SECTION III-A

GENERAL PROVISION SPECIFICATIONS

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Section 10 Definition of Terms

When the following terms are used in these specifications, in the contract, or in any documents or other instruments pertaining to construction where these specifications govern, the intent and meaning shall be defined as follows:

Paragraph Number	Term	Definition
10-01	**AASHTO**	The American Association of State Highway and Transportation Officials.
10-02	**Access Road**	The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public roadway.
10-03	**Advertisement**	A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.
10-04	**Airport**	Airport means an area of land or water which is used or intended to be used for the landing and takeoff of aircraft; an appurtenant area used or intended to be used for airport buildings or other airport facilities or rights of way; airport buildings and facilities located in any of these areas, and a heliport.
10-05	**Airport Improvement Program (AIP)**	A grant-in-aid program, administered by the Federal Aviation Administration (FAA).
10-06	**Air Operations Area (AOA)**	The term air operations area (AOA) shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron.
10-07	**Apron**	Area where aircraft are parked, unloaded or loaded, fueled and/or serviced.
10-08	**ASTM International (ASTM)**	Formerly known as the American Society for Testing and Materials (ASTM).
10-09	**Award**	The Owner’s notice to the successful bidder of the acceptance of the submitted bid.

Paragraph Number	Term	Definition
10-10	**Bidder**	Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.
10-11	**Building Area**	An area on the airport to be used, considered, or intended to be used for airport buildings or other airport facilities or rights-of-way together with all airport buildings and facilities located thereon.
10-12	**Calendar Day**	Every day shown on the calendar.
10-13	**Certificate of Analysis (COA)**	The COA is the manufacturer's Certificate of Compliance (COC) including all applicable test results required by the specifications.
10-14	**Certificate of Compliance (COC)**	The manufacturer's certification stating that materials or assemblies furnished fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer's authorized representative.
10-15	**Change Order**	A written order to the Contractor covering changes in the plans, specifications, or proposal quantities and establishing the basis of payment and contract time adjustment, if any, for work within the scope of the contract and necessary to complete the project.
10-16	**Contract**	A written agreement between the Owner and the Contractor that establishes the obligations of the parties including but not limited to performance of work, furnishing of labor, equipment and materials and the basis of payment. The awarded contract includes but may not be limited to: Advertisement, Contract form, Proposal, Performance bond, payment bond, General provisions, certifications and representations, Technical Specifications, Plans, Supplemental Provisions, standards incorporated by reference and issued addenda.
10-17	**Contract Item (Pay Item)**	A specific unit of work for which a price is provided in the contract.
10-18	**Contract Time**	The number of calendar days or working days, stated in the proposal, allowed for completion of the contract, including authorized time extensions. If a calendar date of completion is stated in the proposal,

Paragraph Number	Term	Definition
		in lieu of a number of calendar or working days, the contract shall be completed by that date.
10-19	**Contractor**	The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the work contracted and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the contract work.
10-20	**Contractors Quality Control (QC) Facilities**	The Contractor's QC facilities in accordance with the Contractor Quality Control Program (CQCP).
10-21	**Contractor Quality Control Program (CQCP)**	Details the methods and procedures that will be taken to assure that all materials and completed construction required by the contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors.
10-22	**Control Strip**	A demonstration by the Contractor that the materials, equipment, and construction processes results in a product meeting the requirements of the specification.
10-23	**Construction Safety and Phasing Plan (CSPP)**	The overall plan for safety and phasing of a construction project developed by the airport operator, or developed by the airport operator's consultant and approved by the airport operator. It is included in the invitation for bids and becomes part of the project specifications.
10-24	**Drainage System**	The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.
10-25	**Engineer**	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for engineering, inspection, and/or observation of the contract work and acting directly or through an authorized representative.
10-26	**Equipment**	All machinery, together with the necessary supplies for upkeep and maintenance; and all tools and apparatus necessary for the proper construction and acceptable completion of the work.

Paragraph Number	Term	Definition
10-27	**Extra Work**	An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which is found by the Owner's Engineer or Resident Project Representative (RPR) to be necessary to complete the work within the intended scope of the contract as previously modified.
10-28	**FAA**	The Federal Aviation Administration. When used to designate a person, FAA shall mean the Administrator or their duly authorized representative.
10-29	**Federal Specifications**	The federal specifications and standards, commercial item descriptions, and supplements, amendments, and indices prepared and issued by the General Services Administration.
10-30	**Force Account**	**a.** Contract Force Account - A method of payment that addresses extra work performed by the Contractor on a time and material basis. **b.** Owner Force Account - Work performed for the project by the Owner's employees.
10-31	**Intention of Terms**	Whenever, in these specifications or on the plans, the words "directed," "required," "permitted," "ordered," "designated," "prescribed," or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer and/or Resident Project Representative (RPR) is intended; and similarly, the words "approved," "acceptable," "satisfactory," or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Engineer and/or RPR, subject in each case to the final determination of the Owner. Any reference to a specific requirement of a numbered paragraph of the contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.
10-32	**Lighting**	A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to

Paragraph Number	Term	Definition
		aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.
10-33	**Major and Minor Contract Items**	A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 20% of the total amount of the award contract. All other items shall be considered minor contract items.
10-34	**Materials**	Any substance specified for use in the construction of the contract work.
10-35	**Modification of Standards (MOS)**	Any deviation from standard specifications applicable to material and construction methods in accordance with FAA Order 5300.1.
10-36	**Notice to Proceed (NTP)**	A written notice to the Contractor to begin the actual contract work on a previously agreed to date. If applicable, the Notice to Proceed shall state the date on which the contract time begins.
10-37	**Owner**	The term “Owner” shall mean the party of the first part or the contracting agency signatory to the contract. Where the term “Owner” is capitalized in this document, it shall mean airport Sponsor only. The Owner for this project is the City of Phoenix.
10-38	**Passenger Facility Charge (PFC)**	Per 14 Code of Federal Regulations (CFR) Part 158 and 49 United States Code (USC) § 40117, a PFC is a charge imposed by a public agency on passengers enplaned at a commercial service airport it controls.
10-39	**Pavement Structure**	The combined surface course, base course(s), and subbase course(s), if any, considered as a single unit.
10-40	**Payment bond**	The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will pay in full all bills and accounts for materials and labor used in the construction of the work.
10-41	**Performance bond**	The approved form of security furnished by the Contractor and their own surety as a guaranty that the Contractor will complete the work in accordance with the terms of the contract.
10-42	**Plans**	The official drawings or exact reproductions which show the location, character, dimensions and details

Paragraph Number	Term	Definition
		of the airport and the work to be done and which are to be considered as a part of the contract, supplementary to the specifications. Plans may also be referred to as 'contract drawings.'
10-43	**Project**	The agreed scope of work for accomplishing specific airport development with respect to a particular airport.
10-44	**Proposal**	The written offer of the bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the provisions of the plans and specifications.
10-45	**Proposal guaranty**	The security furnished with a proposal to guarantee that the bidder will enter into a contract if their own proposal is accepted by the Owner.
10-46	**Quality Assurance (QA)**	Owner's responsibility to assure that construction work completed complies with specifications for payment.
10-47	**Quality Control (QC)**	Contractor's responsibility to control material(s) and construction processes to complete construction in accordance with project specifications.
10-48	**Quality Assurance (QA) Inspector**	An authorized representative of the Engineer and/or Resident Project Representative (RPR) assigned to make all necessary inspections, observations, tests, and/or observation of tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.
10-49	**Quality Assurance (QA) Laboratory**	The official quality assurance testing laboratories of the Owner or such other laboratories as may be designated by the Engineer or RPR. May also be referred to as Engineer's, Owner's, or QA Laboratory.
10-50	**Resident Project Representative (RPR)**	The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for all necessary inspections, observations, tests, and/or observations of tests of the contract work performed or being performed, or of the materials furnished or being furnished by the Contractor, and acting directly or through an authorized representative.

Paragraph Number	Term	Definition
10-51	**Runway**	The area on the airport prepared for the landing and takeoff of aircraft.
10-52	**Runway Safety Area (RSA)**	A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft. See the construction safety and phasing plan (CSPP) for limits of the RSA.
10-53	**Safety Plan Compliance Document (SPCD)**	Details how the Contractor will comply with the CSPP.
10-54	**Specifications**	A part of the contract containing the written directions and requirements for completing the contract work. Standards for specifying materials or testing which are cited in the contract specifications by reference shall have the same force and effect as if included in the contract physically.
10-55	**Sponsor**	A Sponsor is defined in 49 USC § 47102(24) as a public agency that submits to the FAA for an AIP grant; or a private Owner of a public-use airport that submits to the FAA an application for an AIP grant for the airport.
10-56	**Structures**	Airport facilities such as bridges; culverts; catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.
10-57	**Subgrade**	The soil that forms the pavement foundation.
10-58	**Superintendent**	The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instructions from the RPR, and who shall supervise and direct the construction.
10-59	**Supplemental Agreement**	A written agreement between the Contractor and the Owner that establishes the basis of payment and contract time adjustment, if any, for the work affected by the supplemental agreement. A supplemental agreement is required if: (1) in scope work would increase or decrease the total amount of the awarded contract by more than 25%: (2) in scope work would

Paragraph Number	Term	Definition
		increase or decrease the total of any major contract item by more than 25%; (3) work that is not within the scope of the originally awarded contract; or (4) adding or deleting of a major contract item.
10-60	**Surety**	The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the Owner by the Contractor.
10-61	**Taxilane**	A taxiway designed for low speed movement of aircraft between aircraft parking areas and terminal areas.
10-62	**Taxiway**	The portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways, aircraft parking areas, and terminal areas.
10-63	**Taxiway/Taxilane Safety Area (TSA)**	A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an aircraft. See the construction safety and phasing plan (CSPP) for limits of the TSA.
10-64	**Work**	The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the contract, plans, and specifications.
10-65	**Working day**	A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least six (6) hours toward completion of the contract. When work is suspended for causes beyond the Contractor's control, it will not be counted as a working day. Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work will be considered as working days.
10-66	**Owner Defined terms**	None

END OF SECTION 10

Section 20 Not Used

END OF SECTION 20

Section 30 Not Used

END OF SECTION 30

Section 40 Scope of Work

40-01 Intent of contract. The intent of the contract is to provide for construction and completion, in every detail, of the work described. It is further intended that the Contractor shall furnish all labor, materials, equipment, tools, transportation, and supplies required to complete the work in accordance with the plans, specifications, and terms of the contract.

40-02 Alteration of work and quantities. The Owner reserves the right to make such changes in quantities and work as may be necessary or desirable to complete, in a satisfactory manner, the original intended work. Unless otherwise specified in the Contract, the Owner's Engineer or RPR shall be and is hereby authorized to make, in writing, such in-scope alterations in the work and variation of quantities as may be necessary to complete the work, provided such action does not represent a significant change in the character of the work.

For purpose of this section, a significant change in character of work means: any change that is outside the current contract scope of work; any change (increase or decrease) in the total contract cost by more than 25%; or any change in the total cost of a major contract item by more than 25%.

Work alterations and quantity variances that do not meet the definition of significant change in character of work shall not invalidate the contract nor release the surety. Contractor agrees to accept payment for such work alterations and quantity variances in accordance with Section 90, paragraph 90-03, *Compensation for Altered Quantities*.

Should the value of altered work or quantity variance meet the criteria for significant change in character of work, such altered work and quantity variance shall be covered by a supplemental agreement. Supplemental agreements shall also require consent of the Contractor's surety and separate performance and payment bonds. If the Owner and the Contractor are unable to agree on a unit adjustment for any contract item that requires a supplemental agreement, the Owner reserves the right to terminate the contract with respect to the item and make other arrangements for its completion.

40-03 Omitted items. The Owner, the Owner's Engineer or the RPR may provide written notice to the Contractor to omit from the work any contract item that does not meet the definition of major contract item. Major contract items may be omitted by a supplemental agreement. Such omission of contract items shall not invalidate any other contract provision or requirement.

Should a contract item be omitted or otherwise ordered to be non-performed, the Contractor shall be paid for all work performed toward completion of such item prior to the date of the order to omit such item. Payment for work performed shall be in accordance with Section 90, paragraph 90-04, *Payment for Omitted Items*.

40-04 Extra work. Should acceptable completion of the contract require the Contractor to perform an item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, Owner may issue a Change Order to cover the necessary extra work. Change orders for extra work shall contain agreed unit prices for performing the change order work in accordance with the requirements specified in the order, and shall contain any adjustment to the contract time that, in the RPR's opinion, is necessary for completion of the extra work.

When determined by the RPR to be in the Owner's best interest, the RPR may order the Contractor to proceed with extra work as provided in Section 90, paragraph 90-05, *Payment for*

Extra Work. Extra work that is necessary for acceptable completion of the project, but is not within the general scope of the work covered by the original contract shall be covered by a supplemental agreement as defined in Section 10, paragraph 10-59, *Supplemental Agreement*.

If extra work is essential to maintaining the project critical path, RPR may order the Contractor to commence the extra work under a Time and Material contract method. Once sufficient detail is available to establish the level of effort necessary for the extra work, the Owner shall initiate a change order or supplemental agreement to cover the extra work.

Any claim for payment of extra work that is not covered by written agreement (change order or supplemental agreement) shall be rejected by the Owner.

40-05 Maintenance of traffic. It is the explicit intention of the contract that the safety of aircraft, as well as the Contractor's equipment and personnel, is the most important consideration. The Contractor shall maintain traffic in the manner detailed in the Construction Safety and Phasing Plan (CSPP).

a. It is understood and agreed that the Contractor shall provide for the free and unobstructed movement of aircraft in the air operations areas (AOAs) of the airport with respect to their own operations and the operations of all subcontractors as specified in Section 80, paragraph 80-04, *Limitation of Operations*. It is further understood and agreed that the Contractor shall provide for the uninterrupted operation of visual and electronic signals (including power supplies thereto) used in the guidance of aircraft while operating to, from, and upon the airport as specified in Section 70, paragraph 70-15, *Contractor's Responsibility for Utility Service and Facilities of Others*.

b. With respect to their own operations and the operations of all subcontractors, the Contractor shall provide marking, lighting, and other acceptable means of identifying personnel, equipment, vehicles, storage areas, and any work area or condition that may be hazardous to the operation of aircraft, fire-rescue equipment, or maintenance vehicles at the airport in accordance with the construction safety and phasing plan (CSPP) and the safety plan compliance document (SPCD).

c. When the contract requires the maintenance of an existing road, street, or highway during the Contractor's performance of work that is otherwise provided for in the contract, plans, and specifications, the Contractor shall keep the road, street, or highway open to all traffic and shall provide maintenance as may be required to accommodate traffic. The Contractor, at their expense, shall be responsible for the repair to equal or better than preconstruction conditions of any damage caused by the Contractor's equipment and personnel. The Contractor shall furnish, erect, and maintain barricades, warning signs, flag person, and other traffic control devices in reasonable conformity with the Manual on Uniform Traffic Control Devices (MUTCD) (http://mutcd.fhwa.dot.gov/), unless otherwise specified. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary for ingress to and egress from abutting property or intersecting roads, streets or highways.

40-06 Removal of existing structures. All existing structures encountered within the established lines, grades, or grading sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the work or to remain in place. The cost of removing such existing structures shall not be measured or paid for directly, but shall be included in the various contract items.

Should the Contractor encounter an existing structure (above or below ground) in the work for which the disposition is not indicated on the plans, the Resident Project Representative (RPR) shall be notified prior to disturbing such structure. The disposition of existing structures so

encountered shall be immediately determined by the RPR in accordance with the provisions of the contract.

Except as provided in Section 40, paragraph 40-07, *Rights in and Use of Materials Found in the Work*, it is intended that all existing materials or structures that may be encountered (within the lines, grades, or grading sections established for completion of the work) shall be used in the work as otherwise provided for in the contract and shall remain the property of the Owner when so used in the work.

40-07 Rights in and use of materials found in the work. Should the Contractor encounter any material such as (but not restricted to) sand, stone, gravel, slag, or concrete slabs within the established lines, grades, or grading sections, the use of which is intended by the terms of the contract to be embankment, the Contractor may at their own option either:

a. Use such material in another contract item, providing such use is approved by the RPR and is in conformance with the contract specifications applicable to such use; or,

b. Remove such material from the site, upon written approval of the RPR; or

c. Use such material for the Contractor's own temporary construction on site; or,

d. Use such material as intended by the terms of the contract.

Should the Contractor wish to exercise option a., b., or c., the Contractor shall request the RPR's approval in advance of such use.

Should the RPR approve the Contractor's request to exercise option a., b., or c., the Contractor shall be paid for the excavation or removal of such material at the applicable contract price. The Contractor shall replace, at their expense, such removed or excavated material with an agreed equal volume of material that is acceptable for use in constructing embankment, backfills, or otherwise to the extent that such replacement material is needed to complete the contract work. The Contractor shall not be charged for use of such material used in the work or removed from the site.

Should the RPR approve the Contractor's exercise of option a., the Contractor shall be paid, at the applicable contract price, for furnishing and installing such material in accordance with requirements of the contract item in which the material is used.

It is understood and agreed that the Contractor shall make no claim for delays by reason of their own exercise of option a., b., or c.

The Contractor shall not excavate, remove, or otherwise disturb any material, structure, or part of a structure which is located outside the lines, grades, or grading sections established for the work, except where such excavation or removal is provided for in the contract, plans, or specifications.

40-08 Final cleanup. Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. The Contractor shall cut all brush and woods within the limits indicated and shall leave the site in a neat and presentable condition. Material cleared from the site and deposited on adjacent property will not be considered as having been disposed of satisfactorily, unless the Contractor has obtained the written permission of the property Owner.

END OF SECTION 40

Section 50 Control of Work

50-01 Authority of the Resident Project Representative (RPR). The RPR has final authority regarding the interpretation of project specification requirements. The RPR shall determine acceptability of the quality of materials furnished, method of performance of work performed, and the manner and rate of performance of the work. The RPR does not have the authority to accept work that does not conform to specification requirements.

50-02 Conformity with plans and specifications. All work and all materials furnished shall be in reasonably close conformity with the lines, grades, grading sections, cross-sections, dimensions, material requirements, and testing requirements that are specified (including specified tolerances) in the contract, plans, or specifications.

If the RPR finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the plans and specifications, but that the portion of the work affected will, in their opinion, result in a finished product having a level of safety, economy, durability, and workmanship acceptable to the Owner, the RPR will advise the Owner of their determination that the affected work be accepted and remain in place. The RPR will document the determination and recommend to the Owner a basis of acceptance that will provide for an adjustment in the contract price for the affected portion of the work. Changes in the contract price must be covered by contract change order or supplemental agreement as applicable.

