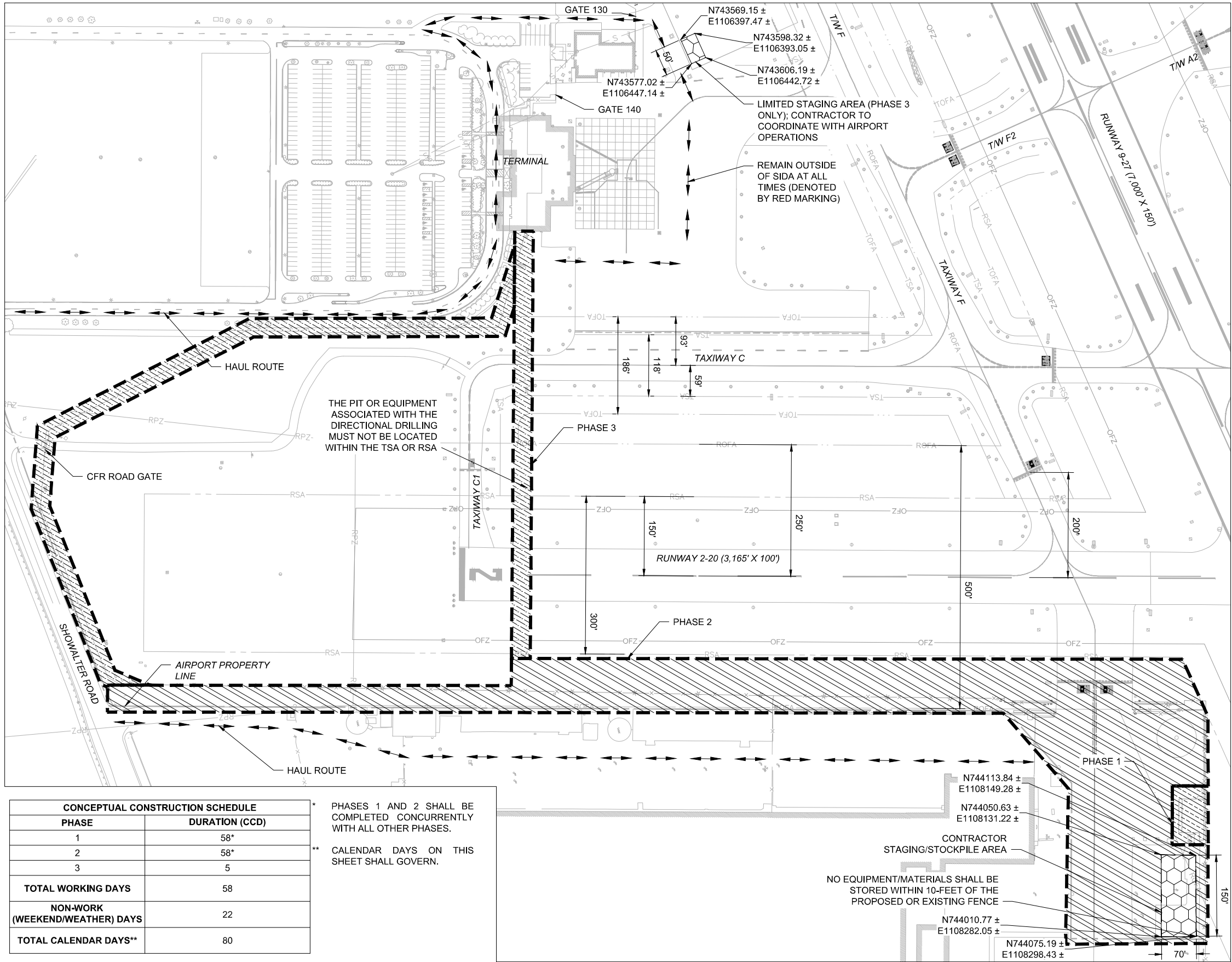
APRIL 2025

FAA AIP No.: 3240019071-2024  
Bid No.: PUR-1744  
Grading Permit No.: SGP-24-040

SHEET NO.:

VS100

7 OF 48



- NOTES:**
- SEE SHEETS GI003 AND GI004 FOR GENERAL CONSTRUCTION AND SAFETY NOTES AND GC500 FOR CONSTRUCTION SAFETY PHASING NOTES AND DETAILS.
  - CONTRACTOR SHALL BE RESPONSIBLE FOR ALL GATE GUARDS AND ESCORTS.
  - POTENTIAL UTILITY OVERLAPS MAY ARISE WHEN THE TERMINAL EXPANSION PROJECT IS BEING PERFORMED. CONTRACTOR SHALL COORDINATE WITH THE RPR AND AIRPORT WITH REGARD TO THE TERMINAL PROJECT'S SCHEDULE.

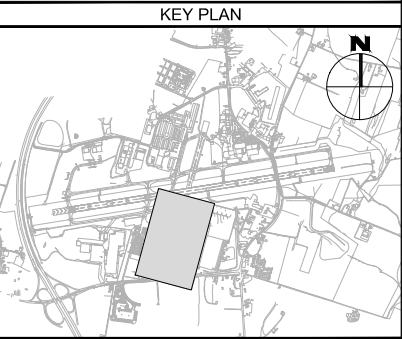
**LIQUIDATED DAMAGES:**  
\$2,500 PER DAY BEYOND CONTRACT DURATION

- WORK DESCRIPTION:**
- OLD ARFF BUILDING DEMOLITION
  - AIRFIELD SECURITY FENCE/GATE MODIFICATIONS (REMOVAL AND NEW INSTALLATION)
  - INSTALLATION OF NEW PERIMETER GATE NOS. 170 AND 170A.
  - INSTALLATION OF CCTV CAMERAS AT PERIMETER GATE 170.
  - INSTALLATION OF CONTROL CABLE FROM GATE 170 AND 170A TO CENTRAL COMMUNICATIONS ROOM IN TERMINAL BUILDING.

**CONSTRUCTION WORK HOURS:**  
NO RESTRICTIONS

**CONTRACT DURATION:**  
80 CONSECUTIVE CALENDAR DAYS (CCD)  
(DOES NOT INCLUDE MOBILIZATION AND CLOSEOUT)

- LEGEND:**
- PHASE 1
  - PHASE 2
  - PHASE 3
  - HAUL ROUTE
  - CONTRACTOR STAGING / STOCKPILE AREA
  - RPZ — RUNWAY PROTECTION ZONE
  - RSA — RUNWAY SAFETY AREA
  - ROFA — RUNWAY OBJECT FREE AREA
  - TOFA — TAXIWAY OBJECT FREE AREA
  - TSA — TAXIWAY SAFETY AREA
  - OFZ — OBSTACLE FREE ZONE



CONCEPTUAL CONSTRUCTION SCHEDULE	
PHASE	DURATION (CCD)
1	58*
2	58*
3	5
TOTAL WORKING DAYS	58
NON-WORK (WEEKEND/WEATHER) DAYS	22
TOTAL CALENDAR DAYS**	80

\* PHASES 1 AND 2 SHALL BE COMPLETED CONCURRENTLY WITH ALL OTHER PHASES.

\*\* CALENDAR DAYS ON THIS SHEET SHALL GOVERN.

CONSULTANT:

**ADCI**

AIRPORT DESIGN CONSULTANTS  
6031 UNIVERSITY BLVD, SUITE 330  
ELLICOTT CITY, MD 21043  
TEL: 410.465.9600  
FAX: 410.465.9602



PROFESSIONAL CERTIFICATION:  
"I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND"

LICENSE NO. 32705

EXPIRATION DATE: 02/21/2026

DESIGNED: B.J.D.  
DRAWN: J.A.A.  
CHECKED: V.J.D.  
APPROVED: R.N.M.

REVISION NO.	REVISION DATE	DESCRIPTIONS

BID DOCUMENTS

**HGR**

**HAGERSTOWN REGIONAL AIRPORT**  
Washington County, MD

PROJECT TITLE: ARFF BUILDING DEMOLITION; AOA FENCE/ACCESS GATE REALIGNMENT

SHEET TITLE: OVERALL CONSTRUCTION SAFETY AND PHASING PLAN

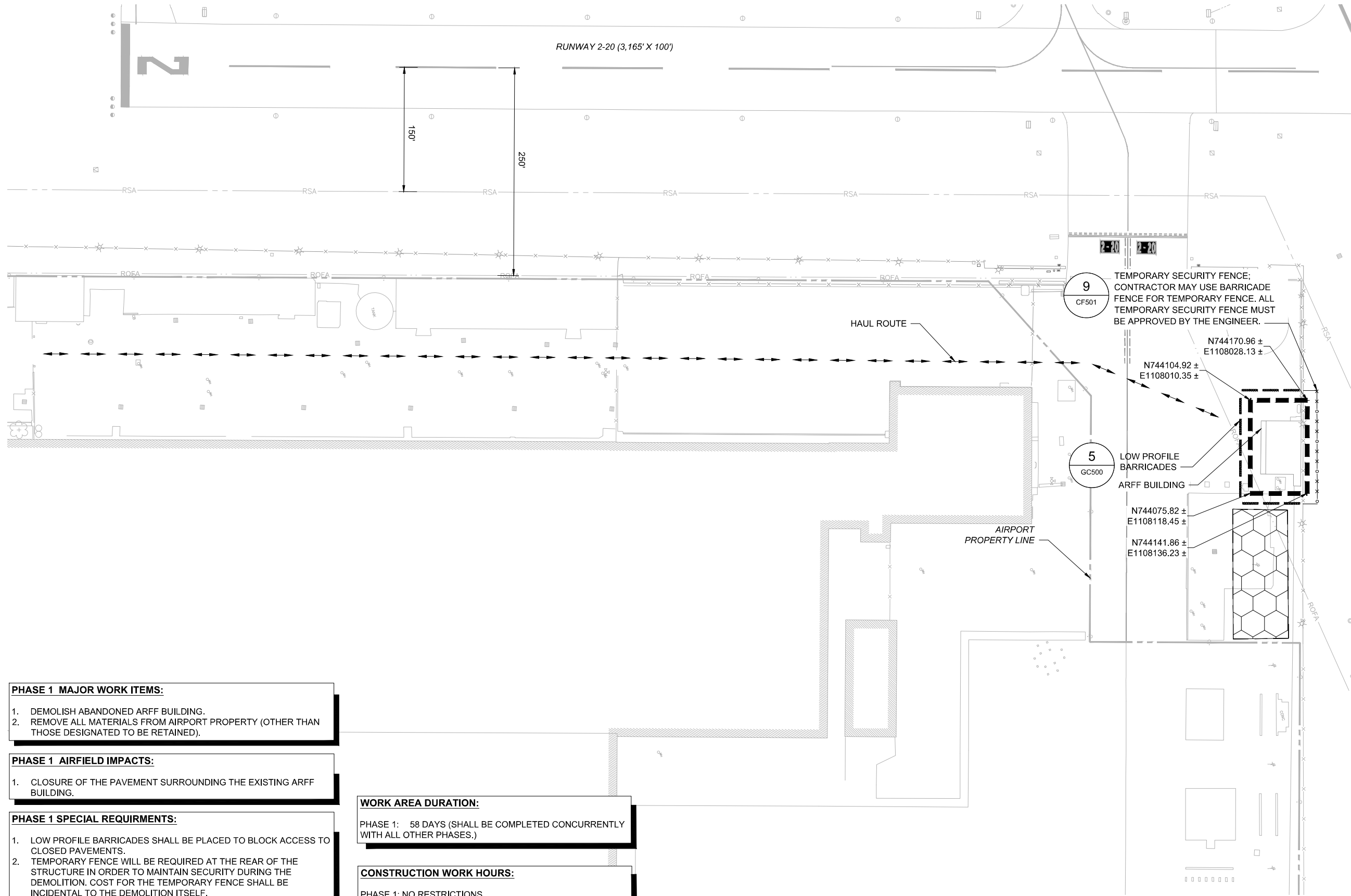
SCALE: AS SHOWN

DATE: APRIL 2025

FAA AIP No.: 3240019071-2024  
Bid No.: PUR-1744  
Grading Permit No.: SGP-24-040

SHEET NO.: GC110

8 OF 48



**NOTES:**

1. SEE SHEET GI003 AND GI004 FOR GENERAL CONSTRUCTION AND SAFETY NOTES AND GC500 FOR CONSTRUCTION SAFETY PHASING NOTES AND DETAILS.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL GATE GUARDS AND ESCORTS.
3. SEE SHEET GC110 FOR CONTRACTOR STAGING AND STOCKPILE LOCATIONS.

**LEGEND:**

- PHASE 1 WORK LIMITS
- CONTRACTOR STAGING / STOCKPILE AREA
- HAUL ROUTE
- LOW PROFILE BARRICADES
- TEMPORARY SECURITY FENCE
- RSA RUNWAY SAFETY AREA
- ROFA RUNWAY OBJECT FREE AREA
- EXISTING AOA FENCE
- TSA TAXIWAY SAFETY AREA
- TOFA TAXIWAY OBJECT FREE AREA

**PHASE 1 MAJOR WORK ITEMS:**

1. DEMOLISH ABANDONED ARFF BUILDING.
2. REMOVE ALL MATERIALS FROM AIRPORT PROPERTY (OTHER THAN THOSE DESIGNATED TO BE RETAINED).

**PHASE 1 AIRFIELD IMPACTS:**

1. CLOSURE OF THE PAVEMENT SURROUNDING THE EXISTING ARFF BUILDING.

**PHASE 1 SPECIAL REQUIRMENTS:**

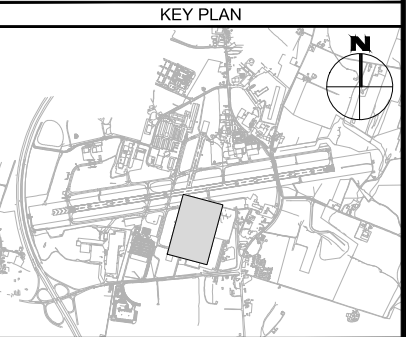
1. LOW PROFILE BARRICADES SHALL BE PLACED TO BLOCK ACCESS TO CLOSED PAVEMENTS.
2. TEMPORARY FENCE WILL BE REQUIRED AT THE REAR OF THE STRUTURE IN ORDER TO MAINTAIN SECURITY DURING THE DEMOLITION. COST FOR THE TEMPORARY FENCE SHALL BE INCIDENTAL TO THE DEMOLITION ITSELF.

**WORK AREA DURATION:**

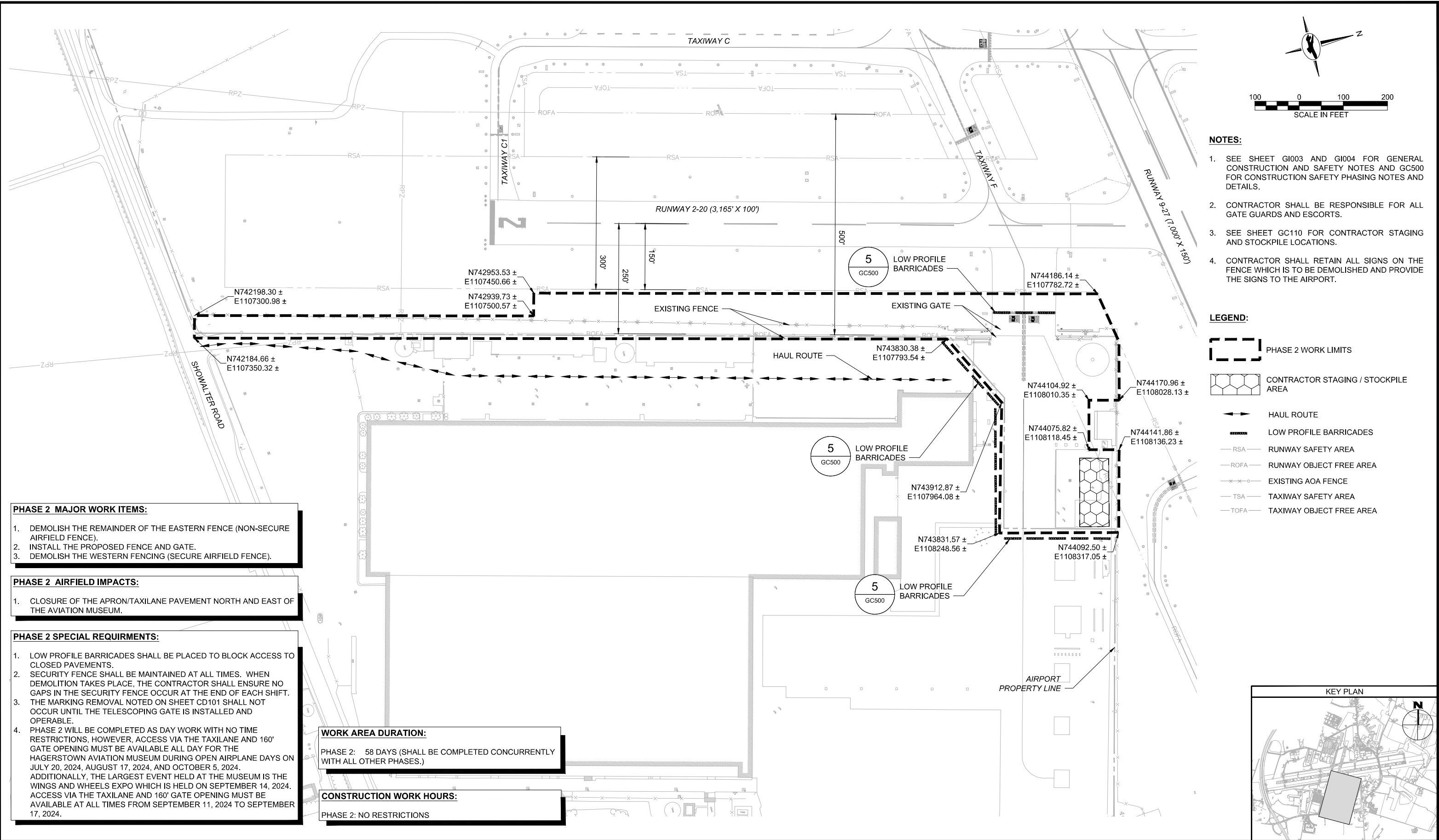
PHASE 1: 58 DAYS (SHALL BE COMPLETED CONCURRENTLY WITH ALL OTHER PHASES.)

**CONSTRUCTION WORK HOURS:**

PHASE 1: NO RESTRICTIONS



<b>CONSULTANT:</b>  AIRPORT DESIGN CONSULTANTS 6031 UNIVERSITY BLVD, SUITE 330 ELLICOTT CITY, MD 21043 TEL: 410.465.9600 FAX: 410.465.9602		<b>SEAL:</b> 		<b>PROFESSIONAL CERTIFICATION:</b> "I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND" LICENSE NO. 32705 EXPIRATION DATE: 02/21/2026		<b>DESIGNED:</b> B.J.D. <b>DRAWN:</b> J.A.A. <b>CHECKED:</b> V.J.D. <b>APPROVED:</b> R.N.M.		<b>REVISION NO.</b> <b>REVISION DATE</b> <b>DESCRIPTIONS</b>		 <b>HAGERSTOWN REGIONAL AIRPORT</b> Washington County, MD		<b>PROJECT TITLE:</b> ARFF BUILDING DEMOLITION; AOA FENCE/ACCESS GATE REALIGNMENT		<b>FAA AIP No.:</b> 324-0019-071-2024 <b>Bid No.:</b> PUR-1744 <b>Grading Permit No.:</b> SGP-24-040	
<b>SHEET TITLE:</b> CONSTRUCTION SAFETY AND PHASING PLAN 1										<b>SCALE:</b> AS SHOWN		<b>DATE:</b> APRIL 2025		<b>SHEET NO.:</b> GC111 9 OF 48	



- PHASE 2 MAJOR WORK ITEMS:**
- DEMOLISH THE REMAINDER OF THE EASTERN FENCE (NON-SECURE AIRFIELD FENCE).
  - INSTALL THE PROPOSED FENCE AND GATE.
  - DEMOLISH THE WESTERN FENCING (SECURE AIRFIELD FENCE).

- PHASE 2 AIRFIELD IMPACTS:**
- CLOSURE OF THE APRON/TAXILANE PAVEMENT NORTH AND EAST OF THE AVIATION MUSEUM.

- PHASE 2 SPECIAL REQUIRMENTS:**
- LOW PROFILE BARRICADES SHALL BE PLACED TO BLOCK ACCESS TO CLOSED PAVEMENTS.
  - SECURITY FENCE SHALL BE MAINTAINED AT ALL TIMES. WHEN DEMOLITION TAKES PLACE, THE CONTRACTOR SHALL ENSURE NO GAPS IN THE SECURITY FENCE OCCUR AT THE END OF EACH SHIFT. THE MARKING REMOVAL NOTED ON SHEET CD101 SHALL NOT OCCUR UNTIL THE TELESCOPING GATE IS INSTALLED AND OPERABLE.
  - PHASE 2 WILL BE COMPLETED AS DAY WORK WITH NO TIME RESTRICTIONS, HOWEVER, ACCESS VIA THE TAXILANE AND 160' GATE OPENING MUST BE AVAILABLE ALL DAY FOR THE HAGERSTOWN AVIATION MUSEUM DURING OPEN AIRPLANE DAYS ON JULY 20, 2024, AUGUST 17, 2024, AND OCTOBER 5, 2024. ADDITIONALLY, THE LARGEST EVENT HELD AT THE MUSEUM IS THE WINGS AND WHEELS EXPO WHICH IS HELD ON SEPTEMBER 14, 2024. ACCESS VIA THE TAXILANE AND 160' GATE OPENING MUST BE AVAILABLE AT ALL TIMES FROM SEPTEMBER 11, 2024 TO SEPTEMBER 17, 2024.

**WORK AREA DURATION:**

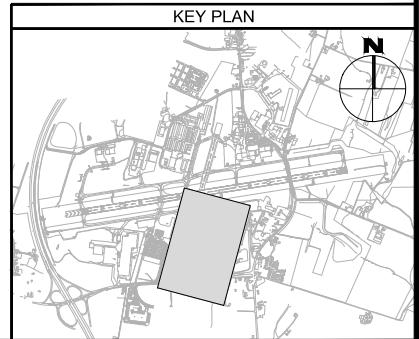
PHASE 2: 58 DAYS (SHALL BE COMPLETED CONCURRENTLY WITH ALL OTHER PHASES.)




**CONSTRUCTION WORK HOURS:**

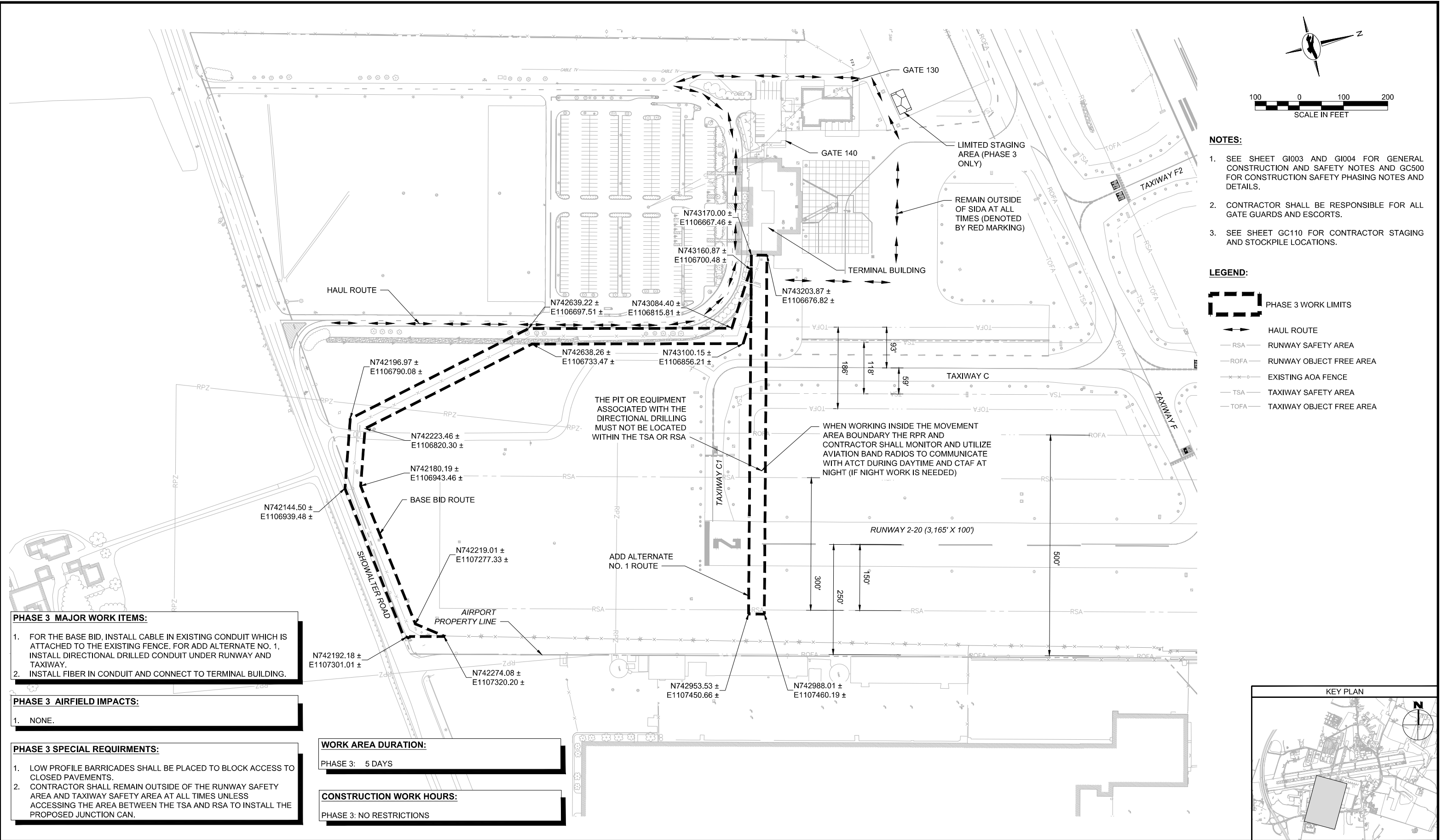
PHASE 2: NO RESTRICTIONS

- NOTES:**
- SEE SHEET GI003 AND GI004 FOR GENERAL CONSTRUCTION AND SAFETY NOTES AND GC500 FOR CONSTRUCTION SAFETY PHASING NOTES AND DETAILS.
  - CONTRACTOR SHALL BE RESPONSIBLE FOR ALL GATE GUARDS AND ESCORTS.
  - SEE SHEET GC110 FOR CONTRACTOR STAGING AND STOCKPILE LOCATIONS.
  - CONTRACTOR SHALL RETAIN ALL SIGNS ON THE FENCE WHICH IS TO BE DEMOLISHED AND PROVIDE THE SIGNS TO THE AIRPORT.

- LEGEND:**
- PHASE 2 WORK LIMITS
  - CONTRACTOR STAGING / STOCKPILE AREA
  - HAUL ROUTE
  - LOW PROFILE BARRICADES
  - RSA RUNWAY SAFETY AREA
  - ROFA RUNWAY OBJECT FREE AREA
  - EXISTING AOA FENCE
  - TSA TAXIWAY SAFETY AREA
  - TOFA TAXIWAY OBJECT FREE AREA



<p>CONSULTANT:</p>  <p>AIRPORT DESIGN CONSULTANTS 6031 UNIVERSITY BLVD, SUITE 330 ELLICOTT CITY, MD 21043 TEL: 410.465.9600 FAX: 410.465.9602</p>		<p>SEAL:</p> 	<p>PROFESSIONAL CERTIFICATION:</p> <p>"I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND"</p> <p>LICENSE NO. 32705</p> <p>EXPIRATION DATE: 02/21/2026</p>	<p>DESIGNED: B.J.D.</p> <p>DRAWN: J.A.A.</p> <p>CHECKED: V.J.D.</p> <p>APPROVED: R.N.M.</p>	<p>REVISION NO.</p> <p>REVISION DATE</p> <p>DESCRIPTIONS</p>	<p><b>BID DOCUMENTS</b></p>	<p> <b>HAGERSTOWN REGIONAL AIRPORT</b> Washington County, MD</p>	<p>PROJECT TITLE: ARFF BUILDING DEMOLITION; AOA FENCE/ACCESS GATE REALIGNMENT</p> <p>SHEET TITLE: CONSTRUCTION SAFETY AND PHASING PLAN 2</p> <p>SCALE: AS SHOWN</p> <p>DATE: APRIL 2025</p>	<p>FAA AIP No.: 3240019071-2024 Bid No.: PUR-1744 Grading Permit No.: SGP-24-040</p> <p>SHEET NO.: GC112</p> <p>10 OF 48</p>
--	--	--	--	---	--	-----------------------------	---	---	--



**NOTES:**

1. SEE SHEET G1003 AND G1004 FOR GENERAL CONSTRUCTION AND SAFETY NOTES AND GC500 FOR CONSTRUCTION SAFETY PHASING NOTES AND DETAILS.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL GATE GUARDS AND ESCORTS.
3. SEE SHEET GC110 FOR CONTRACTOR STAGING AND STOCKPILE LOCATIONS.

**LEGEND:**

- PHASE 3 WORK LIMITS
- HAUL ROUTE
- RSA RUNWAY SAFETY AREA
- ROFA RUNWAY OBJECT FREE AREA
- EXISTING AOA FENCE
- TSA TAXIWAY SAFETY AREA
- TOFA TAXIWAY OBJECT FREE AREA

**PHASE 3 MAJOR WORK ITEMS:**

1. FOR THE BASE BID, INSTALL CABLE IN EXISTING CONDUIT WHICH IS ATTACHED TO THE EXISTING FENCE. FOR ADD ALTERNATE NO. 1, INSTALL DIRECTIONAL DRILLED CONDUIT UNDER RUNWAY AND TAXIWAY.
2. INSTALL FIBER IN CONDUIT AND CONNECT TO TERMINAL BUILDING.

**PHASE 3 AIRFIELD IMPACTS:**

1. NONE.

**PHASE 3 SPECIAL REQUIRMENTS:**



1. LOW PROFILE BARRICADES SHALL BE PLACED TO BLOCK ACCESS TO CLOSED PAVEMENTS.
2. CONTRACTOR SHALL REMAIN OUTSIDE OF THE RUNWAY SAFETY AREA AND TAXIWAY SAFETY AREA AT ALL TIMES UNLESS ACCESSING THE AREA BETWEEN THE TSA AND RSA TO INSTALL THE PROPOSED JUNCTION CAN.

**WORK AREA DURATION:**

PHASE 3: 5 DAYS

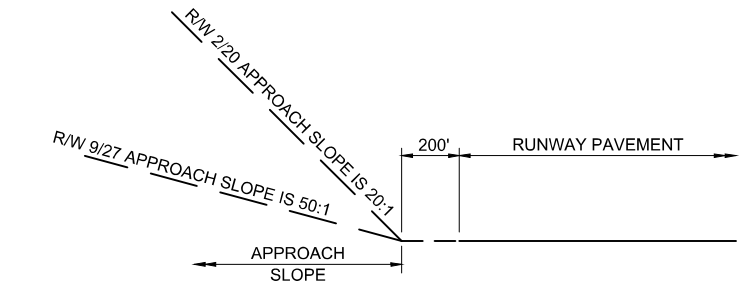
**CONSTRUCTION WORK HOURS:**

PHASE 3: NO RESTRICTIONS

<b>CONSULTANT:</b>  AIRPORT DESIGN CONSULTANTS 6031 UNIVERSITY BLVD, SUITE 330 ELLICOTT CITY, MD 21043 TEL: 410.465.9600 FAX: 410.465.9602		<b>SEAL:</b> 		<b>PROFESSIONAL CERTIFICATION:</b> "I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND." LICENSE NO. 32705 EXPIRATION DATE: 02/21/2026		<b>DESIGNED:</b> B.J.D. <b>DRAWN:</b> J.A.A. <b>CHECKED:</b> V.J.D. <b>APPROVED:</b> R.N.M.		<b>REVISION NO.</b> <b>REVISION DATE</b> <b>DESCRIPTIONS</b>		<b>BID DOCUMENTS</b>		 <b>HAGERSTOWN REGIONAL AIRPORT</b> Washington County, MD		<b>PROJECT TITLE:</b> ARFF BUILDING DEMOLITION; AOA FENCE/ACCESS GATE REALIGNMENT		<b>SHEET TITLE:</b> CONSTRUCTION SAFETY AND PHASING PLAN 3		<b>SCALE:</b> AS SHOWN		<b>DATE:</b> APRIL 2025		<b>FAA AIP No.:</b> 3240019071-2024 <b>Bid No.:</b> PUR-1744 <b>Grading Permit No.:</b> SGP-24-040		<b>SHEET NO.:</b> GC113 11 OF 48	
---	--	---	--	---	--	--	--	--	--	----------------------	--	---	--	---	--	---	--	---------------------------	--	----------------------------	--	--	--	--	--

GENERAL PHASING NOTES:

1. THE INTENT OF THE PHASING PLAN IS TO MINIMIZE THE IMPACT OF CONSTRUCTION ON THE OPERATION OF THE AIRPORT. THE CONTRACTOR SHALL CONSTRUCT THE PROJECT AS OUTLINED IN THE PLANS UNLESS OTHERWISE APPROVED BY THE RESIDENT PROJECT REPRESENTATIVE (RPR). ADJUSTMENTS TO THE PHASING PLAN MAY BE NECESSARY TO ACCOMMODATE UNFORESEEN PROBLEMS WITH AIRPORT OPERATION.
2. THE CONTRACTOR SHALL PROVIDE, MAINTAIN, MOVE, REMOVE (AS DIRECTED) CONSTRUCTION BARRIERS TO DELINEATE AREAS CLOSED TO AIRCRAFT TRAFFIC AND TO MARK ALL OPEN EXCAVATIONS, PAVEMENT DROP-OFFS ETC.
3. THE CONTRACTOR SHALL SUBMIT A CONSTRUCTION SCHEDULE FOR REVIEW AND APPROVAL OF THE RPR PRIOR TO STARTING CONSTRUCTION. STRICT ADHERENCE TO THE APPROVED SCHEDULE WILL BE ENFORCED TO AVOID CONFLICTS WITH OTHER CONSTRUCTION ACTIVITIES AND ADVERSE EFFECTS ON AIRPORT OPERATIONS.
4. ELECTRICAL WORK SHALL BE SEQUENCED TO MAINTAIN ALL ELECTRICAL SYSTEMS WITHOUT ANY INTERRUPTIONS. TEMPORARY WIRING IF REQUIRED SHALL BE INCIDENTAL TO THE CORRESPONDING ELECTRICAL WORK. ALL ELECTRICAL WORK SHALL BE COORDINATED WITH THE RPR AND THE AIRPORT MAINTENANCE DEPARTMENT.
5. EROSION AND SEDIMENT CONTROL DEVICES MUST BE IN PLACE PRIOR TO THE START OF GRADING OPERATIONS.
6. ACTIVE PAVEMENTS MUST BE KEPT CLEAR AND FREE OF DEBRIS AT ALL TIMES. THE CONTRACTOR MUST HAVE A VACUUM SWEEPER AND OPERATOR READY AT ALL TIMES DURING WORK ADJACENT TO ACTIVE AIRFIELD PAVEMENTS.
7. THE CONTRACTOR MUST COMPLY WITH ALL APPLICABLE FAA ADVISORY CIRCULARS AND FEDERAL AVIATION REGULATIONS. PAY PARTICULAR ATTENTION TO FAA AC 150/5370-2G.
8. MAXIMUM EQUIPMENT HEIGHTS FOR ACTIVE WORK AREAS AND STAGING AREA ARE LIMITED BY FAR PART 77 AND OBSTACLE FREE ZONE (OFZ) SURFACES IDENTIFIED ON THIS SHEET.
9. DUST ON CONSTRUCTION PROJECTS IS A MAJOR PROBLEM. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DUST CONTROL ON-SITE AT ALL TIMES ON A CONTINUOUS BASIS. THE CONTRACTOR MUST SUBMIT A DETAILED DUST CONTROL PLAN TO THE RPR FOR APPROVAL PRIOR TO BEGINNING WORK. THE COST FOR THIS WORK SHALL BE INCLUDED UNDER VARIOUS CONTRACT ITEMS.
10. RED LIGHTS SHALL MEET THE LUMINANCE REQUIREMENTS OF THE FAA.
11. WHEN INSTALLING SECURITY FENCE, OR NEW AIRFIELD GATES, THE CONTRACTOR MUST AT ALL TIMES PROVIDE SECURITY WHERE FENCE IS REMOVED. THE NEW FENCE MUST BE IN-PLACE BEFORE THE EXISTING FENCE IS REMOVED.