If the RPR finds the materials furnished, work performed, or the finished product are not in reasonably close conformity with the plans and specifications and have resulted in an unacceptable finished product, the affected work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor in accordance with the RPR's written orders.

The term "reasonably close conformity" shall not be construed as waiving the Contractor's responsibility to complete the work in accordance with the contract, plans, and specifications. The term shall not be construed as waiving the RPR's responsibility to insist on strict compliance with the requirements of the contract, plans, and specifications during the Contractor's execution of the work, when, in the RPR's opinion, such compliance is essential to provide an acceptable finished portion of the work.

The term "reasonably close conformity" is also intended to provide the RPR with the authority, after consultation with the Sponsor and FAA, to use sound engineering judgment in their determinations to accept work that is not in strict conformity, but will provide a finished product equal to or better than that required by the requirements of the contract, plans and specifications.

The RPR will not be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction or the safety precautions incident thereto.

50-03 Coordination of contract, plans, and specifications. The contract, plans, specifications, and all referenced standards cited are essential parts of the contract requirements. If electronic files are provided and used on the project and there is a conflict between the electronic files and hard copy plans, the hard copy plans shall govern. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions; contract technical specifications shall govern over contract general provisions, plans, cited standards for materials or testing, and cited advisory circulars (ACs); contract general provisions shall govern over plans, cited

standards for materials or testing, and cited ACs; plans shall govern over cited standards for materials or testing and cited ACs. If any paragraphs contained in the Special Provisions conflict with General Provisions or Technical Specifications, the Special Provisions shall govern.

From time to time, discrepancies within cited testing standards occur due to the timing of the change, edits, and/or replacement of the standards. If the Contractor discovers any apparent discrepancy within standard test methods, the Contractor shall immediately ask the RPR for an interpretation and decision, and such decision shall be final.

The Contractor shall not take advantage of any apparent error or omission on the plans or specifications. In the event the Contractor discovers any apparent error or discrepancy, Contractor shall immediately notify the Owner or the designated representative in writing requesting their written interpretation and decision.

50-04 List of Special Provisions. Refer to Section III B for the Project Technical Special Provisions.

50-05 Cooperation of Contractor. The Contractor shall be supplied with five hard copies or an electronic PDF of the plans and specifications. The Contractor shall have available on the construction site at all times one hardcopy each of the plans and specifications. Additional hard copies of plans and specifications may be obtained by the Contractor for the cost of reproduction.

The Contractor shall give constant attention to the work to facilitate the progress thereof, and shall cooperate with the RPR and their inspectors and with other Contractors in every way possible. The Contractor shall have a competent superintendent on the work at all times who is fully authorized as their agent on the work. The superintendent shall be capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the RPR or their authorized representative.

50-06 Cooperation between Contractors. The Owner reserves the right to contract for and perform other or additional work on or near the work covered by this contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct the work not to interfere with or hinder the progress of completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with their own contract and shall protect and hold harmless the Owner from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced because of the presence and operations of other Contractors working within the limits of the same project.

The Contractor shall arrange their work and shall place and dispose of the materials being used to not interfere with the operations of the other Contractors within the limits of the same project. The Contractor shall join their work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

50-07 Construction layout and stakes. The Engineer/RPR shall establish necessary horizontal and vertical control. The establishment of Survey Control and/or reestablishment of survey control shall be by a State Licensed Land Surveyor. Contractor is responsible for preserving integrity of horizontal and vertical controls established by Engineer/RPR. In case of negligence on the part of the Contractor or their employees, resulting in the destruction of any horizontal and vertical control, the resulting costs will be deducted as a liquidated damage against the Contractor.

Prior to the start of construction, the Contractor will check all control points for horizontal and vertical accuracy and certify in writing to the RPR that the Contractor concurs with survey control established for the project. All lines, grades and measurements from control points necessary for the proper execution and control of the work on this project will be provided to the RPR. The Contractor is responsible to establish all layout required for the construction of the project.

Copies of survey notes will be provided to the RPR for each area of construction and for each placement of material as specified to allow the RPR to make periodic checks for conformance with plan grades, alignments and grade tolerances required by the applicable material specifications. Surveys will be provided to the RPR prior to commencing work items that cover or disturb the survey staking. Survey(s) and notes shall be provided in the following format(s): .pdf, .xml, .dtm, .txt (PNEZD), .csv (PNEZD).

Laser, GPS, String line, or other automatic control shall be checked with temporary control as necessary. In the case of error, on the part of the Contractor, their surveyor, employees or subcontractors, resulting in established grades, alignment or grade tolerances that do not concur with those specified or shown on the plans, the Contractor is solely responsible for correction, removal, replacement and all associated costs at no additional cost to the Owner.

No direct payment will be made, unless otherwise specified in contract documents, for this labor, materials, or other expenses. The cost shall be included in the price of the bid for the various items of the Contract.

50-08 Authority and duties of Quality Assurance (QA) inspectors. QA inspectors shall be authorized to inspect all work done and all material furnished. Such QA inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. QA inspectors are not authorized to revoke, alter, or waive any provision of the contract. QA inspectors are not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor.

QA Inspectors are authorized to notify the Contractor or their representatives of any failure of the work or materials to conform to the requirements of the contract, plans, or specifications and to reject such nonconforming materials in question until such issues can be referred to the RPR for a decision.

50-09 Inspection of the work. All materials and each part or detail of the work shall be subject to inspection. The RPR shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

If the RPR requests it, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be at the Contractor’s expense.

Provide advance written notice to the RPR of work the Contractor plans to perform each week and each day. Any work done or materials used without written notice and allowing opportunity for inspection by the RPR may be ordered removed and replaced at the Contractor’s expense.

Should the contract work include relocation, adjustment, or any other modification to existing facilities, not the property of the (contract) Owner, authorized representatives of the Owners of such facilities shall have the right to inspect such work. Such inspection shall in no sense make any facility owner a party to the contract, and shall in no way interfere with the rights of the parties to this contract.

50-10 Removal of unacceptable and unauthorized work. All work that does not conform to the requirements of the contract, plans, and specifications will be considered unacceptable, unless otherwise determined acceptable by the RPR as provided in paragraph 50-02, *Conformity with Plans and Specifications*.

Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner in accordance with the provisions of Section 70, paragraph 70-14, *Contractor's Responsibility for Work*.

No removal work made under provision of this paragraph shall be done without lines and grades having been established by the RPR. Work done contrary to the instructions of the RPR, work done beyond the lines shown on the plans or as established by the RPR, except as herein specified, or any extra work done without authority, will be considered as unauthorized and will not be paid for under the provisions of the contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply with any order of the RPR made under the provisions of this subsection, the RPR will have authority to cause unacceptable work to be remedied or removed and replaced; and unauthorized work to be removed and recover the resulting costs as a liquidated damage against the Contractor.

50-11 Load restrictions. The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads beyond the limits of the work. A special permit will not relieve the Contractor of liability for damage that may result from the moving of material or equipment.

The operation of equipment of such weight or so loaded as to cause damage to structures or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited as directed. No loads will be permitted on a concrete pavement, base, or structure before the expiration of the curing period. The Contractor, at their own expense, shall be responsible for the repair to equal or better than preconstruction conditions of any damage caused by the Contractor's equipment and personnel.

50-12 Maintenance during construction. The Contractor shall maintain the work during construction and until the work is accepted. Maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

In the case of a contract for the placing of a course upon a course or subgrade previously constructed, the Contractor shall maintain the previous course or subgrade during all construction operations.

All costs of maintenance work during construction and before the project is accepted shall be included in the unit prices bid on the various contract items, and the Contractor will not be paid an additional amount for such work.

50-13 Failure to maintain the work. Should the Contractor at any time fail to maintain the work as provided in paragraph 50-12, *Maintenance during Construction*, the RPR shall immediately notify the Contractor of such noncompliance. Such notification shall specify a reasonable time

within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. The time specified will give due consideration to the exigency that exists.

Should the Contractor fail to respond to the RPR's notification, the Owner may suspend any work necessary for the Owner to correct such unsatisfactory maintenance condition, depending on the exigency that exists. Any maintenance cost incurred by the Owner, shall be recovered as a liquidated damage against the Contractor.

50-14 Partial acceptance. If at any time during the execution of the project the Contractor substantially completes a usable unit or portion of the work, the occupancy of which will benefit the Owner, the Contractor may request the RPR to make final inspection of that unit. If the RPR finds upon inspection that the unit has been satisfactorily completed in compliance with the contract, the RPR may accept it as being complete, and the Contractor may be relieved of further responsibility for that unit. Such partial acceptance and beneficial occupancy by the Owner shall not void or alter any provision of the contract.

50-15 Final acceptance. Upon due notice from the Contractor of presumptive completion of the entire project, the RPR and Owner will make an inspection. If all construction provided for and contemplated by the contract is found to be complete in accordance with the contract, plans, and specifications, such inspection shall constitute the final inspection. The RPR shall notify the Contractor in writing of final acceptance as of the date of the final inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the RPR will notify the Contractor and the Contractor shall correct the unsatisfactory work. Upon correction of the work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed. In such event, the RPR will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

50-16 Claims for adjustment and disputes. If for any reason the Contractor deems that additional compensation is due for work or materials not clearly provided for in the contract, plans, or specifications or previously authorized as extra work, the Contractor shall notify the RPR in writing of their intention to claim such additional compensation before the Contractor begins the work on which the Contractor bases the claim. If such notification is not given or the RPR is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor and the fact that the RPR has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within 10 calendar days, submit a written claim to the RPR who will present it to the Owner for consideration in accordance with local laws or ordinances.

Nothing in this subsection shall be construed as a waiver of the Contractor's right to dispute final payment based on differences in measurements or computations.

END OF SECTION 50

Section 60 Control of Materials

60-01 Source of supply and quality requirements. The materials used in the work shall conform to the requirements of the contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

In order to expedite the inspection and testing of materials, the Contractor shall furnish documentation to the RPR as to the origin, composition, and manufacture of all materials to be used in the work. Documentation shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials.

At the RPR's option, materials may be approved at the source of supply before delivery. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish materials from other sources.

The Contractor shall furnish airport lighting equipment that meets the requirements of the specifications; and is listed in AC 150/5345-53, *Airport Lighting Equipment Certification Program* and *Addendum*, that is in effect on the date of advertisement.

60-02 Samples, tests, and cited specifications. All materials used in the work shall be inspected, tested, and approved by the RPR before incorporation in the work unless otherwise designated. Any work in which untested materials are used without approval or written permission of the RPR shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the RPR, shall be removed at the Contractor's expense.

Unless otherwise designated, quality assurance tests will be made by and at the expense of the Owner in accordance with the cited standard methods of ASTM, American Association of State Highway and Transportation Officials (AASHTO), federal specifications, Commercial Item Descriptions, and all other cited methods, which are current on the date of advertisement for bids.

The testing organizations performing on-site quality assurance field tests shall have copies of all referenced standards on the construction site for use by all technicians and other personnel. Unless otherwise designated, samples for quality assurance will be taken by a qualified representative of the RPR. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the work. Copies of all tests will be furnished to the Contractor's representative at their request after review and approval of the RPR.

A copy of all Contractor QC test data shall be provided to the RPR daily, along with printed reports, in an approved format, on a weekly basis. After completion of the project, and prior to final payment, the Contractor shall submit a final report to the RPR showing all test data reports, plus an analysis of all results showing ranges, averages, and corrective action taken on all failing tests.

The Contractor shall employ a Quality Control (QC) testing organization to perform all Contractor required QC tests in accordance with Item C-100 Contractor Quality Control Program (CQCP).

60-03 Certification of compliance/analysis (COC/COA). The RPR may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by

manufacturer's COC stating that such materials or assemblies fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified. The COA is the manufacturer's COC and includes all applicable test results.

Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

The form and distribution of certificates of compliance shall be as approved by the RPR.

When a material or assembly is specified by "brand name or equal" and the Contractor elects to furnish the specified "or equal," the Contractor shall be required to furnish the manufacturer's certificate of compliance for each lot of such material or assembly delivered to the work. Such certificate of compliance shall clearly identify each lot delivered and shall certify as to:

a. Conformance to the specified performance, testing, quality or dimensional requirements; and,

b. Suitability of the material or assembly for the use intended in the contract work.

The RPR shall be the sole judge as to whether the proposed "or equal" is suitable for use in the work.

The RPR reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

60-04 Plant inspection. The RPR or their authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for acceptance of the material or assembly.

Should the RPR conduct plant inspections, the following conditions shall exist:

a. The RPR shall have the cooperation and assistance of the Contractor and the producer with whom the Contractor has contracted for materials.

b. The RPR shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.

c. If required by the RPR, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Place office or working space in a convenient location with respect to the plant.

It is understood and agreed that the Owner shall have the right to retest any material that has been tested and approved at the source of supply after it has been delivered to the site. The RPR shall have the right to reject only material which, when retested, does not meet the requirements of the contract, plans, or specifications.

60-05 Engineer/ Resident Project Representative (RPR) field office. The Contractor shall provide dedicated space for the use of the engineer, RPR, and inspectors, as a field office for the duration of the project. This space shall be located conveniently near the construction and shall be separate from any space used by the Contractor. The Contractor shall furnish water, sanitary facilities, heat, air conditioning, and electricity.

60-06 Storage of materials. Materials shall be stored to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the RPR. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the plans and/or CSPP, the storage of materials and the location of the Contractor's plant and parked equipment or vehicles shall be as directed by the RPR. Private property shall not be used for storage purposes without written permission of the Owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the RPR a copy of the property Owner's permission.

All storage sites on private or airport property shall be restored to their original condition by the Contractor at their expense, except as otherwise agreed to (in writing) by the Owner or lessee of the property.

60-07 Unacceptable materials. Any material or assembly that does not conform to the requirements of the contract, plans, or specifications shall be considered unacceptable and shall be rejected. The Contractor shall remove any rejected material or assembly from the site of the work, unless otherwise instructed by the RPR.

Rejected material or assembly, the defects of which have been corrected by the Contractor, shall not be returned to the site of the work until such time as the RPR has approved its use in the work.

60-08 Owner furnished materials. The Contractor shall furnish all materials required to complete the work, except those specified, if any, to be furnished by the Owner. Owner-furnished materials shall be made available to the Contractor at the location specified.

All costs of handling, transportation from the specified location to the site of work, storage, and installing Owner-furnished materials shall be included in the unit price bid for the contract item in which such Owner-furnished material is used.

After any Owner-furnished material has been delivered to the location specified, the Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies that may occur during the Contractor's handling, storage, or use of such Owner-furnished material. The Owner will deduct from any monies due or to become due the Contractor any cost incurred by the Owner in making good such loss due to the Contractor's handling, storage, or use of Owner-furnished materials.

END OF SECTION 60

Section 70 Legal Regulations and Responsibility to Public

70-01 Laws to be observed. The Contractor shall keep fully informed of all federal and state laws, all local laws, ordinances, and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. The Contractor shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the Owner and all their officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by the Contractor or the Contractor's employees.

70-02 Permits, licenses, and taxes. The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful execution of the work.

70-03 Patented devices, materials, and processes. If the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, the Contractor shall provide for such use by suitable legal agreement with the Patentee or Owner. The Contractor and the surety shall indemnify and hold harmless the Owner, any third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay by reason of an infringement, at any time during the execution or after the completion of the work.

70-04 Restoration of surfaces disturbed by others. The Owner reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, FAA or National Oceanic and Atmospheric Administration (NOAA) facility, or a utility service of another government agency at any time during the progress of the work. To the extent that such construction, reconstruction, or maintenance has been coordinated with the Owner, such authorized work (by others) must be shown on the plans and is indicated as follows:

Except as listed above, the Contractor shall not permit any individual, firm, or corporation to excavate or otherwise disturb such utility services or facilities located within the limits of the work without the written permission of the RPR.

Should the Owner of public or private utility service, FAA, or NOAA facility, or a utility service of another government agency be authorized to construct, reconstruct, or maintain such utility service or facility during the progress of the work, the Contractor shall cooperate with such Owners by arranging and performing the work in this contract to facilitate such construction, reconstruction or maintenance by others whether or not such work by others is listed above. When ordered as extra work by the RPR, the Contractor shall make all necessary repairs to the work which are due to such authorized work by others, unless otherwise provided for in the contract, plans, or specifications. It is understood and agreed that the Contractor shall not be entitled to make any claim for damages due to such authorized work by others or for any delay to the work resulting from such authorized work.

70-05 Federal Participation. The United States Government has agreed to reimburse the Owner for some portion of the contract costs. The contract work is subject to the inspection and approval of duly authorized representatives of the FAA Administrator. No requirement of this contract shall be construed as making the United States a party to the contract nor will any such requirement interfere, in any way, with the rights of either party to the contract.

70-06 Sanitary, health, and safety provisions. The Contractor's worksite and facilities shall comply with applicable federal, state, and local requirements for health, safety and sanitary provisions.

70-07 Public convenience and safety. The Contractor shall control their operations and those of their subcontractors and all suppliers, to assure the least inconvenience to the traveling public. Under all circumstances, safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of aircraft and vehicular traffic with respect to their own operations and those of their own subcontractors and all suppliers in accordance with Section 40, paragraph 40-05, *Maintenance of Traffic,* and shall limit such operations for the convenience and safety of the traveling public as specified in Section 80, paragraph 80-04, *Limitation of Operations*.

The Contractor shall remove or control debris and rubbish resulting from its work operations at frequent intervals, and upon the order of the RPR. If the RPR determines the existence of Contractor debris in the work site represents a hazard to airport operations and the Contractor is unable to respond in a prompt and reasonable manner, the RPR reserves the right to assign the task of debris removal to a third party and recover the resulting costs as a liquidated damage against the Contractor.

70-08 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. The CSPP is included in the Contract Documents. Construction Safety and Phasing Plan sheets are included as sheets GC-100 through GC-104 and GC-501 of the project plans.

70-09 Use of explosives. The use of explosives is not permitted on this project.

70-10 Protection and restoration of property and landscape. The Contractor shall be responsible for the preservation of all public and private property, and shall protect carefully from disturbance or damage all land monuments and property markers until the Engineer/RPR has witnessed or otherwise referenced their location and shall not move them until directed.

The Contractor shall be responsible for all damage or injury to property of any character, during the execution of the work, resulting from any act, omission, neglect, or misconduct in manner or method of executing the work, or at any time due to defective work or materials, and said responsibility shall not be released until the project has been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the non-execution thereof by the Contractor, the Contractor shall restore, at their expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, or otherwise restoring as may be directed, or the Contractor shall make good such damage or injury in an acceptable manner.