FAR PART 77 NOTES:

1. THE OFZ SHALL GOVERN EQUIPMENT CLEARANCE DURING CONSTRUCTION ADJACENT TO AN ACTIVE RUNWAY. UNDER NO CIRCUMSTANCES SHALL ANY MEN OR EQUIPMENT PENETRATE THESE SURFACES UNLESS PRIOR ARRANGEMENTS HAVE BEEN MADE WITH THE RPR, HGR, AND THE TOWER.
2. THE FAR PART 77 SURFACES (PRIMARY AND TRANSITIONAL) GOVERN STOCKPILE AND PARKED EQUIPMENT. UNDER NO CIRCUMSTANCES SHALL PARKED EQUIPMENT, STOCKPILES, OR OTHER ITEMS PENETRATE THESE SURFACES DURING CONSTRUCTION ADJACENT TO AN ACTIVE RUNWAY.
3. THE FAR PART 77 APPROACH SURFACE GOVERNS STOCKPILES, CONSTRUCTION EQUIPMENT AND OTHER OBJECTS BEYOND THE RUNWAY END. UNDER NO CIRCUMSTANCES SHALL THESE ITEMS PENETRATE THE APPROACH SLOPES.

TYPICAL PROFILE FAR PART 77  
IMAGINARY SURFACES

3

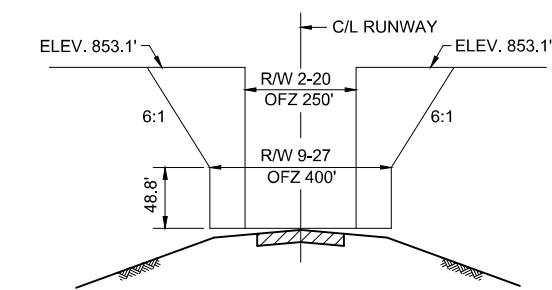
GC500

SCALE: NTS

SUPERVISION:

THE PRIME CONTRACTOR SHALL HAVE THE PROJECT SUPERINTENDENT OR SOMEONE IN RESPONSIBLE CHARGE BE PRESENT AT ALL TIMES ON THE PROJECT SITE. THIS PERSON SHALL BE FAMILIAR WITH ALL TYPES OF CONSTRUCTION BEING PERFORMED AND SHALL BE THE SAME PERSON EACH DAY THROUGHOUT THE PROJECT. THE SUPERINTENDENT SHALL HAVE THE RESPONSIBILITY OF COORDINATING EACH DAY'S WORK WITH THE RPR AND AIRPORT PERSONNEL AND SHALL HAVE AUTHORITY TO SCHEDULE AND ADJUST ALL WORKERS, PRIME AND SUB CONTRACTORS, TO ACCOMMODATE AIRPORT OPERATION AS DIRECTED BY THE RPR AND/OR AIRPORT PERSONNEL.

ALL WORK MUST BE PERFORMED WITH THE RPR AND/OR AIRPORT PERSONNEL ON THE SITE. WORK DURING EVENINGS AND WEEKENDS MUST BE COORDINATED WITH THE RPR AND AIRPORT PERSONNEL AT LEAST 7 DAYS IN ADVANCE, EXCLUDING EMERGENCIES AND INCLEMENT WEATHER CONDITIONS. ALL PERSONNEL SHALL CLEAR THE CONSTRUCTION AREA ONCE WORK HAS STOPPED FOR THE DAY. ALL MECHANICS NEEDING ACCESS TO THE AIR OPERATIONS AREA DURING EVENINGS AND WEEKENDS TO WORK ON CONSTRUCTION EQUIPMENT SHALL HAVE A PICTURED IDENTIFICATION BADGE, RECEIVE DRIVING PRIVILEGES, AND HAVE THEIR VEHICLES IDENTIFIED WITH THE CONTRACTOR NAME OR MAGNETIC PLACARD ISSUED BY THE AIRPORT OPERATIONS.

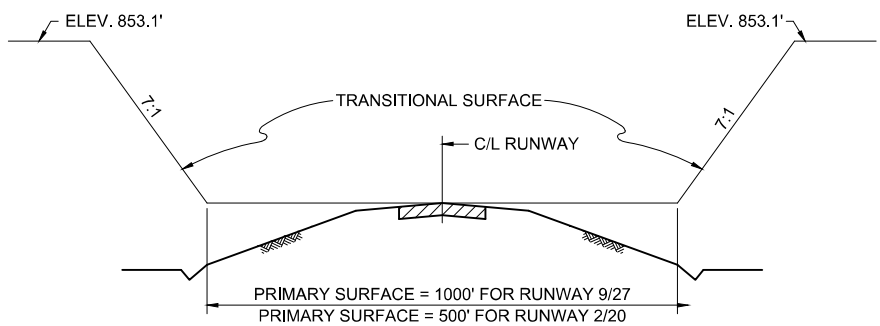


1

GC500

TYPICAL SECTION OBSTACLE FREE ZONE

SCALE: NTS

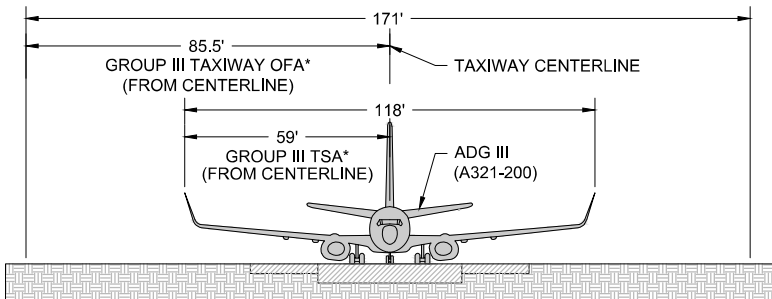


2

GC500

TYPICAL SECTION FAR PART 77  
IMAGINARY SURFACES

SCALE: NTS



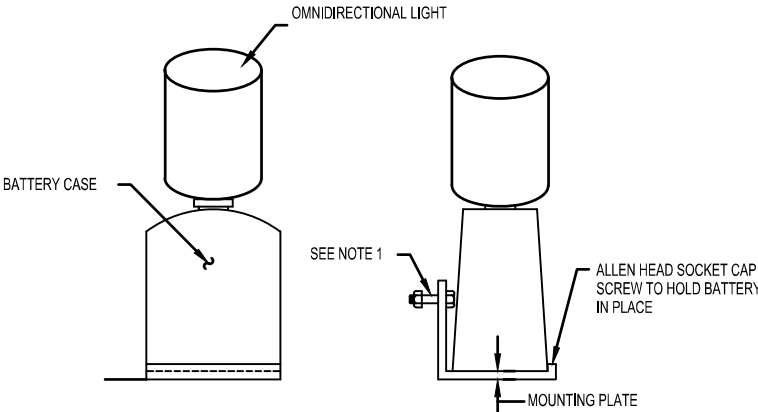
\*NO CONSTRUCTION MAY OCCUR WITHIN THE TAXIWAY OBJECT FREE AREA WHILE THE TAXIWAY IS OPEN FOR AIRCRAFT OPERATIONS. SEE FAA AC 150/5370-2G, SECTION 2.22.4 FOR ADDITIONAL RESTRICTIONS.

GROUP III TAXIWAY SAFETY AREA  
(TSA) - TAXIWAY OBJECT FREE AREA  
(TOFA) - TANGENT SECTION

4

GC500

SCALE: NTS



NOTES:

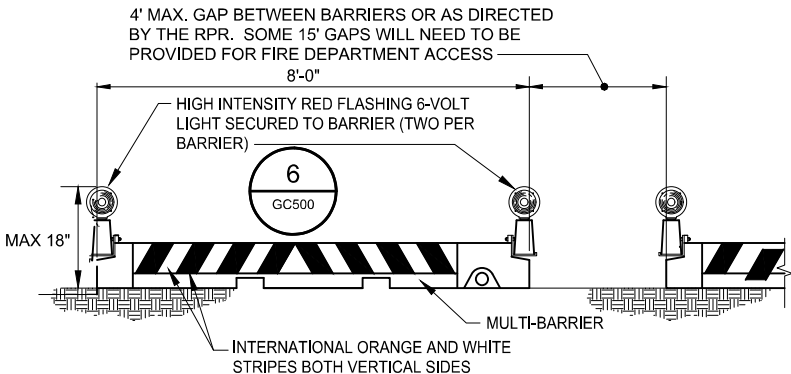
1. MOUNTING PER MANUFACTURER RECOMMENDATION TO WITHSTAND 80 MPH JET BLAST.

6

GC500

TEMPORARY BARRIER LIGHT DETAIL

SCALE: NTS



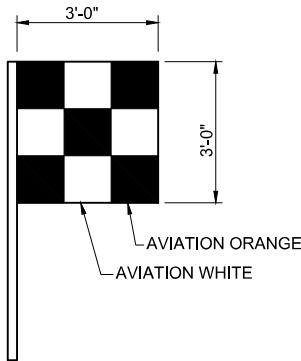
\* TIMBER BARRICADES MAY ALSO BE ACCEPTABLE

5

GC500

POLYETHYLENE CONSTRUCTION BARRIERS

SCALE: NTS



7

GC500

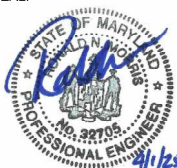
VEHICLE-EQUIPMENT FLAG

SCALE: NTS

CONSULTANT:



SEAL:



PROFESSIONAL  
CERTIFICATION:

"I HEREBY CERTIFY THAT THESE DOCUMENTS WERE PREPARED OR APPROVED BY ME, AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MARYLAND"

LICENSE NO. 32705

EXPIRATION DATE: 02/21/2026

DESIGNED:

B.J.D.

DRAWN:

J.A.A.

CHECKED:

V.J.D.

APPROVED:

R.N.M.

REVISION  
NO.

REVISION  
DATE

DESCRIPTIONS

BID DOCUMENTS



HAGERSTOWN  
REGIONAL AIRPORT  
Washington County, MD

PROJECT TITLE:

ARFF BUILDING DEMOLITION;  
AOA FENCE/ACCESS GATE REALIGNMENT

SHEET TITLE:

CONSTRUCTION SAFETY PHASING  
NOTES AND DETAILS

SCALE:

N.A.

DATE:

APRIL 2025

FAA AIP No.: 3240019071-2024  
Bid No.: PUR-1744  
Grading Permit No.: SGP-24-040

SHEET NO.:

GC500

12 OF 48

**APPENDIX C. SAMPLE CONTRACTORS SAFETY PLAN COMPLIANCE DOCUMENT (SPCD)**

**PAGE INTENTIONALLY LEFT BLANK**

---

---

## SAFETY PLAN COMPLIANCE DOCUMENT (SPCD)

Project Location: Hagerstown Regional Airport

Project Name: ARFF Building Demolition; AOA Fence/Access Gate Realignment

### General Statement:

The Construction Safety and Phasing Plan (CSPP), has been prepared in accordance with FAA Advisory Circular 150/5370-2G, *Operational Safety on Airports During Construction and the requirements of the Airport Owner*. The CSPP has been submitted to the FAA for review and comment. Any comments from the FAA which were received prior to bid opening have been incorporated into the CSPP.

In the event that the FAA transmits comments which require that the CSPP be revised after bid opening, I understand that I am obligated to abide by the conditions and statements contained in the revised CSPP. I further understand that I will be given the opportunity to evaluate the revised CSPP as it relates to my contract and request appropriate compensation in accordance with the provisions of the contract.

### Supplemental Information:

Where the CSPP covers a subject and no additional information is needed, the statement below reads, "No supplemental information required". Where additional information is required by the Contractor, the information shall be provided in the spaces below.

The section numbers below correspond with the section numbers in the CSPP.

#### 3.1 Coordination

**Statement:** [Explain how you will distribute information and details of meetings to employees and subcontractors.]

---

---

---

---

#### 3.2 Phasing

**Statement:** [List the number of days each Work Area will take. State the time day work will start and finish for each work area.]

---

---

---

### 3.3 Areas and Operations affected by the construction activity

**Statement:** Information is provided in the CSPP. No supplemental information is required.

### 3.4 Navigational Aid (NAVAID) Protection

**Statement:** Information is provided in the CSPP. No supplemental information is required.

### 3.5 Contractor Access

**Security Statement:** [Explain how you will maintain integrity of the airport security fence at the access gate, e.g.: Gate guards, closed and locked gates, temporary fencing, etc.]

---

---

---

---

**Training Statement:** [List individuals who will receive driver training (for certificated airports and as requested.)]

---

---

---

---

**Communication Statement:** [Identify types of radios, if any, you will use to communicate with drivers and personnel. Identify who will be monitoring radios. Identify a contact person and phone number if ATCT cannot reach the contractor's designated person by radio.]

---

---

---

---

**Escort Statement:** [Identify who will escort material delivery vehicles.]

---

---

---

---

---

### 3.6 Wildlife Management

**Statement:** [Identify who will be monitoring wildlife in the construction area. Identify who will be monitoring wildlife at the construction gate.]

---

---

---

---

### 3.7 Foreign Object Debris (FOD) Management

**Statement:** [Identify who will be preparing a FOD Management Plan. (Plan must be approved prior to the start of construction activities.)]

---

---

### 3.8 Hazardous Material (HAZMAT) Management

**Statement:** [Identify who will be preparing a Spill Prevention Plan. (Plan must be approved prior to the start of construction activities.)]

---

---

---

---

### 3.9 Notification of Construction Activities. Provide the following:

**Key Personnel Statement:** [Identify your key personnel points of contact with phone numbers.]

---

---

---

---

**Emergency Contacts Statement:** [Identify your emergency contacts with 24 hour phone numbers.]

---

---

---

---

**Equipment Statement:** [Part 77: Identify equipment you will be using that is taller than 25 feet, including on-site batch plants. Identify the maximum height it will be extended to during construction for each Work Area and the expected duration. Identify when during the day it will be used.]

---

---

---

---

### 3.10 Inspection Requirements.

**Statement:** [Identify the person who will be responsible for daily inspections to ensure conformance with the CSPP. Describe additional inspections you will employ, if any, to ensure conformance.]

---

---

---

---

### 3.11 Underground Utilities.

**Statement:** [Discuss proposed methods of identifying and protecting underground utilities.]

---

---

---

---

### 3.12 Penalties

**Statement:** Information is provided in the CSPP. No supplemental information is required.

### 3.13 Special Conditions.

**Statement:** [Identify who will be responsible for moving equipment and personnel from the work area and vacating the area in the event of a special condition listed in the CSPP.]

---

---

---

---

### 3.14 Runway and Taxiway Visual Aids. Including marking, lighting, signs, and visual NAVAIDs.

**Statement:** Information is provided in the CSPP. No supplemental information is required.

---

**3.15 Marking and Signs for Access Routes.** Discuss proposed methods of demarcating access routes for vehicle drivers.

**Statement:** Information is provided in the CSPP. No supplemental information is required.

**3.16 Hazard Marking and Lighting.**

**Statement:** [Identify who will be responsible for maintaining hazard marking and lighting. Include a 24 hour phone number.]

---

---

---

---

**3.17 Work Zone Lighting for Nighttime Construction.**

**Statement:** [Identify who will be responsible for maintaining work zone lighting for nighttime construction. Include a 24 hour phone number.]

---

---

---

---

**3.18 Protection of Areas, Zones, and Surfaces.** Include object free areas, obstacle free zones, approach/departure surfaces and safety areas as required. Discuss proposed methods of identifying, demarcating, and protecting airport surfaces including:

Equipment and methods for maintaining Taxiway/Taxilane Safety Area standards.

**Statement:** Information is provided in the CSPP. No supplemental information is required.

Equipment and methods for separation of construction operations from aircraft operations, including details of barricades.

**Statement:** Information is provided in the CSPP. No supplemental information is required.

**3.19 Other Limits of Construction.**

Other limitations are identified in the CSPP and do not require an entry in this document.

**The following shall complement the safety plan compliance document:**

1. Contractor shall have copies of the CSPP and SPCD available at all times for reference by the Owner and its representatives, and by subcontractors and Contractor employees.

Location(s) of CSPP and SPCD: \_\_\_\_\_

2. Provide a point of contact that will coordinate an immediate response to correct any construction-related activity that may adversely affect the operational safety of the airport. Project will require 24-hour coverage.

Point of Contact: \_\_\_\_\_ Phone: \_\_\_\_\_

3. Contractor's on-site employees responsible for monitoring compliance with the CSPP and SPCD whenever active construction is taking place.

Contact Person: \_\_\_\_\_ Phone: \_\_\_\_\_

Contact Person: \_\_\_\_\_ Phone: \_\_\_\_\_

4. The Contractor shall list all proposed deviations or modifications to the CSPP. For each alteration the Contractor shall provide:

- a. The reason why the alteration is desired.
- b. Provide sufficient narrative description and/or pictorial descriptions of the proposed change so a complete review of the proposal can be made.
- c. If no alterations are to be made to the CSPP, clearly state; **"No alterations to the CSPP are proposed."**

5. The Contractor shall describe the frequency of inspections to ensure construction personnel comply with the CSPP and SPCD and that there are no altered construction activities that could create potential safety hazards. Inspections shall ensure that all proper safety devices, signs, demarcations etc. are in place and in proper working order in accordance with the approved CSPP & SPCD. A Construction Project Daily Safety Inspection Checklist is attached to aid in making a thorough inspection.

---

---

---

---

---

6. Provide a description and schedule for any anticipated supplemental submittal through the airport operator of Form 7460-1 for the purpose of conducting an aeronautical study of Contractor equipment such as tall equipment (cranes, concrete pumps, and other equipment), stockpiles, and haul routes when different from cases previously filed as part of the CSPP.

---

---

---

---

---

7. Provide a description of Contractor's plan to ensure that construction personnel are familiar with the safety procedures and regulations on the airport, the CSPP, and the SPCD.

---

---

---

---

---

**SPCD Amendment:**

The SPCD shall be amended any time there is a construction practice proposed by the contractor that does not conform to the CSPP and SPCD and may impact the airport's operational safety. This will require a revision to the CSPP and SPCD and re-coordination with the airport operator and the FAA in advance.

**Certification:**

I certify that we understand the operational safety requirements of the CSPP and assert that we will not deviate from the approved CSPP and SPCD unless written approval is granted by the airport operator.

Print Name: \_\_\_\_\_ Title: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**PAGE INTENTIONALLY LEFT BLANK**

**APPENDIX D. CONSTRUCTION PROJECT DAILY SAFETY INSPECTION CHECKLIST**

PAGE INTENTIONALLY LEFT BLANK

**APPENDIX D. CONSTRUCTION PROJECT DAILY SAFETY INSPECTION CHECKLIST**

The situations identified below are potentially hazardous conditions that may occur during airport construction projects. Safety area encroachments, unauthorized and improper ground vehicle operations, and unmarked or uncovered holes and trenches near aircraft operating surfaces pose the most prevalent threats to airport operational safety during airport construction projects. The list below is one tool that the airport operator or contractor may use to aid in identifying and correcting potentially hazardous conditions. It should be customized as appropriate for each project including information such as the date, time and name of the person conducting the inspection.

**Table D-1. Potentially Hazardous Conditions**

<b>Item</b>	<b>Action Required (Describe)</b>	<b>No Action Required (Check)</b>
Excavation adjacent to runways, taxiways, and aprons improperly backfilled.		
Mounds of earth, construction materials, temporary structures, and other obstacles near any open runway, taxiway, or taxi lane; in the related Object Free area and aircraft approach or departure areas/zones; or obstructing any sign or marking.		
Runway resurfacing projects resulting in lips exceeding 3 inch (7.6 cm) from pavement edges and ends.		
Heavy equipment (stationary or mobile) operating or idle near AOA, in runway approaches and departures areas, or in OFZ.		
Equipment or material near NAVAIDs that may degrade or impair radiated signals and/or the monitoring of navigation and visual aids. Unauthorized or improper vehicle operations in localizer or glide slope critical areas, resulting in electronic interference and/or facility shutdown.		
Tall and especially relatively low visibility units (that is, equipment with slim profiles) — cranes, drills, and similar objects — located in critical areas, such as OFZ and		

<b>Item</b>	<b>Action Required (Describe)</b>	<b>No Action Required (Check)</b>
approach zones.		
Improperly positioned or malfunctioning lights or unlighted airport hazards, such as holes or excavations, on any apron, open taxiway, or open taxi lane or in a related safety, approach, or departure area.		
Obstacles, loose pavement, trash, and other debris on or near AOA. Construction debris (gravel, sand, mud, paving materials) on airport pavements may result in aircraft propeller, turbine engine, or tire damage. Also, loose materials may blow about, potentially causing personal injury or equipment damage.		
Inappropriate or poorly maintained fencing during construction intended to deter human and animal intrusions into the AOA. Fencing and other markings that are inadequate to separate construction areas from open AOA create aviation hazards.		
Improper or inadequate marking or lighting of runways (especially thresholds that have been displaced or runways that have been closed) and taxiways that could cause pilot confusion and provide a potential for a runway incursion. Inadequate or improper methods of marking, barricading, and lighting of temporarily closed portions of AOA create aviation hazards.		
Wildlife attractants — such as trash (food scraps not collected from construction personnel activity), grass seeds, tall grass, or standing water — on or near airports.		
Obliterated or faded temporary markings on active operational areas.		
Misleading or malfunctioning obstruction lights. Unlighted or unmarked obstructions in the approach to any open runway pose aviation hazards.		

<b>Item</b>	<b>Action Required (Describe)</b>	<b>No Action Required (Check)</b>
Failure to issue, update, or cancel NOTAMs about airport or runway closures or other construction related airport conditions.		
Failure to mark and identify utilities or power cables. Damage to utilities and power cables during construction activity can result in the loss of runway / taxiway lighting; loss of navigation, visual, or approach aids; disruption of weather reporting services; and/or loss of communications.		
Restrictions on ARFF access from fire stations to the runway / taxiway system or airport buildings.		
Lack of radio communications with construction vehicles in airport movement areas.		
Objects, regardless of whether they are marked or flagged, or activities anywhere on or near an airport that could be distracting, confusing, or alarming to pilots during aircraft operations.		
Water, snow, dirt, debris, or other contaminants that temporarily obscure or derogate the visibility of runway/taxiway marking, lighting, and pavement edges. Any condition or factor that obscures or diminishes the visibility of areas under construction.		
Spillage from vehicles (gasoline, diesel fuel, oil) on active pavement areas, such as runways, taxiways, aprons, and airport roadways.		
Failure to maintain drainage system integrity during construction (for example, no temporary drainage provided when working on a drainage system).		

<b>Item</b>	<b>Action Required (Describe)</b>	<b>No Action Required (Check)</b>
Failure to provide for proper electrical lockout and tagging procedures. At larger airports with multiple maintenance shifts/workers, construction contractors should make provisions for coordinating work on circuits.		
Failure to control dust. Consider limiting the amount of area from which the contractor is allowed to strip turf.		
Exposed wiring that creates an electrocution or fire ignition hazard. Identify and secure wiring, and place it in conduit or bury it.		
Site burning, which can cause possible obscuration.		
Construction work taking place outside of designated work areas and out of phase.		

## **APPENDIX B – SITE HEALTH AND SAFETY PLAN (HASP)**

**PAGE HAS BEEN INTENTIONALLY LEFT BLANK**

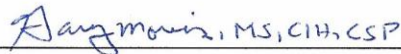
---

# SITE HEALTH AND SAFETY PLAN

## Hagerstown Regional Airport AOA Fence/Access Gate Realignment

18434 Showalter Road  
Hagerstown, Maryland 21742

May 13, 2024

  
\_\_\_\_\_  
Gary Morris, MS, CIH, CSP  
CIH #5386

Prepared by:



1311 Haubert Street  
Baltimore, MD 21230  
p 410.659.9971



## TABLE OF CONTENTS

1.0	INTRODUCTION .....	1
1.1.	Project Description.....	2
2.0	ROLES AND RESPONSIBILITIES.....	2
2.1.	Project Manager (PM).....	2
2.2.	Health and Safety Officer (HSO) .....	3
2.3.	General Work Rules .....	4
2.4.	Workers.....	5
2.5.	Visitors .....	5
3.0	GENERAL SAFETY AND HEALTH PLAN .....	5
3.1.	Regulatory Requirements.....	5
3.2.	Safety and Health Training .....	6
3.2.1.	Project-Specific Health Orientation .....	6
3.2.2.	Toolbox Safety Meetings .....	6
3.2.3.	Training and Briefing Topics .....	7
3.2.4.	Equipment Operators.....	7
3.2.5.	Documentation .....	7
3.2.6.	Violating HASP Procedures .....	8
3.2.7.	Drug and Alcohol Abuse .....	8
4.0	HAZARD ANALYSIS AND CONTROL MEASURES .....	8
4.1.	Known or Anticipated Hazards .....	9
4.2.	Chlorinated Solvents Hazards .....	9
4.3.	Chromium .....	10
4.4.	Activity Specific Hazards .....	10
4.5.	Personal Protective Equipment .....	13
4.6.	Air Monitoring.....	14
5.0	SITE CONTROL .....	14
5.1.	Barricade and Traffic Control Program.....	15
6.0	DECONTAMINATION .....	16
7.0	PERSONAL HYGIENE .....	16
8.0	SLIPS, TRIPS AND FALLS .....	16
8.1.	Contributing Factors .....	17
8.2.	Behaviors That Lead To Falls.....	17
8.3.	Falls from Vehicles and Equipment.....	17
8.4.	Shoes and Boots .....	17
9.0	FIRE PREVENTION PROGRAM .....	18
9.1.	Hazard Determination and Communication .....	18
9.2.	Engineering Controls .....	18
9.3.	Administrative Controls.....	18
9.4.	General Fire Prevention Measures .....	18
9.5.	Fire Extinguishing Equipment.....	19



9.5.1.	Class A Fires .....	19
9.5.2.	Class B Fires .....	20
9.5.3.	Class C Fires.....	20
9.5.4.	Class D Fires.....	20
9.6.	Hot Work .....	21
10.0	INSECTS .....	21
10.1.	Wasps, Bees, Hornets and Yellow Jackets.....	21
10.2.	Spiders.....	22
11.0	SEVERE WEATHER PLAN.....	23
11.1.	Heat Related Illnesses.....	24
12.0	HAZARD COMMUNICATION.....	26
12.1.	Emergency Response/Spill Containment Plan .....	26
12.2.	Container Labeling.....	26
12.3.	Hazard Communication Training Program .....	27
13.0	EMERGENCY RESPONSE/PLANNING .....	27
13.1.	Emergency Telephone Numbers/Directions for Medical Treatment .....	27
14.0	INJURY AND ILLNESS REPORTING.....	28

## ATTACHMENTS

TAB 1: Site Map

TAB 2: HASP Acknowledgment Form



## 1.0 INTRODUCTION

The purpose of this project-specific Health and Safety Plan (HASP) is to define requirements and designate protocols to be followed during the excavation and installation of a new fence and demolition of the existing fence at a portion of the Hagerstown Regional Airport property located at 18434 Showalter Road in Hagerstown, Maryland. This HASP has been prepared due to the existence of potentially contaminated soil/groundwater associated with former aircraft manufacturing operations at the site. A site location map is included as TAB 1. The objective of this HASP is to prevent exposures of project personnel to chlorinated solvents and chromium that is contained in the groundwater. Chromium contamination is suspected to have originated from previous chromic acid plating operations and storage tanks.

This HASP presents various work practices and requirements for the protection of workers performing work activities during disturbance of the anticipated contaminated soils/groundwater and for protection of the surrounding area from potential airborne hazards as a result of the work. These areas of work are defined as Exclusion Zones and shall be understood as locations where soil disturbance is being performed, where spoils are exposed and coincide with areas where sub-strata soil contamination is present or suspected of being present and the potential for occupational exposure exists in excess of known regulatory limits. In conjunction with the Exclusion Zone, a Contamination Reduction Zone, and a Support Zone will be established.

This HASP also provides emergency response procedures. This HASP was prepared in accordance with applicable Occupational Safety and Health Administration (OSHA) standards, including 29 CFR 1910.1018.

Prior to conducting fieldwork, all project personnel must review this HASP and sign the HASP Acknowledgment Form (TAB 2) documenting agreement to comply with these requirements. The Acknowledgment Form will be maintained at the site for inspection and additional copies will be kept in the construction trailer. All personnel at the site, including subcontractors and visitors, shall be informed of the emergency response procedures and any known potential health or safety hazards during the targeted tasks.

The requirements set forth in this HASP are based on standard safety and health precautions applicable to excavation/disturbance of contaminated soils. This HASP will be implemented by the General Contractor and a designated Health and Safety Officer (HSO) employed by the General Contractor with coordination with the various subcontractors. The HSO shall coordinate with Project Managers, as necessary, to identify when additional requirements are necessary and ensure that this HASP is supplemented and expanded as needs dictate.

The HSO will monitor conditions and potential exposures to the extent described and will oversee implementation of this HASP. This HASP addresses potential hazards and work practices associated with excavating soil for the installation of fence posts. Although HASP attempts to address all matters relating to general safety compliance, all applicable regulations apply and are the sole responsibility of each contractor/subcontractor working on this project.



## 1.1. Project Description

The Project Site is located at 18450 Showalter Road in Hagerstown, Maryland. The location of the new fence installation is on the approximate 2.74-acre parcel that contains the former Aircraft Rescue and Fire Fighting (ARFF) building. The subject property is situated at the northwest corner of the intersection of Showalter Road and Crayton Boulevard north of the City of Hagerstown, Maryland. The site is further bounded by the Hagerstown Regional Airport grounds and tarmac runways to the west, northwest, north, and northeast, and by the Top Flight Airpark to the east. The Site was formerly part of the property that housed a Fairchild's Industries, Inc. aircraft manufacturing facility from at least 1943 until 1983. The Site Property was recently subdivided from the Top Flight Airpark property and sold to Washington County.

A Phase I Environmental Assessment conducted by AEI Consultants in 2017 indicated chlorinated solvents and chromium are present in the Site groundwater at concentrations above regulatory limits. The presence of chlorinated solvents and chromium in the groundwater was first identified during groundwater sampling conducted in the 1970's.

The activities covered by this HASP are those tasks in which disturbance of the soil are expected, potentially resulting in exposure to chlorinated solvents and chromium via skin contact with soil/groundwater and inhalation of vapors. These tasks consist of the following:

- ❖ Digging holes for new fence posts with an auger attached to a piece of equipment such as an excavator.
- ❖ Demolition of the existing fence.
- ❖ Backfilling old fence holes with stockpiled soil.

This HASP is designed to control exposure of workers involved with the disturbance of the soil to prevent exposure to chlorinated solvents and chromium in the groundwater. Stockpiled soils shall be placed on ground-covered plastic and covered at the end of the day with another layer of plastic.

## 2.0 ROLES AND RESPONSIBILITIES

All project personnel will review the HASP prior to field operations and sign the HASP Acknowledgment Form (TAB 2) indicating that they have reviewed, understand, and will comply with the plan, and that they have the requisite training, medical monitoring, skills and abilities required to perform the job duties safely.

Key project staff personnel are listed below, including duties and responsibilities. Airport Design Consultants, Inc. (ADCI) and Arc Environmental must approve any modification to the HASP.

### 2.1. Project Manager (PM)

The General Contractor shall assign a Project Manager (PM) to the project. The PM assumes responsibility for providing management of overall health, safety, and environmental concerns.



The PM will review subcontractor deliverables, and manage all resources, schedules, and budgets. The PM is responsible for overall coordination of the project and reporting contractor man-hours, if required. Specific responsibilities as PM include:

- Reviewing and understanding the Project HASP;
- Coordinating all aspects of on-site activities, providing overall direction, maintaining health and safety activities, and maintaining contract specifications;
- Coordinating with the subcontractors' designated Project Manager;
- Providing overall supervisory control for all health and safety protocols in effect for the project;
- Reviewing reports of incidents related to project activities;
- Directing construction activities; and
- Assigning a HSO who will assume the respective responsibilities and enforce all provisions of the HASP.

## **2.2. Health and Safety Officer (HSO)**

The General Contractor shall assign a HSO for this project. The HSO is responsible for day-to-day oversight of health and safety practices of personnel during targeted field activities and compliance with the HASP. The HSO shall be on site at all times throughout the project. If deviations from this HASP become necessary due to work conditions or operations, the proposed changes must be acceptable to the HSO before implementation at the job site. Specific responsibilities of the onboard HSO include:

- Review and understand the HASP.
- Implementing all on-site safety monitoring procedures and operations included in this HASP.
- Presenting initial health and safety briefings to all site workers and visitors.
- Conduct daily and weekly safety inspections.
- Leading weekly health and safety tailgate awareness meetings throughout the project.
- Ensuring that proper response actions are followed.
- Authorizing the upgrading or downgrading of the levels of personal protection based on site observations and monitoring in accordance with predetermined and approved criteria.
- Determining and posting locations and routes to medical facilities (including poison control centers) and arranging emergency transportation to medical facilities (as required).
- Notifying (as required) local public emergency officers (i.e., police and fire departments) of the nature of the team's operations and making emergency telephone numbers available to all site workers.



- Ensuring that at least one member of the project team is available to stay behind and notify emergency services if the on-site supervisor must enter an area of maximum hazard, or entering this area only after notifying emergency services (police department).
- Observing workers for symptoms of on-site exposure or stress.
- Monitoring compliance with the HASP and assisting in enforcement measures.
- Supervising decontamination procedures on personnel, tools, and equipment to ensure that the procedures are followed and effective.
- Preventing site entry of unauthorized personnel or coordinating with local law enforcement agencies or state authorities to limit site access.
- Coordinating site activities so that they may be performed in an efficient and safe manner consistent with the HASP.
- Ensuring ready access and availability of all safety equipment.
- Preparing Injury/Exposure Incident Report Form, as necessary; and
- Arranging for the availability of on-site emergency medical care and first aid, as necessary.

The HSO has the authority and responsibility to stop any operation that threatens the health or safety of the team or surrounding populace or causes significant adverse impact to the environment.

### **2.3. General Work Rules**

- ❖ All project personnel must attend daily or weekly Tailgate Safety Meetings.
- ❖ Any individual taking prescribed drugs shall inform the project HSO of the type of medication. The HSO will review the matter with a qualified medical consultant, who will decide if the employee can safely work while taking the medication.
- ❖ The personal protective equipment specified by an HSO and in the HASP shall be worn by all site personnel. This includes hard hats, steel-toe safety shoes, and safety glasses, which must be worn at all times in active work areas. Hearing protection is required when working around equipment that produces sound pressure levels at or above 85 decibels.
- ❖ All personnel must sign the work log used for the project.
- ❖ Eating, drinking, chewing tobacco or gum, smoking, and any other practice that may increase the possibility of hand-to-mouth contact is prohibited in the work area (exceptions may be permitted by the HSO to allow fluid intake during heat stress conditions.)
- ❖ All signs and demarcations shall be followed. Such signs and demarcation shall not be removed except as authorized by the HSO.
- ❖ All personnel must follow hot work permits as issued (if necessary for welding equipment).
- ❖ Hand and portable power tools must be inspected prior to use following the manufacturer's guidelines. Defective tools and equipment shall not be used.



- ❖ Ground fault circuit interrupters shall be used for cord and plug equipment used outdoors or in damp locations. Electrical cords shall be kept out of walkways and puddles unless protected and rated for the service.
- ❖ Horseplay of any kind is prohibited.
- ❖ Possession or use of alcoholic beverages, controlled substances, or firearms on any site is forbidden.
- ❖ All incidents, no matter how minor, must be reported immediately to the HSO or to a supervisor.
- ❖ All personnel shall be familiar with the Emergency Response Plan.

## **2.4. Workers**

All site workers are responsible for understanding and complying with the requirements of this HASP. The responsibilities of site workers include:

- Review and understand this HASP.
- Attending tailgate safety meetings;
- Obeying safety and health related orders from the HSO.
- Performing work activities in a safe manner in accordance with this HASP and good work practices; and
- Reporting any unsafe conditions to the HSO.

## **2.5. Visitors**

All visitors, including government representatives, are required to comply with all provisions of this HASP. The responsibilities of visitors include:

- Reviewing and understanding this HASP.
- Alerting the HSO of their presence.
- Complying with all aspects of this HASP; and
- Obeying safety and health-related orders from the HSO.

## **3.0 GENERAL SAFETY AND HEALTH PLAN**

### **3.1. Regulatory Requirements**

OSHA standards 29 CFR 1910 (General Industry) and 1926 (Construction) apply to work performed under this HASP. The General Contractor shall ensure that a copy of relevant sections of these regulations is available upon request. Each contractor and subcontractor working onsite is responsible for ensuring compliance with applicable regulations.



### **3.2. Safety and Health Training**

The General Contractor shall establish and implement programs for the education and training of employees, subcontractors, visitors, and vendors in the recognition, avoidance, and prevention of unsafe work practices and conditions during the project. Employee training shall be task specific. It will be the responsibility of the PM with guidance from this HASP and the HSO to identify potential training needs and timetables so that these requirements are met. Documentation of training shall be provided to the HSO and be maintained in the project files.

#### **3.2.1. Project-Specific Health Orientation**

The HSO will train new employees in job safety prior to or on the first day of the project. This training will include an interview to ensure that the employee has the necessary qualifications for the job task. The recognition and avoidance of unsafe conditions and practices, OSHA standards relating to the job and Project Safety Requirements will also be included in the employees' initial training. The new employee is to acknowledge that he/she has reviewed and discussed the applicable Policies, Procedures and Programs by signing the attached HASP Acknowledgment Form.

#### **3.2.2. Tailgate Safety Meetings**

Tailgate safety meetings are an effective training aid and an essential means of increasing an employee's hazard awareness and improving job performance. Tailgate safety meetings will be conducted daily by the HSO or their designee. The daily Tailgate Safety Meeting shall include, as a minimum, the following:

- ✓ Review of all Safety Bulletins and other important topics that relate to the work.
- ✓ Instructions in the safe and efficient planning and performance of work.
- ✓ Review of project accidents, injuries, illnesses, near misses, hazards, and unsafe acts; and
- ✓ Discuss other suggestions and comments relating to safety.

Meeting minutes will be taken at Tailgate Safety Meetings and shall contain the following:

- ✓ Name of project and date.
- ✓ Name of person conducting the meeting.
- ✓ Name of all personnel in attendance.
- ✓ Subjects discussed; and
- ✓ Safety comments and suggestions from employees.

All project employees will attend the Tailgate Safety Meetings. Subcontractors are also responsible for assuring that their subcontractors also comply with safety meeting requirements.



The subject material shall be pertinent to the work being performed or to be performed as part of the project work.

### **3.2.3. Training and Briefing Topics**

Project employees will receive training/briefing by the HSO via Tailgate safety meetings or similar methods:

- ❖ Hazard Communication, with specific attention to chlorinated solvent and chromium hazards and hazard control
- ❖ Heat Stress Awareness
- ❖ Task-Specific Hazards and Safe Work Practices
- ❖ Personal protective equipment selection, care, and use
- ❖ Site Security
- ❖ Fire Extinguishers
- ❖ Decontamination procedures for personnel, their personal protective equipment and other equipment used on the project.

Refresher training shall be conducted as necessary for clarification or reiteration as determined by the HSO whenever new hazards are recognized and if addenda are added to this HASP.

Project-specific training will include information needed to ensure that the personnel are able to respond effectively to emergencies. This segment of the training will include a description of the communications systems to be used and the procedures for responding to fires and other emergencies. Briefings will be provided prior to site entry and as required, each morning before work begins and after each day's field activities have been completed. The HSO will document topics addressed in these briefings and those in attendance. The HSO will hold and document supervisory safety meetings to assess work performance.

### **3.2.4. Equipment Operators**

All operators of equipment must be qualified and experienced. Equipment operators can demonstrate qualifications through specific training, experience, field demonstration or a combination of all. These qualifications must be presented to the HSO or PM. Only those operators qualified to operate a particular type of machinery may operate that type of machinery.

### **3.2.5. Documentation**

For each day that health and safety monitoring is performed, daily reports will be prepared which record air monitoring results, daily activities, and health and safety action items. Reports will be submitted to the appropriate personnel as necessary. Personal and environmental monitoring will be made part of the permanent project record. All safety inspections will be conducted by the HSO as needed.



Training records for personnel shall be made available for inspection by the HSO prior to job start. Also, subcontractors are required to make training records available for inspection, as required.

### **3.2.6. Violating HASP Procedures**

The major purpose of any disciplinary action is to correct the problem, prevent recurrence, and either prepare the employee for satisfactory service in the future or terminate the employee for conduct that will not be tolerated in the workplace. The General Contractor shall have the right to remove any individual who violates safety practices. Disciplinary measures are at the discretion of the HSO and will be commensurate with the severity of the infraction. It is the responsibility of everyone to understand and comply with safety procedures and request clarification as needed. Supervisors carry additional oversight and enforcement responsibilities and, consequently, disciplinary measures will be more severe. The following guidelines apply for minor infractions:

- ✓ First infraction: Verbal warning with no further action if individual corrects infraction immediately and acknowledges the infraction.
- ✓ Second infraction: Written warning.
- ✓ Third infraction: Individual banned from the Site.

For serious or willful negligent acts, safety violations will result in temporary or permanent banishment from the work site.

### **3.2.7. Drug and Alcohol Abuse**

Alcohol and drug (non-prescriptive) use is strictly prohibited. Any employee found with possession or under the influence of drug or alcohol will be removed from the Site and disciplinary actions will be enforced.

## **4.0 HAZARD ANALYSIS AND CONTROL MEASURES**

The current known and potential environmental hazards associated with digging of the new fence posts and removal of the existing fencing at the Project Site are chlorinated solvents and chromium, which are associated with former airplane manufacturing operations. Access to below grade materials may potentially expose workers to these contaminants.

Safety measures and equipment operational parameters are to be in accordance with OSHA regulations. A copy of each contractor's applicable safety plans and programs must be available at the Site and a copy provided for reference. Submission of the contractor's work plan along with their applicable safety plans and programs is a requirement.

Note that it is each contractor's responsibility for compliance with regulatory requirements and to perform work in a safe and responsible manner. Submission of contractor plans and programs shall not constitute a review or approval of such plans and programs.



General physical hazards associated with operating and working in the vicinity of heavy equipment will be present at the site (e.g. excavator). These hazards will be minimized by allowing only trained, qualified, and licensed personnel to operate the heavy machinery. Underground utility hazards will also be present at the site. These hazards will be minimized by contacting **Miss Utility Maryland (811)** to identify underground product, electrical, natural gas and sewer lines etc. prior to the beginning of construction. In the event that previously unidentified underground utilities or structures are discovered, work will be stopped immediately until proper identification can be made. Safe work practices in compliance with OSHA standards and this document will be used at all times.

Minimum levels of personal protective equipment (PPE) for the tasks covered by this project consist of safety glasses, hard hats, steel-toe shoes, long pants, and long-sleeve shirts. Additional PPE will be required based on task-specific hazards. Respiratory protection is not anticipated for this project. If required, affected employees shall be entered into the employer's respiratory protection program, to include medical qualifications, training and fit testing.

A detailed analysis of potential hazards associated with the post digging and existing fence removal is provided in the Activity Hazards Analysis (AHA). The AHA evaluates known or anticipated hazards associated with this project, as well as control measures as needed. This HASP will be revised to address additional hazards as they are identified. Work may be halted until the hazards are sufficiently controlled. If an unforeseen situation occurs, a specific plan based on that situation will be produced.

#### **4.1. Known or Anticipated Hazards**

There are a variety of hazards and conditions anticipated during the activities. Known or anticipated hazards or conditions for the field activities have been tabulated in the Activity Hazard Analysis included in the Tables provided in this section.

Specific hazards that may be encountered include:

- Biological hazards (and insects).
- Heat stress.
- Slips, trips, and falls.
- Digging.
- Struck by equipment.
- Exposure to chlorinated solvents and chromium.
- Exposure to noise (from excavator).

#### **4.2. Chlorinated Solvents Hazards**

As noted in the various investigation reports, chlorinated solvents and chromium are present in the groundwater at the Site. Exposure during the tasks covered in this HASP may occur from skin



contact with soils/groundwater and inhalation of vapors. Exposure to chlorinated solvents such as those present includes acute and chronic effects. Acute effects from vapor inhalation primarily consist of narcotic effects with some causing irritation of the eyes, nose, throat, and lungs. Chronic effects include liver, kidney, nervous system and other organ damage. Some chlorinated solvents (e.g. perchloroethylene) have been linked to the development of cancer. Vinyl chloride is considered a known occupational carcinogen (causes liver cancer). All chlorinated solvents can cause dermatitis (chapping, drying, rashes) on repeated contact with the skin.

### 4.3. Chromium

Elemental chromium is seldom found naturally in the environment. The oxidized states of chromium III and chromium VI are the most important forms of the chemical. Chromium III is an essential trace element in humans, but chronic exposure may be harmful. Chromium VI (hexavalent chromium) is the oxidized state of principal concern in occupational safety and health and the environment because of its extreme toxicity and designation as a human carcinogen.

### 4.4. Activity Specific Hazards

ACTIVITY HAZARD ANALYSIS – EXCAVATING SOIL			
MINIMUM PPE REQUIREMENTS: LEVEL D (Safety Glasses, Hard Hat, Steel-Toed Boots, Ear Plugs or Muffs)			
Principal Steps	Potential Safety/Health Hazards	Recommended Hazard Control Measures	Personal Protective Equipment
Access Site to Set Up Work Zones	✓ Struck by Excavator	<ul style="list-style-type: none"> <li>✓ Use a spotter.</li> <li>✓ Instruct site personnel to stay away from equipment operating area.</li> </ul>	N/A
	✓ Sun Exposure	<ul style="list-style-type: none"> <li>✓ Wear minimum SPF 15 when working outdoors, regardless of cloud cover.</li> <li>✓ Wear UVA/UVB protective safety glasses.</li> <li>✓ Limit exposure in direct sunlight if possible.</li> <li>✓ Drink plenty of fluids.</li> </ul>	N/A



ACTIVITY HAZARD ANALYSIS – EXCAVATING SOIL			
MINIMUM PPE REQUIREMENTS: LEVEL D (Safety Glasses, Hard Hat, Steel-Toed Boots, Ear Plugs or Muffs)			
Principal Steps	Potential Safety/Health Hazards	Recommended Hazard Control Measures	Personal Protective Equipment
Walking and Working	✓ Slips, Trips, Falls	<ul style="list-style-type: none"> <li>✓ Clear walkways, work areas of equipment, excavation overburden, debris, and other materials.</li> <li>✓ Be careful of wet surfaces and slippery deck conditions.</li> <li>✓ Mark, identify, or barricade obstructions.</li> </ul>	N/A
Digging Fence Posts	<ul style="list-style-type: none"> <li>✓ Contacting Utilities</li> <li>✓ Contacting overhead power lines</li> <li>✓ Noise Exposure</li> <li>✓ Bystander(s) struck by excavator/auger attachment</li> <li>✓ Projectiles</li> </ul>	<ul style="list-style-type: none"> <li>✓ Locate underground utilities and protect from damage.</li> <li>✓ Call Miss Utility Maryland (811).</li> <li>✓ Survey area and mark overhead lines as appropriate.</li> <li>✓ Instruct bystander employees to stay from excavator. Use as spotter if needed.</li> <li>✓ Inspect area for obstacles.</li> <li>✓ Ensure that bystanders stand clear of work area.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Hearing protection</li> <li>✓ Safety vest</li> <li>✓ Safety glasses</li> </ul>



ACTIVITY HAZARD ANALYSIS – HANDLING SOILS			
MINIMUM PPE REQUIREMENTS: LEVEL D (Safety Glasses, Hard Hat, Steel-Toed Boots, Ear Plugs or Muffs)			
Principal Steps	Potential Safety/Health Hazards	Recommended Hazard Control Measures	Personal Protective Equipment
Removing Excavated Soils and Backfilling Old Fence Posts With Excavated Soils	<ul style="list-style-type: none"> <li>✓ Skin Contact with Contaminated Soil/Groundwater</li> <li>✓ Struck by equipment</li> </ul>	<ul style="list-style-type: none"> <li>✓ Place plastic on ground and cover stockpiled soil at the end of day with plastic.</li> <li>✓ Instruct bystander employees to stay from front-end loader/skid steer/dump truck. Use as spotter if needed.</li> </ul>	Level D PPE, nitrile gloves and protective clothing

ACTIVITY HAZARD ANALYSIS – EQUIPMENT DECONTAMINATION			
MINIMUM PPE REQUIREMENTS: LEVEL D (Safety Glasses, Hard Hat, Steel-Toed Boots, Ear Plugs or Muffs)			
Principal Steps	Potential Safety/Health Hazards	Recommended Hazard Control Measures	Personal Protective Equipment
Decontamination	<ul style="list-style-type: none"> <li>✓ Skin Contact with Contaminated Soil/Water</li> </ul>	<ul style="list-style-type: none"> <li>✓ Minimize contact with soil/ground water.</li> </ul>	Level D PPE, nitrile gloves and protective clothing
	<ul style="list-style-type: none"> <li>✓ Pressurized Water</li> </ul>	<ul style="list-style-type: none"> <li>✓ Use safe operating procedures when working with pressure washer.</li> <li>✓ Maintain control of pressure washer.</li> </ul>	Level D PPE, nitrile gloves, face shield and protective clothing
	<ul style="list-style-type: none"> <li>✓ Noise Exposure</li> </ul>	<ul style="list-style-type: none"> <li>✓ N/A</li> </ul>	Ear plugs or muffs
	<ul style="list-style-type: none"> <li>✓ Slips, trips, and falls</li> </ul>	<ul style="list-style-type: none"> <li>✓ Maintain work surfaces as free of water as possible.</li> </ul>	N/A



#### **4.5. Personal Protective Equipment**

Minimum personal protective equipment and engineering controls to be used shall be in accordance with the "Controls" column in the Hazard Analysis Table and as listed herein.

All personnel at the site who will enter into the Exclusion Zone or Contaminate Reduction Zone shall have the minimum general personal protective equipment listed above. Use of gloves, work boots, and eye protection is required at all times. Safety glasses shall be donned in all areas of the Site, except for authorized areas used as offices, restrooms, lunchrooms, locker rooms, showers, and changing rooms. Hard hats and eye protection devices and any other personal protective equipment deemed contaminated shall be left in a designated area or decontaminated prior to leaving the Exclusion Zone.

##### **General Site Personal Protective Equipment Requirements:**

- Safety glass with fixed side shields.
- Work boots with steel shank and toe (min. 6" height with distinct heel).
- Long pants and sleeved shirt.
- Work gloves.
- Nitrile gloves when in contact with groundwater.
- Hearing protection – during drilling and pressure washing during decontamination of tools/equipment.

Exclusion Zone Personal Protective Equipment during digging and/or direct contact of soil/groundwater:

- All General Site requirement items
- Nitrile gloves

Contaminate Reduction Zone during decontamination activities:

- All General Site requirement items
- Non-slip rubber footwear
- Disposable coveralls
- Rain suit suitable for protection from water spray
- Heavy rubber gloves
- Face shield
- Body Coverings



## **Respiratory Protection**

Respiratory protection use is not anticipated during this project. Personnel who wear or may wear respiratory protection must be provided with respirators in accordance with 29 CFR 1910.134. The regulation requires that an individual's ability to wear respiratory protection be medically certified before he/she performs designated duties and that the user be trained and fit tested with the model and size respirator to be worn.

No excessive facial hair that interferes with the effectiveness of a respirator will be permitted on personnel required to wear respiratory protection equipment. The respirator must seal against the face so that the wearer receives air only through the air purifying cartridges. It is the responsibility of each employer to ensure that fit testing is performed prior to respirator use to ensure the wearer obtains a proper seal.

## **Engineering Controls**

Specific engineering controls shall be incorporated in the work activities at the Project Site to minimize the potential for airborne dusts and contact with excavated soils. These controls include:

- Site access restrictions as provide under Site Control
- Use of wetting techniques of soil surfaces
- Use of impermeable covering atop excavated soils
- Establishing dedicated access routes at the Site
- Use of a Contaminate Reduction Zone for vehicles and equipment
- Collection of wash debris and liquids from the Contaminate reduction zone
- Use of a decontamination area for workers exiting the Exclusion Zone and Contaminate Reduction Zone

### **4.6. Air Monitoring**

Air monitoring is not required for this project.

## **5.0 SITE CONTROL**

The HSO is responsible for enforcing health and safety aspects as described in this HASP. The HSO also has the authority to stop any identified unsafe work activity or any operation that can cause significant adverse impact to the environment. Security to keep out trespassers will be instituted. The HSO shall maintain an entry log of all personnel who enter the areas of work known as the Exclusion Zone and Contaminate Reduction Zone.

The key project and emergency/medical response telephone numbers shall be posted at the project site office/staging area.



Site control methods shall be utilized to reduce the potential spread of potentially contaminated soil and groundwater from the Exclusion Zone. These methods are also designed to identify and isolate the immediate area of work and to minimize unauthorized entry into the Exclusion Zone or Contaminate Reduction Zone.

The areas of work at the Project Site are divided into three major zones as described below. These zones are based on the potential for exposure to contaminated soil/groundwater during the work and may be adjusted as necessary to protect personnel and maintain clean areas.

Exclusion Zone - This zone shall be designated as the disturbed soil area at the Project Site and includes open stockpiled soils and where bulk debris has accumulated. The Exclusion Zone shall be maintained until all spoils are placed to fill post-holes or removed from the Site. The size of the exclusion zone may be adjusted as the work progresses across the Project Site. The Exclusion Zone should have a minimum buffer of 20 feet from any work activity.

Equipment exiting the Exclusion Zone shall proceed directly to the Contaminate Reduction Zone. Prior to leaving the Exclusion Zone, any bulk debris shall be knocked off so as not to trail from the Exclusion Zone. Any fallen debris during transit shall be promptly collected and placed in the storage stockpile. The equipment shall be deemed contaminated until completion of cleaning in the Contaminate Reduction Zone.

While working in the Exclusion Zone, Site Workers shall work in pairs such that visual contact can be maintained, workers can observe one another for signs of stressors and summon assistance in the event of an emergency.

Contaminate Reduction Zone - This zone is established for the decontamination of equipment and collection of associated wash water and waste. This zone shall be maintained free of visible accumulations of debris and free liquid at all times.

Support Zone - This zone is designated as non-contaminated and located beyond the outer boundary of the Contaminate Reduction Zone and Exclusion Zone. Administrative, clerical and other support functions are based in the Support Zone.

## **5.1. Barricade and Traffic Control Program**

Hazards are associated with work in the proximity of moving equipment. There are several methods to minimize equipment hazards and to control traffic flow. These methods include visual and/or sound alarms on moving equipment; spotters and/or signalers who track the movement of both equipment and personnel; and barricades.

A barricade means an obstruction to deter the passage of persons. Signs may be used to supplement barricade protection. Signs may also be used with barricades to warn of hazards and will be temporarily or permanently affixed or placed, at locations where hazards exist.

Barricades will be routinely used by project personnel to protect employees and other individuals and as a visual warning for employees. The primary means of barricading will be done by using



tape and the Barricade Tape Program as described below. However, employees may also utilize cones, fencing and other means to block off access to potentially hazardous areas.

**Examples of where barricades may be required on the project site include:**

- ◆ Around operating machinery, which has the potential for entangling personnel.
- ◆ Around demolition, trenching and excavating activities.
- ◆ At any other work locations designated by management to protect personnel from job hazards.

## **6.0 DECONTAMINATION**

Site Workers leaving the Exclusion Zone and/or Contamination Reduction Zone shall be thoroughly decontaminated.

- A decontamination station shall be positioned at the perimeter of the Exclusion Zone and the contamination Reduction Zone. The decontamination station shall be equipped with potable water soap, disposal towels and bags for waste. All Site Workers leaving the Exclusion Zone and/or Contamination Reduction Zone shall pass through the decontamination station.
- Site Workers exiting the Exclusion Zone or Contaminate Reduction Zone shall proceed to the designated wash area/decontamination station.
- Prior to entering the decontamination station, disposable coveralls and boots are to be removed and placed in designated waste bags for disposal.
- Site Workers shall wash all exposed skin surfaces with soap and water. Hands and face must be thoroughly washed after exiting the Exclusion Zone and/or Contaminate Reduction Zone and before eating, drinking, or any other activity.
- Eating, drinking, smoking, or tobacco chewing is not permitted in the Exclusion Zone or Contaminate Reduction Zone to do any of the above; the decontamination sequence must be completed.

## **7.0 PERSONAL HYGIENE**

Prior to smoking, drinking, or eating, and the end of the work shift, workers shall clean all exposed skin surfaces with soap and water. Hands and face must be thoroughly washed after exiting the work area. Eating, drinking, smoking, chewing gum or tobacco is not permitted in the work area.

## **8.0 SLIPS, TRIPS AND FALLS**

Slips, trips, and falls constitute the majority of general industry accidents. In the U.S., they cause 15 percent of all accidental, job-related deaths and are second only to motor vehicles as a cause of fatalities, according to OSHA.



### **8.1. Contributing Factors**

Proper housekeeping in work and walking areas can contribute to safety and the prevention of falls. Not only is it important to maintain a safe working environment and walking surface, these areas must also be kept free of obstacles which can cause slips and trips. Adequate lighting to ensure proper vision is also important in prevention.

### **8.2. Behaviors That Lead to Falls**

In addition to wearing the wrong footwear, there are specific behaviors which can lead to slips, trips, and falls. Walking too fast, or running, is a major problem. Rapid changes in direction create a similar problem.

Other problems are distractions, not watching where we are going, carrying materials which obstruct our vision, wearing sunglasses in low-light areas and failure to use handrails. These and other behaviors, caused by lack of knowledge, impatience, or bad habits developed from past experiences, can lead to falls, injuries or even death.

### **8.3. Falls from Vehicles and Equipment**

Whenever mounting or climbing on a vehicle or machine, have a good handhold before stepping up. Pulling yourself up reduces the force between your shoe and the step and reduces the danger of a slip. As with a ladder, the foot should be placed on the step or rung just in front of your heel, under the arch. Always face the vehicle or equipment when mounting and dismounting. When you step down backward, you step down on the ball of your foot; when you step down forward, you land on your heel, increasing your chances of falling, twisting your ankle or knees or suffering some other injury.

### **8.4. Shoes and Boots**

According to the National Safety Council (NSC), there are 110,000 injuries each year to the feet and toes of United States workers, representing 19 percent of all disabling work injuries.

The most important protection is to wear the proper footwear for your work and environment. In most occupations, shoes or boots should provide three major types of protection.

- The soles and heels should be slip-resistant.
- The toe of the shoe should resist crushing injuries.
- The shoe should support the ankle.

ANSI sets standards for shoes and boots. Never purchase work shoes that do not meet these standards. A typical ANSI rating could be 1-75 C-25. This means the toe will withstand 75-foot pounds of impact and 2,500 pounds of compression.



## **9.0 FIRE PREVENTION PROGRAM**

The objective of this program is to establish the criteria for preventing and responding to fires. The provisions of this program are applicable to all personnel. This program applies to all personnel who work with or whose job responsibilities require them to be familiar with fire prevention and fire hazards. The HSO will review and evaluate this program regularly or when operational changes on the job occur that require revision.

### **9.1. Hazard Determination and Communication**

The following fire hazards, prevention measures, and safety precautions should be followed by all personnel:

- Consideration must be given to storage and use of flammable liquids, combustible materials, construction material, and locations of welding or other spark-producing or open-flame processes.
- All means of fire protection should be located and communicated to all personnel.
- Prevention is the best fire protection measure.

### **9.2. Engineering Controls**

Fire extinguishers, small hose systems, alarm systems, foam systems and employee training serve as engineering controls. Additional controls include the storage of flammable and combustible liquids and materials in approved containers.

### **9.3. Administrative Controls**

Regular inspections shall be conducted by the HSO and/or designee for the proper maintenance and care of all firefighting equipment and proper storage of all flammable materials.

### **9.4. General Fire Prevention Measures**

Management has the responsibility to ensure that hazardous accumulations of combustible materials are controlled so that a fast-developing fire, rapid spread of toxic smoke or an explosion will not occur.

Some of the preventative measures that personnel should employ are:

- Report and repair all flammable liquid or gas leaks immediately. If immediate repairs are not possible, post an adequate warning sign, isolate the area and take extra precautions against fire.
- In the event of a flammable liquid or gas leak, extinguish all fires and remove other sources of ignition immediately. Shutdown engines and other potential sources of ignition, such as pilot lights. Report the leak promptly to the manager in charge. Shut off fuel supply or process if possible.



- Use gasoline as a motor fuel only. Using gasoline as a cleaning agent is not permitted. Use a high flash point (140°+ F) safety solvent to clean tools, machinery and other similar equipment. Wear gloves made of hydrocarbon-resistant rubber to protect hands.
- Transport flammable liquid only in approved, clearly marked safety containers. Any volatile liquids should be stored in containers made for their purpose. Never place flammable liquid containers inside car or truck passenger compartments.
- Turn off electrical equipment when not in use and at the end of the workday.
- Avoid overloading electric circuits.
- Smoking is only permitted in designated safe areas.

## 9.5. Fire Extinguishing Equipment

Fire extinguishers shall be available at that job site. It is imperative that personnel be familiar with the location and proper use of all firefighting equipment. Regular inspections of this equipment shall be made by the HSO to ensure that all units are functional and that all fire extinguishers contain a full charge.

Classes of Fires & Correlating Extinguishers:

- CLASS A – Ordinary Combustibles
- CLASS B – Flammable Liquids
- CLASS C – Electrical Equipment
- CLASS D – Combustible Metals

Most fire extinguishers will have a label indicating what kind of fire the extinguisher is for.

### 9.5.1. Class A Fires

Treatable with a pressurized water extinguisher.

#### Class A Extinguishers

- **Class A Extinguishers** will put out fires in ordinary combustibles, such as wood, paper, many plastics, cloth, trash, and rubber. The numerical rating for this class of fire extinguisher refers to the amount of water the fire extinguisher holds and the amount of fire it will extinguish.
- At proper distance (maximum range of discharge stream), pull safety pin and squeeze lever. Aiming at base of fire at front edge and sweeping side to side, move closer as fire gets smaller.
- 60 second discharge duration; may be used intermittently; maximum range 30-40 feet.
- Works by cooling.



### 9.5.2. Class B Fires

Treatable with dry chemical extinguishers: either multipurpose A:B:C or B:C.

#### Class B Extinguishers

- **Class B Extinguishers** should be used on fires involving flammable liquids. The numerical rating for this class of fire extinguisher states the approximate number of square feet of a flammable liquid fire that a non-expert person can expect to extinguish.
- Dry chemical extinguishers require operation similar to water extinguishers, but technique more critical because of shorter range (12-20 foot).
- Duration of discharge 8-25 seconds.
- Work by blanketing fuel and interrupting chemical chain reaction at fuel surface.
- Continue blanketing to prevent reignition after fire appears to be out.

### 9.5.3. Class C Fires

Treatable with combination B:C carbon dioxide (CO<sub>2</sub>) extinguishers.

#### Class C Extinguishers

- **Class C Extinguishers** are suitable for use on electrically energized fires. This class of fire involves energized electrical equipment. This class of fire extinguishers does not have a numerical rating. The presence of the letter "C" indicates that the extinguishing agent is nonconductive.
- Commonly used on Class C fires; identifiable by horn.
- Nonconductive extinguishing agent required because of electrical shock hazard.
- Operation similar to above, but short range (3-8 foot) and short discharge time (8-30 seconds).
- Works by displacing oxygen, smothering fire.
- Continue discharging to prevent reignition after fire appears out.

### 9.5.4. Class D Fires

Treatable with special extinguishing agents such as Metal-X or foam.

#### Class D Extinguishers

**Class D Extinguishers** are designed for use on flammable metals and are often specific for the type of metal in question. This class of fire may involve combustible metals such as potassium, sodium, aluminum, magnesium, et cetera. There is no picture designator for Class D



extinguishers. These extinguishers generally have no rating nor are they given a multi-purpose rating for use on other types of fires.

## **9.6. Hot Work**

Hot work includes any activity involving an open flame (e.g., use of welding equipment) or any spark-producing activity (e.g. cutting and grinding).

## **10.0 INSECTS**

Personnel should be familiar with hazard identification, prevention and control as it relates to biting/stinging insects. There are a variety of biting/stinging insects that may be encounter and many are listed below and described in the following subsections.

### **10.1. Wasps, Bees, Hornets and Yellow Jackets**

Wasps, bees, hornets, and yellow jackets are venomous insects whose stings produce a variety of symptoms ranging from minor pain and swelling to fatal allergic reactions. Wasps do not have barbed stingers and can sting repeatedly. In general, wasps are aggressive.

Avoiding Stings: People are often stung by these insects while walking barefoot. Stepping on a bee result in a painful sting. Wasps and bees often fly into soft drink cans unnoticed resulting in painful stings of the lips, tongue, and mouth.

Effects of stings: Bee and wasp stings produce similar effects. There are three patterns of symptoms seen following stings.

Local Effects: These symptoms begin immediately after the sting. Typically, the area around the sting is pale and is surrounded by redness. The stinger may still be present. It looks like a little thorn or splinter. The pale area may quickly turn into a red welt. The sting is usually painful, but the pain usually improves in minutes. There may be a great deal of swelling. Swelling may be delayed for five or six hours after the sting. Usually, hands and feet swell more than stings to the chest or abdomen. Local swelling, even dramatic swelling, is normal and not a sign of allergy. Swelling often takes 3-4 days to resolve. Bruising and itching are often associated with this swelling. Bee and wasp stings can become infected and therefore, all sting sites should be washed with soap and water. Signs of infection include a red streak running up the extremity, fever, or any discharge from the sting. Infection requires prompt medical attention.

Allergic Reactions: Bee sting allergy produces sudden severe symptoms that usually occur within minutes following a sting. Signs of a severe reaction include flushing and anxiety which are almost always present. Facial swelling, especially around the lips and eyelids may be present. The victim may have difficulty breathing, feel as if the throat is closing, or may lose consciousness. These symptoms require emergency action. Telephone 911 to summon paramedics and help the victim to use a bee sting kit if one is available.



**Toxic Reactions:** Multiple bee stings can cause the above reactions, but also additional, unique problems. Shock may occur if the victim has suffered hundreds of stings. Delayed symptoms are common and range from nausea and vomiting, common after even a few stings, to destruction of red blood cells and kidney failure which occurs with large numbers of stings. Anyone who has suffered more than five stings should consult their doctor. Anyone who has suffered more than 50 stings needs emergency room care.

**FIRST AID FOR STINGS:** Many remedies recommended in the past have been shown to be useless, or to be dangerous.

**DOs:**

- DO remove the stinger if present. Scrape it out with a credit card or fingernail.
- DO wash stings with soap and water.
- DO apply an ice pack for five to fifteen minutes.
- DO telephone 911 to summon paramedics if the victim is having an allergic reaction and use a bee sting kit as prescribed.
- DO treat swelling by elevating the swollen body part above the heart.

**DO NOTs:**

- DO NOT squeeze the sting or rub mud into it. This increases the risk of infection.
- DO NOT apply meat tenderizer or baking soda.

**10.2. Spiders**

The brown recluse spider is found in the area of the Project Site and is one of six poisonous kinds of spiders in the United States. It has long, skinny legs and is about one-half inch long overall. Its entire body is brown, except for a dark mark in the shape of a violin on its head. Brown recluse spiders usually hang out in dark places. When they are outside, they like to spend time in piles of rocks, wood, or leaves. They are non-aggressive and bite only when disturbed. A person who gets bitten by a brown recluse spider may not notice anything at first or only feel a little sting at first. After about four to eight hours, the sting will start to hurt a little more. It might look like a bruise or might form a blister surrounded by a bluish-purple area that turns black or brown and becomes crusty after a few days. Brown recluse spider bites rarely kill people, but it's important to get medical attention as soon as you can because they can make you pretty sick. Wash the bite well with soap and water, apply ice to the area, elevate it, and keep it still. If it's possible, catch and bring the spider to the doctor's office with you.

The black widow spider is found in the area of the Project Site and is one of six poisonous kinds of spiders in the United States. Its body is about one-half inch long (smaller than a dime), and it has long legs. The black widow spider is shiny and black with a red-orange or yellow mark in the shape of an hourglass on its stomach. Black widow spiders and their relatives can be found almost anywhere in the Western hemisphere of the world in damp and dark places. Their favorite places



are wood piles, tree stumps, trash piles, storage sheds, fruit, and vegetable gardens, in stone walls, and under rocks. A person who gets bitten by a black widow spider might not know it right away, since the bite can sometimes feel like a little pinprick. After 30 to 40 minutes, though, the area of the bite will swell and hurt a lot. Wash the bite well with soap and water and apply an ice pack to the bite to slow down the spread of the spider's venom. Try to elevate the area and keep it still to help prevent the spread of venom. If it's possible, catch and bring the spider to the doctor's office with you. Signs and Symptoms:

- Bite mark
- Swelling
- Pain
- Nausea and vomiting
- Difficulty breathing or swallowing

Treatment:

- Wash wound
- Apply a cold pack
- Get medical care to receive antivenin

## **11.0 SEVERE WEATHER PLAN**

A detailed weather forecast will be obtained each day for the following day's weather forecast to determine the impending weather. The HSO and/or PM will monitor local weather forecasts and immediately communicate any severe weather warnings they receive to all personnel.

In the event a thunderstorm is forecasted, the HSO, or designee will monitor the activity. In this event, all personnel will keep an "eye to the sky". Operations will cease when it is determined that thunderstorm cells are within five miles of the site, based on NWS Doppler Radar, or if lighting is observed from any location. Operations will be allowed to continue 30-minutes after the last lightning bolt is observed, unless NWS Doppler Radar shows other storms approaching.

### Temperature Extremes

Adverse and extreme weather or environmental conditions frequently become important considerations in planning and conducting work operations. Weather and working conditions can combine to create potentially hazardous extreme temperature conditions that can cause physical discomfort, loss of efficiency, impairment of judgment, and personal injury, even death. If the body's physiological processes fail to maintain a normal body temperature because of excessive heat or cold, a number of physical responses can occur ranging from fatigue and abnormal behavior to collapse, unconsciousness, and ultimate death. In addition to the environmental factors affecting a worker, personal characteristics such as age, weight, fitness, medical condition, and acclimatization are also important considerations in determining temperature stress of a worker.



One of the greatest factors affecting the levels of stress on workers can be the use of PPE. Even in moderate temperature environments, conditions inside protective clothing may be extreme enough to cause a temperature stress situation. Thus, addressing the hazards related to temperature extremes can help prevent injury and illness.

The ACGIH TLV and BEI booklet contains detailed information on heat and cold stress and is recommended to be used by employees as a reference and supplement to the program.

### **11.1. Heat Related Illnesses**

The stress of working in areas of high heat, humidity and radiant heat can cause a variety of strains on the body, including heat exhaustion or heat stroke; the latter can be fatal. Working in protective clothing and using respirators, particularly where use of other protective equipment is required, can significantly increase heat stress. Heat stress has occurred at various work locations including hazardous waste remediation sites at ambient temperatures less than 70°F when plastic suits were in use or strenuous work was required. The symptoms of heat stress need to be recognized and necessary actions implemented when they occur.

Heat stress can be a major hazard for employees who are dressed in protective clothing. The same protective materials that protect the body from chemical exposure also limit the dissipation of body heat and moisture. Heat stress can occur very rapidly depending upon certain ambient conditions and work being performed. Heat stress can pose as great a danger to worker health as chemical exposure.