70-11 Responsibility for damage claims. The Contractor shall indemnify and hold harmless the Engineer/RPR and the Owner and their officers, agents, and employees from all suits, actions, or claims, of any character, brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the "Workmen's Compensation Act," or any other law, ordinance, order, or

decree. Money due the Contractor under and by virtue of their own contract considered necessary by the Owner for such purpose may be retained for the use of the Owner or, in case no money is due, their own surety may be held until such suits, actions, or claims for injuries or damages shall have been settled and suitable evidence to that effect furnished to the Owner, except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that he or she is adequately protected by public liability and property damage insurance.

70-12 Third party beneficiary clause. It is specifically agreed between the parties executing the contract that it is not intended by any of the provisions of any part of the contract to create for the public or any member thereof, a third-party beneficiary or to authorize anyone not a party to the contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of the contract.

70-13 Opening sections of the work to traffic. 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 must be specified below and indicated on the approved Construction Safety and Phasing Plan (CSPP) and the project plans. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified.

- Phase 1 shall be completed and usable for aircraft operations within 110 calendar days. The limits and scope of Phase 1 are shown on sheet GC-101 of the construction plans.
- Phase 2 shall be completed and usable for aircraft operations within 70 calendar days. The limits and scope of Phase 2 are shown on sheet GC-102 of the construction plans.
- Phase 3 shall be completed and usable for aircraft operations within 65 calendar days. The limits and scope of Phase 3 are shown on sheet GC-103 of the construction plans.
- Phase 4 shall be completed and usable for aircraft operations within 21 calendar days. The limits and scope of Phase 4 are shown on sheet GC-104 of the construction plans.

Upon completion of any portion of work listed above, such portion shall be accepted by the Owner in accordance with Section 50, paragraph 50-14, *Partial Acceptance*.

No portion of the work may be opened by the Contractor until directed by the Owner in writing. Should it become necessary to open a portion of the work to traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the RPR, such portion of the work is in an acceptable condition to support the intended traffic. Temporary or intermittent openings are considered to be inherent in the work and shall not constitute either acceptance of the portion of the work so opened or a waiver of any provision of the contract. Any damage to the portion of the work so opened that is not attributable to traffic which is permitted by the Owner shall be repaired by the Contractor at their expense.

The Contractor shall make their own estimate of the inherent difficulties involved in completing the work under the conditions herein described and shall not claim any added compensation by reason of delay or increased cost due to opening a portion of the contract work.

The Contractor must conform to safety standards contained AC 150/5370-2 and the approved CSPP.

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

70-14 Contractor's responsibility for work. Until the RPR's final written acceptance of the entire completed work, excepting only those portions of the work accepted in accordance with Section 50, paragraph 50-14, *Partial Acceptance*, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God such as earthquake, tidal wave, tornado, hurricane or other cataclysmic phenomenon of nature, or acts of the public enemy or of government authorities.

If the work is suspended for any cause whatever, the Contractor shall be responsible for the work and shall take such precautions necessary to prevent damage to the work. The Contractor shall provide for normal drainage and shall erect necessary temporary structures, signs, or other facilities at their own expense. During such period of suspension of work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established planting, seeding, and sodding furnished under the contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

70-15 Contractor's responsibility for utility service and facilities of others. As provided in paragraph 70-04, *Restoration of Surfaces Disturbed by Others*, the Contractor shall cooperate with the owner of any public or private utility service, FAA or NOAA, or a utility service of another government agency that may be authorized by the Owner to construct, reconstruct or maintain such utility services or facilities during the progress of the work. In addition, the Contractor shall control their operations to prevent the unscheduled interruption of such utility services and facilities.

To the extent that such public or private utility services, FAA, or NOAA facilities, or utility services of another governmental agency are known to exist within the limits of the contract work, the approximate locations have been indicated on the plans and/or in the contract documents.

Arizona Public Service (APS):	David McCasland	(602) 371-6451
FAA Facilities:	Roger Gusfafson	(602) 305-2532
Communication (Lumen):	John O'Dell	(602) 530-0496
Gas (Southwest Gas):	Norma Jardin	(602) 484-5344
Water/Sewer (City):	Jami Erickson	(602) 261-8229
Environmental (City):	Rebecca Godley	(602) 273-3396
Electrical (City)	David Thornton	(602) 540-7667
Communication (City):	Chad Blotkamp	(602) 708-0244
All Emergency, Fire, Police, Medical	Operator	(602) 273-3311

It is understood and agreed that the Owner does not guarantee the accuracy or the completeness of the location information relating to existing utility services, facilities, or structures that may be shown on the plans or encountered in the work. Any inaccuracy or omission in such information shall not relieve the Contractor of the responsibility to protect such existing features from damage or unscheduled interruption of service.

It is further understood and agreed that the Contractor shall, upon execution of the contract, notify the Owners of all utility services or other facilities of their plan of operations. Such notification shall be in writing addressed to “The Person to Contact” as provided in this paragraph and paragraph 70-04, *Restoration of Surfaces Disturbed By Others*. A copy of each notification shall be given to the RPR.

In addition to the general written notification provided, it shall be the responsibility of the Contractor to keep such individual Owners advised of changes in their plan of operations that would affect such Owners.

Prior to beginning the work in the general vicinity of an existing utility service or facility, the Contractor shall again notify each such Owner of their plan of operation. If, in the Contractor’s opinion, the Owner’s assistance is needed to locate the utility service or facility or the presence of a representative of the Owner is desirable to observe the work, such advice should be included in the notification. Such notification shall be given by the most expeditious means to reach the utility owner’s “Person to Contact” no later than two normal business days prior to the Contractor’s commencement of operations in such general vicinity. The Contractor shall furnish a written summary of the notification to the RPR.

The Contractor’s failure to give the two days’ notice shall be cause for the Owner to suspend the Contractor’s operations in the general vicinity of a utility service or facility.

Where the outside limits of an underground utility service have been located and staked on the ground, the Contractor shall be required to use hand excavation methods within 3 feet (1 m) of such outside limits at such points as may be required to ensure protection from damage due to the Contractor’s operations.

Should the Contractor damage or interrupt the operation of a utility service or facility by accident or otherwise, the Contractor shall immediately notify the proper authority and the RPR and shall take all reasonable measures to prevent further damage or interruption of service. The Contractor, in such events, shall cooperate with the utility service or facility owner and the RPR continuously until such damage has been repaired and service restored to the satisfaction of the utility or facility owner.

The Contractor shall bear all costs of damage and restoration of service to any utility service or facility due to their operations whether due to negligence or accident. The Owner reserves the right to deduct such costs from any monies due or which may become due the Contractor, or their own surety.

70-15.1 FAA facilities and cable runs. The Contractor is hereby advised that the construction limits of the project include existing facilities and buried cable runs that are owned, operated and maintained by the FAA. The Contractor, during the execution of the project work, shall comply with the following:

a. The Contractor shall permit FAA maintenance personnel the right of access to the project work site for purposes of inspecting and maintaining all existing FAA owned facilities.

b. The Contractor shall provide notice to the FAA Air Traffic Organization (ATO)/Technical Operations/System Support Center (SSC) Point-of-Contact through the airport Owner a minimum of seven (7) calendar days prior to commencement of construction activities in order

to permit sufficient time to locate and mark existing buried cables and to schedule any required facility outages.

c. If execution of the project work requires a facility outage, the Contractor shall contact the FAA Point-of-Contact a minimum of 72 hours prior to the time of the required outage.

d. Any damage to FAA cables, access roads, or FAA facilities during construction caused by the Contractor's equipment or personnel whether by negligence or accident will require the Contractor to repair or replace the damaged cables, access road, or FAA facilities to FAA requirements. The Contractor shall not bear the cost to repair damage to underground facilities or utilities improperly located by the FAA.

e. If the project work requires the cutting or splicing of FAA owned cables, the FAA Point-of-Contact shall be contacted a minimum of 72 hours prior to the time the cable work commences. The FAA reserves the right to have a FAA representative on site to observe the splicing of the cables as a condition of acceptance. All cable splices are to be accomplished in accordance with FAA specifications and require approval by the FAA Point-of-Contact as a condition of acceptance by the Owner. The Contractor is hereby advised that FAA restricts the location of where splices may be installed. If a cable splice is required in a location that is not permitted by FAA, the Contractor shall furnish and install a sufficient length of new cable that eliminates the need for any splice.

70-16 Furnishing rights-of-way. The Owner will be responsible for furnishing all rights-of-way upon which the work is to be constructed in advance of the Contractor's operations.

70-17 Personal liability of public officials. In carrying out any of the contract provisions or in exercising any power or authority granted by this contract, there shall be no liability upon the Engineer, RPR, their authorized representatives, or any officials of the Owner either personally or as an official of the Owner. It is understood that in such matters they act solely as agents and representatives of the Owner.

70-18 No waiver of legal rights. Upon completion of the work, the Owner will expeditiously make final inspection and notify the Contractor of final acceptance. Such final acceptance, however, shall not preclude or stop the Owner from correcting any measurement, estimate, or certificate made before or after completion of the work, nor shall the Owner be precluded or stopped from recovering from the Contractor or their surety, or both, such overpayment as may be sustained, or by failure on the part of the Contractor to fulfill their obligations under the contract. A waiver on the part of the Owner of any breach of any part of the contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor, without prejudice to the terms of the contract, shall be liable to the Owner for latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the Owner's rights under any warranty or guaranty.

70-19 Environmental protection. The Contractor shall comply with all federal, state, and local laws and regulations controlling pollution of the environment. The Contractor shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, asphalts, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

70-20 Archaeological and historical findings. Unless otherwise specified in this subsection, the Contractor is advised that the site of the work is not within any property, district, or site, and does not contain any building, structure, or object listed in the current National Register of Historic Places published by the United States Department of Interior.

Should the Contractor encounter, during their operations, any building, part of a building, structure, or object that is incongruous with its surroundings, the Contractor shall immediately cease operations in that location and notify the RPR. The RPR will immediately investigate the Contractor's finding and the Owner will direct the Contractor to either resume operations or to suspend operations as directed.

Should the Owner order suspension of the Contractor's operations in order to protect an archaeological or historical finding, or order the Contractor to perform extra work, such shall be covered by an appropriate contract change order or supplemental agreement as provided in Section 40, paragraph 40-04, *Extra Work,* and Section 90, paragraph 90-05, *Payment for Extra Work*. If appropriate, the contract change order or supplemental agreement shall include an extension of contract time in accordance with Section 80, paragraph 80-07, *Determination and Extension of Contract Time*.

70-21 Not Used.

END OF SECTION 70

Section 80 Not Used

END OF SECTION 80

Section 90 Not Used

END OF SECTION 90

SECTION III-B

TECHNICAL SPECIAL PROVISION SPECIFICATIONS

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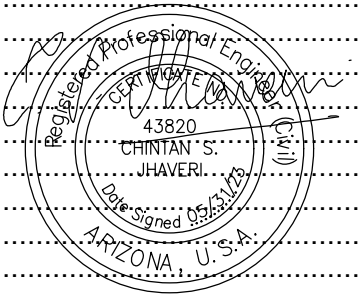


TECHNICAL SPECIAL PROVISION SPECIFICATIONS

1. TRAFFIC CONTROL AND REGULATIONS. All traffic and/or traffic control devices on this project shall be provided, maintained and/or controlled by the Contractor, as specified in the City of Phoenix *Traffic Barricade Manual*, latest edition, with revisions as shown below:

a. The following shall be considered major streets:
- 24th Street;
- Air Lane;
- 48th Street;
- 44th Street;
- Buckeye Road, and;
- Sky Harbor Boulevard;
- Old Tower Road.

b. Permission to restrict City streets, sidewalks and alleys (street closure permits) shall be requested as specified in the *Traffic Barricade Manual*, latest edition.

c. Unless otherwise provided in Special Provision Item 36, “Airport Safety and Security (M-003)”, all traffic on this project shall be regulated as specified in the *Traffic Barricade Manual*, latest edition.

d. No deviation to Special Provision Item 36, “Airport Safety and Security (M-003)” will be allowed or implemented unless submitted to the City for review and approval one (1) week prior to the proposed work.

e. Off-peak hours at Phoenix Sky Harbor International Airport are from 11:00PM to 5:00AM for lane restrictions.

f. No complete road closures are allowed.

g. Sky Harbor Boulevard during peak hours shall have no less than two (2) lanes operational in each direction unless noted otherwise.

h. The Contractor shall submit for each construction phase, a Landside Traffic Control Plan containing traffic control drawings with barricade layouts to the City for approval. This submittal must be transmitted to the City a minimum of one (1) week prior to instituting the particular Traffic Control Plan.

i. Hauling equipment, either full or empty, or any other construction traffic will not be allowed on Sky Harbor Boulevard, the exceptions to this will be either shown on the plans, or otherwise directed by the City of Phoenix Aviation Department. Any damage by the Contractor to major streets, including Sky Harbor Boulevard, shall have full repairs performed the same day that the damage occurred at no cost to the City.

2. PLANS AND SPECIFICATIONS. The Contractor shall keep at least one (1) copy of the contract documents constantly accessible on the work site**.**

The City of Phoenix Supplements will govern over the MAG Standard Specifications and Details.

In case of a discrepancy or conflict between these Contract Documents and the City of Phoenix Supplements or the MAG Standard Specifications and Details, the Plans will govern over both the City of Phoenix Supplements and MAG Standard Specifications and Details. Technical Special Provisions will govern over the City of Phoenix Supplements and the MAG Standard Specifications and Details.

The following is the precedence of the Contract Documents:

a. Technical Special Provision Specifications
b. Civil Technical Specifications
c. Cited Standards for Materials and Testing
d. Cited Federal Aviation Administration (FAA) Advisory Circulars
e. General Provision Specifications
f. Plans
g. City of Phoenix Supplement to MAG Standard Specifications and Details
h. MAG Uniform Standard Specifications and Details for Public Works Construction

Calculated dimensions will govern over scaled dimensions. The Contractor shall not take advantage of any apparent error or omission on the Plans or Specifications. In the event the Contractor discovers any apparent error or discrepancy, he shall immediately call upon the RPR for his/her interpretation and decision, and such decision shall be final.

Electronic files (CAD files) are not a part of the contract documents. Information contained on CAD files may not be compatible with the coordinates, elevations, details, and dimensions shown on the Project Plans. The Contractor may be provided with CAD files; however, the Contractor shall survey and construct the project from the information shown on the Project Plans, and as specified in the Project Specifications and Contract Documents.

3. WATER. All water required for and in conjunction with the work to be performed shall be provided by the Contractor and at the Contractor's expense. The Contractor shall arrange for the installation of an appropriate meter and bear the cost of such installation and the cost of the water.

When the Contractor needs a temporary waterline to the staging area, he shall coordinate the temporary waterline installation with the City of Phoenix Aviation Department Inspection Staff. There shall be no separate pay item for the construction of temporary water lines. These costs shall be included in items for which direct payment is made.

Prior to the actual water line shut down, the Contractor shall follow the following sequence of events:

a. Construct all new waterlines, except for connections to existing water lines.
b. Test the new water line in accordance with MAG and the City of Phoenix Supplemental specifications.
c. Demonstrate that all fittings and waterlines are on site available to connect the new waterline to the existing waterline.
d. Notify all customers in writing who will be experience water service interruption.
e. Notify the Fire Department of possible low pressures to firelines and satisfy Fire Department requirements.
f. Complete the connection of new temporary waterline under this Contract, to existing, with minimum disruption to the waterline system.

4. SECURITY FENCES AND GATES. All existing security fences and gates affected by the work shall be maintained by the Contractor until final completion and acceptance of the work. Existing security fence and gates that interfere with construction operations shall not be relocated or dismantled until permission is obtained from the City of Phoenix Airside Operations, through the RPR. The duration that the security fence or gate may be left relocated or dismantled shall be approved by the City of Phoenix.

The Contractor shall submit to the City, a Security Gate Access Plan for review prior to the work, and prior to relocation or removal of any security gates or fence. The Contractor shall restore all security fences and gates that are affected by the work, to their original or to a better condition.

5. POWER. All power for lighting, operation of Contractor's plant or equipment, or for any other use as may be required in the execution of the work to be performed under the provisions of these contract documents shall be provided by the Contractor at his/her expense. Subject to the approval of the City, he/she may be permitted to connect to existing facilities where available, but he/she shall meter and bear the cost of such power.

Should electrical power not be immediately available for the Contractor's field offices, batch plant or the RPR's field offices and testing laboratories, the Contractor shall provide a generator(s) until such electrical power is available.

6. OPERATIONAL SAFETY AND MARKING. This project is within the limits of the Phoenix Sky Harbor International Airport Air Operations Area, and as such, strict safety and security requirements are in effect. The Contractor's attention is directed to the City of Phoenix, *Airport Construction Safety Manual* and the following FAA Advisory Circulars:

a. Federal Aviation Advisory Circulars.

1. Advisory Circular AC 150/5340-1M, "Standards for Airport Markings" which is incorporated into these Contract Documents by reference. The requirements of Section 5 of the Advisory Circular regarding marking of closed or hazardous areas shall also be adhered to.

2. Advisory Circular AC 150/5210-5D, "Painting, Marking, and Lighting of Vehicles Used on an Airport", which is incorporated into these contract documents by reference. All Contractor vehicles and equipment shall be provided with orange and white checkered flags during hours with sufficient daylight. Fully functional amber rotating beacons shall be provided during all hours of work, as described in Special Provision Item 36.

3. Advisory Circular AC 150/5370-2G, "Operational Safety on Airports During Construction", which is incorporated into these Contract Documents by reference. The Special Safety requirements during construction shall be strictly observed.

b. Portable Light Plants.

1. The height, placement and orientation of light plants used during night construction will be subject to the review and approval of the City of Phoenix Aviation Department. Special care must be made to light plant position, orientation and use in order to avoid impairing both aircraft movements and the Air Traffic Control Tower (ATCT) operations.

2. A minimum of seven (7) days prior to the start of night construction the Contractor shall submit a Construction Lighting Plan for review and approval by the RPR. This lighting plan shall be updated and re-submitted for approval, as and when dictated by changes to the Plan

during the progression of the work, or if a revised Plan is requested by the RPR.

c. Contractor Operational Assistance.

1. The Contractor shall provide trained personnel with vehicles, to escort the Contractor employees, subcontractors, vendors, truckers and any other person who are required to perform work that allows them to have access to the secured areas of the Airport.

2. The Contractor provided Operational Assistance shall hold security badges and attend escort training/airfield drivers training that will be conducted by Airside Operations.