To minimize the potential for heat stress problems at the job site, these guidelines on heat-related illnesses that should be reviewed by employees prior to job assignments so that early symptoms of heat stress are recognizable by all employees and prompt corrective first aid measures can be taken to minimize the potential for more serious heat-related illnesses.

In the preliminary stages of heat stress, rashes, cramps, discomfort, and drowsiness can occur resulting in impaired functional ability that threatens the safety of both the individual and coworkers. Continued heat stress can lead to heat stroke and death. Avoiding overprotection, careful training and frequent monitoring of workers who wear protective clothing, strategic scheduling of work and rest periods, and frequent replacement of fluids can protect against heat stress hazards.

Ambient temperature has a major influence on work mission duration as it affects both the worker and the protective integrity of the ensemble. Heat stress, which can occur even in relatively moderate temperatures, is the greatest immediate danger to an ensemble-encapsulated worker. In addition, a person's body will need to be physiologically adjusted, or acclimatized, to working under hot conditions. The National Institute of Occupational Safety and Health (NIOSH) recommends a progressive six-day acclimatization period for the un-acclimatized worker before allowing them to perform full work on a hot job site.

The following table summarizes the stages, symptoms and first aid measures for victims of heat stress. If more detailed information on heat stress is desired for a particular project, the American



Conference of Governmental Industrial Hygienist (ACGIH) publishes a booklet, which can be used in the field as a reference on thermal stress. This booklet is entitled, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*. The ACGIH booklet emphasizes the importance of acclimating individuals to hot environments and provides screening criteria for heat stress exposure provides examples of activities with metabolic rate categories and discusses controls for limiting heat strain.

Ways to reduce or prevent heat stress include the use of body cooling devices and work time limits. Frequent rest cycles to cool down and replace the body fluids and electrolytes lost through perspiration should be employed to control heat related illnesses.

### Stages, Symptoms and First Aid Measures for Heat Stress

STAGE	SYMPTOMS	FIRST AID MEASURES
Heat Cramps	<ul style="list-style-type: none"> <li>✓ Sweaty skin</li> <li>✓ Painful muscle spasms</li> <li>✓ Normal body temperature</li> </ul>	<ul style="list-style-type: none"> <li>✓ Stop all activity and sit in a cool place</li> <li>✓ Drink clear juice or a sports beverage</li> <li>✓ Seek medical attention if the worker has heart problems or the cramps do not subside within one hour</li> </ul>
Heat Exhaustion	<ul style="list-style-type: none"> <li>✓ Heavy sweating</li> <li>✓ Extreme weakness or fatigue</li> <li>✓ Dizziness or confusion</li> <li>✓ Nausea</li> <li>✓ Clammy, moist skin</li> <li>✓ Pale or flushed skin</li> <li>✓ Muscle cramps</li> <li>✓ Slightly elevated body temperature</li> </ul>	<ul style="list-style-type: none"> <li>✓ Have worker rest in a cool place</li> <li>✓ Drink plenty of water</li> <li>✓ Have them take a cool shower, bath, or sponge bath</li> </ul>
Heat Syncope	<ul style="list-style-type: none"> <li>✓ Light-headedness</li> <li>✓ Dizziness</li> <li>✓ Fainting</li> </ul>	<ul style="list-style-type: none"> <li>✓ Have worker sit or lie down in a cool place</li> <li>✓ Slowly drink water, clear juice, or a sports beverage</li> </ul>



STAGE	SYMPTOMS	FIRST AID MEASURES
Heat Stroke	<ul style="list-style-type: none"> <li>✓ Hot, dry skin, or profuse sweating</li> <li>✓ Throbbing headache</li> <li>✓ High body temperature</li> <li>✓ Confusion/dizziness</li> <li>✓ Slurred speech</li> </ul>	<ul style="list-style-type: none"> <li>✓ Get emergency medical aid immediately</li> <li>✓ Remove victim from heat</li> <li>✓ Cool worker by soaking clothes in water, spraying, sponging or showering them with water, or fanning their body</li> </ul>

## 12.0 HAZARD COMMUNICATION

Each contractor/subcontractor shall maintain a hazard communication program to address the hazardous materials to be used as part of their work activities. This will include maintenance of a chemical inventory and safety data sheets for each hazardous material on the inventory. Employees will be trained on the hazardous materials that they may work with, or otherwise be exposed to, with specific instruction on chlorinated solvents and chromium. A copy of the inventory(s) and safety data sheets will be maintained in the main construction trailer.

### 12.1. Emergency Response/Spill Containment Plan

In the event of a spill, the HSO, Project Manager and/or their qualified designee will immediately direct all non-response personnel to remain in a safe location from the spill site. The HSO and/or Project Manager will then immediately assess the magnitude of the spill and take appropriate actions to contain the spill, consulting the appropriate MSDS if necessary for information regarding the spilled material. Particular care will be taken to ensure that no spilled materials enter the water or a storm drain or run onto unpaved surfaces.

Minor spills may be cleaned up site personnel if they are properly trained in the methods and equipment/supplies required. In the event of a serious spill a qualified emergency response contractor and properly trained personnel will be retained to take immediate action above and beyond the training expertise of on-board personnel when spill conditions warrant such action.

All hazardous wastes generated, including absorbent materials, and contaminated booms will be collected and held for disposal determination. All clean up materials shall be disposed of in accordance with Maryland hazardous waste regulations. All contaminated wash water, waste solutions or residues generated during clean-up, shall be collected and disposed of as hazardous waste, in compliance with all applicable local, state and federal regulations.

### 12.2. Container Labeling

All containers of hazardous materials received on site will be inspected to ensure that they are clearly labeled as to the contents, the appropriate hazard warnings will be noted, and the name and address of the manufacturer will be listed. All secondary containers will be labeled with the



name of the hazardous material and primary hazard(s). The National Fire Protection Association (NFPA) 704 labeling system or the Hazardous Materials Information System (HMIS) labeling system will suffice for hazard labeling.

### **12.3. Hazard Communication Training Program**

Prior to starting work, each new employee and/or contractor will attend a Health & Safety Orientation and will receive information in training on the following:

- Any operations in their work area where hazardous chemicals are present.
- Physical and health hazards of the chemicals in their work area.
- Methods and observation techniques used to determine the presence or release of toxic and hazardous substances in the work area, to include chlorinated solvents and chromium.
- Measures employees can take to protect themselves from hazards in their workplace, including specific procedures the employer has implemented to prevent exposure to hazardous chemicals such as appropriate work practices, emergency procedures, and personal protective equipment.
- Explanation of the labeling system and what the label information means; and
- Explanation of SDS sheets and how employees can use this information to protect themselves.

Prior to a new chemical hazard being introduced, each affected employee will be given information as outlined above.

## **13.0 EMERGENCY RESPONSE/PLANNING**

### **13.1. Emergency Telephone Numbers/Directions for Medical Treatment**

The following telephone numbers and directions are provided to expedite emergency assistance if needed. Emergency information will also be conspicuously posted on the vessel.

**Nearest Hospital:** Meritus Medical Center and Emergency Room  
11116 Medical Campus Road  
Hagerstown, MD 21740

**CHEMTREC (Chemical Transportation Emergency Center): 800-424-9300**

**National Response Center: 800-424-8802**

**Fire Department: 911**

**Police Department: 911**

**Ambulance: 911**

**Poison Control Center: 215-386-2100**



## 14.0 INJURY AND ILLNESS REPORTING

The HSO will record new work-related injuries and illnesses that meet one or more of the OSHA general recording criteria or meet the recording criteria for specifying types of conditions. Recordable work-related injuries and illnesses are those that result in one or more of the following:

- Medical treatment beyond first aid.
- Loss of consciousness.
- Restricted work.
- Transfer to another job.
- Fatality or multiple hospitalization incidents.
- Diagnosis of a significant injury or illness; or
- Days away from work.

OSHA does not require recording of injuries if they are minor injuries requiring only first aid treatment, and which do not involve medical treatment, loss of consciousness, restriction of work or motion, or transfer to another job.

The HSO will investigate mishaps involving personal injuries or property damage. The extent of the investigation will depend on the severity of the accident.

TAB 1



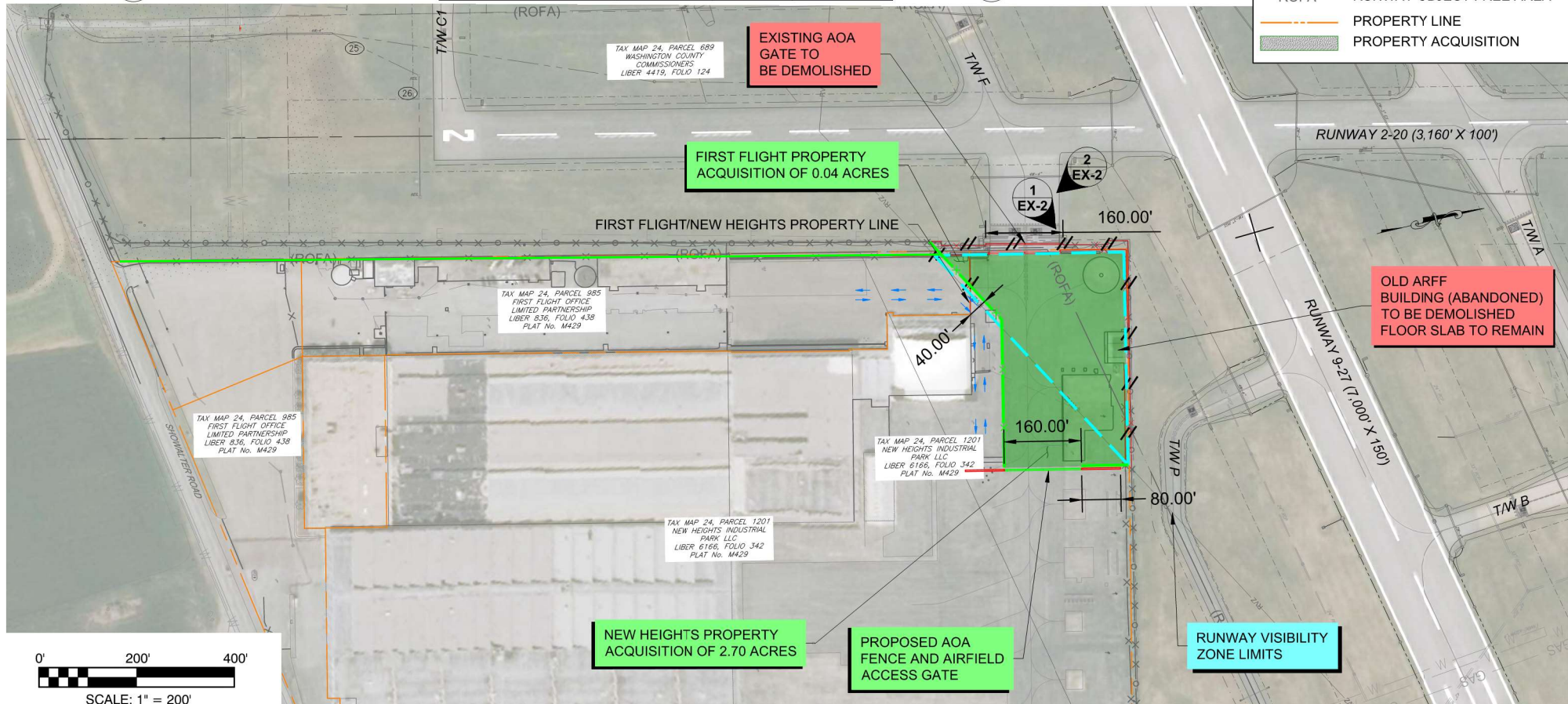
**1**  
**EX-2** PHOTO 1  
**OLD ARFF BUILDING**

PROPERTY OWNERS			
OWNER	EXISTING ACREAGE	Δ ACREAGE	NEW ACREAGE
NEW HEIGHTS INDUSTRIAL PARK LLC	41.9 AC	(2.70) AC	39.20 AC
FIRST FLIGHT LIMITED PARTNERSHIP	12.4 AC	(0.04) AC	12.36 AC
WASHINGTON COUNTY COMMISSIONERS (HGR)	401.89 AC	2.74 AC	404.63 AC



**2**  
**EX-2** PHOTO 2  
**AOA GATE AND DOUBLE FENCE**

LEGEND	
	FENCE DEMOLITION
	PROPOSED AOA FENCE
	PROPOSED ACCESS GATE
	RUNWAY VISIBILITY ZONE LIMITS
	RSA RUNWAY SAFETY AREA
	ROFA RUNWAY OBJECT FREE AREA
	PROPERTY LINE
	PROPERTY ACQUISITION



<b>ADCI</b> AIRPORT DESIGN CONSULTANTS 6031 UNIVERSITY BLVD SUITE 330 ELLICOTT CITY, MD 21043 PHONE/FAX: 410.465.9600/9601	DESIGNED: M.P.P.	<table border="1"> <tr> <th>REVISION No.</th> <th>REVISION DATE</th> <th>DESCRIPTION</th> </tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </table>	REVISION No.	REVISION DATE	DESCRIPTION										<b>Washington County, MD</b> HAGERSTOWN REGIONAL AIRPORT	PROJECT TITLE: ARFF DEMOLITION; AOA FENCE/ACCESS GATE REALIGNMENT	FAA AIP No.:
	REVISION No.		REVISION DATE	DESCRIPTION													
DRAWN: Z.A.F.	SHEET TITLE: PROJECT EXHIBIT	SHEET No.:															
CHECKED: M.P.P.	SCALE: AS SHOWN	DATE: DECEMBER 2023															
APPROVED: M.S.K.																	

FILE NAME: O:\HGR\Projects\1000-1304\_RVZ\_Land\_Acquisition\CAD\EXHIBITS\RVZ Future Land Acquisition Exhibit\HGR\_RVZ\_Land\_Acq.dwg

TAB 2



## Attachment 2 – Certificate of Workers Acknowledgement

18434 Showalter Road  
Hagerstown, Maryland

### ***CERTIFICATE OF WORKERS ACKNOWLEDGMENT***

Employee Name: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Employer: \_\_\_\_\_

The project as listed in the title above and located in Hagerstown, Maryland involves the disturbance of soil over groundwater with contaminated chlorinated solvents and chromium. Based on the potential presence of and exposure to chlorinated solvents and chromium, your employer's contract with the above referenced project requires that you:

- ✓ Be trained and knowledgeable of the Health and Safety Plan document (HASP),
- ✓ Be trained in safe work practices and in proper use of the equipment to be used,
- ✓ Receive the appropriate training for the hazards present, and
- ✓ Wear the proper personal protective equipment required to minimize exposure.

By signing this certification, you are acknowledging that your employer has met the obligations described above and you recognize the hazards present on the Project Site and the policies and procedures required minimizing occupational exposure or adverse effects of these hazards. Further, you acknowledge that you have read the HASP, have been orally briefed, and fully understand all of the following aspects of the project:

1. Hazards associated with the project
2. Personal protective equipment
3. Emergency procedures/contacts
4. Project team-member responsibilities
5. Work zones and decontamination procedures

I certify that my statements and answers are true and that I am familiar with all applicable health and safety regulations and provisions associated with this project.

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

*(Site Worker)*

## **APPENDIX C – LIMITED SUPPLEMENTAL ASBESTOS- CONTAINING MATERIALS SURVEY REPORT**

**PAGE HAS BEEN INTENTIONALLY LEFT BLANK**

---



FROEHLING  
ROBERTSON

*Assess. Manage. Consult.*

## LIMITED SUPPLEMENTAL ASBESTOS-CONTAINING MATERIALS SURVEY REPORT

### Old Fire Station Demolition and AOA Fence/Access Gate Realignment

18434 Showalter Road  
Hagerstown, Maryland 27142



#### Prepared For:

Airport Design Consultants, Inc.  
6031 University Boulevard, Suite 330  
Ellicott City, MD 21043  
Phone: 717.517.1721  
Attention: Michael Pizza, PE  
Email: [mpizza@adci-corp.com](mailto:mpizza@adci-corp.com)

**Issue Date:** June 6, 2024

**F&R Project Number:** 59C-0111

Prepared By:

Conducted/Reviewed By:

Brian K. Burger  
Industrial Hygienist

Jesse D. Phillips, CIH, CSP  
Industrial Hygiene Practice Leader



## TABLE OF CONTENTS

---

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1.	PURPOSE .....	1
1.2.	SITE DESCRIPTION .....	1
1.3.	BACKGROUND .....	2
<b>2.0</b>	<b>SCOPE OF SERVICES .....</b>	<b>2</b>
<b>3.0</b>	<b>LIMITED ASBESTOS-CONTAINING MATERIALS SURVEY .....</b>	<b>3</b>
3.1.	ASBESTOS-CONTAINING MATERIALS (ACM) METHODOLOGY .....	3
3.2.	ASBESTOS-CONTAINING MATERIALS FINDINGS .....	4
3.3.	ASBESTOS-CONTAINING MATERIALS INVENTORY .....	6
3.3.1.	<i>Presumed Asbestos-Containing Materials</i> .....	7
3.4.	ASBESTOS-CONTAINING MATERIALS RECOMMENDATIONS .....	7
3.5.	APPLICABLE REGULATIONS .....	9
3.5.1.	<i>EPA/NESHAP Regulations for Asbestos-Containing Materials</i> .....	9
3.5.2.	<i>Maryland Department of the Environment Asbestos Program</i> .....	10
3.5.3.	<i>OSHA Asbestos Regulations</i> .....	10
<b>4.0</b>	<b>LIMITATIONS .....</b>	<b>10</b>

## APPENDICES

---

### **Appendix A**

F&R Personnel and Laboratory Accreditations

### **Appendix B**

Facility Diagram

### **Appendix C**

Laboratory Certificates of Analysis  
Bulk Sample Chain of Custody Forms

### **Appendix D**

Photographic Documentation



## 1.0 INTRODUCTION

Froehling & Robertson, Inc. (F&R) conducted limited supplemental asbestos-containing materials sampling services on May 10, 2024 at the Old Fire Station located at 18434 Showalter Road in Hagerstown, Maryland. It is F&R's understanding that the structure is the subject of planned demolition activities which are anticipated to impact building materials. The following sections document the survey procedures and results. Refer to Appendix A for documentation of qualifications for F&R personnel and the testing laboratory associated with this survey.

### 1.1. Purpose

The purpose of the Limited Supplemental Asbestos-Containing Materials Survey is to identify Asbestos-Containing Materials (ACMs) that may require appropriate removal, handling, and disposal procedures prior to scheduled demolition activities at the subject property. This survey is to aid in the determination of health and safety requirements during the conduct of work which may impact identified materials and to satisfy regulatory requirements.

### 1.2. Site Description

The structure consists of an approximately 2,850 square foot single-story concrete masonry unit (CMU) former firehouse facility on a slab foundation with a flat rubber membrane roof over plywood decking on wooden joists/beams supported by metal framing. The topography around the building is flat. The exterior of the facility is composed of painted CMU with a small equipment shed attached to the building on the eastern side; white-painted membrane roofing material is present on the vertical portion between the different roof elevations on the main building over a rigid cementitious fiber board and an underlying cellulose board. The equipment shed is approximately 125 square feet with a built-up roof and slab foundation. The main building has three (3) small garage doors and two (2) large garage doors. Interior finishes include a concrete floor, a wood and steel beam ceiling; a large gypsum wallboard system which previously divided the firehouse in half from south to north has been removed since the previous site visit referenced below in Section 1.3. The firehouse is going to be demolished and security fencing and gate infrastructure realigned. Refer to Appendix B for site sketches of the facility, including asbestos sample locations.

Note that F&R utilizes both cardinal directions and Housing and Urban Development methodology for location identification modifiers: Side A is always the address side or the main entry side of the building. Then, proceeding in a clockwise direction the adjacent sides are labeled B, C and D; for example, the wall on the left side as one enters the building would be denoted as side B. For this site, South roughly aligns with the A side, West with the B side, North with the C side, and East with the D side. Architectural/Mechanical drawings were not provided. Refer to Appendix B for an aerial view of the facility.



It should be noted that material and color descriptions are subjective and that, due to the nature of the environment, identical materials and colors may have been labeled as different or the same depending on the lighting, other colors in the area, and other factors.

### 1.3. Background

A previous survey report prepared by F&R titled *Asbestos and Lead-Based Paint Survey* and dated May 15, 2018 (F&R Project Number 72W-0019) documented an April 19, 2018 site visit and inspection results. The previous survey assessed portions of the structure in a limited capacity for both Asbestos and Lead and included certain materials to be presumed as ACM unless additional testing were to be performed.

The specific materials listed as being unsampled and recommended to be presumed were:

- Electrical panel backing/arc deflectors/spark arresters,
- Roofing materials, primarily any materials under the existing rubber roof over the main portions of the building,
- Potentially concealed HVAC components in the HVAC unit located in the HVAC room,
- Suspect black tar/mastic observed leaking through the ceiling of the Main Garage.

Additionally, the previous survey did not evaluate the interior of the CMU cells which can contain vermiculite which may be contaminated with asbestos.

As such, the provided previous survey was not sufficient to constitute a thorough building survey as required for demolition purposes with regard to applicable Federal and State regulations. The aforementioned previous survey report is not included with this report; however, relevant historic survey data regarding *confirmed* ACMs have been tabulated for reference in Section 3.3 (note that all previously sampled materials are not retabulated here in Section 3.2; however, the original report is available upon request and is in the Client's possession).

F&R observed several changes which have occurred since the original April 19, 2018 survey and the May 10, 2024 supplemental survey, including the removal of a gypsum board partition wall system which had previously been present. Additionally, some equipment has already been removed.

## 2.0 SCOPE OF SERVICES

As outlined in F&R proposal number 2259-00260–Revision I dated October 27, 2023, the survey included the identification and supplemental sampling, as necessary, of previously unrepresented suspect ACMs for analysis with respect to the proposed demolition activities. Based on the vacant nature of the building and planned demolition, sampling of the roof was not followed by repairs.



F&R was also requested to prepare abatement project design specifications for materials associated with the structure which may require abatement and/or special handling and disposal considerations. The abatement project design specifications will be provided under a separate cover to be incorporated as part of a larger project manual for bidding purposes.

Based on information provided by the client, it is F&R's understanding that the firehouse is to be fully demolished. Consequently, F&R has taken a relatively comprehensive approach to supplemental sampling methodology. However, as noted in the proposal, F&R did not access electrical panels, functioning mechanical and electrical controls, plumbing, or other live electrical systems for sampling. F&R observed that there is a possibility that some materials may have remained concealed. As such, this report shall not be utilized for the determination of presence or absence of ACMs beyond what has been represented within this or previous surveys.

### **3.0 LIMITED ASBESTOS-CONTAINING MATERIALS SURVEY**

F&R's Maryland Accredited Asbestos Building Inspector, Jesse D. Phillips (240000710), conducted the supplemental Asbestos Survey of the current site structure located at 18434 Showalter Road on May 10, 2024.

Federal Regulations (40 CFR Part 61, Subpart M – National Emission Standard for Asbestos (NESHAP) and 29 CFR 1926.1101), as well as Maryland State Code of Regulations Title 26 Subtitle Chapter 21 require a thorough asbestos inspection of the structure to be conducted prior to the commencement of demolition activities. An ACM is defined by the Occupational Safety & Health Administration (OSHA) and the Environmental Protection Agency (EPA) as material containing greater than one percent (1%) asbestos.

#### **3.1. Asbestos-Containing Materials (ACM) Methodology**

This survey was conducted in general accordance with the Federal NESHAP and applicable State regulations for the presence of ACMs. The survey was characterized by a visual inspection and sampling of suspect building components at the subject property to be impacted by the proposed renovation/demolition activities which had not been previously represented. The focus of the inspection was the previously unsampled materials. F&R began with a visual review of the materials to be collected and found that electricity was being provided to the facility. Additionally, F&R identified existing and created new openings in CMU shell faces in order to determine whether vermiculite fill may be present; based on our observations, vermiculite is not present in CMU cells based on multiple areas.

Guidelines utilized in the asbestos survey were established by the EPA, ASTM International (ASTM), and The Environmental Information Association, Inc. (EIA). Utilized guidelines included: the Asbestos Hazard Emergency Response Act (40 CFR Part 763, Subpart E – Asbestos-Containing



Materials in Schools (cited as AHERA)), ASTM Standard E2356-14 *Standard Practice for Comprehensive Building Asbestos Surveys*, and the EPA publication *Managing Asbestos in Buildings: A Guide for Owners and Managers – A Revision to the United States Environmental Protection Agency’s 1985 document Guidance for Controlling Asbestos-Containing Materials in Buildings (EPA 560/5-85-024) Known as the Purple Book*.

F&R’s aforementioned Industrial Hygienist collected and submitted suspect asbestos-containing bulk samples to the laboratory, of which, a total of nine (9) suspect asbestos-containing bulk samples with discernable layers were analyzed. Due to multiple layers, a total of seventeen (17) samples were analyzed.

Samples of suspect ACMs were organized as per the AHERA concept of Homogeneous Area (HA), collected, and transported to the Environmental Hazards Services, L.L.C. (EHS) testing laboratory. EHS is a National Institute for Standards and Technology (NIST) National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory (NVLAP Lab Code: 101882-0) and Virginia licensed asbestos laboratory, in Richmond, Virginia, for analysis by Polarized Light Microscopy (PLM) following EPA Method 600/R-93/116 and 600/M4-82-020. Refer to Appendix A for Laboratory Certificates of Accreditations. Refer to Appendix C for Laboratory Certificates of Analysis and Bulk Sample Chain of Custody Forms for further description of sampled materials and analytical results.

F&R collected bulk samples of roofing materials during this survey. As the facility is currently vacant and is scheduled for demolition, roof core sample locations were not patched or repaired. Additionally, F&R noted existing water intrusion within the structure.

### 3.2. Asbestos-Containing Materials Findings

The following material types were identified, sampled, and accordingly homogenized based upon similar construction discovered during bulk sampling:

- Adhesives/Mastics – Various Applications
- Fiberboard
- Roof Membrane
- Sealants – Various Applications

The following table presents a summary of survey results from sampling events performed on May 10, 2024. Refer to Appendix B for illustration of the locations of collected bulk samples. Positive asbestos samples (samples containing >1% asbestos) as well as materials containing detectable concentrations that are <1% (trace) are in **BOLD** type.



**SUSPECT ASBESTOS-CONTAINING MATERIALS SAMPLE INFORMATION**

HA #	Sample #	Situation <sup>1</sup>	Sample Location(s)	Material Description/Function	Laboratory Description	Percent Asbestos
16	16A	R	Upper Main Roof at Western Central Edge	Black Roof Membrane with Yellow Mastic	Membrane; Black Rubbery; Homogeneous	NAD <sup>2</sup>
					Mastic; Yellow Adhesive; Homogeneous	NAD
	16B	R	Western Low Main Roof at Center		Membrane; Black Rubbery; Homogeneous	NAD
					Mastic; Yellow Adhesive; Homogeneous	NAD
17	17A	R	Upper Main Roof at Western Central Edge	White Patch on HA #16	White Rubbery; White Pain; Inhomogeneous	NAD
18 <sup>3</sup>	18A	R	Upper Main Roof at North Center Area at Vent Pipe	Black Adhesive at Vent Pipe Penetration	Black Adhesive; Homogeneous	2% Chrysotile
	18B	R	Upper Main Roof at North Center Area at Vent Pipe		Black Adhesive; Homogeneous	2% Chrysotile
19	19A	R	Upper Main Roof at North Center Area at Exhaust Pipe	Tarry Material at Exhaust Vent Pitch Fan	Black Tar-Like; Homogeneous	10% Chrysotile
	19B	R	Upper Main Roof at North Center Area at Exhaust Pipe		Black Tar-Like; Homogeneous	8% Chrysotile
20 <sup>4</sup>	20A	R	~4-foot Wall at Roof Elevation Change between Western Low Main Roof and Upper Main Roof	Membrane, Rigid Fiber Board, and Cellulose-like Board	Membrane; Black Rubbery; White Paint; Inhomogeneous	Trace <1% Chrysotile
					Mastic; Yellow Adhesive; Homogeneous	Trace <1% Chrysotile
					Transite; Gray Cementitious; White Paint; Inhomogeneous	20% Chrysotile
					Fibrous Backing; Brown Fibrous; Homogeneous	Trace <1% Chrysotile
	20B	R	~4-foot Wall at Roof Elevation Change between Western Low Main Roof and Upper Main Roof		Membrane; Black Rubbery; White Paint; Inhomogeneous	Trace <1% Chrysotile
					Mastic; Yellow Adhesive; Homogeneous	Trace <1% Chrysotile
					Transite; Gray Cementitious; White Paint; Inhomogeneous	20% Chrysotile
					Fibrous Backing; Brown Fibrous; Homogeneous	Trace <1% Chrysotile

<sup>1</sup>Situation: R - Roof

<sup>2</sup>NAD: No Asbestos Detected

<sup>3</sup>**Bold:** Asbestos Containing Material or Trace (<1%) Asbestos Present

<sup>4</sup>HA #20: The laboratory reports several layers of this material as Trace <1% Chrysotile. The "Transite" layer was identified to contain 20% Chrysotile and is presumed by the laboratory to have possibly contaminated these other material layers. Based on the confirmed concentration of asbestos in the "Transite" layer and the presumed contamination of other layers, the entire HA should be treated as ACM.



### 3.3. Asbestos-Containing Materials Inventory

F&R conducted a survey of the reasonably and safely accessible portions of the building to be impacted by the planned demolition which were not previously represented. The following table presents identified materials containing greater than 1% or trace (<1%) concentrations of asbestos, as well verified information obtained from the previous reports referenced in Section 1.3. Further, delineation/quantification was performed; however, while the table below only recounts the sample locations and may not completely represent locations of identified ACMs, quantities of the materials are provided. It is the responsibility of the client or contractor to verify material locations. Photographic documentation of ACMs *identified during this survey* for reference is provided as Appendix D.

**ASBESTOS-CONTAINING MATERIALS INVENTORY**

HA #	Material Description	Sample Location(s)	Asbestos Content	EPA/NESHAP Category <sup>1</sup>	Condition <sup>2</sup>	Quantity
3 <sup>3</sup>	White Roof Flashing with Black Backing	Perimeter of the Equipment Shed roof	40/8% Chrysotile	Category I Non-friable	D	21.5 SF <sup>4</sup>
4	White Flashing Caulk	Perimeter of the Equipment Shed roof	2-3% Chrysotile	Category II Non-friable	D	21.5 SF
9	Beige/Grey Exterior Window Caulk	Exterior perimeter of all windows	2-3% Chrysotile	Category II Non-friable	D	36 SF
10	Grey Interior Window Caulk	Interior perimeter of all windows	2% Chrysotile	Category II Non-friable	D	36 SF
11	Grey Door Caulk	Interior/Exterior Perimeter of doorways	2-3% Chrysotile	Category II Non-friable	D	1.2 SF
12	White Door Caulk	Perimeter of the two end garage doors	2% Chrysotile	Category II Non-friable	D	3 SF
15	Grey Cementitious Ceiling	Bathroom and Laundry room ceiling	20% Chrysotile	Category II Non-friable	G	60 SF
18	Black Adhesive at Vent Pipe Penetration	Upper Main Roof at North Center Area at Vent Pipe	2% Chrysotile	Category II Non-friable	G	1.5 SF
19	Tarry Material at Exhaust Vent Pitch Fan	Upper Main Roof at North Center Area at Exhaust Pipe	8-10% Chrysotile	Category II Non-friable	G	2 SF
20	Membrane, Rigid Fiber Board, and Cellulose-like Board	~4-foot Wall at Roof Elevation Change between Western Low Main Roof and Upper Main Roof	20% Chrysotile	Friable	G	360 SF

<sup>1</sup>EPA/NESHAP Category: See Section 3.5.1 for details.

<sup>2</sup>Condition: G: Good (No damage);  
D: Damaged (<10% distributed or <25% localized);  
SD: Significantly Damaged (>10% distributed or >25% localized)

<sup>3</sup>HA #3-15 represent materials which were identified in previous survey efforts performed by F&R.

<sup>4</sup>SF: Square feet

F&R presumes that, where materials have been documented to be ACMs and where those materials are similar to other materials which have not been found to be positive, those similar materials will be considered to be ACMs (i.e. where one material was analyzed and found to be



positive, it is prudent to consider other similar materials positive, despite potential analytical data to the contrary).

### **3.3.1. Presumed Asbestos-Containing Materials**

During the conduct of this survey, supplemental sampling was limited to those materials which were known not to have been previously represented and which were safely accessible. F&R took a relatively comprehensive approach to sampling; however, the possibility remains that some materials may remain concealed, despite not being observed during sampling activities. Additionally, F&R observed several materials related to the electrical infrastructure including resinous mounting boards, arc chutes, bus-blocks, etc.

As such, materials which were not represented in this or previous surveys should be presumed to be positive, unless sampling is conducted and shown to be negative. F&R specifically recommends treating the electrical components as presumed ACM (PACM). The remainder of the previously presumed materials (including vermiculite within CMU cells) have been evaluated or were not observed.

Note that asbestos was used in over 3,000 known products and was used extensively in construction materials including in insulation and finish materials such as gypsum board-based systems, acoustical tiles, caulks and mastics, vinyl-based materials, and specialty products. Asbestos also continues to be used in new construction because, as stated by the EPA, "the manufacture, importation, processing, and distribution in commerce of [various] products [...] are not banned."

### **3.4. Asbestos-Containing Materials Recommendations**

As detailed above, several materials were identified as asbestos-containing, utilized in various instances throughout the structure. Prior to impacting the identified or presumed ACMs via demolition, F&R recommends that the ACMs be appropriately removed, handled, and disposed of by an appropriately licensed/accredited Abatement Contractor utilizing appropriately licensed/accredited personnel. Best practices dictate that an asbestos abatement specification document be prepared which details project-specific work plans and requirements. This abatement specification document should incorporate delineation/quantification of identified or presumed ACMs and should be furnished by the client or building owner to contractors for bidding purposes. Appropriately licensed or accredited personnel must prepare and/or review such specification documents. This survey report should not be used for bidding purposes. F&R has been engaged to prepare such a specification which will be issued under separate cover. Additionally, this report should be maintained with the prior survey report.

F&R notes that the Contractor may leave select Category I and II non-friable materials in the building during demolition with the following constraints:



- a. The landfill receiving these materials (Category I and/II non-friable) must be notified in writing and must be willing to receive these materials.
- b. The Contractor cannot make these materials friable during demolition by demolition methods including, but not limited to, compaction of the debris. The Contractor cannot salvage the mixed debris following demolition.
- c. During demolition, no visible emissions of dust are allowed. The Contractor must use dust control measures (i.e., water) during demolition.

F&R further recommends that a third party Asbestos Professional be retained to provide on-site surveillance and guidance of the Asbestos Abatement Contractor to confirm complete and proper removal/disposal of ACMs in accordance with applicable federal, state, and local regulations. This recommendation is made as a best practice to reduce potential exposure to workers and limit liability.

The Client should note that F&R has encountered instances in which materials were analyzed by Polarized Light Microscopy (PLM) (following EPA Method 600/R-93/116) for the presence of asbestos with a result of "None Detected", but when analyzed by Transmission Electron Microscopy (TEM) for Non-friable Organically Bound (NOB) bulk material, analytical results have indicated that asbestos is present in quantities greater than 1%. The client should be aware that F&R has samples analyzed by the PLM method for a number of reasons (including financial and time considerations) and that this method is considered acceptable in the State of Virginia; however, some firms employ the more stringent TEM method which is required in some states. Therefore, it is possible that some materials identified as containing no asbestos within this report may, if subjected to a more stringent analytical method, reveal the presence of asbestos at concentrations of 1% or greater.

In addition, it should be noted that through NESHAP Applicability Determinations, asbestos bulk samples composed of friable materials which indicate a result of asbestos content to be less than ten (10) percent, including trace amounts (<1%) when analyzed via PLM, the material in question shall either be assumed to be an ACM or further analyzed via PLM Point Count or TEM to verify asbestos content. Quantitative results obtained via PLM Point Count or TEM analysis shall supersede previous qualitative results obtained by standard PLM analysis. Samples with analytical results via PLM which indicate that no asbestos was detected are not required to be further analyzed via PLM Point Count or TEM.