3. These Contractor Operational Assistance personnel shall be under the direction of the City of Phoenix Airside Operations.

d. Open Trenching Limitations.

Open storm drain trenches, electrical duct or conduit trenches, utility trenches or any other trench shall be limited to 500-feet accumulative in length at any time. Open trenches in the runway safety area (RSA) shall be properly and completely backfilled and compacted in sufficient time before the end of the work shift.

e. Availability of Water Trucks and Vacuum Sweepers.

Vacuum sweepers and highway 4M water trucks shall be available and in operating condition to control dust and remove foreign object debris seven (7) days per week and twenty-four (24) hours per day, including Holidays. A minimum of one (1) vacuum sweeper and one (1) 4M highway water trucks shall be operating continuously at all times the Contractor or any subcontractor is working on the project.

f. Paint Striping and Obliteration. Asbestos and lead based paint identification and/or remediation shall be performed by the City of Phoenix unless otherwise indicated by an authorized City of Phoenix representative.

Prior to starting Work:

1. Paint marking trucks and obliteration by water blasting shall be on call and available to respond to the project site within twelve (12) hours.

2. The Contractor shall fabricate aluminum stencils/templates for all surface painted numbers and letters. Upon project completion, the Contractor shall deliver to the City of Phoenix, all stencils/templates for surface painted numbers and letters. The gauge of the aluminum stencil/template shall match the gauge of the City's existing stencils/templates.

g. Measurement and Payment.

1. Operational Safety and Marking shall not be measured for payment under this Special Provision. All costs in relation herewith will be considered incidental to the item of work to which it pertains.

7. RECORDS. The City of Phoenix, ADOT, the FAA, the Comptroller General of the United States, or any of their authorized representatives, shall be allowed access to any books, documents, papers, and records of the Contractor which are directly pertinent to the Airport Improvement Program project for the purpose of making audit, examination, excerpts, and transcriptions for a period of three (3) years following completion of the work.

8. NOT USED.

9. SHOP DRAWINGS AND SUBMITTALS. The Contractor shall submit all submittals including shop drawings, working drawings or supplementary drawings to the RPR for review for general conformance in accordance with MAG 105.2 and as modified herein. Contractor submittals shall be uploaded to the City's Oracle® Unifier system as necessary in PDF format. Each submittal shall be numbered sequentially and shall be submitted as to cause no delay in the work.

A partial list of submittals has been provided below, and it is intended to provide the Contractor with the minimum of required submittals. This list may not be complete, and it may be revised from time to time as the project progresses. Additional submittals may be required throughout the duration of the project at the discretion of the RPR.

The date when the Contractor provides the submittal(s) to the RPR shall be included in the Contractor's schedule using a distinct schedule activity ID number for each submittal. All submittals shall have assigned due dates. Due dates shall correspond with the approved Critical Path Method (CPM) schedule start dates for related activities allowing a minimum of fifteen (15) calendar days, or otherwise specified in the Technical Specifications, for the RPR's review as well as adequate time for fabrication and delivery of the material. The RPR and the City of Phoenix shall not be held responsible for late or inadequate submittals provided by the Contractor. Failure to submit by the submittal date may result in withholding of payment either in part or in full until the submittals are received. Materials shall not be incorporated into the work without the submittal reviewed, or the material certification reviewed by the City of Phoenix Materials Laboratory.

Submittal Number	Submittal Description
1.	Dust control plan (Civil Technical Specification Item C-102).*
2.	Preliminary CPM Contractor's construction schedule.
3.	A schedule of values.
4.	Revisions to the critical path method construction schedule and monthly report.
5.	A detailed lighting plan for night work (Special Provision Item 36) *
6.	Contractor's emergency names and phone number list (Special Provision Item 36). *
7.	Request for taxiway closing, 72-hours advance written notice (Special Provision Item 36).
8.	A detailed work plan for each phase and sub-phase of construction (Special Provision Item 36).
9.	An airside barricade plan and traffic control plan (Special Provision Item 36).
10.	A security badge control plan (Special Provision Item 36).*
11.	A list designating those portions of the work to be performed by subcontractor's and the Contractor's own forces (City of Phoenix Requirement).
12.	Video tape and written report of the conditions of existing facilities, documenting the results of the inspection performed prior to the start of the work (Special Provision Specification 10).
13.	A list of subcontractors and material suppliers with an experience statement (City of Phoenix Requirement).
14.	Written safety and security program for the work (City of Phoenix Requirement).
15.	Copy of all executed subcontracts, including material suppliers (to be submitted before any subcontractor or material supplier begins work).
16.	A list of proposed construction equipment with specification details for the following: the concrete paver(s) including cure application equipment; structural concrete vibration

equipment, the asphaltic concrete paver, compaction equipment, and the concrete batch plants (FAA Requirement).

17. Certification from the Contractor's registered Land Surveyor or professional Engineer that the primary control established is acceptable and adequate to allow the Contractor's construction staking to meet the accuracy requirements of the specifications. (Special Provision Specification 30).
18. Duplicate original certified payroll reports and statement of compliance, with sworn affidavits from the Contractor (Special Provision Specification, and to be submitted weekly).
19. Three (3) week look ahead project schedule at weekly construction meetings (Special Provision Specifications).
20. A landside barricade plan and traffic control plan for each phase of construction (Special Provision Specifications).
21. Security gate access plan (Special Provision Specifications).
22. Contractor’s Quality Control Plan, to be submitted five (5) business days prior to the pre-construction conference (Civil Technical Specification Item C-100).
23. Contractor’s quality control records, including daily inspection reports and daily test reports, to be submitted daily (Civil Technical Specification Item C-100).
24. Temporary fencing plan for Contractor's staging area (Civil Technical Specification Item P-101).
25. Controlled low strength material (CLSM) mix design with test data (Civil Technical Specification P-153).
26. Storm water pollution prevention plan, including certification of compliance Form* (Civil Technical Specification Item C-102).
27. Storm water pollution prevention plan notice of intent.* (Civil Technical Specification Item C-102).
28. Storm water pollution prevention plan inspection and maintenance reports, monthly submission required, or when precipitation exceeds 0.5-inches (Civil Technical Specification Item C-102).
29. Storm water pollution prevention plan notice of termination (Civil Technical Specification Item C-102).
30. Material gradation, fractured face(s), percentage of wear, Atterberg Limits, and sodium sulfate soundness loss for crushed aggregate base course (Civil Technical Specification Items P-209 and P-219).
31. Structural Portland cement concrete mix design(s) (Civil Technical Specification Item P-610).
32. A letter of certification for any admixture used in structural Portland cement concrete (Civil technical specification Item P-610).
33. Manufacturer’s certified test reports for all paint shipped to the project (Civil Technical Specification Item P-620).
34. A letter of compliance for the rubber gasket reinforced concrete D-load pipe (Civil Technical Specification Item D-701).
35. Gradation and physical requirements for the pipe bedding (Civil Technical Specification Item D-701).
36. Shop drawings for junction structures, manholes and catch basins (Civil Technical Specification Item D-751).
37. MAG concrete mix design(s) (MAG Standard Specifications).
38. A new copy of the sealed and certified weighing and metering devices used for the purpose of proportioning Portland cement, sealed and certified as to accuracy and tolerance prescribed by the weights and measures division of the state of Arizona.
39. Shop drawings and material lists of manufacturers’ brochures containing complete dimensional and performance characteristics, installation and operation instructions, etc. for

each item; the FAA specification number, the manufacturers' name, the manufacturers' catalog number; and the size, type and/or rating of each item used on the project.

40. Manufacturers' statement of warranty for each item used on the project.
41. Materials list shall be submitted listing each specification paragraph number and stating whether the materials proposed are as specified or are substitutions.
42. Contractor's affidavit regarding settlement of claims (Project Close out Requirement).
43. Submit a disadvantaged business enterprise (DBE) utilization percent obtained for the project (Project Close out Requirement).
44. Original affidavit acknowledging that all subcontractors, material suppliers, payrolls, bills for materials and equipment, and other indebtedness connected with the work have been paid or otherwise satisfied (Project Close out Requirement).
45. A written consent of the surety to final payment (Project Close out Requirement).
46. Record drawings with a written certification that the drawings are accurate and complete, due at substantial completion (Project Close out Requirement).
47. An Original, with Notary Signature, Full and Final Release and Waiver on Liens from the Contractor and for each subcontractor and material supplier that documents that they have been paid in full (Project Close out Requirement).
48. A lien release documenting that all subcontractors and material suppliers have been paid for the previous months work (Project Close out Requirement).
49. Certificate of final completion (Project Close out Requirement)
50. Written warranty, due at final completion (Project Close out Requirement).
51. Compact disk containing all the information contained in the submittals. The information shall be submitted in PDF format. Cut sheets, shop drawings, and pages from suppliers catalogs must also be furnished in electronic format as indicated above (Special Provision Specification 9).

* Indicates that the submittal or shop drawing is due at the pre-construction conference.

The Contractor shall submit a detailed listing of all submittals (e.g. mix designs, material certifications) and shop drawings as required by the Civil and Electrical Technical Specifications and elsewhere in these contract documents. The listing can be developed in a spreadsheet format and shall include:

a. Specification item number
b. Item description
c. Description of submittal
d. Specification paragraph requiring submittal, and
e. Scheduled date of submittal to be returned to Contractor

The Contractor shall certify each submittal and shop drawing by providing an original signed and dated letter to the City, that he has reviewed and approved the submittal and that it conforms to the requirements of the contract documents.

If this original certification is not included, the submittal and/or shop drawing will be returned without any action by the City. At the time of each submittal, the Contractor shall define and delineate in writing on the certification, any deviations from the contract documents.

The City's review will be only for general conformance with the design concept of the work and for compliance with the information contained in the contract documents. The review of a specified item, as such, will not indicate review of the assembly in which the item functions. Review by the

City will not relieve the Contractor from responsibility for any errors or omissions in the submittal or shop drawings, nor from his responsibility for complying with the contract documents.

After all submittals and shop drawings are reviewed, the Contractor shall furnish a compact disk read only memory (CD ROM) containing all the information contained in the submittal. The information shall be submitted in Acrobat Reader PDF format. Cut sheets, shop drawings, and pages from suppliers catalogs must also be furnished in electronic format as indicated above, or otherwise approved by the City.

10. PROTECTION OF EXISTING FACILITIES. Prior to the start of the construction, periodically as requested, and at the completion of the project, a representative of the Aviation Department and the Contractor's authorized representative will inspect the excavation and embankment areas, staging area, haul roads and job site to evaluate the condition of existing facilities. The City may videotape these inspections. The Contractor will be held responsible for any damage to existing facilities in accordance with MAG Uniform Standard Specifications Section 107.9. The Quality Control Program Administrator and the Contractor shall video tape and inspect the condition of existing facilities. The video tape and the written report shall be submitted to the RPR, documenting the results of the inspection performed prior to the start of the work.

There may be existing ground monitoring wells throughout the Airport owned by the City of Phoenix and Arizona Department of Environmental Quality (ADEQ). The Contractor shall provide lighted barricades around the existing ground monitoring wells that are within the construction limits, prior to the start of construction.

Existing ground monitoring wells shall be protected in-place by the Contractor. The environmental division of the Aviation Department will complete the grade adjustments to the ground monitoring wells as necessary, unless noted otherwise on plans. However, the cost of repairs due to damage caused by the Contractor shall be borne solely by the Contractor. The Contractor shall coordinate all adjustments or repairs to the ground monitoring wells with the Environmental Division.

11. PROJECT FIELD OFFICES. During the performance of this Contract, the Contractor shall maintain suitable offices, laboratories and testing facilities at the Airport project site (specific site is shown on the plans) that shall be the headquarters of his representative authorized to receive drawings, instructions or other communication or articles.

The Contractor shall be responsible for maintaining the offices and all facilities and equipment therein in good working condition for the full duration of the project. All utility costs shall be the responsibility of the Contractor as well as any fees for permits, cleaning services, sanitary, water, electrical and gas hookups, installation charges, etc.

Any communication given to the said representative or delivered at Contractor's office at the site of the work in his absence shall be deemed to have been delivered to the Contractor. Copies of the drawings, specifications and other Contract Documents shall be kept at Contractor's office at the site of the work and available for use at all times. Refer to Special Provision Item 34 for project requirements for the RPR's field offices and concrete testing facilities for additional project requirements.

12. TELEPHONE SERVICE. Contractor shall make all necessary arrangements with the telephone utility for telephones in his offices at the site and separate telephones in the office of the RPR. The Contractor shall pay all monthly charges therefore, including long-distance calls

from the office of the RPR, not to exceed $250.00 per month.

13. SANITARY FACILITIES. The Contractor shall furnish temporary sanitary facilities at the site, as provided herein, for the needs of all construction workers and others performing work or furnishing services on the project. Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least one (1) or more toilets will be furnished at each secured site, as required by the Arizona State Department of Health Services. The Contractor shall enforce the use of such sanitary facilities by all personnel at the site.

For construction phases or sub-phases where the work hours are limited and the area is to be re-opened at the end of the work shift, the Contractor shall provide mobile chemically treated facilities to be mobilized and demobilized to the work area daily.

14. PARKING. The Contractor shall provide and maintain suitable off-site parking areas outside of the Air Operations Area for the use of all construction workers and others performing work or furnishing services in connection with the project, as required to avoid any need for parking personal vehicles where they may interfere with public traffic, aircraft and Owner's operations, or construction activities. A preliminary parking location is shown in the plans; however, the Contractor's parking area will be determined in the pre-construction conference. The Contractor shall restore all parking areas to original (pre-construction) condition, including fence, gates and ground surfaces following all construction activities.

15. CONSTRUCTION SCHEDULE. Refer to City of Phoenix specifications for project schedule requirements. There will be no work (with exception to vacuum sweeping for the cleanup of foreign object debris) as described in the following:

- **a.** The night shift on New Year's Eve, all day on New Year's day, the night shift on New Year's day
- **b.** The night shift prior to Labor day, all day on Labor day, the night shift on Labor day
- **c.** The night shift prior to Memorial day, all day on Memorial day, the night shift on Memorial day
- **d.** The night shift prior to the 4th of July, all day on the 4th of July, the night shift on the 4th of July
- **e.** The night shift prior to Thanksgiving day, all day on Thanksgiving day, the night shift on Thanksgiving day, the Sunday day shift and the Sunday night shift following Thanksgiving
- **f.** The night shift on Christmas Eve, all day on Christmas day, the night shift on Christmas day
- **g.** Any dates described in the current City of Phoenix Aviation Department's moratorium calendar.

The Contractor shall develop his schedule, plan his work, and provide sufficient manpower materials and equipment to complete all work within the allotted contract time utilizing five (5) day work weeks and multiple shift operations as needed.

16. DELAYS AND EXTENSIONS OF TIME. Delete MAG Section 110 and substitute the following:

a. Notice of Claim for Additional Time. Claims for additional time must be made by the Contractor per Article 6. Notice of any Contractor claims of time extension entitlement due to extra work must be included in the Contractors change order request regarding the extra work. Failure to provide the notice required by this section shall constitute a waiver of any entitlement the

Contractor may otherwise have. Notices shall include: (1) the nature of the delay; (2) the critical path activities being affected; (3) the probably effect of the delay on progress of the work; (4) a description of efforts the Contractor intends to make to mitigate the delay, and; (5) a cost estimate. If the notice includes adverse weather delays, the notice shall also include data substantiating the adverse weather.

b. Notice of Claim for Additional Cost. If the Contractor wishes to make a claim for an increase in the contract sum, written notice shall be given before proceeding to execute the work. The written notice shall be given to the City within five (5) calendar days after the occurrence of the event giving rise to the claim. Prior notice is not required for claims relating to an emergency endangering life or property. The Contractor shall provide notice of claims relating to emergencies within five (5) days after the occurrence of the emergency. Failure to strictly comply with this notice requirement shall constitute waiver of such claims.

c. Out-of-Sequence Work. The Contractor and Owner contemplate that changes in the Contractor's schedule and the performance of out-of-sequence work may be necessary for the beneficial and timely completion of the project, safety of the flying public or convenience of the Owner. The Contractor expressly waives any claim for additional costs resulting from out-of-sequence work beneficial to the overall project.

d. Continuing Contract Performance. Pending final resolution of a claim, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract other than amounts in dispute.

e. Claim Documentation. Within thirty (30) calendar days after the Contractor submits a notice of claim, the Contractor shall submit a "Claim," which shall include the following documentation:

1. The date of the occurrence and the nature and circumstances of the issue for which the notice of claim was given.

2. The identity of any documents and the substance of any oral communication related to the issue.

3. The basis for an assertion that the work required is a change from the original Contractor work or schedule.

4. The identity of particular elements of contract performance for which a change in compensation and/or time may be sought including:

5. A previously submitted project schedule demonstrating that any affected activities were identified as on the project's critical path or were made critical by the delay.

a) Pay item(s) that have been or may be affected by the issue and any adjustments to unit price(s) that are required;
b) Labor and/or materials that will be added, deleted or wasted by the problem and what equipment will be idled or required.
c) Delay and disruption in the manner and sequence of performance that has been or will be required.
d) Adjustments to delivery schedule(s), staging, and contract time due to the dispute and
e) An estimate of time within which the Owner must respond to the notice to minimize cost, delay, or disruption of issue.

6. Any other items or information germane to the dispute.

7. "I, _____, being the _____ (must be an officer) of _____ (Contractor), declare under penalty of perjury under the laws of the State of Arizona, and do personally certify and attest that: I have thoroughly reviewed the attached Claim for additional compensation and/or extension of time, and know it's contents, and said claim is made in good faith; the supporting data is truthful and accurate; that the amount requested accurately reflects the contract

adjustment for which the Contractor believes the City of Phoenix is liable; and, further, that I am familiar with Federal Acquisition Regulation (FAR) clause 52.214-27, found in 48 CFR Part 52; and further know and understand that submission or certification of a false claim may lead to fines, imprisonment, and/or other severe legal consequences."

By:_____
Title: _____
Date: _____

The Contractor's written certification, under oath: If any subcontractor or any lower tier subcontractor wishes to make a Claim, the subcontractor shall also provide the certification (in addition to the General Contractor).

f. Claims for Consequential Damages. The Contractor waives claims against the Owner for consequential damages arising out of or relating to this contract. This waiver includes the Contractor's principal office expenses including the compensation of personnel stationed there, financing losses, business and reputation and lost profits.

g. Claim Review. Claims shall be submitted to the RPR, who will review the Claim and provide a recommendation to the Owner. The RPR's recommendation shall not be binding on the Owner. The Owner may meet with the Contractor review the claim.

h. Owner's Audit Rights. The submission of a Claim by the Contractor shall entitle the Owner to audit all Contractor records and documents relating to the project, including but not limited to the Contractor's bid documents, job cost records and ledgers, payrolls, schedules, communications with its subcontractor and material suppliers and subcontract agreements. The Contractor's failure to timely provide these documents shall constitute a material breach of the Contract.