Should additional suspect ACMs be discovered during demolition activities that have not been sampled and which will be disturbed, F&R recommends the work be temporarily halted. Samples of suspect materials should be collected, analyzed, and handled accordingly prior to the resumption of demolition activities.



### 3.5. Applicable Regulations

#### 3.5.1. EPA/NESHAP Regulations for Asbestos-Containing Materials

The U.S. Environmental Protection Agency promulgated the National Emission Standards for Hazardous Air Pollutants (NESHAP) [40 CFR Part 61], which addresses the application, removal, and disposal of asbestos-containing materials (ACM). Under NESHAP the following categories are defined for asbestos-containing materials:

Friable - When dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

Non-friable - When dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Category I Non-friable ACM - Packings, gaskets, resilient floor coverings, and asphalt roofing products containing more than 1% asbestos.

Category II Non-friable ACM – Material, excluding Category I Non-friable ACM, which contains more than 1% asbestos.

Regulated Asbestos Containing Material (RACM) – One of the following:

1. Friable ACM
2. Category I Non-friable ACM that has become friable.
3. Category I Non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading.
4. Category II Non-friable ACM that has a high probability of becoming, or has become, friable by the forces expected to act on the material in the course of demolition or renovation operations.

Under NESHAP, the following actions are required:

1. Prior to the commencement of demolition or renovation activities, the building owner must inspect the affected facility or part of the facility where the demolition or renovation activities will occur for the presence of asbestos.
2. Remove RACM from the facility before activities begin that would break up, dislodge, or similarly disturb the material or preclude access for subsequent removal.
3. ACM need not be removed before demolition if:
  - a) It is Category I non-friable ACM that is not in poor condition.



- b) It is on a facility component that is encased in concrete or other similar material and is adequately wet whenever exposed.
- c) It was not accessible for testing and was therefore not discovered until after demolition began and because of the demolition the material cannot be safely removed.
- d) It is Category II non-friable ACM and the probability is low that the material will become crumbled, pulverized, or reduced to powder during demolition.

### **3.5.2. Maryland Department of the Environment Asbestos Program**

The Maryland Department of the Environment administers the Asbestos Program for Maryland which accredits individuals and issues permits for asbestos removal projects on behalf of the Federal NESHAP program which has been delegated to the State of Maryland. For more information, visit the Maryland Asbestos Program website at: <http://mde.maryland.gov/programs/Air/Asbestos/Pages/index.aspx>.

### **3.5.3. OSHA Asbestos Regulations**

The Occupational Safety and Health Administration (OSHA) regulates employee exposure to asbestos under 29 CFR 1926.1101 and 29 CFR 1910.1001. Work associated with known or suspect ACMs must be conducted according to these regulations in addition to the noted EPA regulations.

## **4.0 LIMITATIONS**

This report has been prepared for the exclusive use of Airport Design Consultants, Inc. and/or their agents. This service was performed in accordance with generally accepted environmental practices. No other warranty, expressed or implied, is made. Conclusions and recommendations are based, in part, upon information provided to us by others and site observations. We have not verified the completeness or accuracy of the information provided by others, unless otherwise noted. Observations and recommendations are based upon conditions readily visible at the site at the time of the site visit, and upon current industry standards.

During this study, suspect asbestos samples were submitted for analysis at a NVLAP-accredited laboratory via polarized light microscopy. Invasive and destructive sampling methods were used; however, these were not exhaustive. Inaccessible areas, such as behind solid ceilings or behind solid walls were not surveyed; therefore, some target materials may not have been identified. As with similar surveys of this nature, actual conditions exist only at the precise locations from which samples were collected or tested. Areas inspected were limited to those designated by the scope of services by the Client. Certain inferences are based on the results of this sampling and related testing to form a professional opinion of conditions in areas beyond those from which the samples were collected. Unless otherwise noted, F&R does not claim to have performed



exhaustive delineation and/or quantification of identified materials; it is the responsibility of the client or abatement contractor to verify locations and quantities of regulated materials. It is also understood that this is not an exhaustively invasive survey so that it is possible that concealed materials may be present that were not accessible during the original survey. No other warranty, expressed or implied, is made. Reasonable effort was made by inspection personnel to locate and sample suspect materials within the structure with regard to the scope of services. However, for a facility, the existence of unique or concealed ACMs and debris is a possibility. F&R does not warrant, guarantee or profess to have the ability to locate or identify all ACMs in a facility.

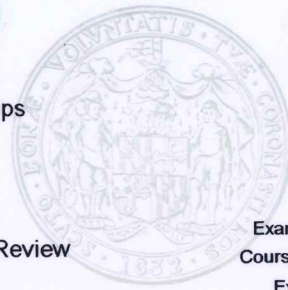
Under this scope of services, F&R assumes no responsibility regarding response actions (e.g. O&M Plans, Encapsulation, Abatement, Removal, Tenant Notification, etc.) initiated as a result of these findings. F&R assumes no liability for the duties and responsibilities of the Client with respect to compliance with appropriate regulations. Compliance with regulations and response actions are the sole responsibility of the Client and should be conducted in accordance with local, state, and/or federal requirements and should be performed by appropriately qualified and licensed/accredited personnel, as warranted.

Froehling & Robertson, Inc. by virtue of providing the services described in this report, does not assume the responsibility of the person(s) in charge of the site, or otherwise undertake responsibility for reporting to local, state, or federal public agencies conditions at the site that may present a potential danger to public health, safety, or the environment. The Client agrees to notify the appropriate local, state, or federal public agencies as required by law, or otherwise to disclose, in a timely manner, information that may be necessary to prevent danger to public health, safety, or the environment. The contents of the report should not be construed in any way as a recommendation to purchase, sell, or develop the project site. F&R retains the right to revise this report if new information is later discovered or made available. The report must be presented in its entirety.



## **Appendix A**

### F&R Personnel and Laboratory Accreditations



Jesse Phillips  
Name

  
Signature

Inspector Review

Course Title

240000710

Exam Date: 04/01/2024

Course Date: 01/25/2024

Exp Date: 01/25/2025

STATE OF MARYLAND

United States Department of Commerce  
National Institute of Standards and Technology



---

## Certificate of Accreditation to ISO/IEC 17025:2017

---

NVLAP LAB CODE: 101882-0

**Environmental Hazards Services, L.L.C.**

North Chesterfield, VA

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:*

**Asbestos Fiber Analysis**

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

---

2024-01-01 through 2024-12-31

*Effective Dates*



A handwritten signature in blue ink, reading "Dana S. Laman".

---

*For the National Voluntary Laboratory Accreditation Program*

**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017**

**Environmental Hazards Services, L.L.C.**

7469 Whitepine Road

North Chesterfield, VA 23237-2261

Ms. Julie Dickerson

Phone: 804-275-4788 Fax: 804-275-4907

Email: [jdickerson@leadlab.com](mailto:jdickerson@leadlab.com)

<http://www.leadlab.com>

**ASBESTOS FIBER ANALYSIS**

**NVLAP LAB CODE 101882-0**

**Bulk Asbestos Analysis**

**Code**

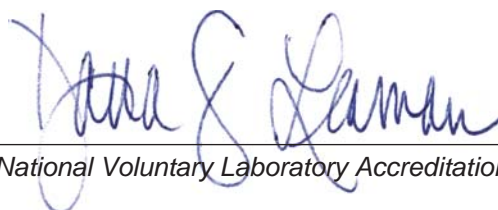
**Description**

18/A01

EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples

18/A03

EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials



*For the National Voluntary Laboratory Accreditation Program*



## **Appendix B**

### Facility Diagram

**Key:**

- Negative ACM Sample Location
- ☆ **Positive ACM Sample Location**



Old Fire Station Roof



**Froehling & Robertson, Inc.**  
3015 Dumbarton Road  
Richmond, Virginia 23228  
T 804.264.2701

Client:	Airport Design Consultants, Inc.		
Project:	Old Fire Station Demolition and AOA Fence/Access Gate Realignment Supplemental ACM Survey		
Location:	Hagerstown Maryland		
Project Number:	59C-0111		FIGURE No.: 1
Data Source:	Google Earth		
Date:	May, 2024	Scale: Not Shown	



## **Appendix C**

Laboratory Certificates of Analysis  
Bulk Sample Chain of Custody Forms



7469 Whitepine Rd  
North Chesterfield, VA 23237  
Telephone: 800.347.4010

## Asbestos Bulk Analysis Report

**Report Number:** 24-05-01977

**Client:** Froehling & Robertson - Richmond  
3015 Dumbarton Road  
Richmond, VA 23228

**Received Date:** 05/13/2024  
**Analyzed Date:** 05/20/2024  
**Reported Date:** 05/20/2024

**Project/Test Address:** 59C-0111-0001; 18448 Showalter Rd; 24172

**Client Number:**  
48-2016

**Fax Number:**  
804-266-1275

# Laboratory Results

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials
24-05-01977-001A	16A	Membrane	Black Rubbery; Homogeneous	NAD	100% Non-Fibrous
24-05-01977-001B	16A	Mastic	Yellow Adhesive; Homogeneous	NAD	2% Cellulose 98% Non-Fibrous
24-05-01977-002	17A		White Rubbery; White Paint; Inhomogeneous	NAD	1% Cellulose 99% Non-Fibrous
24-05-01977-003A	16B	Membrane	Black Rubbery; Homogeneous	NAD	100% Non-Fibrous
24-05-01977-003B	16B	Mastic	Yellow Adhesive; Homogeneous	NAD	3% Cellulose 97% Non-Fibrous

# Environmental Hazards Services, L.L.C

**Client Number:** 48-2016

**Report Number:** 24-05-01977

**Project/Test Address:** 59C-0111-0001; 18448 Showalter Rd;  
24172

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials
24-05-01977-004	18A		Black Adhesive; Homogeneous	2% Chrysotile	2% Cellulose 96% Non-Fibrous
			Total Asbestos: 2%		
24-05-01977-005	18B		Black Adhesive; Homogeneous	2% Chrysotile	3% Cellulose 95% Non-Fibrous
			Total Asbestos: 2%		
24-05-01977-006	19A		Black Tar-like; Homogeneous	10% Chrysotile	90% Non-Fibrous
			Total Asbestos: 10%		
24-05-01977-007	19B		Black Tar-like; Homogeneous	8% Chrysotile	92% Non-Fibrous
			Total Asbestos: 8%		
24-05-01977-008A	20A	Membrane	Black Rubbery; White Paint; Inhomogeneous	Trace <1% Chrysotile	100% Non-Fibrous
			Total Asbestos: Trace <1%		
Possible contamination from transite					
24-05-01977-008B	20A	Mastic	Yellow Adhesive; Homogeneous	Trace <1% Chrysotile	5% Cellulose 95% Non-Fibrous
			Total Asbestos: Trace <1%		
Possible contamination from transite					
24-05-01977-008C	20A	Transite	Gray Cementitious; White Paint Inhomogeneous	20% Chrysotile	80% Non-Fibrous
			Total Asbestos: 20%		
Chrysotile present throughout sample.					
24-05-01977-008D	20A	Other *	Brown Fibrous; Homogeneous	Trace <1% Chrysotile	95% Cellulose 5% Non-Fibrous
			Total Asbestos: Trace <1%		
*Fibrous Backing; Possible contamination from transite					

# Environmental Hazards Services, L.L.C

**Client Number:** 48-2016

**Report Number:** 24-05-01977

**Project/Test Address:** 59C-0111-0001; 18448 Showalter Rd;  
24172

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials
24-05-01977-009A	20B	Membrane	Black Rubbery; White Paint; Inhomogeneous	Trace <1% Chrysotile	2% Cellulose 98% Non-Fibrous
<b>Total Asbestos: Trace &lt;1%</b>					
Possible contamination from transite					
24-05-01977-009B	20B	Mastic	Yellow Adhesive; Homogeneous	Trace <1% Chrysotile	4% Cellulose 96% Non-Fibrous
<b>Total Asbestos: Trace &lt;1%</b>					
Possible contamination from transite					
24-05-01977-009C	20B	Transite	Gray Cementitious; White Paint; Inhomogeneous	20% Chrysotile	80% Non-Fibrous
<b>Total Asbestos: 20%</b>					
Chrysotile present throughout sample.					
24-05-01977-009D	20B	Other *	Brown Fibrous; Homogeneous	Trace <1% Chrysotile	95% Cellulose 5% Non-Fibrous
<b>Total Asbestos: Trace &lt;1%</b>					
*Fibrous Backing; Possible contamination from transite					

# Environmental Hazards Services, L.L.C

**Client Number:** 48-2016

**Report Number:** 24-05-01977

**Project/Test Address:** 59C-0111-0001; 18448 Showalter Rd;  
24172

Lab Sample Number	Client Sample Number	Layer Type	Lab Gross Description	Asbestos	Other Materials
-------------------	----------------------	------------	-----------------------	----------	-----------------

**QC Sample:** 91-M22022-4

**QC Blank:** SRM 1866 Fiberglass

**Reporting Limit:** 1% Asbestos

**Method:** EPA Method 600/R-93/116, EPA Method 600/M4-82-020

**Analyst:** Joey Rust

Reviewed By Authorized Signatory:

*Melissa Kanode*

Melissa Kanode  
QA/QC Clerk

These results are based on a comparative visual estimate. The condition of the samples analyzed was acceptable upon receipt per laboratory protocol unless otherwise noted on this report. Each distinct component in an inhomogeneous sample was analyzed separately and reported as a composite. Results represent the analysis of samples submitted by the client. Sample location, description, area, volume, etc., was provided by the client. This report cannot be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government. This report shall not be reproduced except in full, without the written consent of the Environmental Hazards Service, L.L.C. All information concerning sampling location, date, and time can be found on Chain-of-Custody. Environmental Hazards Services, L.L.C. does not perform any sample collection. . NVLAP #101882-0 VELAP 460172

Environmental Hazards Services, L.L.C. recommends reanalysis by point count (for more accurate quantification) or Transmission Electron Microscopy (TEM), (for enhanced detection capabilities) for materials regulated by EPA NESHAP (National Emission Standards for Hazardous Air Pollutants) and found to contain less than ten percent (<10%) asbestos by polarized light microscopy (PLM). Both services are available for an additional fee.

400 Point Count Analysis, where noted, performed per EPA Method 600/R-93/116 with a Reporting Limit of 0.25%.

LEGEND: NAD = no asbestos detected

# ENVIRONMENTAL HAZARDS SERVICES, LLC

## Asbestos Chain of Custody Form

Page 1 of   

Company Name	Froehling & Robertson, Inc.	Account #	48-2016
Company Address	3015 Dumbarton Road	City/State/Zip	Richmond, VA 23228
Phone	804.264.2701	Email	jphillips@fandr.com
Project Name/Test Address ~18448 Showalter Rd. 24172			
PO Number	59C-0111-0001	Collected By	Jesse Phillips
Turn-Around Time	<input checked="" type="radio"/> 5 Day      3 Day      2 Day      1 Day      Same Day / Weekend - Must Call Ahead		

☐ PLM New York Protocol     
 ☐ PLM New Jersey Protocol     
 ☐ PLM South Carolina Protocol

LAB NUMBER	Client Sample ID	Homogeneous Area	Positive Stop	Collection Date & Time	BULK				AIR					COMMENTS
					PLM	Point Count 400	Point Count 1000	TEM Bulk	PCM	TEM AHERA	NIOSH 7402	Time In Total Minutes	Flow Rate In L/Min	
1	See attached.													
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														
15														

Released By: Jesse Phillips	Date: 5/10/24	Time: <u>          </u>
Signature:		

LAB USE ONLY – BELOW THIS LINE

Received By:

Signature:

Date: 5.13.24      Time: 229      ☐ AM      ☒ PM

☐ Portal Contact Added

24-05-01977



Due Date:  
05/20/2024  
(Monday)

ER MC

JR      aPLM



#1977

**ASBESTOS BULK SAMPLING FIELD RECORD****Project #:** 59C-0111**Inspector:** Jesse Phillips**Field Date:** 5/10/24**Client:** ADCI**Project:** H'town Regional Airport**Address:** ~18448 Showalter Rd. 24172**Notes:** Old Fire Station

No vermiculite observed in CMU cells

HA#	Sample#	Material and Modifiers (dimensions, colors, layers, consistency)	Floor	Sample Location (Room, Side, Modifiers) <sup>1</sup>	Cond <sup>2</sup>	Qty <sup>3</sup>	Mtl Type <sup>4</sup>	Cat <sup>5</sup>	Notes <sup>6</sup>
16	A	Black Roof Membrane with Yellow Adhesive	R	Upper main roof at western central edge	G	TBD	Misc	I/II	
17	A	White Patch on 16A	R		G	TBD	Misc	II	
16	B	Black Roof Membrane with Yellow Adhesive	R	Western low main roof at center	G	TBD	Misc	I/II	
18	A	Black Adhesive at Vent Pipe Penetration (don't analyze membrane represented in HA 16)	R	Upper Main roof at north center area at vent pipe	G	TBD	Misc	I	
18	B	Black Adhesive at Vent Pipe Penetration (don't analyze membrane represented in HA 16)	R		G	TBD	Misc	I	
19	A	Tarry material at exhaust vent pitch pan	R	Upper Main roof at north center area at exhaust vent pan	G	TBD	Misc	I	
19	B	Tarry material at exhaust vent pitch pan	R		G	TBD	Misc	I	
20	A	Membrane, rigid fiber board, and cellulose-like board	R	~4' Wall at roof elevation change between western low main roof and upper main roof	G	TBD	Misc	II	
20	B	Membrane, rigid fiber board, and cellulose-like board	R		G	TBD	Misc	II	

<sup>1</sup>Location: Use Room # or Name/Use; A, B, C, D HUD Side identifiers;<sup>2</sup>Cond (Condition) – G: Good (No damage); D: Damaged (<10% distributed or <25% localized); SD: Significantly Damaged (>10% distributed or >25% localized)<sup>3</sup>Qty (Quantity) – SF: Square Feet; LF: Linear Feet; CF: Cubic Feet. Note: All quantities are estimates based on visible and inferred site conditions; actual quantities may vary.<sup>4</sup>Mtl Type (Material Type) – S: Surfacing (follow 3, 5, 7 rules); TSI: Thermal Systems Insulation (minimum of 3 samples, except for patches); M: Miscellaneous (≥2 samples)<sup>5</sup>Cat (EPA Category) – RACM: Regulated ACM (friable), I: Category I Non-Friable; II: Category II Non-Friable<sup>6</sup>Notes – Other Pertinent Information (E.G. Roof layers in order)PAGE: 1 OF 1

Rec'd By DBowen

5/13/24 229PM



## **Appendix D**

### Photographic Documentation



1. View of the D Side (East) of the Fire Station.



2. View of the A Side (South) of the Fire Station.



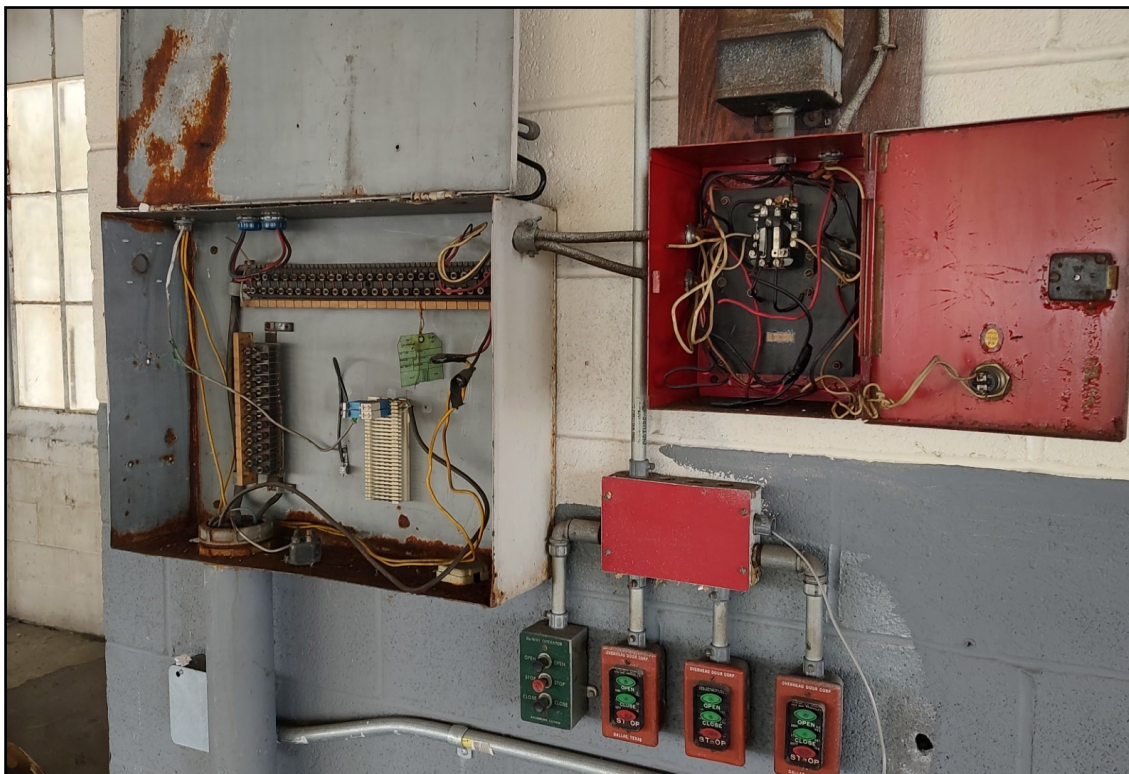
3. View of the interior of the Fire Station.



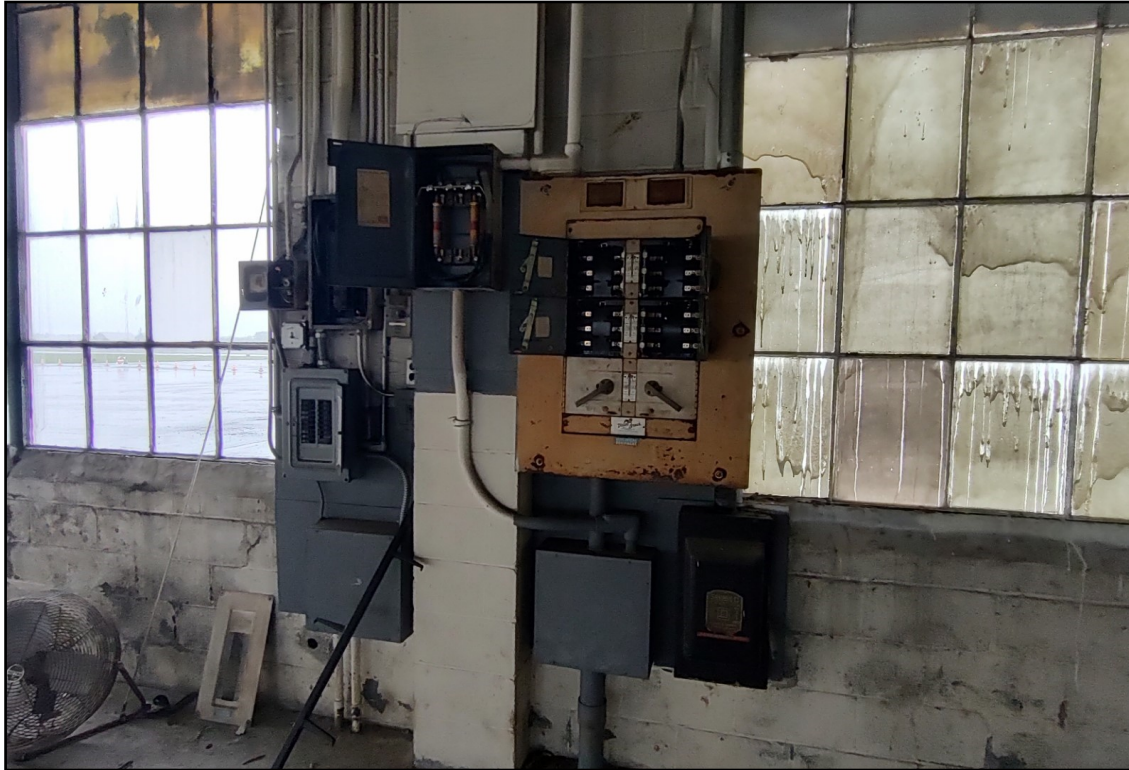
4. View of the interior of the Fire Station.



5. View of a test cut to inspect for the presence of Vermiculite within the CMU Block. Vermiculite was not identified in test cuts made by F&R.



6. View of electrical panels within the Fire Station.



7. View of electrical panels within the Fire Station.



8. View of a tank within the Fire Station.



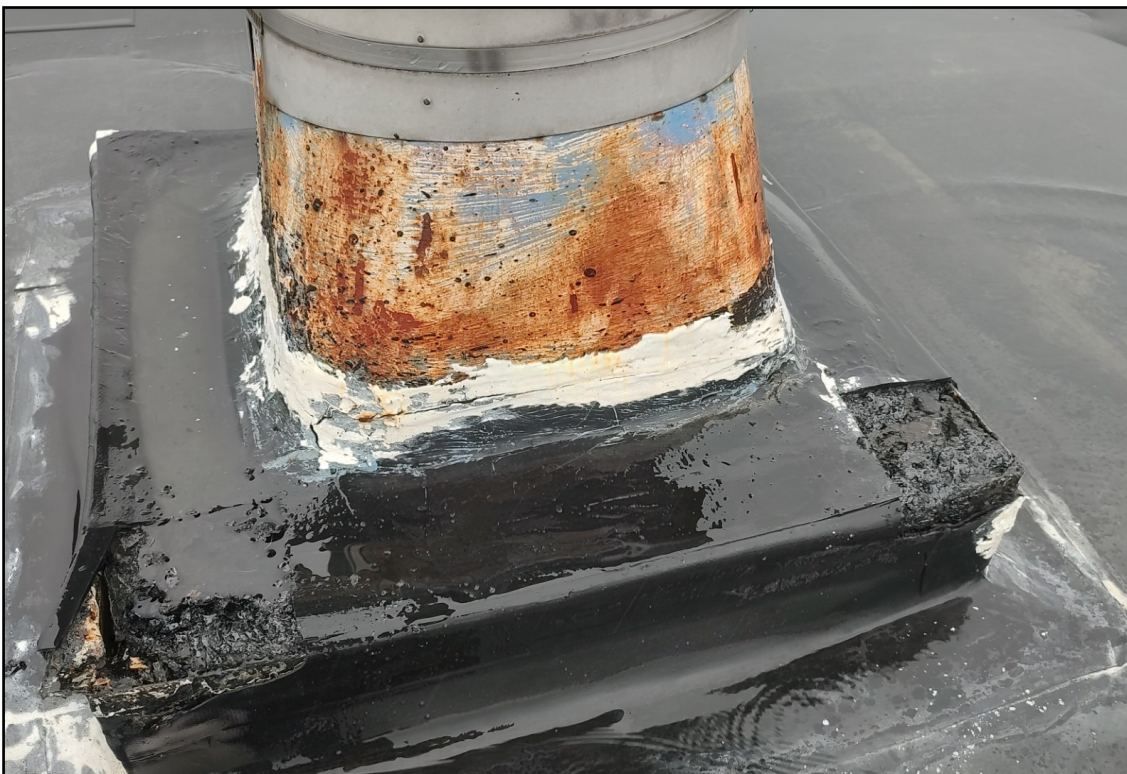
9. View of a portion of the Roof which was historically patched.



10. View of vent and exhaust pipes on the Roof.



11. View of HA #18—Black Adhesive at Vent Pipe Penetration on the Upper Main Roof at the North Center Area at the Vent Pipe. Laboratory analysis reports this material contains 2% Chrysotile.



12. View of HA #19—Tarry Material at Exhaust Vent Pitch Fan located on the Upper Main Roof at the North Center Area at the Exhaust Pipe. Laboratory analysis reports this material contains between 8-10% Chrysotile.



13. View of HA #20—Membrane, Rigid Fiber Board, and Cellulose-like Board located at the ~4-foot Wall at Roof Elevation Change between Western Low Main Roof and Upper Main Roof. Laboratory analysis reports a layer of this material contains 20% Chrysotile. Other layers examined by the laboratory were reported to contain Trace <1% Chrysotile, but such concentrations may be from contamination from the “Transite” layer.

**APPENDIX D – WASHINGTON COUNTY MARYLAND  
GOVERNMENT STRUCTURED CABLING SPECIFICATIONS  
2018**

---

**PAGE HAS BEEN INTENTIONALLY LEFT BLANK**

---



## AIRPORT TERMINAL EXPANSION

The intent of this document is to provide a standard specification that will be used for all Washington County Government facilities requiring structured cabling installations for networking devices. This document provides the performance criteria for the components and sub-systems comprising a complete cabling system that shall accommodate the Owner's requirements in excess, of ten years.

Product specifications, general design considerations, and installation guidelines are provided in this written document. Quantities of telecommunications outlets, typical installation details, cable routing and outlet types for a specific Customer facility will be provided as an attachment to this document. If the bid documents are in conflict, the written specification shall take precedence. The successful vendor shall meet or exceed all requirements for the cabling system described in this document. **It is the Contractors responsibility to ask questions and get clarifications from the owner.**

Washington County Maryland Government Cable Infrastructure Projects require a **Berk-Tek Leviton Technologies Structured Cabling System.**

**A Berk-Tek Leviton Technologies Warranty can only be provided and certified by an authorized Leviton Authorized Network Installation company, Leviton Premier Network Installation company, or Berk-Tek OASIS Certified Contractor. The bidding contractor must provide proof they hold a current Leviton Authorized Network Installation certification, Leviton Premier Network Installation certification, or Berk-Tek OASIS Certified Contractor certification status prior to the contract being awarded as a pre-qualification.**

The following are the standards and specifications that shall be followed by any Engineering or Contracting company performing business in Washington County Maryland Government facilities which affects the communication's infrastructure,

Leviton Network Solutions  
2222 222<sup>nd</sup> Street SE  
Bothell, Washington 98021  
Phone 425-486-2222  
Fax 425-485-3373  
Website [www.leviton.com](http://www.leviton.com)

Berk-Tek, A Nexans Company  
132 White Oak Road  
New Holland, PA 17557  
717-354-6200  
717-354-7944  
[www.berktek.com](http://www.berktek.com)

Program Web Site: [www.BerkTekLevitonTechnologies.com](http://www.BerkTekLevitonTechnologies.com)

## **COMMUNICATIONS CABLING**

### **GENERAL INFORMATION**

The Washington County Maryland Government Information Technology Department provides all of the technology services county-wide including infrastructure, program development, support and maintenance, data systems, and geographic information systems.

### **DESCRIPTION OF SPECIFICATIONS**

The work covered in this Specification consists of low voltage work including the design, installation, maintenance, and repair of the following equipment:

- Telephone systems
- Wireless Access Points
- LAN and various computer related systems
- Video Systems
- Other miscellaneous low voltage cabling

This document defines the cabling system and subsystem components to include cable, termination hardware, supporting hardware, and miscellaneous materials that the Contractor will furnish to install a complete telecommunications system supporting voice and data. The intent of this contract is to provide all pertinent information to allow the Contractor to bid the labor, materials supervision, tooling, and miscellaneous mounting hardware and consumables to install a complete system. However, it is the responsibility of the Contractor to propose any, and all items required for a complete system if not identified in the Bill of Materials attached to this specification. These specification supersede any other specifications.

### **TELECOMMUNICATIONS SYSTEMS DESCRIPTION**

Installer deploys four data circuits to each user outlet as a standard configuration. The data circuits are provided via four Category 6 cables to each outlet. Horizontal data cables are terminated on rack-mounted Category 6 patch panels, Horizontal data circuits are connected to LAN electronics within each TC.

A twenty-four strand OM3 50/125-micron multimode fiber optic backbone is employed between the data MC and each TC for data connectivity within the data MC and the TCs, backbone fiber strands are terminated and housed in rack-mount fiber optic enclosures.

Wireless (wi-fi) installations will require two Category 6A cabling system to each Wireless Access Point to comply with 802.11ac and future standards.

## **STANDARDS AND WARRANTIES**

### **REFERENCE STANDARDS**

ANSI/TIA-492.AAAB-B – Detail Specification for 850-nm Laser-Optimized, 50-um Core Diameter/125-um Cladding Diameter Class 1a Graded-index Multimode Optical Fibers (OM3/OM4). Current Edition

ANSI TIA-492-A Data Center Cabling

ANSI TIA-492.CAAB – Detail Specification for Class Iva Dispersion-Unshifted Single-Mode Optical Fibers with Low Water Peak. Current Edition

ANSI/TIA 526 – OFSTP-19 Optical Signal-to-Noise Ratio Measurement Procedures for Dense Wavelength-Division Multiplexed Systems.

ANSI/TIA-568-0-D – Generic Communications Cabling for Customer Premises..

ANSI/TIA-568-1-D – Commercial Building Communications Cabling Standard Part 1: General Requirements.

ANSI/TIA 568-C.2 – Balanced Twisted-Pair Telecommunications Cabling and Components Standards

ANSI/TIA 568-C.3 – Optical Fiber Cabling Components Standard

ANSI/TIA-569-D – Commercial Building Standard for Telecommunications Pathways and Spaces.

ANSI/TIA-606-B – Administration Standard for the Commercial Telecommunications Infrastructure.

ANSI/JSTD-607-C – Commercial Building Bonding and Grounding (Earthing) Requirements for Telecommunications.

NFPA 70 – National Electrical Code (NEC).

BICSI – TDMM, Building Industries Consulting Services International, Telecommunications Distribution Methods Manual (TDMM)

### **SUBMITTALS**

Product Data: Submit manufacturer's product data sheets, including installation instructions verifying that materials comply with specified requirements and are suitable for intended application.

Installer's Project References: Submit installer's list of successfully completed communications horizontal cabling projects, including project name and location, name of architect, and type and quantity of communications horizontal cabling installed.

## **QUALITY ASSURANCE**

Manufacturer's Qualifications: Manufacturer regularly engaged, for past 10 years, in manufacture of communications horizontal cabling of similar type to that specified.

Installer's Qualifications:

Contractor must be an approved Leviton Authorized Network Installer or Berk-Tek Oasis Integrator before, during, and through completion of the system installation. Supporting certification documentation will be required as part of the submittal.

The Contract will, in general, be awarded to the lowest qualified bidder. The Washington County Government reserves the right to accept or reject any or all bids in part or whole, whether from responsible bidders or otherwise, even though the bidder may not submit the lowest bid.

Washington County Government has sole discretion in determining the best interest of the county and to waive any informality deemed to be in the best interest of Washington County Government.

The Contractor will supply as built drawings/designs, all wiring, cabling and other equipment to meet the needs of any installation. The Contractor must maintain a minimum stock of parts and equipment to deal with any repair requests within 24 hours or one workday.

The Contractor is responsible for workmanship and installation practices in accordance with Leviton Installer Program and the Berk-Tek Oasis Program.

## **DELIVERY, STORAGE, AND HANDLING**

Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

Storage and Handling Requirements:

Store and handle materials in accordance with manufacturer's instructions.

Keep materials in manufacturer's original, unopened containers and packaging until installation.

Store materials in clean, dry area indoors.

Protect materials during storage, handling, and installation to prevent damage.

## **WARRANTY**

**The horizontal communications cabling system installed shall be eligible for coverage by a Limited Lifetime Warranty to the end user.**

Horizontal channels shall be completed with Leviton Network Solutions factory-terminated copper and/or fiber optic patch cords in order to be eligible for the applicable Berk-Tek or Leviton Warranty with channel performance guarantees.

Approved product shall be listed on the most recent version of the applicable Berk-Tek Leviton Technologies data sheets for each Berk-Tek Leviton Technologies solution.

Installer/ Integrator shall provide labor, materials, and documentation in accordance with Berk-Tek Leviton Network Technologies requirements necessary to ensure that the Owner will be furnished with a Limited Lifetime Warranty.

The installed structured cabling system shall provide a warranty guaranteeing installed channel performance above the ANSI/TIA 568-C requirements for Cat 6, and/or Cat 6A cabling systems or ISO 11801 requirements for Class D, Class E, and/or Class E<sub>a</sub>.

Standards-compliant channel or permanent link performance tests shall be performed in the field with a Berk-Tek Leviton Technologies approved certification tester in the appropriate channel or permanent link test configuration. See 1.8 A.1 above for channel requirements.

Necessary documentation for warranty registration shall be provided to the manufacturer by the installer (within 10 days) following 100 percent testing of cables.

Submit test results to Leviton Network Solutions or to Berk-Tek, in the certification tester's original software files.

Installer shall ensure that the warranty registration is properly submitted, with all required documentation within 10 days of project completion.

Contractor/Integrator must adhere to the terms and conditions of the respective manufacturer's warranty programs.

Installer shall ensure that the Washington County Government receives the Berk-Tek Leviton Technologies manufacturer issued project warranty certificate within 90 calendar days of warranty registration.

## **PRODUCT REQUIREMENTS**

### **MANUFACTURERS**

Leviton Network Solutions, 2222 222<sup>nd</sup> Street SE, Bothell, Washington 98021. Phone 425-486-2222.  
Website: [www.leviton.com](http://www.leviton.com).

Berk-Tek, A Nexans Company, 132 White Oak Road, New Holland, PA 17557 Phone: 717-354-6200.  
Website: [www.berktek.com](http://www.berktek.com).

Great Lakes Case & Cabinet, 4193 Route 6N, Edinboro, PA 16412 Phone: 866-879-4522  
Website: [www.greatcabinets.com](http://www.greatcabinets.com)

STI Specified Technologies Inc, 210 Evans Way, Somerville, NJ 08876 Phone: 800-992-1180  
Website: [www.stifirestop.com](http://www.stifirestop.com)

WBT 115 Harting Drive, Centralia, IL 62801, 618-918-3824  
Website: [www.wbtray.com](http://www.wbtray.com)

## **SYSTEM DESCRIPTION**

Horizontal Distribution Subsystem: Intra-building twisted-pair and fiber optic communications cabling connecting Telecommunication Rooms (TRs) to Telecommunication Outlets (TOs) located at individual work areas.

Horizontal Copper Cabling: Combination of the following types of cables from TR to TO:  
Category 6A (WAP locations) or Category 6 WO, (100-Ohm, 4-pair, unshielded twisted pair) cables from TRs to TOs, or Category 6A or Category 6 (100-Ohm, 4-pair, shielded twisted pair) cables from TRs to TOs.

Horizontal and Backbone Fiber Cabling: 50/125 µm, OM3, 850 nm Bend-insensitive Laser Optimized

Communications Horizontal Cabling System: Includes cables, jacks, patch panels, connecting blocks, patch cords, fiber connectors, fiber adapter plates, fiber enclosures, jumpers, and necessary support systems, such as cable managers and faceplates.

Cables: Route through conduit, cable trays, spaces below raised floors, open ceiling areas, non-ventilated spaces above ceiling tile, and through plenum air-handling spaces above ceiling tile.

Furnish and install all materials necessary for a complete and working communications horizontal cabling system.

## CABLING SYSTEMS MATERIAL SPECIFICATIONS

### WIRELESS ACCESS POINT CABLING-Category 6A Unshielded Twisted Pair **Category 6A UTP System**

- 100 ohm, Category 6A, 23 AWG, 4-pair unshielded twisted pair with innovative crosstalk prevention (XTP) technology. LANmark-XTP, CMP rated.
- Jacket Color: White.
- Electrical Characteristics: Characterized to 750 MHz.
- Cable: Third-party verified by ETL.
- Maximum Cable Diameter: 0.275 inch.
- Berk-Tek LANmark-XTP Category 6A CMP  
All category cabling manufacturers must be able to provide documentation from an independent third-party testing agency that verifies through random sampling that cable components perform at or above the levels contained on their product specifications, not simply at or above the standard.

- Channel margin guarantees for a **Category 6A UTP System** (margin vs. ANSI/TIA-568-C.2 and margin guarantees are for a 4-connector channel).

Insertion Loss	3 %
NEXT	5 dB
PSNEXT	6 dB
ACR-F (ELFEXT)	10 dB
PSACR-F (PSELFEXT)	10 dB
Return Loss	4 dB
ACR-N	7 dB
PSACR-N	7 dB
PSANEXT	5 dB
PSAACR-F	11 Db

#### Specified Vendor Product Selection:

Berk-Tek Category 6A, 23 AWG, 4-pair unshielded twisted pair with innovative crosstalk prevention (XTP) technology.

Berk-Tek LANmark-XTP, White jacket CMP Plenum rated  
**Berk-Tek Part Number 11082058**

#### Category 6A Modular Jacks: **Category 6A UTP System**

8-position eXtreme QuickPort modular jack, Category 6A, IDC terminals, T568A/B wiring scheme.

Channel-rated jack.

Each Jack: Identified on its face as CAT 6A.

Jack Color: WHITE.

**Leviton Part Number 6110G-RW6 (White).**

**WORKSTATION CABLING -Category 6 Unshielded Twisted Pair: Category 6 UTP System**

- 100 ohm, Category 6, 23 AWG, 4-pair unshielded twisted pair,Berk-Tek LANmark 1000, CMP rated.
- Jacket Color: Blue.
- O.D. 0.230"
- Electrical Characteristics: Characterized to 550 MHz.
- Each Pair in Cable: Insulated with FEP.
- Cable: Third-party verified by ETL.
- Berk-Tek LANmark-1000 CMP

All category cabling manufacturers must be able to provide documentation from an independent third-party testing agency that verifies through random sampling that cable components perform at or above the levels contained on their product specifications, not simply at or above the standard.

Channel margin guarantees for a **Category 6 UTP System** (margin vs. ANSI/TIA-568-C.2 and margin guarantees are for a 4-connector channel).

Insertion Loss	5 %
NEXT	6 dB
PSNEXT	6 dB
ACR-F (ELFEXT)	8 dB
PSACR-F (PSELFEXT)	9 dB
Return Loss	3 dB
ACR-N	7 dB
PSACR-N	8 dB

- Specified Vendor Product Selection:

Category 6, 23AWG, 4-pair unshielded twisted pair cable  
Berk-Tek LANmark 1000, Jacket Color BLUE CMP Rated  
**Part Number 11074694 (1500' SmartPak box)**  
**Part Number 10032094 (1000' TekPak box)**

Category 6 Modular Jacks: Cat 6 UTP System

8-position Leviton eXtreme QuickPort modular jack, Category 6,  
IDC terminals, T568A/B wiring scheme, component-rated jack.  
Each Jack: Identified on its face as CAT 6. Color: Blue  
**Part Number: Leviton 61110-RL6 (blue)**

**VIDEO CAMERA CABLING -Category 6 Unshielded Twisted Pair: Category 6 UTP System**

- 100 ohm, Category 6, 23 AWG, 4-pair unshielded twisted pair,Berk-Tek LANmark 1000, CMP rated.
- Jacket Color: Green
- O.D. 0.230"
- Electrical Characteristics: Characterized to 550 MHz.
- Each Pair in Cable: Insulated with FEP.
- Cable: Third-party verified by ETL.
- Berk-Tek LANmark-1000 CMP

All category cabling manufacturers must be able to provide documentation from an independent third-party testing agency that verifies through random sampling that cable components perform at or above the levels contained on their product specifications, not simply at or above the standard.

Channel margin guarantees for a **Category 6 UTP System** (margin vs. ANSI/TIA-568-C.2 and margin guarantees are for a 4-connector channel).

Insertion Loss	5 %
NEXT	6 dB
PSNEXT	6 dB
ACR-F (ELFEXT)	8 dB
PSACR-F (PSELFEXT)	9 dB
Return Loss	3 dB
ACR-N	7 dB
PSACR-N	8 dB

- Specified Vendor Product Selection:

Category 6, 23AWG, 4-pair unshielded twisted pair cable  
Berk-Tek LANmark 1000, Jacket Color GREEN CMP Rated  
**Part Number 11074895 (1500' SmartPak box)**  
**Part Number 10032097 (1000' TekPak box)**

Category 6 Modular Jacks: Cat 6 UTP System

8-position Leviton eXtreme QuickPort modular jack, Category 6,  
IDC terminals, T568A/B wiring scheme, component-rated jack.  
Each Jack: Identified on its face as CAT 6. Color: Green  
**Part Number: Leviton 61110-RV6 (Green)**

**TELEVISION CABLING -Category 6 Unshielded Twisted Pair: Category 6 UTP System**

- 100 ohm, Category 6, 23 AWG, 4-pair unshielded twisted pair, Berk-Tek LANmark 1000, CMP rated.
- Jacket Color: Black
- O.D. 0.230"
- Electrical Characteristics: Characterized to 550 MHz.
- Each Pair in Cable: Insulated with FEP.
- Cable: Third-party verified by ETL.
- Berk-Tek LANmark-1000 CMP

All category cabling manufacturers must be able to provide documentation from an independent third-party testing agency that verifies through random sampling that cable components perform at or above the levels contained on their product specifications, not simply at or above the standard.

Channel margin guarantees for a **Category 6 UTP System** (margin vs. ANSI/TIA-568-C.2 and margin guarantees are for a 4-connector channel).

Insertion Loss	5 %
NEXT	6 dB
PSNEXT	6 dB
ACR-F (ELFEXT)	8 dB
PSACR-F (PSELFEXT)	9 dB
Return Loss	3 dB
ACR-N	7 dB
PSACR-N	8 dB

- Specified Vendor Product Selection:

Category 6, 23AWG, 4-pair unshielded twisted pair cable  
Berk-Tek LANmark 1000, Jacket Color BLACK CMP Rated  
**Part Number 11074899 (1500' SmartPak box)**  
**Part Number 10032208 (1000' TekPak box)**

Category 6 Modular Jacks: Cat 6 UTP System

8-position Leviton eXtreme QuickPort modular jack, Category 6, IDC terminals, T568A/B wiring scheme, component-rated jack.

Each Jack: Identified on its face as CAT 6. Color: BLACK

**Part Number: Leviton 61110-RE6 (black)**

For the TV's a LYNX Broadband Adapter shall be used (Cat 6 on the backside and coax on the front)

## MODULAR JACKS AND FIBER ADAPTERS FOR WORKSTATION OUTLETS

Category 6A and Category 6 Modular Jacks:

- 8-position modular jack, Category 6A and Category 6, IDC terminals, T568A/B wiring scheme.
- The modular connector shall exceed all component performance requirements in the ANSI/TIA-568-C.2 standard for Augmented Category 6 from 1 MHz to 500 MHz to support the IEEE 802.3an standard for 10GBASE-T network performance
- The Modular Connector shall be terminated without the need for any punch down tool or other specialized or proprietary termination tool.
- The Connector Module shall feature a termination wire manager that holds individual conductors in place during termination.
- The Modular Connector termination method shall be consistent with the termination method available for UTP modules from the same manufacturer. The same termination method shall also be consistent with 6 and 6A shielded modules from the same manufacturer.
- The Modular Connector shall be reusable and support multiple termination and re-termination cycles and be facilitated by simple termination release levers.
- The modular connector shall be independently tested and verified by Intertek (ETL) to exceed Category 6A and Category 6 component performance.
- The eight-position connector module shall utilize a method of line tensioning that prevents six-position modular plug insertion from damaging either the cord or the module.
- The connector body shall be made of die-cast zinc and all plastic components shall be made of high-impact, fire-retardant plastic rated UL 94V-0.
- The connector shall also be in compliance with all National Electrical Codes; compliant with ANSI/TIA-1096-A (formerly FCC Part 68); cULus Listed; and independently tested for component compliance.
- In addition to Category 6A and Category 6 component compliance, the connector shall have the ability to support high megabit and shared sheath applications.
- Connector wiring shall be universal and will accommodate both T568A and T568B pair/pin assignments.
- The connector shall incorporate a triple-stage compensation design with integrated flexible circuit design that enhances link and channel performance.
- The modular connector shall fit a range of telecommunications faceplates, outlets, and field-configurable patch panels.
- The modular connector shall be available in 13 TIA 606-A compatible colors.
- Connector Modules shall be available with an internal shutter option to protect against dust and debris
- Connector Module shall have a maximum depth of 1.31"
- Each connector shall be identified on its face as CAT 6A or CAT 6.
- Basis for design: Leviton eXtreme UTP Category 6A and Category 6 Connector.

**All jack colors are to match cable colors:**

<b>Wireless Access Points:</b>	<b>White</b>
<b>Data:</b>	<b>Blue</b>
<b>Camera:</b>	<b>Green</b>
<b>Television:</b>	<b>Black</b>

## WORK AREA OUTLETS

### Flush-Mounted Stainless Steel ANGLED Faceplates:

Use 4-port flush ANGLED QuickPort faceplates. Faceplates shall be constructed of 304 Grade Stainless Steel in a brushed finish to provide corrosion resistance in a non-magnetic material and fit NEMA electrical boxes. Each faceplate shall contain four Category 6 jacks for data. There shall be four Category 6 cables terminated as noted in 3.1 above. Each port shall be provided with an icon to indicate its function. Faceplates shall accommodate two labels and provide a clear polycarbonate cover for each. Faceplates shall be LEVITON part number 43081-2L4 or an approved equivalent. The faceplates shall be mounted to in-wall single gang boxes

#### Specified Vendor Product Selection

4-port dual-gang Stainless Steel ANGLED wallplate with ID windows.

Stainless Steel Plates

**Part Number: Leviton 43081-2L4**

## WIRELESS ACCESS POINT OUTLETS

In-Ceiling Brackets - Mounting QuickPort Jacks, Connectors, 1 & 2 Port Surface Mounted Box, with 10 foot Slack Loops.

#### Specified Vendor Product Selection

QuickPort In-Ceiling 2 Port Bracket, includes clip for drop wire/rod

Colors: Metal

Part Number: Leviton 49223-CBC.

QuickPort In-Ceiling 2 Port Bracket, no clip .

Colors: Metal

**Part Number: Leviton 49923-CB0.**

## COPPER RACKMOUNT PATCH PANELS

Modular Patch Panels: **Category 6A UTP System and Category 6 UTP System**

Specified Vendor Product Selection – QuickPort Patch Panel with Magnifying Lens Label Holder. Cable Management bar included. Suitable to accept all colors of QuickPort modular jacks and adapters. These panels are unloaded. The panel fits all industry-standard 19-inch racks and cabinets. The installer must obtain QuickPort modular jacks to insert based on solution color.

All jack colors are to match cable colors:

Wireless Access Points: White

Data: Blue

Camera: Green

Television: Black

Specified Vendor Product Selection

**24-port, flat panel, Part Number: Leviton 49255-L24.**  
**48-port, flat panel, Part Number: Leviton 49255-L48**

## **OPTICAL FIBER CABLE, OM3 FIBER OPTIC SYSTEM:**

Each Multimode Fiber shall be:

- Graded-index optical fiber wave-guide with nominal OM4 50/125µm-core/cladding diameter.
- The fiber shall comply with the latest revision of ANSI/EIA/TIA-492AAAC.
- Attenuation shall be measured in accordance with ANSI/EIA/TIA-455-78.
- Information transmission capacity shall be measured in accordance with the latest revision of ANSI/EIA/TIA-455-204.
- The measurements shall be performed at 23°C ± 5°C.
- Maximum attenuation dB/km @ 850/1300 nm: 3.0/1.0
- EMB Bandwidth 2000 MHz-km @ 850nm.
- OFL Bandwidth 500 MHz-km @ 1300nm.
- Optical Fiber shall be Bend-insensitive Laser Optimized and guarantee 1Gigabit Ethernet distances of 1000m/600m for 850nm and 1300nm, respectively.
- Optical fiber shall guarantee a 10 Gigabit Ethernet distance of 300m at 850nm

Physical Characteristics:

- Shall be suitable for use in indoors or in indoor/outdoor applications.
- Appropriately flame rated optical cable shall be suitable for use in risers, plenums and horizontal applications.
- Plenum rated optical cables shall have and be marked with an UL-OFNP and OFN FT6 Flame Rating. Riser rated optical cables shall have and be marked with an UL-OFNR and OFN FT4 Flame Rating
- Shall comply with the requirements of ICEA S-83-596 (Premises), ICEA S-104-696 (I/O), or ANSI/ICEA S-87-640 (Outside Plant, OSP).
- Suitable for underground or aboveground conduits.
- Optical cables and fibers shall be color coded in accordance with EIA/TIA-598-C.
- Shall have a ripcord for overall jacket.

Specified Vendor Product Selection:

Berk-Tek INDOOR/OUTDOOR Plenum ARMORED optical fiber cable  
with OM3 Bend-insensitive Laser Optimized 50/125 micron fiber (24 Bend-insensitive Laser Optimized optical fibers, Indoor/Outdoor Tight Buffer)  
**Berk-Tek Part Number: PDPK024EB3010/25-I/O-C4C5(AQU)**

## **FIBER OPTIC TERMINATION ENCLOSURES and SPLICE TRAYS.**

Opt-X 1000i SDX Fiber Optic Enclosures: all metal enclosure, rack mountable, holds various fiber adapter plates, splice trays, or MTP modules, based on connector choice and density requirements.

- 1RU Opt-X 1000i rack-mount Fiber Optic Enclosure, empty, with sliding tray.
- Capacity: 72 fiber strands (LC), 3 fiber adapter plates and 3 splice trays, or 3 MTP modules Part Number: Leviton 5R1UM-S03.
- 2RU Opt-X 1000i rack-mount Fiber Optic Enclosure, empty, with sliding tray.
- Capacity: 144 fiber strands (LC), 6 fiber adapter plates and 6 splice trays, or 6 MTP modules Part Number: Leviton 5R2UM-S06.
- 3RU Opt-X 1000i rack-mount Fiber Optic Enclosure, empty.
- Capacity: 216 fiber strands (LC), 9 fiber adapter plates and 9 splice trays, or 9 MTP modules Part Number: Leviton 5R3UM-F09.
- 4RU Opt-X 1000i rack-mount Fiber Optic Enclosure, empty.
- Capacity: 288 fiber strands (LC), 12 fiber adapter plates and 12 splice trays, or 12 MTP modules Part Number: Leviton 5R4UM-F12.

Opt-X 1000 Fiber Optic Wall-mount Enclosures: All metal enclosure, holds various fiber adapter plates, splice trays, or MTP modules, based on connector choice and density requirements. Part numbers shown have a split metal door with key lock.

- Small Opt-X 1000 wall-mount Fiber Optic Enclosure, empty.
- Capacity: 48 fiber strands (LC), 2 fiber adapter plates  
Part Number: Leviton 5W120-00N.
- Medium Opt-X 1000 wall-mount Fiber Optic Enclosure, empty.
- Capacity: 96 fiber strands (LC), 4 fiber adapter plates and 6 splice trays  
Part Number: Leviton 5W320-00N.
- Large Opt-X 1000 wall-mount Fiber Optic Enclosure, empty.
- Capacity: 288 fiber strands (LC), 12 fiber adapter plates and 6 splice trays  
Part Number: Leviton 5W720-00N.

## **FIBER OPTIC ADAPTER PLATES**

50µm Laser-optimized Multimode (LOMM) SDX Adapter Plates, for **OM3 50/125µm Fiber Optic System**

- 6-LC duplex (12-fiber) multimode OM3/OM4, aqua adapter plate, zirconia-ceramic sleeves. Part Number: Leviton 5F100-2QL.
- 6-SC duplex (12-fiber) multimode OM3/OM4, aqua adapter plate, zirconia-ceramic sleeves. Part Number: Leviton 5F100-2QC

## **FIBER OPTIC CONNECTORS**

OM3 and OM4 Laser-optimized Multimode (LOMM) Field Installable Fiber Optic Connectors (aqua):  
Use for OM3 50/125µm Fiber Optic System

- FastCam LC Connector Part Number: Leviton 49991-LLC

- FastCam SC Connector Part Number: Leviton 49991-LSC

## **PATCH CORDS/JUMPERS**

Atlas-X1 Category 6A Modular Patch Cords:

Cat 6A UTP System Slim-Line style, Category 6A, shielded cord  
4-pair, stranded wire construction.

Part Numbers: WIRELESS ACCESS POINT PATCH CORD ASSEMBLIES

- **Leviton 6AS10-03W (3 feet, White)**
- **Leviton 6AS10-05W (5 feet, White)**
- **Leviton 6AS10-07W (7 feet, White)**
- **Leviton 6AS10-10W (10 feet, White)**
- **Leviton 6AS10-15W (15 feet, White)**
- **Leviton 6AS10-20W (20 feet, White)**

Atlas-X1 Category 6 Modular Patch Cords:

Cat 6 UTP System Slim-Line style, Category 6 UTP patch cord,  
4-pair, stranded wire construction.

Part Numbers: DATA PORT PATCH CORD ASSEMBLIES

- **Leviton 6D560-03L (3 feet, Blue)**
- **Leviton 6D560-05L (5 feet, Blue)**
- **Leviton 6D560-07L (7 feet, Blue)**
- **Leviton 6D560-10L (10 feet, Blue)**
- **Leviton 6D560-15L (15 feet, Blue)**
- **Leviton 6D560-20L (20 feet, Blue)**

Part Numbers: CAMERA PATCH CORD ASSEMBLIES

- **Leviton 6D560-03G (3 feet, Green)**
- **Leviton 6D560-05G (5 feet, Green)**
- **Leviton 6D560-07G (7 feet, Green)**
- **Leviton 6D560-10G (10 feet, Green)**
- **Leviton 6D560-15G (15 feet, Green)**
- **Leviton 6D560-20G (20 feet, Green)**

Part Numbers: TELEVISION PORT PATCH CORD ASSEMBLIES

- **Leviton 6D560-03E (3 feet, Black)**
- **Leviton 6D560-05E (5 feet, Black)**
- **Leviton 6D560-07E (7 feet, Black)**
- **Leviton 6D560-10E (10 feet, Black)**
- **Leviton 6D560-15E (15 feet, Black)**
- **Leviton 6D560-20E (20 feet, Black)**

OM3 Fiber Optic System: Factory-terminated, double-ended, 2-strand multimode cordage, color (aqua).

Duplex LC-Duplex LC:

- **Leviton 5LDLC-M01 (1 meter)**
- **Leviton 5LDLC-M02 (2 meter)**
- **Leviton 5LDLC-M03 (3 meter)**
- **Leviton 5LDLC-M05 (5 meter)**
- **Leviton 5LDLC-M10 (10 meter)**

Duplex SC-Duplex SC:

- **Leviton 5LDSC-M01 (1 meter)**
- **Leviton 5LDSC-M02 (2 meter)**
- **Leviton 5LDSC-M03 (3 meter)**
- **Leviton 5LDSC-M05 (5 meter)**
- **Leviton 5LDSC-M10 (10 meter)**

## DISTRIBUTION RACKS AND WIRE MANAGEMENT

### DISTRIBUTION RACKS

Distribution racks shall be from **Great Lakes Case & Cabinet:**

- 2 Post Distribution Rack  
Two Post Rack with mounting hardware:  
84" x 20.31W X 14"D, 45 RMU  
1500lb capacity  
Black anodized finish

Specified Vendor Product Selection

#### **Great Lakes Case & Cabinet P/N GLRR-1984BA**

- 4 Post Distribution Rack  
Four Post Rack with Variable Depth with mounting hardware:  
84"H, Variable depth 4 Post Rack, 45 RMU  
Side rail offers variable depth from 24-36"  
Black anodized finish

Specified Vendor Product Selection

#### **Great Lakes Case & Cabinet P/N VD4P1224-2436**

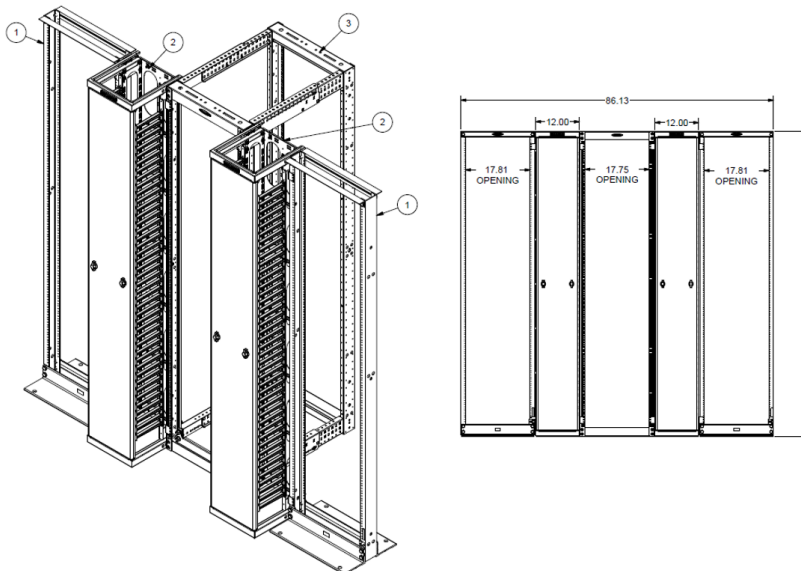
### WIRE MANAGEMENT

- Metal Vertical Cable Management  
12" Channel x 80"Length  
Vertical Front Only Manager, includes dual hinged cover

Specified Vendor Product Selection

#### **Great Lakes Case & Cabinet P/N VCM12**

**BASIS OF RACK LAYOUT Figure 3.0**

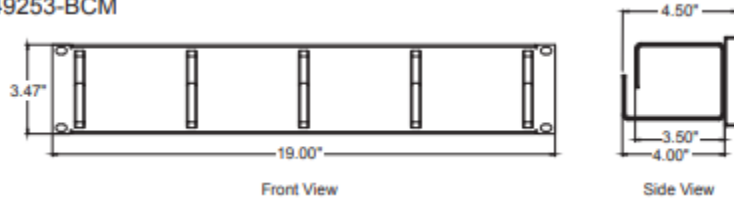


- Horizontal Cable Management for rack mount systems  
2U Horizontal Wire Manager with Snap On Cover  
Front Only Manager, includes cover

Specified Vendor Product Selection

**Leviton P/N 49253-BCM**

49253-BCM



## **FIRESTOP SYSTEMS – COMMUNICATIONS CABLING**

A firestop system is comprised of: the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure. Firestop systems comprise an effective block for fire, heat, vapor and pressurized water stream.

All penetrations through fire rated building structures (walls and floors) shall be sealed with an appropriate firestop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating items i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly fire stopped.

### **Product Specifications**

Firestop systems shall be UL Classified to ASTM E814 (UL 1479) and shall be approved by a qualified Professional Engineer (PE), licensed (actual or reciprocal) in the state where the work is to be performed. A drawing showing the proposed fire stopped system, stamped/embossed by the cognizant PE shall be provided to the County's Technical Representative prior to installing the firestop system(s).

### **Firestop System Installation**

All firestop systems shall be installed in accordance with the manufacturer's recommendations and shall be completely installed and available for inspection by the local inspection authorities prior to cable system acceptance.

## **FIRESTOP PERFORMANCE REQUIREMENTS**

Fire rated cable pathway devices shall be used in fire-rated construction for ALL low-voltage, video, data and voice cabling, optical fiber raceways and certain high-voltage cabling where frequent cable moves, adds and changes may occur. Pathways required for high voltage cabling will be detailed on the prints. Such devices shall:

- Meet the hourly fire-rating of fire rated wall and or floor penetrated.
- Be tested for the surrounding construction and cable types involved.
  - Have UL Systems permitting cable loads from; “Zero to 100% Visual Fill.” This requirement eliminates need for fill-ratio calculations to be made by cable technicians to ensure cable load is within maximum allowed by UL System.
  - Not have inner fabric liner that tightens around and compresses cables tightly together encouraging potential cable damage or interference.
  - Be “Zero-Maintenance”, zero-maintenance is defined as; No action required by cabling technician to open and/or close pathway for cable moves, adds or changes, such as, but not limited to:
    - Opening or closing of doors.

- Spinning rings to open or close fabric liner.
  - Removal and or replacement of any material such as, but not limited to, firestop caulk, putty, pillows, bags, foam muffins, foam, foam plugs, foam blocks, or foam closures of any sort.
  - Evaluation Services Report (ESR) from an accredited Nationally Recognized Third-party Laboratory certifying compliance with this definition of "Zero-Maintenance" and all relevant codes and standards.
- Pathways shall be engineered such that two or more devices may be ganged together for larger cable capacities.
- Pathways shall be engineered to be re-enterable so they can be retrofitted and removed from around existing cables without cutting and re-splicing them.
- Cable Pathway Devices passing vertically through floors shall have equal F & T Rating. (See UL System # F-A-3037, Item #4 "EZ-PATH Grid T-Rating Kit" Part # TRK444)
- Affix adhesive wall label immediately adjacent to devices to communicate to future cable technicians, authorities having jurisdiction and others the manufacturer of the device and the corresponding UL System number installed.
- Non rated cable pathway devices shall be used in non-fire-rated construction for ALL low-voltage, video, data and voice cabling, optical fiber raceways and certain high-voltage cabling where frequent cable moves, adds and changes may occur. Pathways required for high voltage cabling will be detailed on the prints. Such devices shall:
  - Limit the movement of smoke and sound of wall and or floor penetrated.
  - Restore the STC Rating of the penetrated assembly.
  - Provide L Ratings of <1 CFM when empty and <2.5 CFM at all other loading up to 100 percent.
  - Accommodate cable loads from; "Zero to 100% Visual Fill."
  - Not have inner fabric liner that tightens around and compresses cables tightly together encouraging potential cable damage or interference.
  - Pathways shall be engineered such that two or more devices may be ganged together for larger cable capacities.
  - Pathways shall be engineered to be re-enterable so they can be retrofitted and removed from around existing cables without cutting and re-splicing them.
  - Affix adhesive wall label immediately adjacent to devices to communicate to future cable technicians, authorities having jurisdiction and others the manufacturer of the device and the corresponding UL System number installed.

- Be “Zero-Maintenance”, zero-maintenance is defined as; No action required by cabling technician to open and/or close pathway for cable moves, adds or changes, such as, but not limited to:
  - Opening or closing of doors.
  - Spinning rings to open or close fabric liner.
  - Removal and or replacement of any material such as, but not limited to, firestop caulk, putty, pillows, bags, foam muffins, foam, foam plugs, foam blocks, or foam closures of any sort.
  - Furnish letter from manufacturer certifying compliance with this definition of “Zero-Maintenance”.
- As an alternate to using a fire-rated or non-rated cable pathway device for single low voltage cables (up to 0.27 in. (7 mm) O.D) penetrating one or two-hour, gypsum board/stud wall assemblies or non-rated assemblies, either as a through-penetration or as a membrane-penetration, a fire-rated cable grommet may be substituted. The product shall consist of a molded, two-piece, plenum-rated grommet having a foam fire and smoke sealing membrane that conforms to the outside diameter of the individual cable. The grommet product shall be capable of locking into place to secure the cable penetration within the wall assembly. The grommet shall be UL Classified and tested to the requirements of ASTM E814 (UL1479) and CAN/ULC S115.
- Where non-mechanical pathways must be utilized, such as sealing (caulking) around single or grouped conduits, provide products that upon curing do no re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during or after construction. Provide letter from manufacturer certifying compliance with this section.
- Cable pathway shall replace conduit sleeves in walls and floors, and;
  - When installed individually in floors, devices shall pass through core-drilled opening utilizing tested floor plates.
  - When multiple units are ganged in floors, devices shall be anchored by means of a tested grid.
  - When installed individually in walls, devices shall pass through core drilled opening utilizing tested wall plates or integrated flanges.
  - When multiple units are ganged in walls, devices shall be anchored by means of a tested grid.
- Cable tray shall terminate at each barrier and resume on the other side such that cables pass independently through devices. Cable tray shall be properly supported on each side of the barrier.

- **FIRESTOP MANUFACTURERS**

Acceptable Manufacturer: Specified Technologies Inc., 210 Evans Way, Somerville, NJ 08876. Tel: (800) 992-1180, Fax: (908) 526-9623, Email: techserv@stifirestop.com, Website: www.stifirestop.com.

Substitutions: Not permitted. No known equal.

Single Source: Obtain firestop systems for each type of penetration and construction condition indicated only from a single manufacturer

## **FIRESTOP MATERIALS**

General: Use only products that have been tested for specific fire resistance rated construction conditions or acoustical and smoke related requirements conforming to construction assembly type, penetrating item type, annular space requirements, and rating involved for each separate instance.

Fire-Rated Cable Pathways: STI EZ-PATH® Fire-Rated Pathway device modules comprised of steel pathway with self-adjusting intumescent foam pads allowing 0 to 100 percent cable fill, the following products are acceptable:

### **Specified Vendor Product Selection**

- Specified Technologies Inc. (STI) EZ-PATH® Fire Rated Pathway

Smoke and Acoustical Pathways: STI EZ-PATH® Smoke & Acoustical Pathway device module comprised of a nonmetallic pathway with integral self-adjusting smoke and sound sealing system for cable penetrations through non-fire-resistance rated wall or floor assemblies, the following products are acceptable:

### **Specified Vendor Product Selection**

- Specified Technologies Inc. (STI) EZ-PATH® Smoke & Acoustical Pathway; Model No. NEZ33 or NEZ33CK

## HORIZONTAL CABLE TRAY – COMMUNICATIONS CABLING PATHWAYS

### CABLE TRAY

- Cable Tray Materials shall consist of tray sections, tray fittings, connectors, supports and all accessories as required for a complete and permanent Cable tray infrastructure. Provide all incidental and/or miscellaneous hardware not explicitly specified or shown on the contract documents that is required for a fully operational and warranted system.
- Cable tray components shall be manufactured by a single manufacturer.  
Components shall not be intermixed between different manufacturers.  
The cable tray manufacturer shall be:
  - a. WBT Shaped Wire series, or approved equivalentSubstitution is not acceptable unless the cable tray manufacturer has been pre-approved prior to bidding. Contractors, in order to obtain approval for cable tray manufacturer substitution, shall submit their request for substitution to the Engineer at least two weeks prior to the bid date. Approval or denial of a substitution request will be based on upon the sole judgment of the Engineer.
- Product Specifications:
  - 1. Carbon steel wire, ASTM A653, Continuous galvanization before fabrication. Additional finishing not required.
- Cable Tray Finishes:
  - Finish for Carbon Steel Wire after welding;
  - Orange powder-coated surface treatment,
- Cable tray will consist of continuous, rigid, welded steel wire mesh cable management system, to allow continuous ventilation of cables and maximum dissipation of heat, with UL Classified splices where tray acts as Equipment Grounding Conductor (EGC). Wire mesh cable tray will have continuous T-welded top wire to protect cable insulation and installers. All cross wires to be WBT's **SHAPED** wire for maximum support.
- Provide splices, supports, and other fittings necessary for a complete, continuously grounded system.
  - Mesh: 2 x 4 inches.
  - Straight Section Lengths: 118 inches.
  - Wire Diameter: 5mm minimum construction as specified by manufacturer drawings.
  - Continuous T-Weld top wire to protect cable insulation and installers' hands.
  - Fittings: PreForm UL Classified fittings for pathway transitions (90's, Tee's and Intersections), or utilize standard field-fabricated tray fittings from straight tray sections, in accordance with manufacturer's instructions and Item 2.3.
- Cable Tray Size:

- Depth: Cable tray depth will be 6 inches
- Width: Cable tray width will be 20 inches
- Length: Cable tray section length will be 118 inches
- Fill Ratio: Cable tray may be filled to 60% of total fill capacity. Size cable tray to accommodate future cabling changes or additions.

Specified Vendor Product Selection

- **WBT Part Number: WBT6x20 S ORG**
- Load Span Criteria:  
Install and support cable management system in accordance with the following:  
[NEMA VE-1 (2002), with Safety Factor of 1.5]

Cable tray will be capable of carrying a uniformly distributed load of pounds per foot on a support span, according to load tests of standard shown in above.

## CABLE TRAY SUPPORTS & ACCESSORIES

- Fittings/Support:
- Wire mesh cable tray fittings are to utilize WBT Pre Form parts or field-fabricated from straight tray sections, in accordance with manufacturer's instructions
- Ceiling-mounted supports mount to ceiling structure directly or with ¼", 3/8" or ½" threaded rod.
- Wall-mounted supports.
- Underfloor supports mount directly to floor or to floor posts.
- Splices, including those approved for electrical continuity (bonding), as recommended by cable tray manufacturer.
  - Accessories: As required to protect, support, and install a cable tray system.