17. **COORDINATION BETWEEN CONTRACTORS.** There may be work on airport projects by other contractors that could affect this project. The Contractor on this project shall work with airport personnel to coordinate his/her activities and access to the project.

18. **SEQUENCE OF CONSTRUCTION.** The following scheduling requirements are being provided to serve as supplemental information in preparation of the sequencing of construction. It is not the intent of these Special Provisions or the construction plans to dictate to the Contractor his/her method of construction for this project. The Contractor shall review these specifications and submit to the RPR prior to construction, his/her construction plan on how he/she will meet the project schedule for review.

    a. Limitations of Operations. The Contractor shall conduct all his operations in such a manner so as to maintain a smooth, safe, uninterrupted flow of aircraft and vehicular traffic adjacent to the work site. He shall conduct all his earthwork construction in such a manner so as to minimize any potential differential settlement between the edges of existing pavements. Unless noted otherwise on the plans, no work shall be performed within active runway or taxiway safety areas. The Contractor shall remove all equipment from the Runway and Taxiway safety areas including the infields prior to re-opening the Taxiway.

Limits of the various phases of work shall be clearly delineated with barricades, barricade lights, mandatory signs, taxiway signs (temporary and permanent) and paint markings as shown on the plans and specified herein, in order to deter aircraft and vehicles from entering the construction areas. The Contractor shall work closely with Airport Operations personnel, City of Phoenix Inspectors and the RPR to ensure that the work is accomplished with minimal interference with aircraft movements.

Aircraft always have the “right-of-way”. When the Contractor is working adjacent to an active apron, runway or taxiway and an aircraft approaches the work area, the Contractor may be required to "pull back" his operations, i.e., move workers, materials and equipment away from the taxiway or runway, outside of object free area, or as directed by City of Phoenix Operations or Inspection personnel.

The Contractor shall maintain all active runway and taxiway lighting systems at all times, unless otherwise specified. When temporary bypasses of active circuits are to be constructed in order to work on portions of the circuits, the circuits shall be de-energized and re-energized in conformance with the procedures specified by the City of Phoenix Aviation Department.

b. Opening Inspections. When the Contractor requests in writing to open an individual phase of work, or areas that are scheduled to be reopened to aircraft traffic, the RPR will conduct an observation of the construction area before opening to aircraft traffic. The conditions which observations will consider potentially hazardous and which must be corrected prior to reopening the taxiway prior to the end of a work shift (day shift or night shift as the case may be) include but are not limited to, the following:

1. Trenches, holes, or excavations on, or adjacent to any open taxiway, runway, apron or related safety area.
2. Un-marked or un-lighted holes, trenches or excavations near any runway, apron, taxiway, or related safety area.
3. Mounds or piles of earth, temporary stockpiles, construction materials, temporary structures, or other objects on or in the vicinity of any open runway, apron, taxiway object free area, or in a related safety, approach or departure area.
4. Vehicles or equipment (whether operating or idle) on any open apron, taxiway, or in any related safety, approach or departure area.
5. Vehicles, equipment, excavations, stockpiles, or other materials which could impinge upon Navigational Aid (NAVAID) critical areas and degrade or otherwise interfere with electronic signals from radios or electronic NAVAIDs or interfere with visual NAVAID facilities.
6. Objects (whether marked/flagged or not) or activities anywhere on or in the vicinity of the airport which could be distracting, confusing, or alarming to pilots during aircraft operations.
7. Un-flagged or un-lighted low visibility vehicles and equipment including cranes in the vicinity of an active runway, taxiway or apron or near any approach or departure surface.
8. Misleading or malfunctioning obstruction lights or barricade lights.
9. Inadequate approach/departure surfaces (needed to assure adequate landing/takeoff clearance over obstructions or work or storage areas).
10. Inadequate, confusing, or misleading (to user pilots) marking/lighting of any open apron, runway, taxiway, or in any related safety, approach or departure area.
11. Water, dirt, debris, or other transient accumulation that temporarily obscures pavement marking, pavement edges, or derogates the visibility of runway/taxiways marking, lighting or of construction and maintenance areas. There is zero tolerance for foreign object debris (FOD).
12. Inadequate or improper methods of marking, barricading, or lighting of temporarily closed

portions of airport operation areas including unlighted or missing construction and barricade lights.

13. Construction materials, trash or other materials with FOD potential, whether on aprons, runways, taxiways, service road, public streets or related safety areas. Inspectors will be watchful for debris that can be ingested into aircraft engines creating a potential for FOD. Such items include rock, aggregate, soil, loose polyethylene and other light materials capable of being blown onto aircraft movement areas by wind.

14. Construction/maintenance activities or materials that could hamper airport rescue and fire-fighting (ARFF) vehicle access from ARFF stations to all parts of the runway/taxiway system, runway approach and departure areas, or aircraft parking locations.

15. The time allowances for all work is inclusive of the Contractor moving onto the site, performing work activities, performing all clean-up, having the work area and haul routes inspected and approved by the RPR, and moving off the site. The Contractor shall provide adequate lighting for the needs of the inspection personnel.

16. Any Aircraft Operating Areas (AOA), open apron, runway, taxiway, or in any related safety, approach or departure area that does not pass inspection must remain closed until such time cleanup is performed and approved.

c. Construction Phasing. Typical work to be done during each construction phase is given as supplemental information and is not intended to be a complete listing of all work to be accomplished. All work called for on the plans and all items necessary to construct a complete, operational section of a concrete taxiway within the limits of the work area shall be completed in the individual phase and/or sub-phases, prior to proceeding with the next phase or sub-phase.

19. ARCHAEOLOGICAL FEATURES. Although the City of Phoenix Aviation Department has made every effort prior to construction to identify all cultural resources in the project area, previously unidentified archaeological materials may be found during the construction of this project.

If human remains are encountered during any phase of the construction, the Contractor shall suspend all work in the vicinity of the find and shall take steps to secure the protection of the remains. The Archaeological Consultant and the City of Phoenix Archaeologist shall be contacted immediately to determine an appropriate course of action. In the event of suspension of work pursuant to this Special Provision, the Contractor may be entitled to an adjustment of contract time.

If satisfactory fulfillment of the Contract involves alterations to the contract time that affect the Contractor's completion time, the Contractor may request a supplemental agreement that extends that Contract time. The supplemental agreement shall be in the form of a Request for Extension of Contract time and shall include the Contractor's revised schedule and all other pertinent data. The request shall show why an increase of Contract time is warranted.

An extension of contract time will not be considered unless the work affected by the Archaeological investigation and suspension of a construction activity becomes a critical item on the Contractor's CPM schedule.

20. RED OBSTRUCTION LIGHTS. Red obstruction lights shall be 100-watt fixtures, with 360-degree beam spread, and in compliance with the Federal Aviation Administration (FAA) specification found in Advisory Circular AC150/5345-43J “Specification for Obstruction

Lighting Equipment", L-810. The Contractor shall provide a minimum of two (2) red obstruction lights each, for all stationary cranes, batch plants, pug mills or other equipment erected on the Airport, and erected at the other sites that are near the Airport. The red obstruction lights shall be supplemented with additional red obstruction lights as directed by the City of Phoenix Airside Operations or the RPR. All movable cranes shall be provided with red obstruction lights at their highest point, and the boom shall be lowered during the hours of darkness or periods of low visibility.

The City of Phoenix Aviation Department will issue local Notice to Airmen (NOTAM) for obstruction lighting and the Contractor shall notify the RPR a minimum of five (5) working days in advance, if any relocation of the obstruction lights is necessary. The Contractor shall not relocate any red obstruction lights(s) without prior approval from the RPR. All such equipment is to be erected and removed from the Air Operations Area (AOA) during the off peak hours.

21. **YELLOW WARNING LIGHTS FOR VEHICLES.** The Contractor will provide flashing yellow warning lights at all times during construction, including periods of low visibility, as well as orange and white checkered flags during daylight, for all vehicles and all mobile construction equipment on the construction site, per Advisory Circular 150/5210-5D, "Painting, Marking, and Lighting of Vehicles Used on an Airport" as included in the Appendix. Yellow warning lights and orange and white checkered flags must be displayed in a prominent visible position and kept operational at all times. The Contractor must rectify the condition of any lights or flags not found to be acceptable to the City of Phoenix Operations immediately. If not rectified within six (6) hours, or a lesser time, at the discretion of the City of Phoenix, or if a clearly unsafe condition exists, work may be suspended at no cost to the City of Phoenix, until the situation is addressed.

    All construction motor vehicles must display adequate company identification logos on both sides of the vehicle and at all times while within the AOA. Failure to comply will result in the issuing of a Notice of Violation (NOV) and the appropriate fine.

    There will be no separate pay item for yellow warning lights, checkered flags or company identification logos. The cost will be included in other bid items. Refer to Special Provision Item 36, "Airport Safety and Security (M-003)" and Compliance with Airport Construction Safety Phasing Plan" for additional requirements.

22. **AIRCRAFT TRAFFIC REGULATIONS.** Aircraft traffic will continue to use existing runways, aprons, and taxiways of the airport during the time that work under this contract is being performed. The Contractor shall at all times so conduct his work as to create no hindrance, hazard, or obstacle to aircraft using the airport and must, at all times, conduct the work in conformance with requirements of the Airport Director and FAA Control Tower or their authorized representative.

    Any proposed haul routes across aircraft movement areas will require controlled crossings with flagmen at each side of the controlled crossing, in accordance with Aviation Department details and requirements. Nighttime crossings shall be equipped with light plants on both sides of the crossing. The Contractor shall provide traffic control, crossing guards, barricades, and temporary fencing plan(s) to the RPR for approval five (5) days prior to instituting operations in the Air Operations Area.

    When absolutely essential, in order to permit construction under this contract, taxiways may

be closed at the Aviation Department's discretion to aircraft operations upon advance written application by the Contractor to the RPR. The Contractor will schedule and organize his work so that a minimum of crossings or crossings of taxiways will be required during the performance of the entire project.

23. **DISPOSAL OF SURPLUS MATERIAL WHICH DOES NOT CONTAIN ASBESTOS.** No measurement or direct payment will be made for the hauling and disposal of surplus and/or waste material; the cost shall be incidental to the cost of the project. All surplus and/or waste material shall be disposed of by Contractor at and off-site location such as a landfill, subject to the following conditions:

    a. If the City landfills are used, the Contractor shall pay the normal dumping fee. The Estes Landfill will not be available to dispose of surplus materials.

    b. If private property within the City limits is used, the Contractor shall obtain written permission from the property Owner and deliver a copy of this Agreement to the RPR prior to any hauling or dumping. All disposal and grading shall be in strict conformance with the City of Phoenix Grading and Drainage Ordinance. The Contractor shall obtain and pay for the necessary permit(s).

    c. If the surplus material is disposed of outside the City limits, the Contractor shall comply with all applicable laws/ordinances of the agency concerned and be responsible for all cost incurred.

24. **HAUL PERMIT.** Obtaining the haul permit and the approval by Street Transportation does not release the Contractor from strict compliance with MAG Subsection 108.5, Limitation of Operations. On any project, when the quantity of fill or excavation to be hauled exceeds 10,000 cubic yards, or when the duration of the haul is for more than twenty (20) working days, the Contractor shall:

    a. Obtain and pay for a written haul permit from the Development Services Department.

    b. Obtain approval of the proposed haul route, number of trucks, etc., by the Street Transportation Department.

25. **UNDERGROUND FACILITIES.** The Contractor will make whatever investigation it deems necessary to verify the location of underground utility facilities, by providing a private utility locating company to verify the location of all on-site utilities prior to construction. The utility locator company shall mark all utilities that may or may not conflict with construction. The Contractor shall field survey these utilities and plot this information on the Record Drawings that the Contractor will be preparing. If such facilities are not in the location shown in the drawings, then (regardless of whether this is discovered prior to or during construction) the Contractor's remedies, if any, pursuant to Article 6.3, Chapter 2, Title 40, A.R.S. (A.R.S. § 40-360.21 through A.R.S. § 40-360.32, "Underground Facilities"), shall be the Contractor's sole remedy for extra work, delays, and disruption of the job, or any other claim based on the location of utility facilities. Locations of utility facilities are shown on drawings and were furnished by the City, are to be regarded as preliminary information only, subject to further investigation by the Contractor. The City does not warrant the accuracy of these locations, and the Contractor, by entering into this Contract, expressly waives and disclaims any claim

or action against the City under any theory for damage resulting from location of utility facilities.

The Contractor shall be responsible for obtaining all utility location information, and for performing all requirements as prescribed in A.R.S. § 40-360.21 through A.R.S. § 40-360.29, for all underground facilities, including those that have been installed on the current project, until the project is accepted by the City.

At least two (2) working days prior to commencing any excavation, the Contractor shall contact Arizona 811, the Blue Stake Center, between the hours of 6:00 a.m. and 5:00 p.m., Monday through Friday, for information relative to the location of buried utilities that are located on landside. The number to be called is as follows: Maricopa County: (602) 659-7500.

Several utility owners, including the City of Phoenix, the Federal Aviation Administration, and others have utilities in the proposed work area. These utilities shall be located and potholed by the Contractor prior to starting construction. The Contractor is advised that several underground environmental monitoring facilities exist within the project work limits. These facilities are to be protected by the Contractor and left in an undisturbed condition, unless noted on plans. Any inadvertent damage must be reported immediately to the Aviation Department Environmental Section. The Contractor will be responsible for returning any damaged environmental monitoring facility to a pre-construction condition. Refer to Special Provision Item 33 for method of measurement and basis of payment.

26. CHANGE ORDER REQUEST MARKUPS. The Contractor shall conform to the following markups for change order work, or for the allowance work that is self-performed by the Contractor and/or performed by a subcontractor. The Contractor shall also utilize the Change Order Request Summary Worksheet. The Contractor shall submit all required backup and supplemental information, calculations, invoices, etc., that are required to justify and support all Contractor and subcontractor costs.

a. General Contractor Self-Performed Work and Subcontractor Work Markups. For overhead and profit, the actual or approved costs for equipment, material, and labor shall be marked up by twelve percent (12%) for profit and overhead.

b. General Contractor Markups of Subcontractor Work and Subcontractor Markups of Lower Tier Subcontractors. The Contractor shall be allowed to markup actual or approved subcontractor costs for equipment, material, and labor (excluding subcontractor overhead and profit) by seven and one half percent (7.5%). Subcontractors shall be allowed to markup actual or approved lower tier subcontractor costs for equipment, material, and labor (excluding lower tier subcontractor overhead and profit) by seven and one half percent (7.5%).

c. Bond. No markups for bond will be permitted until the contract monetary amount has been exceeded for which the bond has been issued. No bond markups will be permitted for work performed by subcontractors and lower tier subcontractors.

d. Insurance. The Contractor shall be allowed to markup the cost for change order work plus bond costs for property damage/public liability insurance, utilizing the same percentage used on the initial contract. Verification, from insurance carriers, of this percentage shall be submitted with the initial change order request.

e. Sales Tax. The Contractor shall be allowed to markup the cost for change order work plus bond and insurance costs by the current, approved sales tax multiplier.

27. EXTENSIONS OF CONTRACT TIME. MAG General Condition Specification 108.7, DETERMINATION AND EXTENSION OF CONTRACT TIME, is deleted in its entirety and substitute the following:

a. Weather Delay. "Extensions of time due to adverse weather conditions not reasonably anticipated will be granted only if such inclement weather prevents the execution of critical path items of work at the time of the inclement weather. Extensions of time for weather delays will be considered only if such actual monthly inclement weather exceeds the monthly average for that month as shown in the Table below. The extension would be considered on the day after the rainfall exceeds the monthly average listed in the Table. The Contractor shall base his CPM Schedule using at least three (3) weather delay days per month between January and March, and at least one (1) weather delay day per month between April and December. These weather days will not be considered for an extension of contract time.

The Contractor shall request an extension of time in writing within forty-eight (48) hours after the event that caused the delay. This written notification is required regardless if the request is based on inclement weather or based on other factors. No extension of time will granted if the written request is not received within forty-eight (48) hours.

TABLE – City of Phoenix Average Monthly Precipitation Data.

Month	*Average Monthly Precipitation*
January	0.94-inches
February	1.05-inches
March	1.13-inches
April	0.32-inches
May	0.11-inches
June	0.05-inches
July	0.88-inches
August	0.98-inches
September	0.75-inches
October	0.65-inches
November	0.67-inches
December	0.94-inches

b. Notice of Claim for Additional Time. If the Contractor wishes to make a claim for an increase in the Contract Time, written notice shall be given. The notice shall be made in writing to the RPR within five (5) days of the delay causing occurrence except for notice of adverse weather caused delays, which shall be made within forty-eight (48) hours. The notice shall set forth (a) the cause of the delay, (b) a description of the portion or portions of Work affected by the delay, (c) the specific number of days of delay for which an extension of time is requested, (d) all actions the Contractor is taking to mitigate the delay (e) any actions the Owner or others could take to mitigate the delay (f) the latest schedule showing the delayed activity's relationship to the project's critical path and (g) all details pertaining thereto. In the case of a continuing delay, the Contractor shall weekly submit an updated notice. Failure to give notice of a claim for extension of time in strict compliance with this provision shall constitute a waiver of such claim.

c. Critical Path. No extension of time shall be granted to the Contractor for a delay caused by the Owner, RPR, other contractors or any other party, or other causes beyond the Contractor's control, unless the delay affects the critical path of the Project as defined on a critical path method schedule or monthly update provided to the Owner before the delaying occurrence and then only to the extent that the delay affects the critical path. If the delay event forces a previously non-critical path activity onto the project critical path, this change must be shown on the next monthly update and expressly identified in the narrative report. Failure to so identify critical path changes shall be deemed to waive the Contractor's right to recover any costs associated with the delay event's impact on the activity. Delays not identified on the Contractor's next monthly update shall be waived. No extension of time shall be granted to the Contractor to the extent that, not withstanding the existence of any such circumstance beyond the Contractor's control, delay would have resulted in any event due to a concurrent unexcused delay.

d. Changes in the Work. For changes in the work that significantly affect the time and progress of the work, any time extensions shall be requested no later than when the change in the work is requested. Any change order negotiated and signed by the Contractor and Owner that does not include an express time extension shall be deemed conclusive evidence that no time extensions related to the changed work is warranted and the Contractor shall forever waive its right to claim entitlement to such a time extension.

Change order requests shall include all costs necessary to perform the extra work within the contract period unless a time extension is granted. This shall include but not be limited to necessary acceleration costs. The Contractor may reserve the right to request a time extension at a later date. However, if the Contractor elects to do so, the City will withhold ten (10) percent of the change order amount until the Contractor submits a critical path method schedule analysis that complies with all Contract requirements and identifies the resultant delay. If the Contractor fails to timely do so, the Owner may use the withheld amount to perform a schedule analysis to identify the resulting delay.

e. Overhead Costs During Time Extensions. The Contractor and Owner contemplate that the entire contract period may be reasonably necessary to complete this Contract's scope of work. It is the contemplation of the parties that any home office or field overhead or supervision costs necessary to perform work during the entire contract period is incorporated into the Contractor's overall Bid. The Contractor shall not be entitled to recover home office or field overhead and supervision costs during the performance period, even if the Contractor originally planned to complete the work before the contract period expired. Acceptance by the Owner of schedules showing early completion by the Contractor shall not constitute a waiver of this provision.

28. STOCKPILED MATERIAL. Stockpiled materials shall not be allowed in the air operations area, unless permitted by the City of Phoenix. Material shall not be stored near aircraft turning areas or movement areas.

The maximum stockpile height, if permitted by the City of Phoenix, shall not exceed 3-feet above the adjacent pavement elevation. Therefore, the Contractor shall prepare his bid on the basis of hauling the material off-site of the Airport, and importing the material at a later date when the work area on site is available to receive the material.

All unsuitable materials, as defined in Civil Technical Specification Item P-152, shall be

disposed of at an offsite legal location, such as a landfill, at the time the material is excavated, and shall not be temporarily stockpiled on the Airport.

When asphalt pavement is milled, the material shall be hauled off site of the airport at the time the pavement is milled. Any asphalt millings that are not used in the formation of subbase shall become property of the Contractor and exported from the site.

Storm drain pipe shall not be stockpiled in the Air Operations Area.

Open trenches shall be limited to no more than 500 linear feet. Open trenches in the RSA shall be properly and completely backfilled and compacted in sufficient time before the end of the work shift.

29. MAG SPECIFICATION MODIFICATIONS. In addition to any other modifications to the MAG specifications contained elsewhere in this Contract, the following changes are made:

a. MAG Section 104.2.4 is deleted and replaced with:

"104.2.4 At the Contractor's Request: Changes in the plans or specifications, which do not materially affect and are not detrimental to the work or to the interests of the Contracting Agency, may be granted to facilitate the work. Requests shall be in writing and submitted to the RPR for approval. The Contracting Agency shall be entitled to a reduction in cost equal to one-hundred percent of any cost reductions to the Contractor caused by the change. In no event shall a Contractor requested change result in any additional cost to the Contracting Agency. The Contractor assumes sole responsibility and liability for changes it requests and the Contracting Agency's approval of a proposed change shall not create any liability on the part of the Contracting Agency.

b. MAG Section 105.11 is deleted and replaced with:

"105.11 REMOVAL OF UNACCEPTABLE AND UNAUTHORIZED WORK:

(A) *Duty to Uncover Work:* If a portion of the work is covered contrary to the RPR's request or to requirements specifically expressed in the Contract, the RPR may order in writing that it either be uncovered for observation and/or replaced. The cost of uncovering or replacing the work shall be solely at the Contractor's expense. The Contractor shall not be entitled to any associated time extensions or impact costs associated with such a request.

(B) *Cost of Uncovering Work:* If a portion of the work has been covered that the RPR has not specifically requested to observe prior to it's being covered or the Contract does not provide for inspection, the RPR may request the Contractor to uncover the work. If the uncovered work is in compliance with Contract requirements, the Contracting Agency shall bear the cost of uncovering and replacing the work. If the uncovered work is not in compliance with Contract requirements, the Contractor shall bear such costs.

(C) *Duty to Correct Rejected Work:* Work done contrary to the instruction of the RPR, work done beyond the lines shown on the plans, or as given, any extra work done without authority, unacceptable work, poor workmanship, work done with defective materials, work damaged through carelessness or found unacceptable by the RPR, whether observed

before or after substantial completion of the work and whether or not fabricated, installed or completed shall be promptly corrected by the Contractor. The Contractor shall bear all costs of correcting such work, including the replacement or repair of other work affected, additional testing and inspection costs, and additional RPR costs. The Contractor shall not be entitled to recover any impact costs or delay damages and shall not be entitled to any time extensions in any way relating to correcting the work. Work rejected by the RPR shall be promptly corrected. All work rejected before final acceptance shall be corrected prior to final payment.

(D) *One Year Duty to Correct Work:* Without limiting the Owner's statutory, common law, or other contractual rights, if within one (1) year after the date of final acceptance, or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty or guarantee required by the Contract, any defective work or work not in accordance with the Contract shall be promptly corrected by the Contractor after written notice by the RPR or Owner to do so. The Contractor shall bear all costs of correcting such work, including replacement or repair of other work affected by the defect and any other damages resulting from such defect. This obligation shall survive Final Payment to the Contractor.

(E) *Owner's Right to Correct Non-Conforming Work:* If the Contractor fails to correct nonconforming or defective work within a reasonable time, the Owner may correct it with its own forces. If the Contractor does not correct the work within a reasonable time, the Owner may provide written notice to the Contractor and then remove and store the salvable materials or equipment at the Contractor's expense. If the Contractor does not pay the Owner's expenses within ten (10) days thereafter, the Owner may sell such materials and equipment and shall deduct its expenses, including additional services by the RPR.

(F) *Acceptance of Non-Conforming Work:* If the Owner prefers to accept defective or non-conforming work rather than require its removal and correction, the Owner shall be entitled to recover one-hundred and fifty (150) percent of the cost of removing and correcting the work. Such adjustment shall be effected whether or not final payment has been made."

c. Delete MAG Section 108.4 and substitute the following:

"The Contractor shall furnish the RPR a construction schedule and monthly updates to the schedule. The RPR's review of the Contractor's schedule is for purposes of: (1) determining the Contracting Agency's staffing requirements; (2) to ensure general compliance with the contract documents as it relates to the completion of all work; (3) to monitor and evaluate the construction status for purposes of approving progress payments; (4) to evaluate project delays and claims for additional time and compensation; and (5) to identify methods for mitigating delay impacts. In the event the schedule does not contain sufficient information to meet the above purpose, or does not comply with the Contract's schedule and monthly update requirements, the Contractor shall resubmit a new schedule or update with the required information. The Contractor shall not change an accepted construction schedule without the written consent of the RPR. The orderly procedure of all work to be performed shall be the full responsibility of the Contractor.

Review of a submitted schedule by the RPR shall in no way be construed as an affirmation or admission that the schedule is reasonable or workable, which responsibility remains the Contractor's obligation. When the schedule shows a completion prior to the completion date, this extra time between the contract completion date and the scheduled completion date (float), may be used by the Contracting Agency without additional compensation to the Contractor, including extended field and home office overhead and supervision costs. The Contracting Agency shall not be liable to the Contractor for any damages for delay if the Contractor complete the work prior to expiration of the original Contract completion date or as modified by approved change orders, if any."

d. Delete MAG section 108.11 and substitute the following:

"A. *Termination for Convenience:* The Owner may, without cause, terminate the Contract for its convenience, even if the Contractor has not failed to perform any part of the Contract. Termination of the Contract shall be affected by written notice to the Contractor. Upon receipt of such notice, the Contractor shall, unless the notice directs otherwise:

1. Immediately discontinue the work and the placing of all orders and subcontracts in connection with this Contract;
2. Immediately cancel all of the existing orders and subcontracts made hereunder;
3. Immediately transfer to the Owner all materials, supplies, work in progress, appliances, facilities, machinery and tools acquired by the Contractor in connection with the performance of the Contract, and take such action as may be necessary or as the Owner may direct for protection and preservation of the Work relating to this Contract;
4. Deliver all plans, Drawings, Specifications and other necessary information to the Owner;
5. Take all necessary steps to secure the project site and work.

B. *Contractor's Exclusive Remedy:* If the Owner terminates the Contract for convenience, the following shall be the Contractor's exclusive remedy.

1. Reimbursement of all actual expenditures and costs approved by the Owner as having been made or incurred in performing the work;
2. Reimbursement of expenditures made and costs incurred with the Owner's prior written approval in settling or discharging outstanding commitments entered into by the Contractor in performing the Contract; and
3. Payment of profit, in so far as profits is realized hereunder, of an amount equal to the actual profit on the entire Contract at the time of termination multiplied by the percentage of the completed work. In no event shall the Contractor be entitled to anticipated fees or profits on Work not required to be performed.

C. *Warranties, Guarantees and Indemnities to Remain in Effect.* All obligations of the Contractor under the Contract with respect to completion of the work, including but not limited to all warranties, guarantees and indemnities, shall apply to all work

completed or substantially completed by the Contractor prior to a convenience or for cause termination by the Owner. Notwithstanding the above, any termination by the Owner or payments to the Contractor shall be without prejudice to any claims or legal remedies that the Owner may have against the Contractor for any cause.

D. *Conversion of Termination for Cause to Termination for Convenience.* If a termination for convenience by the Owner is determined to be wrongful or improper for any reason, such termination shall automatically be converted to a convenience termination and the Contractor's remedy for such wrongful termination shall be limited to the recoveries for a convenience termination.

E. *Remedy Limited to Damages:* In the event that the Contractor is terminated, whether for cause or convenience, the Contractor's sole remedy shall be for damages. In no event shall the Contractor be entitled to reinstatement or other equitable relief from a court or other forum.

F. *Termination For Cause:* The Owner may terminate the Contract if the Contractor:

1. fails or refuses to supply enough properly skilled workers or proper materials to ensure compliance with approved schedules or as directed by the RPR;
2. fails to make payment to subcontractors for labor or materials in accordance with the respective agreements between the Contractor and subcontractors or A.R.S. § 34-221.
3. disregards laws, ordinances, rules, regulations or orders of a public authority having jurisdiction;
4. breaches any provision of the Contract;
5. fails to furnish the Owner with satisfactory assurances evidencing the Contractors ability to complete the work in compliance with all Contract requirements.;
6. fails to comply with approved schedules or fails to comply with Contract schedule requirements; or
7. fails after commencement of the work to proceed diligently and continuously with the construction and completion of the work for more than seven (7) days, except as permitted under the Contract.

G. *Contractor Right to Receive Payment:* When the Owner terminates the Contract for cause; the Contractor shall not be entitled to receive further payment until the work is finished. If it appears the Contractor would have sustained a loss on the entire Contract had it been completed, the Contractor shall not be entitled to any profit and an appropriate adjustment shall be made reducing the Contractor's payment to reflect the Contractor's anticipated rate of loss for the entire Contract.

H. *Cost of Finishing Work.* If the unpaid balance of the Contract exceeds costs of finishing the work, including compensation to the RPR and other Owner representatives, such excess shall be paid to the Contractor. If such costs exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner shall be certified by the RPR and this obligation for payment shall survive the Contract's termination.

30. CONSTRUCTION SURVEYING LAYOUT. The Contractor shall set all construction stakes, establishing lines, grades and elevations to construct the Project, including necessary utilities, appurtenances and shall be responsible for their conformance with plans and specifications. The Engineer has established survey control points and benchmarks for the project. Refer to the Survey Control Plan.

a. Initial Verification. Prior to setting any construction stakes, the Contractor shall first verify the accuracy of the control points established by the Engineer. If errors are discovered during this verification process, and the control points do not agree with the geometry shown in the plans, the Contractor shall immediately notify the Engineer in writing, explaining the issue in detail. Upon completion of this verification process, the Contractor shall employ an Arizona registered Land Surveyor to certify in writing that all control points established by the Engineer are acceptable and adequate to allow the Contractor's construction staking to meet the accuracy requirements of the specifications.

b. General Description. After the Contractor's registered land surveyor has submitted his written certification verifying the accuracy of the control points established by the Engineer, the Contractor shall set all stakes including, but not necessarily limited to: centerline stakes; offset stakes; reference point stakes; slope stakes; pavement lines; grade stakes; blue tops for subgrade and subbase course; stakes for utilities; drainage; pipe; base and pavement courses; paint striping layouts; supplemental bench marks and permanent record drawing elevations; as well as all other horizontal and vertical controls necessary for complete and accurate layout of the construction work.

c. Materials, Personnel and Equipment. All work shall be done under the direction of a registered land surveyor employed by the Contractor. All survey crew chiefs shall be a registered civil engineer, a registered land surveyor, an engineer in training or a NICET level III (or a higher level NICET level) certified technician. The Contractor shall furnish all materials, personnel and equipment necessary to perform all surveying, staking and verification of the accuracy of all existing control points, which have been provided by the Engineer and/or the City. Included in this work shall be all calculations required for the satisfactory completion of the project in conformance with the plans and specifications.

Materials and equipment shall include, but shall not necessarily be limited to: vehicles for transporting personnel and equipment; properly adjusted and accurate survey equipment; stakes; flagging and all other devices necessary for checking; marking, establishing and maintaining lines, grades and layout to perform the work called for in the contract. The Contractor shall furnish a sufficient quantity of competent personnel to perform the survey work and layout.

d. Light Bases. The Contractor shall stake all airfield light bases.

e. Discrepancies. Any discrepancies in the grade, alignment, quantities, locations or dimensions detected by the Contractor shall immediately be brought to the attention of the RPR. Changes to the project plans will not be allowed without the written approval of the RPR.

f. Record Drawings. The work shall include establishing and marking the "Record Drawings" with coordinates, elevations and changes to the design, as well as locating existing utilities with coordinates and elevations. Refer to A.R.S. § 32-152.

g. Measurement and Payment. Survey will be measured for payment by the lump sum. Travel time shall not be measured for payment. Survey work for quality control surveys shall not be measured for payment, but shall be considered incidental to the Contractor Quality Control program.

Payment will be made under:

Item SP-30.1 Construction Survey Layout – per Lump Sum

31. WORK DONE BY CITY FORCES There are items of work that are to be performed by the City that the Contractor will have to build into his schedule. This includes paint removal of any paint containing lead, prior to pavement removal, and asbestos testing of the concrete. It is anticipated that the paint removal will take approximately twelve working days and will need to be completed prior to the asphalt removal and after the area is barricaded. There shall be no separate payment for coordination between the Contractor and City related to this item.

32. ADJUST EXISTING STRUCTURE TO FINISHED GRADE The work under this item shall consist of adjusting existing structures (such as monitoring wells, electrical manholes/handholes, storm drain manholes/inlets, and sanitary sewer manholes) to finished grade in accordance with the locations shown on the plans. The adjustments of the existing structures shall be in accordance with the details shown on the project plans per each structure type.

Measurement and payment for this item shall be made at the contract unit price per each structure adjusted to finished grade or well type converted in accordance with the specifications and accepted by the Engineer. This price shall be full compensation for all labor, materials, and equipment necessary to complete the item.

Payment will be made under:

Item SP-32.1 Raise Existing COP Utility Vault – per Each

33. REMOVAL OF AIRFIELD UTILITY STRUCTURES The work under this item shall consist of removing and disposing of concrete utility vault aprons and lids as necessary to complete the project that involves a removal or relocation that is not specifically identified as another item of work. Removals shall be made in accordance with the locations shown on the plans. All vault identification tags shall be removed and salvaged for re-installation, when necessary.

All holes remaining after the removal of structures shall have the sides broken down to flatten out the slopes, and shall be backfilled with acceptable material, moistened and properly compacted in layers to the density required in Item P-152.

Measurement and payment for this item shall be made at the contract unit price per each removal item. This price shall be full compensation for all labor; materials, including backfill and compaction; and equipment necessary to complete the item.

Payment will be made under:

Item SP-33.1 Remove and Salvage Existing Concrete Lid and Apron – per Each

34. CONSTRUCT NEW AIRFIELD UTILITY VAULT LID AND APRON The work under this item shall consist of the furnishing and construction of new precast airfield utility vault lid and apron, complete in place. New lids and aprons shall be placed in accordance with the locations shown on the plans. Construction of the new lids and aprons shall be in accordance with the details shown on the project plans per each structure type. Vault identification tags salvaged from removed structures shall be installed when necessary.

Measurement and payment for this item shall be made at the contract unit price per each structure in accordance with the specifications and accepted by the Engineer. This price shall be full compensation for all labor, materials, and equipment necessary to complete the item.

Payment will be made under:

Item SP-34.1 Construct New Precast Concrete Lid and Apron – per Each

35. SAWCUT ASPHALT PAVEMENT FULL DEPTH Existing asphalt pavements that are to be matched shall be trimmed to a neat true line, with straight vertical edges free from irregularities using a saw specifically designed for this purpose.

The existing asphalt pavement at the shoulders shall be cut full depth and be painted with a coating of asphalt cement or emulsified asphalt immediately prior to constructing the new bituminous surface course in the infields.

Payment will be made under:

Item SP-35.1 Sawcut Asphalt Pavement Full Depth – per Linear Foot

36. AIRPORT SAFETY AND SECURITY (M-003)

36-1.1 GENERAL. The Contractor shall carry out his operations in a manner that will cause a minimum of interference with air traffic, and shall cooperate with the FAA, the City (Owner), City of Phoenix, tenants, flight schools and Fixed Base Operators, and other contractors working in the area.

All work shall be completed in accordance with the Construction Safety and Phasing Plan (CSPP) adopted for the project, the Contractor prepared Safety Plan Compliance Document (SPCD), FAA Advisory Circular 150/5370-2G or current series, and the City of Phoenix Department of Aviation's Airport Construction Safety Manual and the Supplementary Conditions, Special Provisions and Technical Specifications of these Contract Documents.

Phasing of the work will be necessary to minimize impacts on airport operations during construction. The priorities for phasing of the work are shown in the CSPP.

All work within the Runway Safety Area will require that the runway be closed.

The preparation of a Safety Plan Compliance Document (SPCD) by the Contractor to indicate how it will comply with the CSPP, the project Supplementary Conditions, Special Provisions and Special Provision Item 36 Airport Safety and Security (M-003) is included in the Contractor's scope of work.

Any conflicts between the CSPP, the Contract Documents and Special Provision Item 36 Airport Safety and Security (M-003) shall be reported to the Aviation Department Project Manager, PHX

Aviation Supervisor and the Engineer of Record for resolution. Until resolved, the Contractor shall comply with the most stringent requirement.

The Contractor shall hold weekly airfield coordination meetings with PHX Airport Operations. Additionally, the Contractor shall meet with Airport Operations prior to the start of each shift to discuss the day's anticipated work activities.