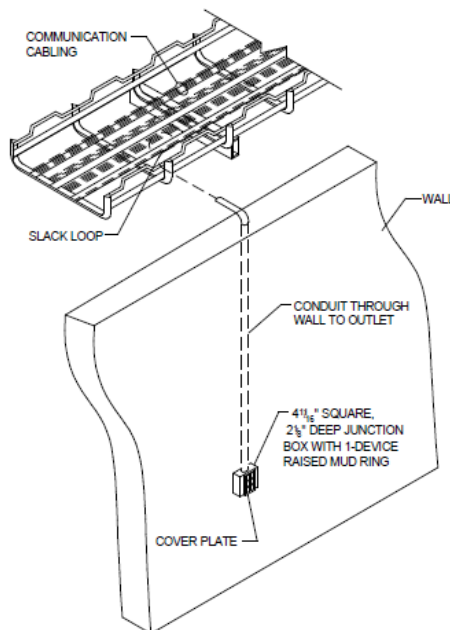
## **EXECUTION INSTALLATION – GENERAL**

### **INSTALLATION – COPPER UTP CABLES**

- Examine areas to receive communications horizontal cabling.
- Notify Architect of conditions that would adversely affect installation or subsequent use.
- Do not begin installation until unacceptable conditions are corrected.
- Install communications horizontal cabling in accordance with manufacturer's instructions, ANSI/TIA-568-C.0, ANSI/TIA-568-C.1, ANSI/TIA-569-C, BICSI TDM, and NFPA 70.
- Field Terminated Copper and Fiber Optic Patch Cords and Jumpers: Not allowed.
- Copper Patch Cords and Fiber Jumpers: Manufactured by Leviton Network Solutions.
- Install cables after building interior has been physically protected from weather and mechanical work likely to damage cabling has been completed.
- Ensure cable pathways are completely and thoroughly cleaned before installing cabling.
- Inspect installed conduit, wireway, cable trays, and innerduct.
- Clean additional enclosed raceway and innerduct systems furnished.
- Provide protection for exposed cables where subject to damage.
- Abrasion Protection:
  - Provide abrasion protection for cable or wire bundles which pass through holes or across edges of sheet metal.
  - Use protective bushings to protect cables.
- Cable Ties and Other Cable Management Clamps:
  - No more than hand tightened.
  - Fit snugly, but not compress, crimp, or otherwise change physical characteristics of cable jacket or distort placement of twisted-pair components.
  - Replace cables exhibiting stresses due to over tightening of cable management devices.
  - Use plenum-rated cable ties in plenum spaces.
  - Velcro wraps are preferred over cable ties for all cable bundles. Plenum-rated Velcro wraps are available from Leviton.
- Where possible, route cables in overhead cable trays and inside wire management systems attached to equipment cabinets and racks.
  - Use Velcro, plastic ties or ducts to restrain cabling installed outside of wire management systems on racks or in cabinets.
- Cable Trays: Do not exceed 50 percent fill.

- Cable Raceways: Do not fill greater than ANSI/TIA-569-B maximum fill for particular raceway type.
- When not in horizontal cable tray, support horizontal cables at a maximum of 48-inch (1.2 to 1.5-m) irregular intervals, if J-hook or trapeze system is used to support cable bundles.
- Do not allow cables to rest on acoustic ceiling grids, plumbing pipes, or electrical conduits.
- Bundle horizontal distribution cables in groups of no more than amount of cables designed for by cable support manufacturer, based on cable OD and weight.
- Fire-Sprinkler System:
  - Install cables above fire-sprinkler system.
  - Do not attach cables to fire-sprinkler system or ancillary equipment or hardware.
  - Install cable system and support hardware so that it does not obscure valves, fire alarm conduit, boxes, or other control devices.
- Do not attach cables to ceiling grid or lighting fixture wires.
- Install appropriate carriers to support cabling, where support for horizontal cables are required.
- Replace before final acceptance, cables damaged or exceeding recommended installation parameters during installation.
- All Communication cables from horizontal cabletray to outlets must be in 1" metal conduit as shown in Figure 6.0

**FIGURE 6.0**



- Install unshielded twisted-pair cables in accordance with manufacturer's instructions.
- Install cables in continuous lengths from origin to destination, without splices, except for transition points or consolidation points.
- Where transition points or consolidation points are allowed, they shall be located in accessible locations and housed in enclosure intended and suitable for the purpose.
- Cable Minimum Bend Radius and Maximum Pulling Tension:
  - Do not exceed bend radius for UTP = 4 X Cable OD, FTP = 4 X Cable OD.
  - Install unshielded twisted-pair cables so that there are no bends smaller than 4 times cable outside diameter at any point in the run and at the termination field.
  - Pulling Tension on 4-Pair UTP Cables: Do not exceed 25 ft.lb. for 4-pair UTP cable.
- Separation from Power Lines: Provide following minimum separation distances between pathways for copper communications cables and power wiring of 480 volts or less:
  - Open or Nonmetal Communications Pathways: Electric motors, fluorescent light fixtures, and unshielded power lines carrying up to 3 kVA: 12 inches.
  - Electrical equipment and unshielded power lines carrying more than 5 kVA: 36 inches.
  - Large electrical motors or transformers: 48 inches.
- Grounded Metal Conduit Communications Pathways:
  - Electrical equipment and unshielded power lines carrying up to 2 kVA: 2-1/2 inches.
  - Electrical equipment and unshielded power lines carrying from 2 kVA to 5 kVA: 6 inches.
  - Electrical equipment and unshielded power lines carrying more than 5 kVA: 12 inches.
  - Power lines enclosed in grounded metal conduit (or equivalent shielding) carrying from 2 kVA to 5 kVA: 3 inches.
  - Power lines enclosed in grounded metal conduit (or equivalent shielding) carrying more than 5 kVA: 6 inches.
- Coil cables to house cable coil without exceeding manufacturer's bend radius.
- In hollow wall installations where box eliminators are used, store excess wire in wall.
- Store no more than 12 inches of UTP and 36 inches of fiber slack.
- Loosely coil excess slack and store in ceiling above each drop location, when there is not enough space present in outlet box to store slack cables.
- Dress and terminate cables in accordance with ANSI/TIA-568-C.0, ANSI/TIA- C.1, BICSI TDMM, and manufacturer's instructions.
- Terminate 4-pair cables on jack and patch panels using T568-B or T568-A wiring scheme.
- Pair Untwist at Termination: Do not exceed 12 mm (1/2 inch).
- Bend Radius of Horizontal Cables:
  - Not less than 4 times OD of UTP cables.
  - Not less than 4 times OD of FTP cables.
- Maintain cable jacket to within 25 mm (1 inch) of termination point.
- Neatly bundle cables and dress to their respective panels or blocks.

- Feed each panel or block by individual bundle separated and dressed back to point of cable entrance into rack or frame.

## **INSTALLATION – OPTICAL FIBER CABLES**

- Place fiber optic cables to maintain minimum cable bend radius limits specified by manufacturer or 15 times cable diameter, whichever is larger.
- Use care when handling fiber optic cables.
  - Carefully monitor pulling tension so as not to exceed limits specified by manufacturer.
- Do not splice horizontal fiber optic cables.

## **FIELD QUALITY CONTROL**

### **CABLES AND TERMINATION HARDWARE:**

- Test 100 percent for defects in installation and verify cabling system performance under installed conditions in accordance with ANSI/TIA-568-C.0.
  - Verify all pairs of each installed cable before system acceptance.
  - Defects in cabling system installation, including but not limited to cables, connectors, patch panels, and connector blocks shall be repaired or replaced to ensure 100 percent useable conductors in all cables installed.
- Test all cables in accordance with this specification section, ANSI/TIA-568-C.2, and ANSI/TIA-568-C.3 standards, and Berk-Tek Leviton Network Solutions instructions
- If any of these are in conflict, bring discrepancies to the attention of the Architect for clarification and resolution.
- Cables, Jacks, Connecting Blocks, and Patch Panels:
  - Verify all pairs of each installed cable before system acceptance.
  - Defects in cabling system installation, including but not limited to cables, connectors, patch panels, and connector blocks shall be repaired or replaced to ensure 100 percent useable conductors in all cables installed.
- Testing Unshielded Twisted-Pair Cables: (NOTE: Permanent Link Test results are recommended, and are the expected norm – unless patch cords that will remain installed)

at the work area and cross-connect are also being tested, in which case Channel Test results would be expected and accepted).

- Test twisted-pair copper cable links for continuity, pair reversals, shorts, opens, and performance as specified.
- Additional testing is required to verify Category performance.
- Test horizontal cabling using approved certification tester for Category 6A, Category 6, and Category 5e performance compliance in accordance with ANSI/TIA-568-C.2.
  - (NOTE: Appropriate Fluke, Agilent, Ideal, or JDSU certification testers may be used).
- Category 6A shall conform to ANSI/TIA-568-C.2 for augmented Category 6 to 500 MHz.
- Category 6 shall conform to ANSI/TIA-568-C.2 for Category 6 to 250MHz
- Follow ANSI/TIA-568-C.2. Basic Tests Required:
  - Wire map.
  - Length (feet).
  - Insertion loss (dB), formerly attenuation.
  - NEXT (Near end crosstalk) (dB).
  - Return loss (dB).
  - ELFEXT (dB).
  - Propagation delay (ns).
  - Delay skew (ns).
  - PSNEXT (Power sum near-end crosstalk loss) (dB).
  - PSELFEXT (Power sum equal level far-end crosstalk loss) (dB).
    - Test Category 6A by auto test to 500 MHz.
  - Alien Crosstalk (AXT) testing and AXT test results are NOT required by Leviton or Berk-Tek for warranty of a Category 6A system. (**Note:** AXT testing may be required by the customer, in which case these tests WOULD have to be performed).
    - Test Category 6 by auto test to 250 MHz.
    - Test Category 5e by auto test to 100 MHz.
    - Provide test results in approved certification testers original software format on CD, with the following minimum information per cable:
  - Circuit ID.
  - Information from specified basic tests required.
  - Test Result: "Pass" or "Fail".
  - Date and time of test.
  - Project name.
  - NVP.
  - Software version.
  - An occasional asterisk-Pass (\*Pass) will be accepted by Leviton or Berk-Tek at the manufacturer's discretion, but rework of these links should be done in an attempt to achieve clean "Pass" results prior to submission of test results.
  - To receive Manufacturer's Warranty for the project, submit software copy of test results, in original tester software format, to the Owner and to the Manufacturer (either Berk-Tek or Leviton).
  - Submit fully functional version of tester software for use by the Owner in reviewing test results.
  - Report in writing to the Owner immediately, along with copy of test results, failed test results that cannot be remedied through re-termination (as in the case of reversed or split pairs).

## Testing Optical Fiber

- Testing procedures shall be in accordance with the following: ANSI/TIA-568-C.3.  
ANSI/TIA-526-7, Method B.  
Proposed TSB-140 Tier One Fiber Certification, C.  
Encircled Flux testing per the TSB-4979 and TIA-526-14-B standard.
  - Test Equipment: Certification tester (Note: Fluke or equivalent Level III testers may be used).
  - Testing:
    - Test optical fibers at both 850 nm and 1300 nm wavelengths for multimode
    - Telecommunications Room (TR) to Telecommunications Outlet (TO), Telecommunications Outlet (TO) to Telecommunications Room (TR).
    - Maximum insertion loss for horizontal fiber optic cables without consolidation point: 2.0 dB.
    - Test horizontal fiber runs TR to TO, TO to TR, at wavelength of operation to desktop applications.
      - Submit software copy of test results, in original tester software format, to the Owner and to the Manufacturer (either Berk-Tek or Leviton).

## LABELING

- All labeling is to be in accordance with ANSI/TIA-606-B and manufacturer's instructions.
- Label horizontal cables using machine-printed label at each end of cable at approximately 12 inches from termination point and again at approximately 48 inches from termination point.  
**Handwritten Labels: Not acceptable.**
- Label patch panel ports and wall plate ports with cable identifier
- Labels: Denote TO ID and unique cable number for that TO, i.e. A-001-A for cable number 1, A-001-B for cable number 2, and so forth.
- Owner may provide specific labeling requirements. Coordinate with the Owner.
- Note labeling information on as-built drawings.

## AS-BUILT DRAWINGS

The installation contractor will be provided with 2 sets of D or E-size drawings at the start of the project. One set will be designated for as the central location to document all as-built information as it occurs throughout the project. The central set will be maintained by the Contractor's Foreman on a daily basis, and will be available to the Technical representative upon request during the course of the project. Anticipated variations from the build-to drawings may be for such things as cable routing and actual outlet placement. No variations will be allowed to the planned termination positions of horizontal and backbone cables, and grounding conductors unless approved in writing by the Owner.

The Contractor shall provide the central drawing set to the owner at the conclusion of the project. The marked up drawing set will accurately depict the as-built status of the system including termination locations, cable routing, and all administration labeling for the cabling system. In addition, a narrative

will be provided that describes any areas of difficulty encountered during the installation that could potentially cause problems to the telecommunications system.

## **TEST DOCUMENTATION**

Test documentation shall be provided in a three-ring binder(s) within three weeks after the completion of the project. The binder(s) shall be clearly marked on the outside front cover and spine with the words "Test Results", the project name, and the date of completion (month and year). The binder shall be divided by major heading tabs, Horizontal and Backbone. Each major heading shall be further sectioned by test type. Within the horizontal and backbone sections, scanner test results (Category 3 or 6), fiber optic attenuation test results, OTDR traces, and green light test results shall be segregated by tab. Test data within each section shall be presented in the sequence listed in the administration records. The test equipment by name, manufacturer, model number and last calibration date will also be provided at the end of the document. Unless a more frequent calibration cycle is specified by the manufacturer, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test.

Scanner tests shall be printed on 8-1/2" x 11" paper. Hand written test results (attenuation results and green light results) shall be documented on the attached test form (Appendix C). OTDR test results shall be printed or attached and copied on 8-1/2" x 11" paper for inclusion in the test documentation binder.

When repairs and re-tests are performed, the problem found, and corrective action taken shall be noted, and both the failed and passed test data shall be collocated in the binder.

## **CABLING SYSTEM ACCEPTANCE**

The Owner's Technical Representative will make periodic inspection of the project in progress. All work must be approved by Owner's Technical Representative before installation. This includes cabling tray, cable, all telecommunications room equipment, etc.

## **FINAL INSPECTION**

Upon completion of the project, the Owner's Technical Representative will perform a final inspection of the installed cabling system with the Contractor's Project Foreman. The final inspection will be performed to validate that all horizontal and backbone cables were installed as defined in the drawing package, and that the installation meets the aesthetic expectations of the Owner.



**THIS PAGE WAS INTENTIONALLY LEFT BLANK.**

## **APPENDIX E – GEOTECHNICAL REPORT AND BORING LOGS FOR RUNWAY 2-20**

**PAGE HAS BEEN INTENTIONALLY LEFT BLANK**

---

**Report of  
Geotechnical Exploration**

**Hagerstown Regional Airport Runway 2-20  
Pavement Evaluation  
Washington County, Maryland**

**Triad Project No. 03-23-0084**

**Prepared for:**

**Mr. Ron Morris, PE  
Airport Design Corporation, Inc.  
6031 University Blvd.  
Ellicott City, Maryland 21043**

**Prepared by:**



**1075-D Sherman Avenue  
Hagerstown, Maryland 21740  
[www.triadeng.com](http://www.triadeng.com)**

**May 26, 2023**



# TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
FOREWORD.....	1
SITE AND PROJECT DESCRIPTION.....	1
GEOLOGIC SETTING.....	2
General.....	2
Development in Karst Terrain .....	2
FIELD EXPLORATION.....	3
SUBSURFACE CONDITIONS .....	3
Subsurface Strata.....	3
Groundwater Observations.....	4
LABORATORY TESTING .....	4
SUMMARY AND SUBGRADE CBR VALUE RECOMMENDATIONS .....	5

## APPENDIX A

Site Location Plan .....	Figure No. A-1
Test Location Plan .....	Figure No. A-2

## APPENDIX B

Key to Identification of Soil and Weathered Bedrock Samples.....	Figure B-1
Logs .....	B-1 through B-4
Core Photos .....	4 Pages

## APPENDIX C

Results of Laboratory Testing .....	C-1 to C-5
-------------------------------------	------------

**Report of Geotechnical Exploration  
Hagerstown Regional Airport Pavement Evaluation, Runway 2-20  
Washington County, Maryland  
Triad Project No. 03-23-0084**

**FOREWORD**

This report has been prepared for the exclusive use of ACDI for specific application to the evaluation and design of the proposed Hagerstown Regional Airport, Runway 2-20 Pavement Evaluation project in Washington County, Maryland. The work has been performed in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made.

This report should not be used for estimation of construction quantities and/or costs, and contractors should conduct their own exploration of site conditions for these purposes. Please note that Triad is not responsible for any claims, damages or liability associated with any other party's interpretation of the data or re-use of these data or engineering analyses without the express written authorization of Triad. Additionally, this report must be read in its entirety. Individual sections of this report may cause the reader to draw incorrect conclusions if considered in isolation from each other.

The conclusions and recommendations contained in this report are based, in part, upon our field observations and data obtained from the field exploration at the site. The nature and extent of variations may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations presented herein. Similarly, in the event that any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained herein shall not be considered valid unless the changes are reviewed, and the conclusions are modified or verified in writing by Triad.

It is recommended that we be provided the opportunity to review the final plan and specifications so that our recommendations may be properly interpreted and implemented. If we are not afforded the privilege of making this review, we will not assume responsibility for misinterpretation of our recommendations, as our recommendations are strictly limited to conditions represented to Triad at the time this report was issued.

**SITE AND PROJECT DESCRIPTION**

The site is the existing Runway 2-20 at Hagerstown Regional Airport located at 18434 Showalter Road in Hagerstown, Maryland. A Site Location Plan, Figure A-1, is included in Appendix A. The site is the existing asphalt covered runway 2-20 and is in various states of repair. We understand that the pavement and subsurface conditions on Runway 2-20 required exploration to gain insight into the existing conditions for proposed improvements. We were requested to explore the existing subgrade and

pavement sections and provide existing conditions data and subgrade recommendations based on our exploration for pavement design in accordance with FAA 5320-6.

## **GEOLOGIC SETTING**

### **General**

According to the Geologic and Karst Features Map of the Hagerstown Quadrangle, Washington County, Maryland (2013), the site is underlain by the Rockdale Run Formation.

The general lithology of the Rockdale Run Formation is described as: *“Interbedded and cyclic limestone and dolomite, cherty in the lower 400 feet. Limestone intervals consist of medium to light gray, ribbony and thrombolytic to stromatolitic, lime mudstone to boundstone. Locally, limestone layers are light gray oolitic packstone to oolitic grainstone. Dolomite parts of cycles vary from tan, laminated, to light gray to tan, massive, fractured with wispy dolomitic laminae. The relative proportion of the limestone to dolomite varies upsection. In the lower 600 feet, limestone is typically thicker than dolomite. This progressively changes upsection so that the upper 700 feet is dominantly dolomitic with little limestone within individual cycles.”*

The carbonate rock formations that underlie the site are moderately solution-prone, highly calcareous and weather differentially to produce a pinnacled top of rock profile. The degree of weathering or solutioning within the bedrock is controlled by joint orientation and frequency. Where joints intersect or are highly fractured, subsequent solutioning is intensified creating low areas and seams that are generally filled with residual clay soils. Conversely, more competent high areas represent slightly to non-weathered rock units that are often coarse-grained and only slightly solution prone.

### **Development in Karst Terrain**

Karst terrain, such as that which underlies the site, is characterized by caves, internal drainage, lack of surface streams, and topographic features such as sinkholes. These features are the result of the dissolution of soluble bedrock, such as limestone or dolomite, by groundwater. As groundwater enters fractures and bedding planes in soluble carbonate bedrock, it slowly (over millions of years) dissolves the rock and enlarges the fractures. This results in the formation of solutioning channels or underground streams or ravines. Sinkholes are created by the subsidence of unconsolidated materials (soils) into underlying voids such as solutioning channels or caves. Usually, subsidence occurs slowly and steadily over geologic time. Many sinkholes, however, are caused by a sudden collapse of a solutioning cave when the roof of the cave becomes too thin to support the overburden materials. Sinkholes recently created by such a collapse can usually be identified by the presence of freshly broken rock outcrops around the rim or throat of the sinkhole.

It is important to note that there are certain risks that an owner must accept when developing in these karst areas. These risks can include groundwater contamination and flooding due to the unpredictable groundwater flow paths within the bedrock, but primarily subsidence. In all these instances, water is the primary cause of the problem. Alterations in the ground surface, particularly in cut areas, during construction can impact the natural drainage within the site, and it is common to have small solutioning features develop in these areas as a result of construction. Also, normal blasting required to remove hard rock can create micro-fractures within the bedrock that will allow greater surface water infiltration into areas that may normally not receive water and, in turn, disturb old solutioning features and/or possibly create new solutioning features. Although these features are not typically enormous (building size) in this general geographic area, they can result in some minor delays and unanticipated costs for remediation during construction. Any sinkholes encountered during construction should be remediated under the direction and observation of Triad.

## **FIELD EXPLORATION**

The field exploration included drilling four (4) soil borings and split spoon sampling of the subgrade. Coring of the surface asphalt was performed at each of the borings. Photos of the cores are included in Appendix B. The exploration locations were selected ACDI and staked by Triad Engineering, Inc. (Triad). Ground surface elevations at each test location were determined by Triad. Exploration locations are shown on the Test Location Plan, Figures A-2, included in Appendix A.

The test borings included Standard Penetration Testing (SPT) and split barrel sampling (ASTM D 1586) at select intervals to planned termination depths or to auger refusal on hard rock. Refusal was encountered at 3 of the 4 test locations at depths ranging from 4.4 to 5.5 feet below existing grades.

Geotechnical personnel from our office were present full time during the drilling operations to direct the drill crew, log all recovered soil samples, and observe groundwater and rock conditions. The recovered soil samples were transported to our laboratory for further testing. Detailed descriptions of materials encountered at each test location are contained on the logs in Appendix B. Figure 1 in Appendix B contains a description of the classification system and terminology utilized.

## **SUBSURFACE CONDITIONS**

### **Subsurface Strata**

The materials encountered in the borings and asphalt core locations are generally described below. Stratification lines indicated on the logs represent the approximate boundaries between material types.

**Pavement and Subbase:** Asphalt was encountered at the surface in all of the test locations. The asphalt ranged in thickness from approximately 7 to 10 inches. Test locations B-2 & B-3 encountered tar and crushed stone below the asphalt and ranged in thickness from 3 to 4 inches. Crushed stone was encountered below the asphalt at test locations B-1 & B-4 and it ranged in thickness from approximately 5 to 28 inches.

**Residual Soils:** Residual soils were encountered below the surface materials and/or old fill materials in all test locations they extended to refusal or termination depths. The residual soils generally consisted tan orange, red orange and tan brown medium to high plasticity clays with varying amounts of sand and gravel. Based on SPT N-values varying from 8 per foot to 50 blows per one inches of penetration, the residual materials exhibited a medium stiff to very stiff consistency. However, the blow counts for several of the samples were likely artificially elevated due to the impact of underlying bedrock.

### **Groundwater Observations**

Groundwater was not encountered in any of the test locations. It should be noted that our borings did not extend into bedrock. It is important to note that fluctuations in groundwater levels may occur due to variations in environmental conditions, recent precipitation events, surface drainage and other factors which may not have been evident at the time measurements were made and reported herein.

## **LABORATORY TESTING**

Laboratory tests were performed to supplement the field classifications and establish design criteria. All laboratory tests were performed in accordance with appropriate ASTM standard test methods. Detailed results of the laboratory tests are contained in Appendix C. A summary of the test results is presented below.

TEST TYPE	TEST RESULTS
Natural Moisture Content	24.3 to 29.8 %
Atterberg Limits: Liquid Limit Plasticity Index	46 and 56 25 to 35
Percent Passing No. 200 Sieve	92.4 to 92.6 %
Modified Proctor: Maximum Dry Density Optimum Moisture	100.4 pcf 21.2 %
California Bearing Ratio (CBR) (at 95% of Maximum Dry Density per Modified Proctor Value)	1.6 %
USCS Soil Classification	CH and CL

## **SUMMARY AND SUBGRADE CBR VALUE RECOMMENDATIONS**

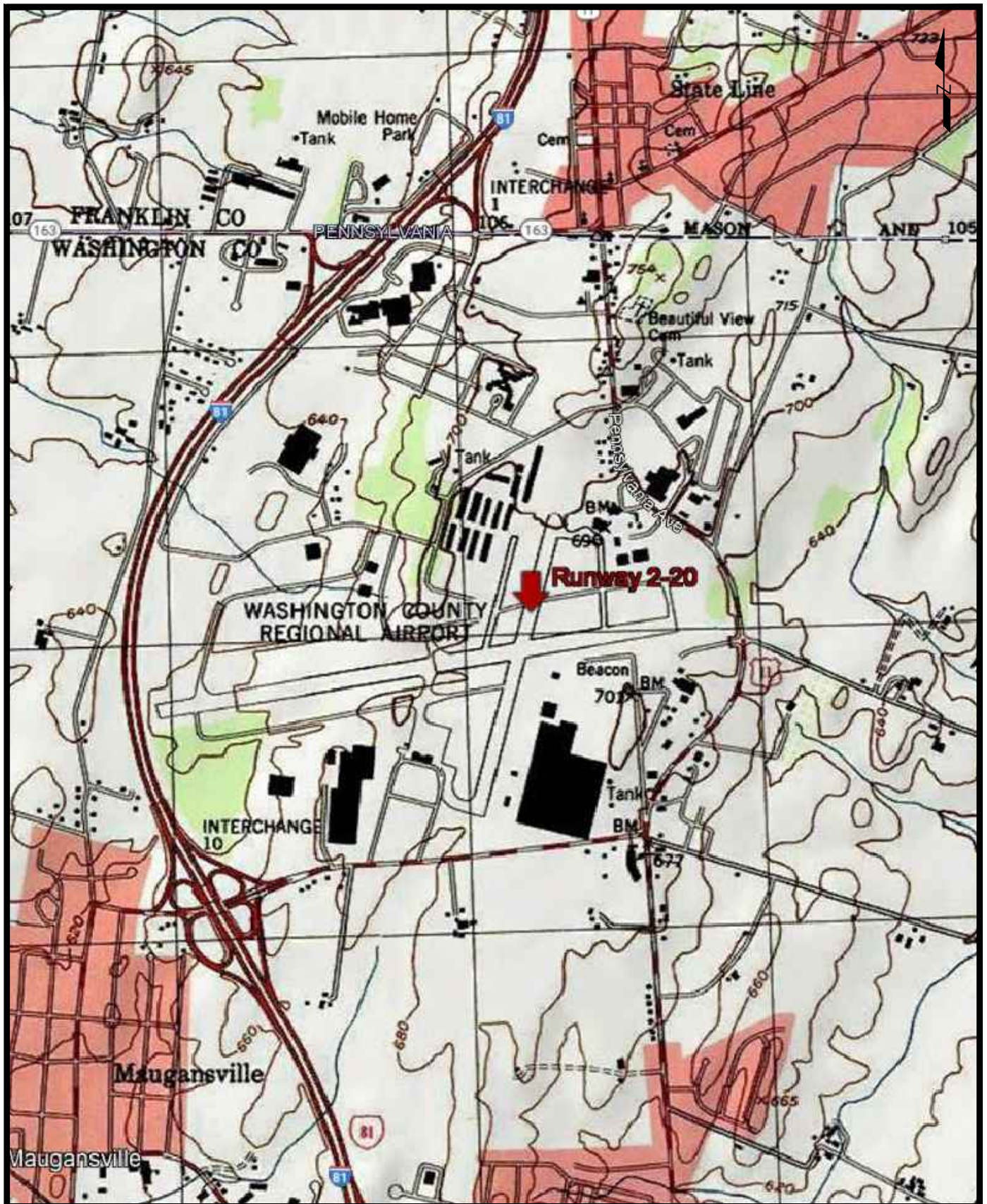
The following table below provides a summary of the surface materials and subgrade materials at each test location. Based on the results of our field exploration and the laboratory testing performed we recommend a design CBR of 1.5 be used for the flexible pavement design.

We recommend this information be reviewed in conjunction with the historical data to make appropriate adjustments.

<b>SUMMARY OF SUBSURFACE CONDITIONS</b>		
<b>Test Location</b>	<b>Surface Materials</b>	<b>Generalized Subgrade Material</b>
B-1	10" Asphalt 5" Crushed Stone	Clay
B-2	9" Asphalt 3" Tar and Stone	Clay
B-3	7" Asphalt 4" Tar and Stone	Clay
B-4	8" Asphalt 28" Crushed Stone	Clay

# **APPENDIX A**

## ***Illustrations***



Washington County  
Maryland

## SITE LOCATION PLAN

**TRIAD**  
TRIAD ENGINEERING, INC.

PREPARED BY: JRW  
REVIEWED BY: SJG

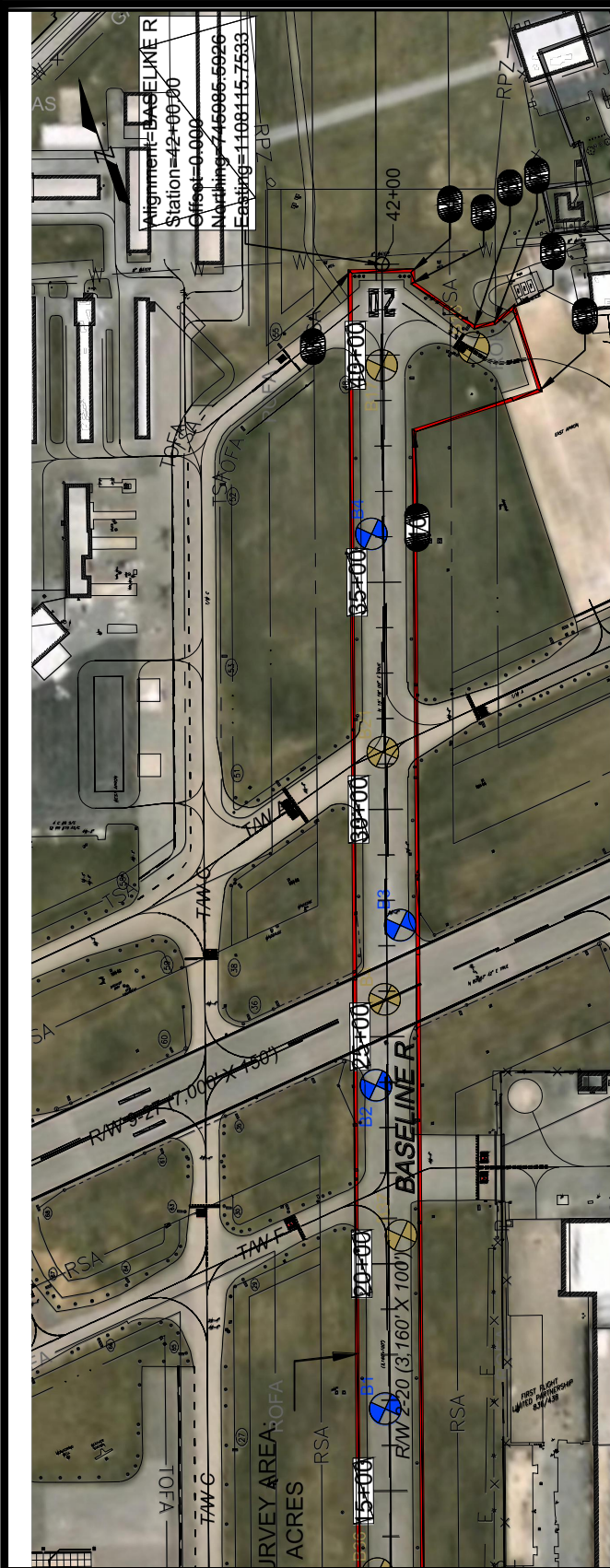
HAGERSTOWN REGIONAL AIRPORT  
PAVEMENT EVALUATION / RUNWAY 2-20

www.triadeng.com  
1075-D SHERMAN AVENUE  
HAGERSTOWN, MD 21740

DATE: 5/16/23  
SCALE: N/A

PROJECT NO:03-23-0084

Figure: A-1



LEGEND:

SURVEY AREA

B1 B1

APPROX. BORING LOCATION

EXISTING CORING LOCATION

0' 150' 300'


SCALE: 1" = 300'

BORING LOCATION TABLE				
ID	NORTHING	EASTING	ELEV (FT)*	DEPTH (FT)
B1	743557.7845	1107441.3238	-	10'
B2	744249.0308	1107614.2196	-	10'
B3	744573.9748	1107761.1173	-	10'
B4	745419.9489	1107933.1299	-	10'

\* ELEVATIONS TO BE PROVIDED BY SURVEYOR UPON COMPLETION OF FIELD SURVEY.

NOTES:

1. ALL STATIONS AND OFFSETS REFERENCE "BASELINE R"
2. ALL SURFACE FEATURES: LIGHT FIXTURES, PAVEMENT MARKING, UTILITIES, PAVEMENT BREAKS, PAVEMENT JOINTS, PAVEMENT LIMITS, SWALES/BREAKS IN GRADE, UTILITY INVERTS, AND ANY OTHER VISIBLE ITEMS WITHIN THE LIMITS SHOWN.
3. EXISTING GROUND SURVEY CAN BE COMPLETED BY DRONE AND SUPPLEMENTED WITH GROUND BASED TO PICK UP SURFACE FEATURES.
4. BORING LOCATIONS ARE APPROXIMATE. EXACT BORING LOCATIONS WILL BE PROVIDED PRIOR TO STARTING.

 Approximate Test Location	
PREPARED BY: JRW	REVIEWED BY: SJG
DATE: 5/16/23	SCALE: N/A

## TEST LOCATION PLAN

HAGERSTOWN REGIONAL AIRPORT  
PAVEMENT EVALUATION / RUNWAY 2-20

PROJECT NO:03-23-0084

Figure:A-2



TRIAD ENGINEERING, INC.

www.triadeng.com

1075-D SHERMAN AVENUE  
HAGERSTOWN, MD 21740

# **APPENDIX B**

## ***Field Exploration***

## **FIELD EXPLORATION**

The subsurface conditions at the site were explored by drilling four (4) soil borings. The borings were drilled utilizing a track-mounted drill rig equipped with hollow stem augers. The field exploration was supervised by a geotechnical engineer from our office.

SPT and sampling was performed in accordance with ASTM D 1586. The SPT's were performed to depths indicated on the attached boring logs using a split barrel sampler with an outside diameter of two (2) inches and an inside diameter of one and three-eighths (1-3/8) inches. The split barrel sampler was driven eighteen (18) inches with a hammer weighing approximately 140 pounds and falling thirty (30) inches. The number of blows required to drive the split barrel sampler at six (6) inch increments was recorded on the boring logs. The method utilized to classify the soils is defined in Figure B-1.