All vehicles shall have flashing amber lights in accordance with the CSPP and Special Provision Item 36. All vehicles shall be required to have the headlights and flashing amber lights on at all times while on the airfield.

The Contractor shall be required to supply, place, maintain, move and store the items listed herein, as appropriate, to facilitate construction and protect air traffic. The Contractor shall keep on site an adequate extra supply of these items.

MATERIALS

36-2.1 RED WARNING LIGHTS. Red warning lights shall meet the requirements of the "Manual on Uniform Traffic Control Devices for Streets and Highways" for Type A and Type B flashers or as shown in the *Airport Construction Safety Manual*. All warning lights used on the airfield shall be RED only.

36-2.2 WARNING MARKERS. (For use on roadways and service roads only) Warning markers shall be the type and size detailed on the plans or shown in the CSPP. Markers shall be equipped with a red warning light per paragraph 36-2.1.

36-2.3 TEMPORARY RUNWAY/TAXIWAY CLOSED DEVICES AND SYMBOL. The airport operations personnel will provide "Lighted X's" to mark all runway closures. The closed devices shall be portable lighted "X", SWEEPSTER Model LX Runway Closure Marker conforming to FAA AC 150/5345-55A *Specification for L-893 Lighted Visual Aid to Indicate Temporary Runway Closure* or approved equal.

All other temporary closure symbols, including vinyl "X's", shall be painted or applied on the pavement surface in accordance with the CSPP, plans and Civil Technical Specification Item P-620.

36-2.4 LOW AND MEDIUM LEVEL BARRIER SYSTEMS. Medium and low-level barriers shall be the Airport Runway Safety Barricade Model AR-1 and AR-2 Multi-Barrier as manufactured by Off The Wall Products, LLC, or approved equal. The AR-1 barrier medium level sections shall be eight (8) feet long and two (2) feet high and the AR-2 low level barrier sections shall be eight (8) feet long and ten (10) inches high and shall have reflective sheeting on the side facing the active airfield. Both sections shall be interlocking and shall be ballasted with water to prevent damage from jet blast. Each barricade section shall be equipped with a Model: SL-H867R Solar Powered Safety lights as manufactured by Leotek Electronics USA Corp., or approved equal. The barriers shall be furnished, maintained and relocated during each phase by the Contractor, and at the completion of the Contract they shall become property of the City.

36-2.5 VACUUM SWEEPER. Vacuum Sweeper shall be Tymco, Model HSP-600 or Elgin Model Crosswind, or approved equal. A sweeper and operator shall be available at all times during construction activities.

36-2.6 SAFETY AREA SUPPORT. Reinforced structural steel plates, precast slabs or other approved material necessary to cover open excavation in the Runway Safety Area shall conform

to Paragraph 36-5.1(1)(c)(i). Excavations that cannot be covered to provide the required protection shall be backfilled.

36-2.7 SECURITY CHECK POINTS AND CONTROLLED CROSSINGS. Provide as shown on the plans, in the CSPP, in Appendix A of the SPCD, and as detailed within this specification, the items necessary to control access to the Air Operations Area (AOA) through Entry Gate #___ and control crossings at active taxiways. These items include, but are not limited to the following:

1) Flaggers equipped for day time and nighttime operations.
2) Marking, symbols, barrier systems and warning markers in accordance with the CSPP and this specification.

RESPONSIBILITIES

36-3.1 CONTROL REQUIREMENTS. The Contractor's responsibilities for work areas are as follows:

1) The Contractor shall be held responsible for controlling his employees, subcontractors, and their employees with regard to traffic movement. The Contractor is required to submit a Safety Plan Compliance Document (SPCD) to indicate how he/she will comply with the Construction Safety and Phasing Plan (CSPP) and how he/she will safely operate within the AOA. This SPCD shall conform to Chapter 2, Safety Plans, *Operational Safety on Airports During Construction,* AC 150/5370-2F and the Aviation Department Airport Construction Safety Manual, June 2006. It shall be submitted and approved by the Airside Operations Manager before the commencement of any construction. Information needed for preparation of the SPCD is located in AC 150/5370-2F, the CSPP and at the end of this section.

2) The Contractor shall rebuild, repair, restore, and make good at his own expense all injuries or damages to any portion of the work occasioned by his use of these facilities before completion and acceptance of his work.

3) The Contractor shall submit to the Engineer in writing a detailed work plan for each construction phase. The work plan shall include, but not be limited to, paving sequence, marking sequence, maintenance of airfield electrical and NAVAID power and control circuits. This plan shall be submitted 14 calendar days prior to the start of each construction phase. No work within the construction phase may commence until the phase work plan is approved.

4) The Contractor shall submit to the Engineer in writing a plan, by construction phase, for controlling construction equipment and vehicular movements, including material haul roads, in the Air Operations Area (AOA). This plan shall be submitted at the Pre-Construction Meeting and prior to each construction phase. No work may commence until this plan is approved by PHX Airport Operations. The plan must include material haul roads.

5) **Paved surfaces shall be kept clear at all times and specifically must be kept free from all Foreign Object Debris (FOD) which might damage aircraft.**

6) The Contractor shall prepare a security badge control plan for review by Airport Operations. The plan shall be submitted prior to or at the Pre-Construction Meeting.

No work may commence until this plan is approved. The plan shall be prepared on the Contractor's company letterhead and signed by the company representative who is authorized to sign the badge applications. The plan shall describe in detail the Contractor's and/or subcontractor's plan to control badges.

7) The Contractor shall ensure that no personnel or equipment enters the active movement areas or their associated Object Free Areas without the appropriate Airport Operations escort. **Access into movement areas or Object Free Areas without an Airport Operations escort is prohibited!**

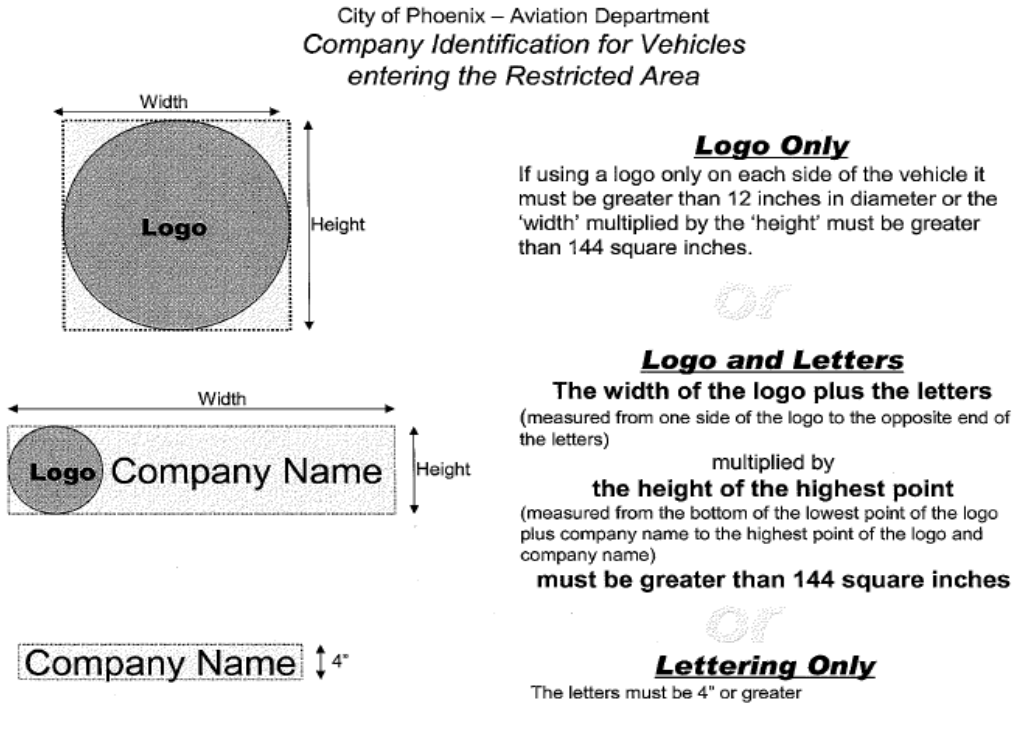
8) The Contractor will be required to coordinate his work so as to satisfy clearance requirements for arrival and departure of aircraft in compliance with the CSPP and in compliance with FAA Advisory Circular 150/5370-2G concerning Operational Safety on Airports during Construction.

36-3.2 VEHICLE AND PEDESTRIAN CONTROL. Vehicle and access routes for airport construction shall be controlled as necessary to prevent inadvertent or unauthorized entry of persons, vehicles or animals onto Air Operation areas. No vehicle shall enter the AOA except at predetermined locations. The amount of construction traffic will require a flag person to control traffic crossing taxiways and other aircraft movement areas. Contractor personnel who operate vehicles in the AOA shall comply with the Airport Operations rules and regulations for vehicle marking, lighting, and operation. Failure to comply may result in contract non-compliance costs and Notice of Violation assessments, per paragraph 36-3.10.

36-3.3 CONTROL AND WARNING DEVICES. During construction operations near active taxiways or runways the Contractor shall furnish and maintain medium and low-level barricades equipped with red warning lights along the edges of the runway and taxiway safety areas to warn construction equipment to stay clear of the active airfield pavement as well as warn pilots of areas having construction hazards. Per paragraph 36-2.4 barricades shall be equipped with red lights acceptable to the Airport Operations. The Contractor shall furnish and maintain warning markers with red warning lights along the edges of the runway safety area as designated and detailed on the plans. The Contractor shall maintain red warning lights and warning flags around all equipment, stockpiles, or other areas as directed by the Engineer and Airport Operations.

The Contractor shall provide the phone numbers of five (5) of its responsible personnel, including the project superintendent, and three (3) each responsible personnel, from the paving and safety subcontractors, each of whom may be contacted in an emergency. Personnel shall be on call 24 hours per day for maintaining construction hazard lighting and barricades. The Contractor shall employ watchmen to maintain and service all traffic control equipment. The project superintendent, foreman and on-site manager for the Contractor and all subcontractors shall have cell phones with a "602", "480" or "623" area code.

36-3.4 VEHICLE MARKING AND IDENTIFICATION. All permitted vehicles operating in the AOA shall display in full view above the vehicle a 3' x 3' or larger, orange and white checkerboard flag, each checkerboard color being 1' square. Any vehicle operating on the AOA shall be equipped with a flashing amber dome-type light, mounted on top of the vehicle and of such intensity to conform to local codes for maintenance and emergency vehicles. All vehicles operating within the airfield boundary which are approved for unescorted access shall be identified with a painted or magnetic sign on each side of the vehicle bearing the name and logo of the company. The sign shall conform to the requirements below:



Rented or leased vehicles cannot be granted unescorted access unless the above signage is placed on it. All vehicles with unescorted access must have available for inspection, when entering the Restricted area or while in the Restricted area, the current registration and proof of insurance for the vehicle.

Vehicles making only occasional visits to the job site are exempt from the identification requirements contained above provided that the Airside Operations Manager is notified and a properly identified vehicle escorts them into, through, and out of the airport secured area. These and other vehicles needing intermittent identification may be marked with tape or with magnetically attached markers that are commercially available to meet identification size and content requirements.

36-3.5 VEHICLE TRAFFIC AND OPERATIONS. When any vehicle other than those approved for use in the AOA is required to travel to or from the work area or over any portion of the work area, shall be escorted by a vehicle properly identified to operate in the area and be provided with a flag on a staff attached to the vehicle. All construction vehicles/equipment shall have automatic signaling devices to sound an alarm when moving in reverse. All equipment shall be operated within the approved speed limits.

All vehicles and/or construction equipment operating inside the active AOA, but outside of the designated haul roads, shall be escorted by Airport Operations, who will maintain radio contact with the ATCT. Crossing the active runway shall not be permitted. Vehicular traffic routes which need to cross an active taxiway shall be coordinated in advance (at least 72 hours) with Airport Operations to ensure that proper Notices to Airmen (NOTAMs) are in place. These prearranged traffic routes must be controlled by flag-persons as detailed on the plans. Aircraft ***always*** have the right-of-way. Construction equipment shall ***always*** yield to aircraft. Construction vehicle traffic shall ***never*** cross an active taxiway unless escorted by Airport Operations or at the pre-approved crossing points while crossing guards are stationed.

At such a pre-approved taxiway crossing point, the Contractor shall have a flag-person stationed on each side of the crossing point to monitor aircraft movement and to direct construction traffic. The flag-person shall be equipped with handheld signs or flags to assist in directing construction traffic. For nighttime construction operations, the flag-person shall also be equipped with lighted wands and light plants on each side of the taxiway. In addition, one vacuum sweeper and one water truck shall be dedicated to and stationed full time at each active taxiway crossing to maintain the surface of the taxiway free from construction traffic debris. Mud and other material tracked onto taxiway surfaces shall be removed by hand if necessary to achieve its complete removal.

Prior to entering any work site within the AOA, the Contractor will physically meet with Airport Operations to brief each other on the intended activities. The Contractor must also arrange a physical inspection of the work area with Airport Operations prior to leaving any area that has been closed for work, or that has been used for a crossing point or haul route by the Contractor.

36-3.6 VEHICLE PARKING. All vehicles shall be parked and serviced in the designated staging and employee parking areas shown on the plans. The Contractor is responsible for transporting his/her employees from these areas to the jobsite.

36-3.7 RADIO COMMUNICATIONS. The control of vehicular activity on the AOA is of the highest importance. This requires coordination with airport users and Air Traffic Control Tower (ATCT). The Contractor shall have no direct contact with the ATCT. All communications with the ATCT shall be coordinated through Airport Operations. However, the Contractor shall properly train his/her personnel, particularly flag-persons, on the proper procedures for monitoring radio frequencies.

36-3.8 AIRPORT SECURITY REQUIREMENTS. The Contractor will be required to coordinate his work so as to satisfy clearance requirements for arrival and departure of scheduled aircraft, and in compliance with FAA Advisory Circular 150/5370-2G concerning operational safety on airports during construction activity.

The airport is operated in strict compliance with Federal, State and local rules and regulations, which prohibits unauthorized persons or vehicles in the AOA. Equipment and personnel will be restricted to the work areas defined on the plans. Any violations by Contractor's personnel will subject the Contractor to the contract non-compliance assessments imposed by FAA and the Aviation Department.

Airport restricted areas are fenced and must remain fenced at all times. No temporary airport perimeter security fencing is required for this project. If, as the project progress, any temporary security fences and/or gates are required they shall be constructed by the Contractor according to specifications set by Airport Operations. The temporary fence and gate must be approved by Airport Operations before any of the regulated perimeter security fence may be altered. If needed, temporary fencing shall be constructed in accordance with FAA Specification F-162. The gates will remain closed and locked, or if used continuously for ingress and egress, the Contractor will provide approved guards trained by Airport Operations to monitor access to the Airport. The Contractor shall provide guards with a roster of his personnel and ensure that each individual has adequate identification. Contractor locks are not permitted on any airport gate. Gates will be staffed during shift working hours and will be secured when there is no activity at that location. The Contractor will be responsible for a 24-hour advance notification to Airport Operations regarding the scheduling of the use of the various security check point gates. There will be a communications system for emergency responses, security breaches, etc.

Entrance to the airfield is subject to strict security regulations. All personnel entering the airfield must obtain and display Airport security identification badges and all vehicles must meet minimum identification requirements and have proof of insurance on file with the Airport Security Office. All vehicles will be searched upon entering the AOA. All vehicles will be searched each time prior to passing the security check points and may be subject to random searches while operating in the AOA. Due to these TSA mandatory searches, throughput of vehicles entering the AOA at these check points may be severely reduced, thereby possibly affecting the execution of some construction activity. The Contractor must account for the possible loss of time associated with these vehicle searches in his/her bid. No additional time or compensation will be permitted for actions resulting from these vehicle searches.

The Contractor shall maintain the security integrity between the public and AOA. All barrier designs and their phasing shall be submitted to the Aviation Department and approved by them in writing prior to erection.

All construction personnel assigned to the project, except for escorted in-transit material suppliers, shall make application for and wear security badges. The term of the badge will be no more than six months. If the prime contract is for more than six months, a renewal badge application will be required at no cost to the company making the application. The Contractor and the subcontractor can make application for these items by contacting Phoenix Sky Harbor International Airport. A “Fingerprint Criminal History Records Check Application” form must be completed prior to finger printing. Photo identification badges will be made for each employee. Each employee shall be responsible for paying the current fee schedule, which is approximately $10.00 for each badge and $53.00 for federal fingerprinting. Badges must be surrendered upon termination of the employee or contract. The Contractor must notify the Phoenix Sky Harbor International Airport immediately to report any badges that are lost or stolen. The Contractor’s employees, the subcontractor’s employees and others taking the Airfield Drivers Training class and the Security class should anticipate that the duration to wait in line, and submit to fingerprinting, may take one to two hours per person. Required classes will be scheduled upon completion of the federal background check, and may take two to five days to schedule and two to three hours to complete.

Each employee is required to submit the following:

- A completed “Fingerprint Criminal History Records Check” form. All questions must be answered “yes” or “no”. Applicants may be subject to a criminal history records check and fingerprinting check. Any disqualifying crimes committed within the past ten years will eliminate an applicant from the badging process and they are not permitted to be escorted. The completed form must be submitted to the Security Badging office along with the employee’s Security Badge Application Form (form available in Security Badging Office).
- Two forms of current identification. At least one form of a government issued pictured ID (state driver’s license, ID card, military ID, etc). The second form does not have to be a picture ID (social security card, bank card, etc).

Contractor company officials/officials who wish to become authorized signers on the “Company Application for Air Operations Area Access” form must also be fingerprinted. Once their prints are cleared they will be designated an ‘Authorized Signer’ for that company and are authorized to sign badge applications for other company employees.

The Contractor shall maintain an up-to-date record of all badge holders showing name, address, social security number and Immigration form I-9 (eligibility to work in the United States). The Contractor will be required to furnish this information to the Airport upon request.

The Contractor shall restrict passage into the Security Area to badged persons, vehicles and equipment displaying his identification or that of the Airport. Should the Contractor wish to allow visitors, vendors or delivery through his access point, he shall provide an escort in accordance with escort procedures.

The Contractor shall be responsible for providing at his own cost a badged escort for all vehicles that do not operate on a daily basis within the AOA. Escorted vehicles shall not be left unattended. The badged escort shall remain with the escorted vehicle at all times while on the AOA and shall be escorted back and forth to the point of entry. One badged escort vehicle shall be required for EACH unbadged vehicle. There will be no exceptions to this requirement.