# KEY TO IDENTIFICATION OF SOIL AND WEATHERED BEDROCK SAMPLES

Descriptor Sequence		1. Color		2. Primary Component		3. Fractions	
1	Color	Gray	Tan	Component	Grain Size	And	≥ 35%
2	Primary Component	Brown	Black	Boulders	≥ 12 inches	Some	20 to 35%
3	Fractions	Orange	Red	Cobbles	3 to 12 inches	Little	10 to 20%
4	Moisture	Green	Yellow	Coarse Gravel	1 to 3 inches	Trace	< 10%
5	Descriptors	Purple	Blue	Medium Gravel	$\frac{3}{8}$ to 1 inch	4. Moisture	
6	Plasticity	Modifiers		Fine Gravel	$\frac{5}{64}$ to $\frac{3}{8}$ inch	Dry	Dry to touch
7	Consistency/Relative Density	Light	Lighter side of color range	Coarse Sand	#40 to #10	Damp	Slightly moist
8	Deposition Type	Dark	Darker side of color range	Fine Sand	#200 to #40	Moist	No visible free water
		Mottled	Irregularly marked with spots of different colors	Silt/Clay	≤ #200	Wet	Visible free water
		Banded	Alternating shades or colors				

5. Descriptors	
Fissile	Splits easily along closely spaced parallel planes (breaks into plates)
Hackly	Jagged or irregular fracture planes
Slickenside	Polished and striated surface that results from friction along a fault plane
Laminated	Alternating thin layers of varying material or colors less than ¼" thick
Lensed	Inclusion of small pockets of different soils
Saprolitic	Completely weathered rock that retains the appearance of the original rock structure but has only a trace of the original bond strength
Micaceous	Containing mica minerals
Varved	Laminated sediment consisting of alternating layers of fine sand and silt or clay deposited in still water

6. Plasticity of Fine-Grained Soils						7a. Relative Density of Granular Coarse-Grained Soils	
Fine-Grained Component	Plasticity	Estimated Plasticity Index (PI)	Smallest Thread Diameter	Thread Characteristics	Dilatancy	Descriptor	N-Value
Silt ↑ More Silt ↑	Non-Plastic	0 - 2%	Ball cracks	Dries rapidly; a 1/8-inch thread cannot be rolled at any water content	Moist ball sheds water when shaken giving a glossy appearance	Very Loose	≤ 4
	Low Plasticity	3 - 10%	$\frac{1}{8}$ to $\frac{1}{4}$ inch	Feels powdery when drying out during rolling; thread can barely be rolled	Moist ball retains water or sheds water slowly when shaken	Loose	5 - 10
Clay ↓ More Clay ↓	Medium Plasticity	> 10 - 20%	$\frac{1}{16}$ inch	Thread cannot be rerolled after reaching plastic limit		Medium Dense	11 - 30
	Highly Plastic	> 20%	$\frac{1}{32}$ inch	Thread can be rerolled after reaching plastic limit	Moist ball retains water when shaken	Dense	31 - 50
						Very Dense	> 50

7b. Consistency of Fine-Grained Soils			8. Type of Deposit	
Descriptor	Pocket Penetrometer (tons/ft <sup>2</sup> )	N-Value	Alluvium	Sediment deposited by moving water
Very Soft	≤ 0.25	≤ 2	Colluvium	Sediment deposited by gravity
Soft	≥ 0.25 - 0.5	3 - 4	Fill	Manmade deposit
Medium Stiff	> 0.5 - 1.0	5 - 8	Fluviomarine	Stratified materials formed by the combined action of river and sea processes
Stiff	> 1.0 - 2.0	9 - 15	Glacial Outwash	Sediment deposited by glacial meltwater; commonly sand and gravel
Very Stiff	> 2.0 - 4.0	16 - 30	Glacial Till	Unsorted sediment deposited by glacier
Hard	> 4	≥ 31	Glacial Lake Deposit	Sediment deposited in glacial lake; commonly silt and clay
			Residuum	Insoluble material remaining from weathered rock
			Weathered Bedrock	Bedrock that has been weathered

FIGURE B-1

# BORING LOG

Sheet 1 of 1

Project Number: **03-23-0084** Project Name: **KHGR Pavement Eval. Runway 2-20**

Inspector: **JRW**

Boring Location: **See Figure A-2**

Boring No.: **B-1**

Date Started: **04/24/23**

Drilling Method: **3.25 HSA**

Date Completed: **04/24/23**

Driller: **CONNELLY**

Ground Elev.: **694.14**

Depth (feet)	Pocket Penetrometer (tsf)	Sample Type	Penetration Blows/6 inches	Recovery (%)	RQD (RUN)	Strata Depth (ft)	<div> <div>Shelby Tube</div> <div>Standard Split Spoon</div> <div>Core Sample</div> <div>Auger Probe</div> </div>	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
								10.0" ASPHALT				
						0.8						693.3
						1.3		5.0" CRUSHED STONE				692.9
	4.5	X	12-7-6	61%				Tan orange <b>CLAY</b> , stiff, medium plasticity, trace sand, moist				
	4.0	X	6-50/3"	44%								
						4.0		- RESIDUUM -				690.1
								REFUSAL AT 4.0 FEET				
5.0												
10.0												

TRIAD\_C - REVISED 03-23-0084 LOGS.GPJ 03-11-0062 EMMITSBURG WWTP ENR UPGRADE.GPJ 05/24/23

Remarks: Boring dry during and upon completion of drilling.

# BORING LOG

Sheet 1 of 1

Project Number: **03-23-0084** Project Name: **KHGR Pavement Eval. Runway 2-20**

Inspector: **JRW**

Boring Location: **See Figure A-2**

Boring No.: **B-2**

Date Started: **04/24/23**

Drilling Method: **3.25 HSA**

Date Completed: **04/24/23**

Driller: **CONNELLY**

Ground Elev.: **695.62**

Depth (feet)	Pocket Penetrometer (tsf)	Sample Type	Penetration Blows/6 Inches	Recovery (%)	RQD (RUN)	Strata Depth (ft)	<div> <div>Shelby Tube</div> <div>Standard Split Spoon</div> <div>Core Sample</div> <div>Auger Probe</div> </div>	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
								9.0" ASPHALT				
						0.8						694.9
						1.0		TAR AND GRAVEL, (1"-2" Gravel)				694.6
								Tan black <b>CLAY</b> , stiff, medium plasticity, trace sand, little rock fragments, moist				
	3.0		14-7-5	39%								
	N/A		7-14-50/1"	31%								
						4.0		- RESIDUUM -				691.6
								REFUSAL AT 4.0 FEET				
5.0												
10.0												

TRIAD\_C - REVISED 03-23-0084 LOGS.GPJ 03-11-0062 EMMITSBURG WWTP ENR UPGRADE.GPJ 05/24/23

Remarks: Boring dry during and upon completion of drilling.

# BORING LOG

Sheet 1 of 1

Project Number: **03-23-0084**

Project Name: **KHGR Pavement Eval. Runway 2-20**

Inspector: **JRW**

Boring Location: **See Figure A-2**

Boring No.: **B-3**

Date Started: **04/24/23**

Drilling Method: **3.25 HSA**

Date Completed: **04/24/23**

Driller: **CONNELLY**

Ground Elev.: **696.49**

Depth (feet)	Pocket Penetrometer (tsf)	Sample Type	Penetration Blows/6 Inches	Recovery (%)	RQD (RUN)	Strata Depth (ft)	<div> <div>Shelby Tube</div> <div>Standard Split Spoon</div> <div>Core Sample</div> <div>Auger Probe</div> </div>	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
								7.0" ASPHALT				
						0.6						695.9
						0.9		TAR AND GRAVEL, (1"-2" Gravel)				695.6
	2.5		6-4-4	67%				Tan orange <b>CLAY</b> , medium stiff, medium to high plasticity, trace sand, moist				
								- stiff				
	4.5		4-6-8	56%								
								- very stiff				
5.0	4.5		6-8-10	100%								
								- stiff				
	>4.5		6-6-9	100%								
10.0						10.0		- RESIDUUM -				686.5
								BORING TERMINATED AT 10.0 FEET				

TRIAD\_C - REVISED 03-23-0084 LOGS.GPJ 03-11-0062 EMMITSBURG WWTP ENR UPGRADE.GPJ 05/24/23

Remarks: Boring dry during and upon completion of drilling.

# BORING LOG

Sheet 1 of 1

Project Number: **03-23-0084**

Project Name: **KHGR Pavement Eval. Runway 2-20**

Inspector: **JRW**

Boring Location: **See Figure A-2**

Boring No.: **B-4**

Date Started: **04/24/23**

Drilling Method: **3.25 HSA**

Date Completed: **04/24/23**

Driller: **CONNELLY**

Ground Elev.: **695.79**

Depth (feet)	Pocket Penetrometer (tsf)	Sample Type	Penetration Blows/6 Inches	Recovery (%)	RQD (RUN)	Strata Depth (ft)	<div> <div>Shelby Tube</div> <div>Standard Split Spoon</div> <div>Core Sample</div> <div>Auger Probe</div> </div>	MATERIAL DESCRIPTION	RQD (Strata)	Water Level	Graphic Log	Strata Elevation
						0.7		8.0" ASPHALT				695.1
	N/A		14-18-25	89%		3.0		28.0" CRUSHED STONE dense				
						3.0		- FILL -				692.8
	4.0		16-4-5	89%		5.5		Red orange <b>CLAY</b> , stiff, medium plasticity, trace sand, moist				
5.0	N/A		50/3"	67%				- RESIDUUM -				690.3
								REFUSAL AT 5.5 FEET				
10.0												

TRIAD\_C - REVISED 03-23-0084 LOGS.GPJ 03-11-0062 EMMITSBURG WWTP ENR UPGRADE.GPJ 05/24/23

Remarks: Boring dry during and upon completion of drilling.



B-1



B-2



B-3



B-4

# **APPENDIX C**

## ***Laboratory Testing***

## **LABORATORY TESTING**

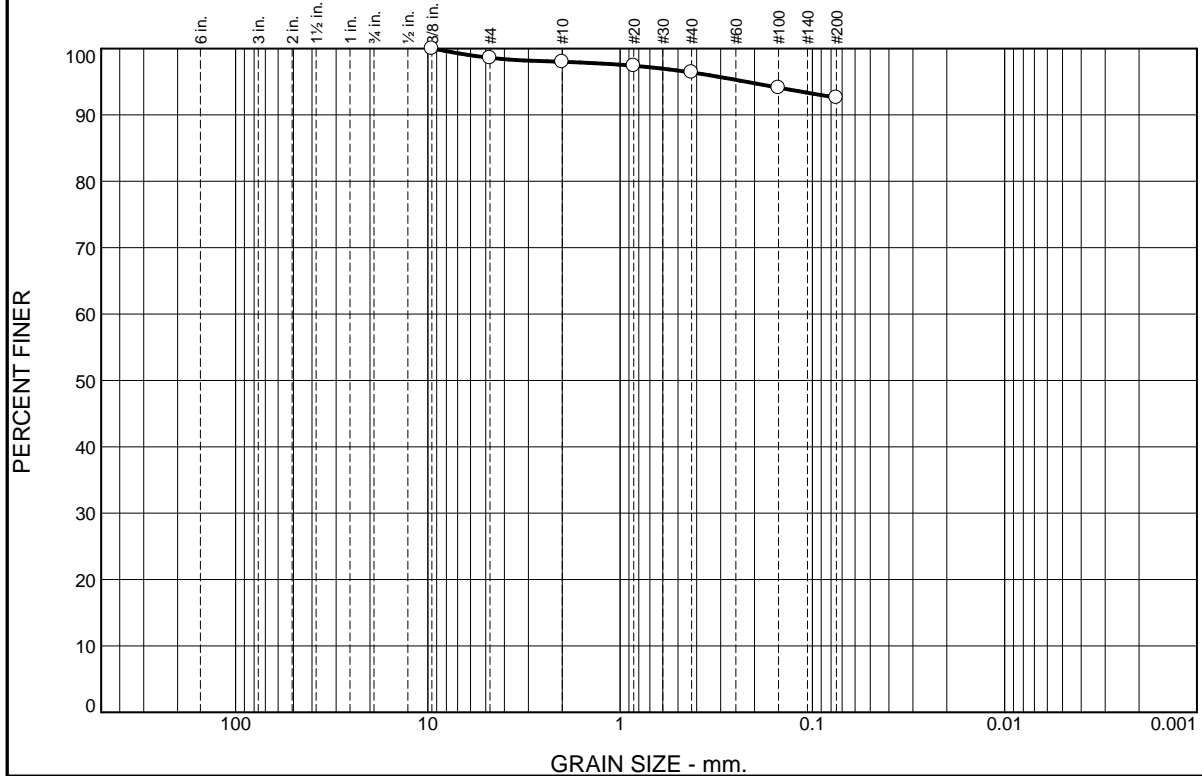
The soil samples obtained from the field exploration were visually classified in the field by a geotechnical engineer from Triad. The recovered soils were further evaluated by laboratory testing. Laboratory soil tests were conducted in accordance with applicable ASTM standards as listed below:

- 1) Moisture content tests were performed in accordance with ASTM D 2216.
- 2) Atterberg Limits tests, consisting of the liquid limit, plastic limit, and plasticity index, were performed in accordance with ASTM D 4318.
- 3) Sieve analyses with washed No. 200 sieve tests were performed in accordance with ASTM D 422.
- 4) A Modified Proctor test was performed in accordance with ASTM D 1557.
- 5) California Bearing Ratio tests were performed in accordance with AASHTO T 193.

A summary and details of the laboratory tests are included on the following pages of this appendix.

[illegible]

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.4	0.6	1.6	3.8	92.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	98.6		
#10	98.0		
#20	97.4		
#40	96.4		
#100	94.1		
#200	92.6		

\* (no specification provided)

**Soil Description**  
Brown fat CLAY

**Atterberg Limits**  
PL= 21      LL= 56      PI= 35

**Coefficients**  
D<sub>90</sub>=      D<sub>85</sub>=      D<sub>60</sub>=  
D<sub>50</sub>=      D<sub>30</sub>=      D<sub>15</sub>=  
D<sub>10</sub>=      C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
USCS= CH      AASHTO= A-7-6(36)

**Remarks**

Sample Number: B-2+3

Depth: 1.0'-5.0'

Date: 5/15/23

**Triad Engineering, Inc.**

Client: Airport Design Consultants, Inc.

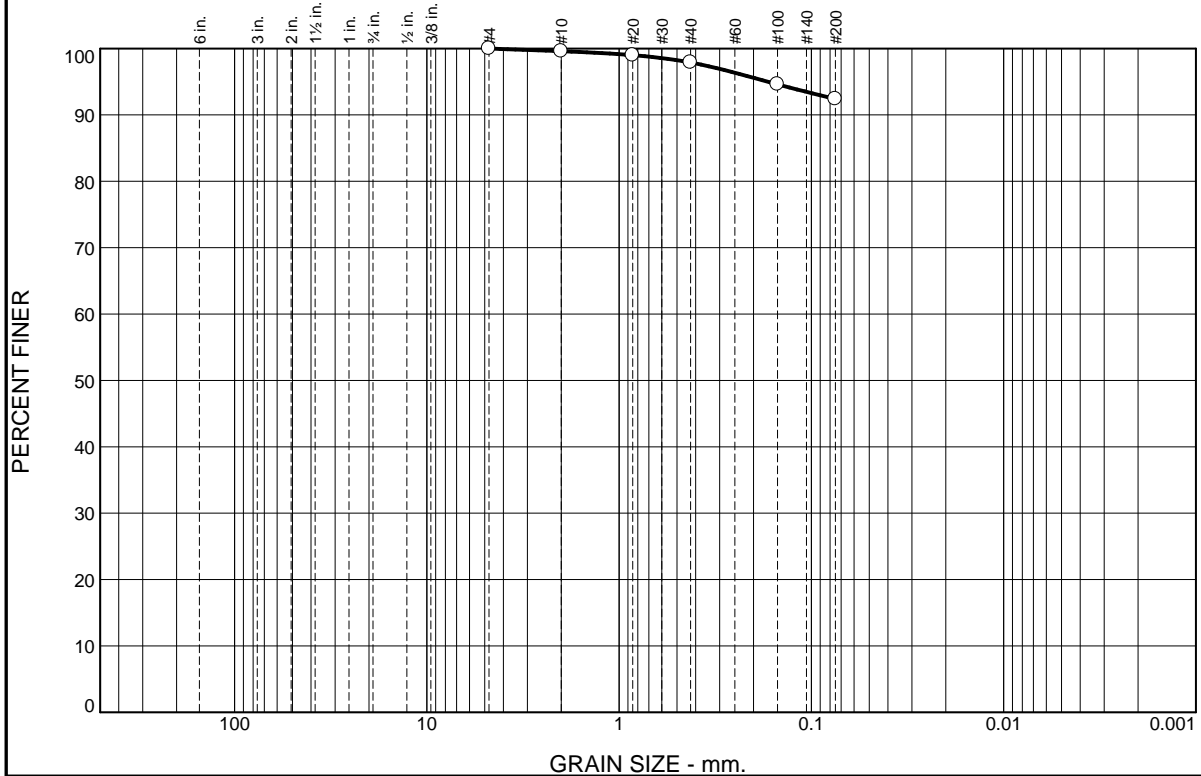
Project: KHGR RW 2-20  
Washington County, MD

Project No: 03-23-0084

Figure C-2

Tested By: DLS

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.4	1.7	5.5	92.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.6		
#20	99.0		
#40	97.9		
#100	94.6		
#200	92.4		

\* (no specification provided)

**Soil Description**  
Brown lean CLAY

**Atterberg Limits**  
PL= 18      LL= 46      PI= 28

**Coefficients**  
D<sub>90</sub>=      D<sub>85</sub>=      D<sub>60</sub>=  
D<sub>50</sub>=      D<sub>30</sub>=      D<sub>15</sub>=  
D<sub>10</sub>=      C<sub>u</sub>=      C<sub>c</sub>=

**Classification**  
USCS= CL      AASHTO= A-7-6(27)

**Remarks**

Sample Number: B-3      Depth: 2.5'-6.5'

Date: 5/15/23

**Triad Engineering, Inc.**

Client: Airport Design Consultants, Inc.

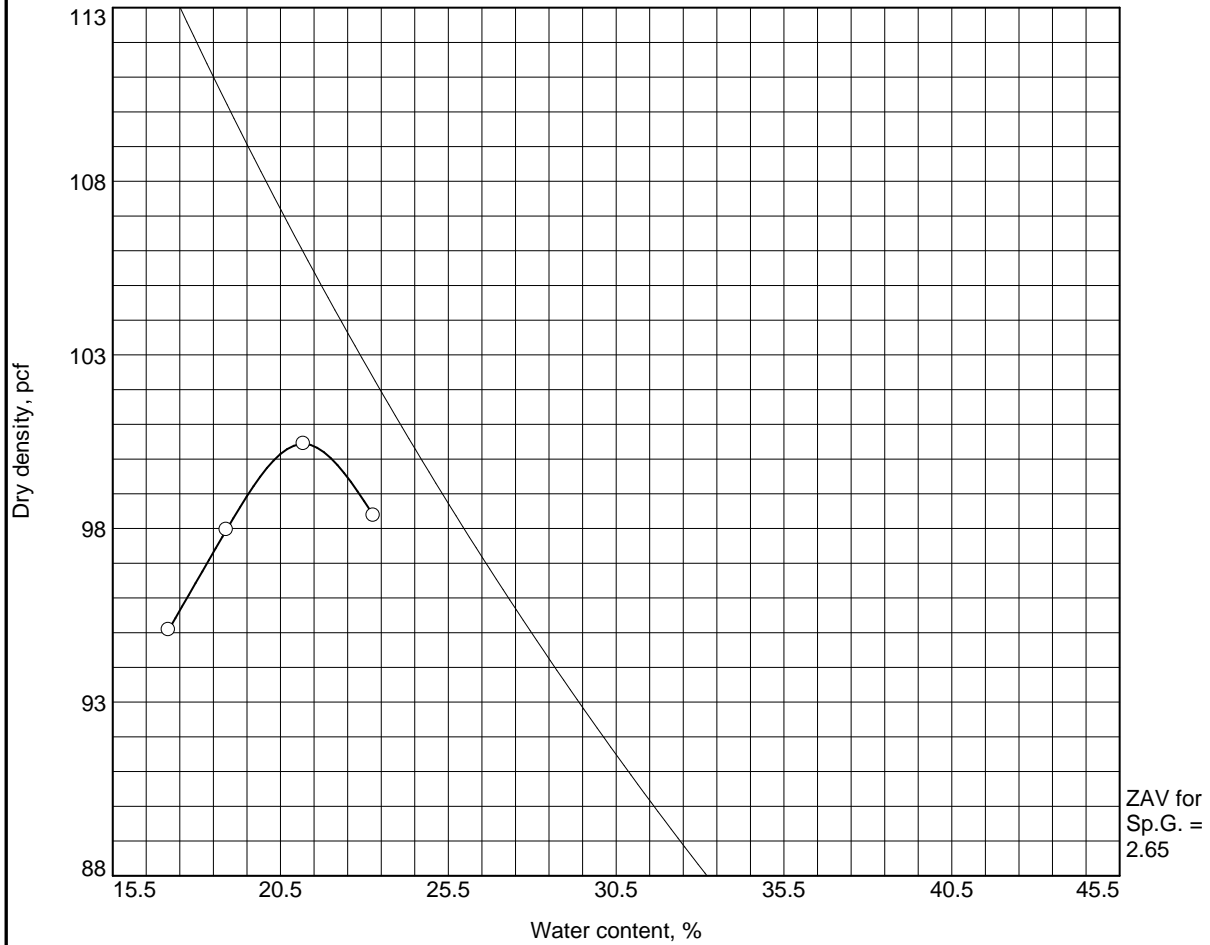
Project: KHGR RW 2-20  
Washington County, MD

Project No: 03-23-0084

Figure C-3

Tested By: DLS

# COMPACTION TEST REPORT



Test specification: ASTM D 1557-00 Method B Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
1.0'-5.0'	CH	A-7-6(36)	15.1		56	35	0.0	92.6

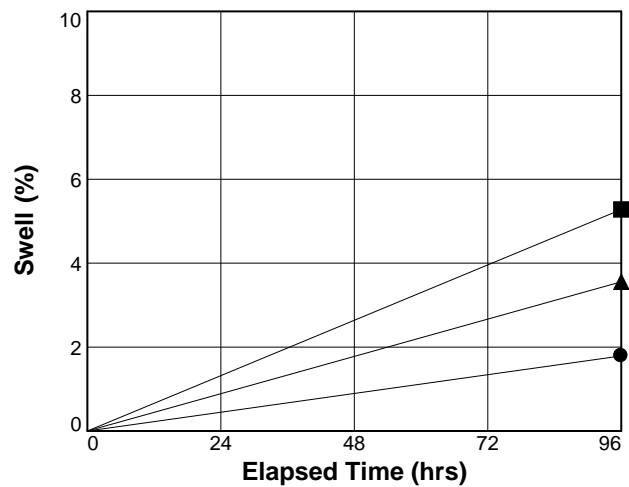
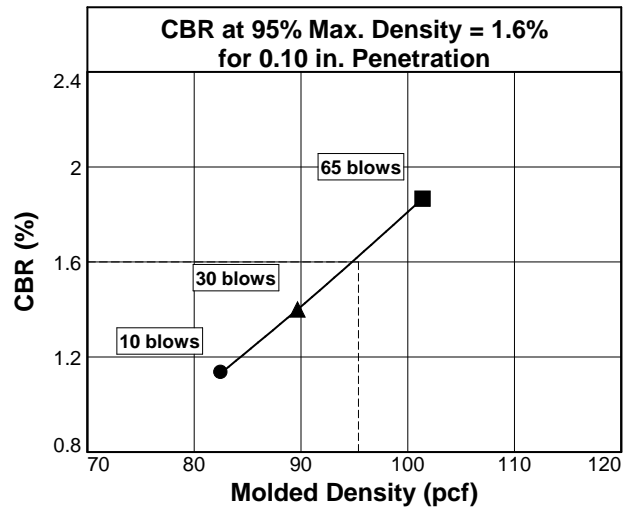
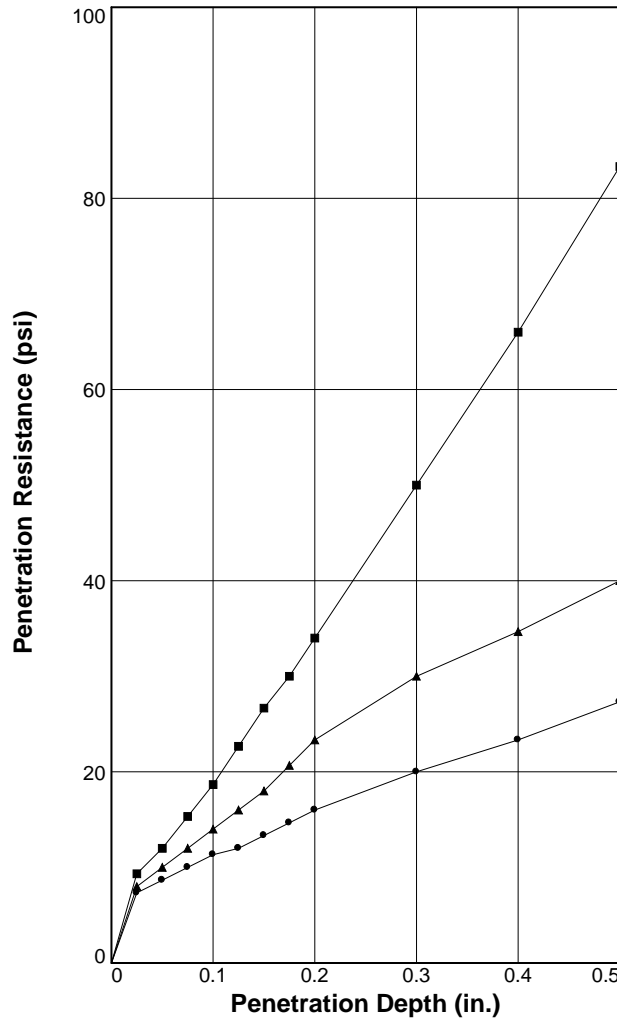
TEST RESULTS		MATERIAL DESCRIPTION
Maximum dry density = 100.4 pcf		Brown fat CLAY
Optimum moisture = 21.2 %		
<b>Project No.</b> 03-23-0084 <b>Client:</b> Airport Design Consultants, Inc. <b>Project:</b> KHGR RW 2-20 Washington County, MD <b>Date:</b> 5/15/23 <input type="radio"/> <b>Sample Number:</b> B-2+3		<b>Remarks:</b>
<b>Triad Engineering, Inc.</b>		

Figure C-4

Tested By: DLS

# BEARING RATIO TEST REPORT

## AASHTO T 193-99



	Molded			Soaked			CBR (%)		Linearity Correction (in.)	Surcharge (lbs.)	Max. Swell (%)
	Density (pcf)	Percent of Max. Dens.	Moisture (%)	Density (pcf)	Percent of Max. Dens.	Moisture (%)	0.10 in.	0.20 in.			
1 ○	82.5	82.2	23.6	81.1	80.8	38.4	1.1	1.1	0.000	10	1.8
2 △	89.7	89.3	21.4	86.6	86.3	31.0	1.4	1.6	0.000	10	3.6
3 □	101.4	101	21.4	96.3	95.9	27.0	1.9	2.3	0.000	10	5.3
Material Description							USCS	Max. Dens. (pcf)	Optimum Moisture (%)	LL	PI
Brown fat CLAY							CH	100.4	21.2	56	35

**Project No:** 03-23-0084

**Project:** KHGR RW 2-20 Washington County, MD

**Sample Number:** B-2+3      **Depth:** 1.0'-5.0'

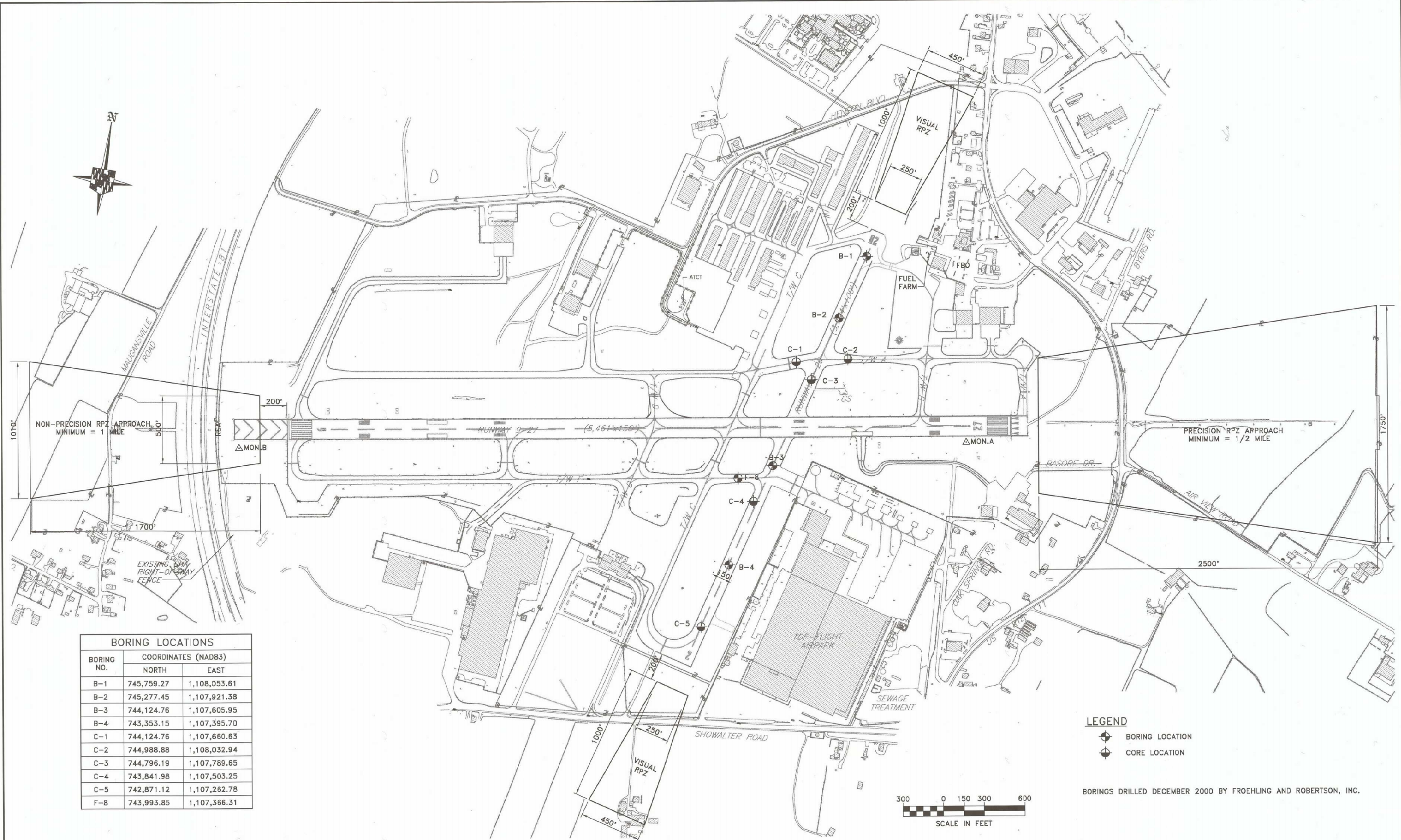
**Date:** 5/15/23

BEARING RATIO TEST REPORT  
**Triad Engineering, Inc.**

**Test Description/Remarks:**

Modified Proctor Effort

**Figure C-5**



BORING LOCATIONS		
BORING NO.	COORDINATES (NAD83)	
	NORTH	EAST
B-1	745,759.27	1,108,053.61
B-2	745,277.45	1,107,921.38
B-3	744,124.76	1,107,605.95
B-4	743,353.15	1,107,395.70
C-1	744,124.76	1,107,660.63
C-2	744,988.88	1,108,032.94
C-3	744,796.19	1,107,789.65
C-4	743,841.98	1,107,503.25
C-5	742,871.12	1,107,262.78
F-8	743,993.85	1,107,366.31

**URS**  
CONSULTING ENGINEERS  
HUNT VALLEY, MARYLAND

DESIGNED M.A.M.  
DRAWN K.A.W.  
CHECKED J.M.D.  
APPROVED S.M.L.

REVISION NO.	REVISION DATE	DESCRIPTION



**BOARD OF COUNTY COMMISSIONERS  
OF WASHINGTON COUNTY, MARYLAND**  
**HAGERSTOWN REGIONAL AIRPORT -  
RICHARD A. HENSON FIELD**

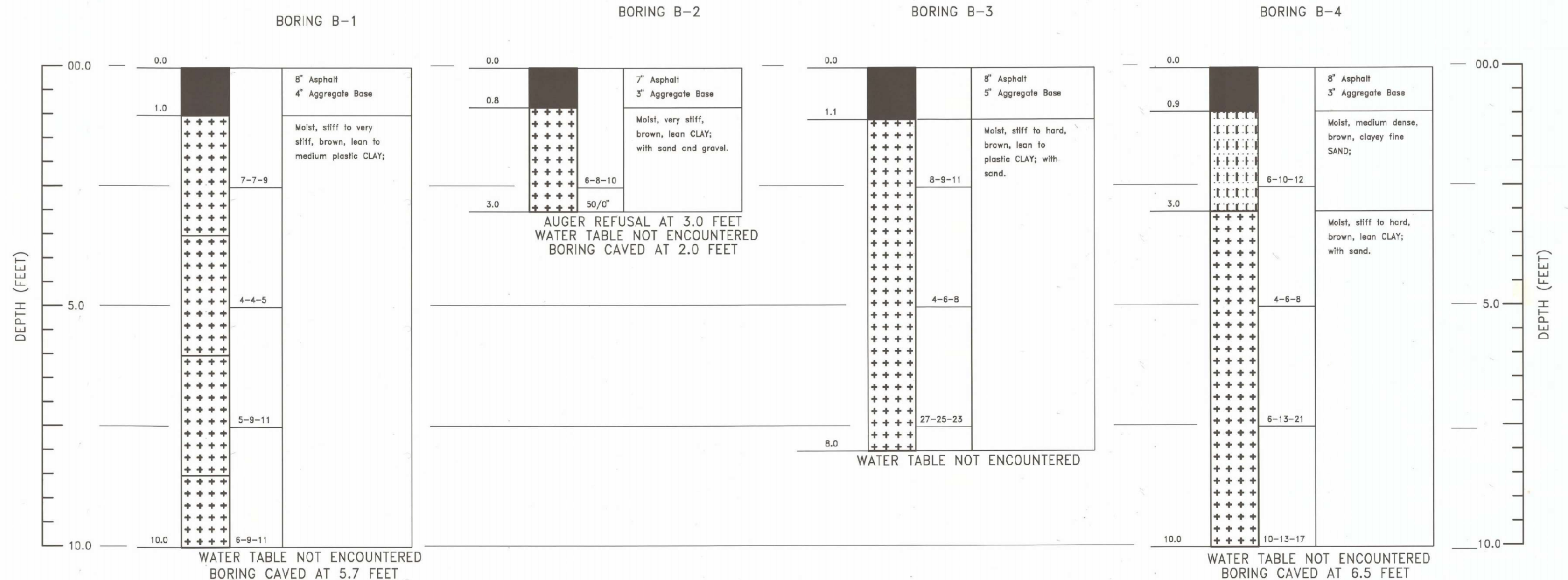
PROJECT TITLE  
**RUNWAY 2-20 REHABILITATION**

SHEET TITLE  
**BORING LOCATION PLAN**

SCALE AS SHOWN DATE JUNE 2001

CONTRACT NO.  
AIP 3-24-0019-20 (DESIGN)  
AIP 3-24-0019-23 (CONST.)

SHEET NO.  
**32**



# SYMBOLS:

	SAND
	SILTY SAND
	SILT, CLAYEY SILT
	CLAYEY SAND
	CLAY

# LEGEND:

D	N	V

PAYEMENT AND/OR  
SOIL DESCRIPTION

N - BLOWS PER 6-INCH INCREMENTS OF PENETRATION  
OF SAMPLING SPOON OR PENETRATION IN INCHES  
FOR THE INDICATED BLOWS OF A 140 lb. HAMMER  
FALLING 30".

V - SYMBOLS INDICATE EXTENT OF SOIL LAYERS

D - DEPTHS

# NOTES:

- BORINGS DRILLED BY FROEHLING & ROBERTSON, INC.  
IN NOVEMBER 2000.
- DRILLING AND SAMPLING CONFORMS TO ASTM D1586.

**URS**

CONSULTING ENGINEERS  
HUNT VALLEY, MARYLAND

DESIGNED	M.A.M.
DRAWN	D.H.
CHECKED	J.M.D.
APPROVED	S.M.L.

REVISION NO.	REVISION DATE	DESCRIPTION



**BOARD OF COUNTY COMMISSIONERS  
OF WASHINGTON COUNTY, MARYLAND**

**HAGERSTOWN REGIONAL AIRPORT -  
RICHARD A. HENSON FIELD**

PROJECT TITLE	RUNWAY 2-20 REHABILITATION		CONTRACT NO.
SHEET TITLE	BORING LOGS		AIP 3-24-0019-20 (DESIGN) AIP 3-24-0019-23 (CONST.)
SCALE	AS SHOWN	DATE	JUNE 2001
			SHEET NO. 33