The Contractor is required to submit a plan on how he/she will safely operate within the AOA. This plan shall be submitted and approved by the Airside Operations Manager before the commencement of any construction. The Contractor is required to prepare, submit for approval and maintain during construction a plan for managing Airport Security Badges of his/her employees, subcontractors or any other party recommended by the Contractor for badging. This plan shall be submitted to Airport Operations prior to the Pre-Construction Meeting.

The Contractor will contact the Airside Operations Manager**,** telephone (602) 273-3490 ten (10) days prior to start of construction to submit the necessary airport security information for all vehicles and personnel required inside the restricted area during construction.

36-3.9 VIOLATION OF RESPONSIBILITIES. Any violation of 36-3.1 - 36-3.8 shall be considered a violation of the Contract itself and shall be sufficient cause for halting the work without extending the time limit of the job.

36-3.10 CONTRACT NON-COMPLIANCE. Due to both the safety and security precautions necessary at Phoenix Sky Harbor International Airport, failure of the Contractor to adhere to the prescribed requirements/regulations has consequences that may jeopardize the health, welfare and lives of the customers and employees at Phoenix Sky Harbor International Airport, as well as the Contractor's own employees. Therefore, if the Contractor is found to be in non-compliance with the security, airfield badging/licensing and airfield safety requirements by either Airside Operation's Personnel or the Engineer or his representatives, the Airside Operations Division will issue Notices of Violation (NOV). The Contractor may appeal the NOV, however appeals must be made in writing, and within four (4) calendar days of the offending incident, to the City of Phoenix's Project Manager. The appeal would need to state, in sufficient detail, why the NOV/circumstances is unwarranted. A final and binding decision on the appeal will be made by the City of Phoenix's Project Management Team within ten (10) working days of receipt of the appeal, the Contractor will then be notified of this decision in writing. No further appeals to the specific NOV will be considered or accepted.

The City of Phoenix Airside Operations has the option to issue warnings on the first offense if the incident justifies it. Individuals involved in a non-compliance violation may be required to surrender their security badge and airfield driver's license pending investigations of the matter and the outcome of the possible appeal.

1) Should any violation caused by the Contractor result in an expense to the City of Phoenix, the City shall recover the total of those expenses from the Contractor. The expenses will be determined by the Aviation Department and will consist of the following:
   a) Labor hours of City staff or consultants which were devoted to investigate and resolve the violation, including overhead and labor burden mark-ups.
   b) Expenses for materials or equipment necessary to make the situation temporarily or permanently safe.

c) Work by others, either contracts, or services, or by airlines, which were performed in order to rectify the situation.
d) Any monetary sanctions assessed by the FAA, TSA or others

Incursions are defined as "any entrance onto an active runway, taxiway, taxilane or apron that may or may not subject any aircraft or crash fire rescue vehicle to yield, stop or change direction to avoid the sudden entrance."

The Airport's Notice of Violation (NOV) program also applies to all security badge holders and the companies they work for. Airport NOVs can result in the suspension or revocation of a companies or individual's privilege to do work at the airport. Responsibilities for security badge holders and their companies are communicated through the badge application process.

COORDINATION OF CONSTRUCTION ACTIVITIES

36-4.1 WORK SCHEDULING AND ACCOMPLISHMENT. The Contractor shall contact PHX Airport Operations each day before beginning work to coordinate the status and nature of work to be done that day. Access to work sites within the AOA will require daily coordination with Airport Operations prior to gaining access. The Contractor shall also report to Airport Operations at the end of each day to schedule the work he plans to do on the following day.

Violations of any coordination requirements shall be considered a violation of the Contract itself and shall be sufficient cause for halting the work without extending the time limit of the job.

SAFETY REQUIREMENTS

36-5.1 GENERAL. Before entering upon or crossing any runway or taxiway, or aircraft movement area, the Contractor shall receive proper clearance from PHX Airport Operations. Emergencies and operating conditions may necessitate sudden changes, both in airport operations and in the operations of the Contractor. Aircraft operations shall always have priority over any and all of the Contractor’s operations. Should runways or taxiways be required for the use of aircraft, and should Airport Operations deem the Contractor to be too close to active runways or taxiways the Contractor shall suspend his operations, remove his personnel, plant, equipment, and materials to a safe distance and stand by until the runways and taxiways are no longer required for use by aircraft. There will be no compensation for delays or inefficiencies due to these changes.

The Contractor shall ensure that no personnel or equipment enters into the active movement areas or their associated Object Free Area without the appropriate Airport Operations escort. **Access into movement areas or Object Free Areas without an Airport Operations escort is prohibited!**

Throughout the duration of the job, any practice or situation that Airport Operations or the Engineer determines to be unsafe or a hindrance to regular airport operations shall be immediately rectified.

Any violation of these or the following safety requirements shall be considered a violation of the Contract itself and shall be sufficient cause for halting the work without extending the time limit of the job.

(1) 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 Advisory Circulars may be found at the FAA website:

http://www.faa.gov/airports_airtraffic/airports/resources/advisory_circulars/

and, Federal Aviation Regulations (FARs) can be found at:

http://www.faa.gov/regulations_policies/faa_regulations.

The Contractor is always to use the latest version of each AC or regulation.

(a) Advisory Circular 150/5370-2G, "Operational Safety on Airports During Construction" sets forth guidelines to assist airport operators in with the requirements of federally funded construction projects.

(b) FAR Part 77, "Objects Affecting Navigable Airspace," Current Edition: Establishes standards for determining obstructions to navigable airspace. Civil airport imaginary surfaces are defined in the publication. It also 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 70/7460-1, "Obstruction Marking and Lighting," Current Edition.

(c) AC 150/5300-13B, "Airport Design" Current Edition: Establishes design, operational and maintenance standards for airports. Standard terms used in the contract plans and specifications are defined below:

(i) Runway Safety Area (RSA) - The defined surface surrounding the runway over which aircraft should, in dry weather, be able to cross at normal operating speeds without incurring significant damage. A safety area is graded, drained and compacted. It is free of any holes, trenches, humps 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, firefighting, and rescue vehicles under normal (dry) conditions.

Prior to re-opening the runway each morning, the RSA must comply with the following:

1) The area(s) shall be able to support an aircraft at normal operating speeds without the aircraft incurring significant damage.

2) For the first 200 feet beyond the runway ends, the longitudinal grade of the RSA is between 0 and 3 percent, with any slope being downward from the runway ends. For the remainder of the RSA, the maximum allowable downward grade is 5 percent and the maximum allowable upward grade shall not penetrate the 20:1 approach surface from the end of the runway, as defined in FAR Part 77. However, limitations on longitudinal grade changes are plus or minus 2 percent per 100 feet.

3) For the RSA during construction (200 feet from runway centerline and up to 200 feet from the runway ends), the transverse grade from the edge of the runway pavement

is 1.5 to 5 percent downward. For areas beyond 200 feet from the runway ends, the maximum allowable transverse grade shall be 5%, upward or downward. Transverse grade changes should be warped smoothly.

4) The maximum permissible drop-off at the edge of the runway pavement is 3 inches.

(ii) Object Free Area (OFA) – An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigations or aircraft ground maneuvering purposes.

(iii) Obstacle Free Zone (OFZ) – The OFZ is the airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance protection for aircraft landing or taking off from the runway, and for missed approaches. The OFZ is subdivided as follows:

1) Runway OFZ. The airspace above a surface centered on the runway centerline.

2) Inner-approach OFZ. The airspace above a surface centered on the extended runway centerline. It applies to runways with an approach lighting system.

3) Inner-transitional OFZ. The airspace above the surfaces located on the outer edges of the runway OFZ and the inner-approach OFZ. It applies to runways with approach visibility minimums lower than ¾-statute mile.

(iv) Taxiway Safety Area (TSA) – A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

(iv) The dimensioning of RSA's, OFA's and OFZ's are determined by the type of aircraft utilizing the runways and taxiways. AC 150/5300-13A provides detailed information for determing the required dimensioning for various safety areas. For the Phoenix Sky Harbor International Airport, the following are the locations of Runway and Taxiway Safety Areas, Object Free Areas and Obstacle Free Zones.

(1) Group V aircraft is the Design Aircraft for Phoenix Sky Harbor International Airport. Workers and equipment are to provide 36' wingtip clearance during taxiing operations if Taxiways remain open to traffic.

Group V – 214' Wingspan

(a) TSA 107' from Taxiway Centerline
(b) OFA 142.5' from Taxiway Centerline

(5) The Contractor shall acquaint his supervisors and employees with the airport and operations that are inherent to Phoenix Sky Harbor International Airport and shall conduct his/her 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.**

(6) 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 personnel. The sequence of operations shall be such that maximum protection is afforded to ensure 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.

(7) During the performance of this contract, the airport facility shall remain in use to the maximum extent possible. Use of areas near the Contractor's work will be controlled to minimize disturbance to the Airport'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.

(8) All work to be performed which is too close to an active runway, taxiway or apron under operational conditions shall be performed when the runway, taxiway or apron is not in use. Such work shall not be accomplished without prior permission from Airport Operations. Requested closings shall be directed to the Airport Operations in writing at least 72 hours in advance so that the proper Notice-to-Airmen (NOTAM) may be issued. Only Airport Operations have the authority to open or close runways or taxiways.

(9) The Contractor shall be aware of the following types of safety problems and/or hazards. These problems or hazards shall not be permitted. Should any of these problems or hazards arise during construction, the Contractor shall immediately rectify/correct the problem or hazard to the satisfaction of the Engineer and Airport Operations Personnel:

(a) Trenches, holes, or excavations 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 any open runway, taxiway, taxilane, 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, excavations, stockpiles, or other materials which could degrade or otherwise interfere with electronic signals from radios or electronic navigational aids (NAVAIDS).

(f) Runway surfacing projects resulting in excessive lips greater than 1 inch for runways and exceeding 3 inches for edges between the old shoulder and new surfaces at runway edges and ends.

(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 the 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 area.

(j) Misleading or malfunctioning obstruction lights or unlighted/unmarked obstructions in an approach to any open runway.

(k) Inadequate approach/departure surfaces 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, dirt, debris, or other transient accumulation which temporarily obscures pavement marking, pavement edges, or derogates visibility of runway/taxiway marking or lighting.

(n) Inadequate or improper methods of marking, barricading, and lighting of temporarily closed portions of AOA.

(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 form open aircraft operating areas.

(q) Failure to control vehicle and human access to open aircraft operating areas.

(r) Construction/maintenance activities or materials which could hamper the response of aircraft rescue and firefighting (ARFF) equipment from reaching all aircraft or any part of the runway/taxiway system, runway approach and departure areas, and aircraft parking locations.

(s) Bird attractants on airport, such as edibles (food scraps, etc.), miscellaneous trash, or ponded water.

(10) 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 needed to prevent/remedy any unsafe or potentially unsafe conditions/activities discovered.

(11) Before actual commencement of construction activity, the Contractor shall notify Airport Operations and the Engineer in writing of his intentions to begin construction, stating the proposed time, date, and work area in order for the appropriate Notice-to-Airmen (NOTAM) to be issued. Only PHX Airport Operations have the authority to open or close runways or taxiways and to issue NOTAMs. In order to properly communicate these closures Airport Operation must receive these requests 72 hours prior to the scheduled closure. Upon completion of work and return of all related areas to standard conditions, the Contractor shall again notify Airport Operations and the Engineer in writing, and describe the area that is complete and available for normal airport operations.

(12) Debris. Debris, waste and loose material or any other FOD (including dust and dirt) capable of causing damage to aircraft landing gear, propellers or being ingested in jet engines shall not be allowed on active aircraft movement areas or adjacent infield areas. Materials observed to be within these areas shall be removed immediately and/or continuously by the Contractor. The Contractor shall be required to have a

sweeping machine and operator on site, 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 at the discretion of the Engineer. Closed pavements shall be swept clean prior to reopening to aircraft traffic. Exposed earth in excavation areas within 75 feet of the centerline immediately adjacent to active taxiways shall be covered to prevent dust from jet blast. Cover material shall be weighted to prevent movement from jet blast.

(13) Flagpersons. In accordance with the specifications, the Contractor shall furnish, at his own expense, flagpersons as necessary to control his traffic unless otherwise directed by the Engineer.

(14) Trenches, Excavations and Stockpiled Material. Open trenches or excavations exceeding 3" in depth and 3" in width or stockpiled material will not be permitted within the limits of restricted areas of operational runways or taxiways. Covering for open trenches or excavations shall be of sufficient strength to support the weight of the heaviest aircraft operating on the runway or taxiway. Trenches and excavations that cannot be protected by covering shall be backfilled, and re-excavated if necessary at the end of each day or before opening the restricted area to operational use of the runway or taxiway. Open storm drain trenches, electrical duct or conduit trenches, utility trenches or any other trench shall be limited to 500-feet accumulative in length at any time. Open trenches in the runway safety area shall be properly and completely backfilled and compacted in sufficient time before the end of the work shift.

(15) Construction in Proximity to Active Runways and Taxiways.

Runway Sides: If appropriate construction/maintenance NOTAM has been issued, construction is permissible as close as 250 feet from the centerline of the active runway provided that all Airport Operations and FAA criteria are met. The 250 feet shall be clearly marked in the infield areas with approved barricades at 10-foot intervals. Runway Ends: No work will be permitted within 1,000 feet of the active runway threshold.

Taxiway Sides: If appropriate construction/maintenance NOTAM has been issued, construction is permissible as close as the dimensions shown on the Construction Safety and Phasing Plan (CSPP) provided that all Airport Operations and FAA criteria are met. This dimension(s) shall be clearly marked in the infield areas using approved barricades at 10-foot intervals. Personnel and equipment working within taxiway Object Free Areas (OFA) must at all times be able to give way to taxiing aircraft.

(16) Equipment Height Restrictions.

Maximum permissible equipment height varies by location and by construction phase. Maximum equipment height requirements are shown in the CSPP and shall not be exceeded unless prior approval is obtained from the Engineer and Airport Operations. Atop all equipment booms shall be mounted the white and orange checkered flag described in Paragraph 36-3.4. The top ten feet (10') of these booms shall be painted fluorescent orange and they shall be equipped with a red obstruction light. Any crane erections shall be coordinated with Airport Operations and the Engineer during every shift.

(17) Miscellaneous.

(a) Open flame, welding or torch cutting are prohibited unless adequate fire and safety precautions have been taken and the procedure has been approved by the Engineer.

(b) All materials and equipment when not in use shall be placed in approved areas where they will not constitute a hazard to aircraft and not penetrate clearance height restrictions as shown in the CSPP. All equipment shall be parked in the appropriate area(s) when not in use.

(c) The Contractor shall provide the Safety/Security Manager with a current list of all employees working on the airport. The list shall be maintained current by the Contractor and Subcontractors.

(d) For emergencies involving life safety (injuries, fires, security breaches, etc.), the Contractor shall immediately call 602-273-3311, the Sky Harbor Emergency number, and simultaneously or as soon as possible contact PHX Airport Operations followed by notification to the Project Manager.

36-5.2 CLOSED RUNWAY AND TAXIWAY MARKING AND LIGHTING. Closed runway and taxiway markings shall be as shown in the CSPP. Closed runway and taxiway marking and lighting materials shall be approved for use by the Engineer prior to placement. Construction activities shall not begin until the layout of such marking and lighting has been approved by the Engineer.

36-5.3 HAZARD MARKING. Hazard-marking barricades, flashers, etc. should be used: to identify and define the limits of construction making them visible to aircraft, personnel, or vehicles; to identify hazards such as open manholes, small areas under repair, stockpiled material, waste areas, etc.; to prevent aircraft from taxiing onto a closed runway for takeoff; and to identify FAA, airport, and National Weather Service facilities, cables, power lines and other sensitive areas to prevent damage, interference, and facility shutdown.

Traffic Cones shall not be used at any time on the Air Operations Area.

Hazardous areas, in which no part of an aircraft may enter, should be indicated by the use of barricades marked with diagonal, alternating orange and white reflective stripes. During reduced visibility or night hours, the barricades should be supplemented with flashing red lights. The intensity of the lights and spacing for barricades, flags, and lights should be adequate to delineate the hazardous area without ambiguity. The Contractor shall have a designated person on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades.

36-5.4 CONSTRUCTION AREA MARKING AND LIGHTING. Low profile lights, retroreflective taxiway edge markers, low level barriers, and warning flags shall be provided and erected by the Contractor as shown in the CSPP or as directed by the Engineer. All construction areas, including closed runways and taxiways, should be clearly and visibly separated from active air operation areas. Hazard areas, facilities, cables, and power lines should also be clearly identified by the Contractor. The Contractor is responsible for maintaining the condition and visibility of all markers identifying above-mentioned areas and that marking and lighting aids remain in place. Appropriate barriers, lights and signs should be used as necessary to clearly separate all construction/maintenance areas from other parts of the AOA. All barricades, temporary markers, flag line supports, and other objects placed and left in safety areas on any open runway, taxiway, or taxilane should be: as low as possible to the ground; of low mass; easily collapsible upon contact with an aircraft or any of its components; weighted down or sturdily attached to the surface to prevent displacement from prop wash, jet blast, wing vortex, or other surface wind currents; and if affixed to the surface, frangible at ground level.

36-5.5 CONSTRUCTION NEAR NAVIGATIONAL AIDS. Construction materials and equipment shall not be placed or parked where they may interfere with the line-of-sight of the ATCT and navigational aids in operation. PHX Operations shall determine if any materials or equipment will cause any type of interference.

36-5.6 CONSTRUCTION SITE ACCESS AND HAUL ROADS. The Contractor will not be permitted to use any access or haul roads other than those designated on the contract drawings. The Contractor should submit specific proposed ingress and egress routes associated with specific construction activities to the Engineer for evaluation and approval prior to commencing construction activities. Aircraft Rescue and Firefighting (ARFF) right-of-way on access roads, haul roads, taxiways, and runways shall not be impeded at any time.

36-5.7 TRENCHES AND EXCAVATIONS. Gaps or holes between paving lanes, open trenches or excavations are not permitted within an operational runway safety area. Coverings for open trenches or excavations such as reinforced structural steel plates, precast slabs or other methods should be of sufficient strength to meet the requirements of the RSA found in Paragraph 36-5.1(1)(c). Open trenches and excavations at the construction site outside of the RSA should be prominently marked with red or orange flags, as approved by the Engineer, and lighted with red light units during hours of restricted visibility or darkness.

Excavations and open trenches may be permitted up to the edge of structural taxiways provided the drop-off is adequately signed, marked, and lighted and the appropriate NOTAM is issued.

36-5.8 CONSTRUCTION MATERIALS STOCKPILING AND EQUIPMENT STORAGE. There shall not be any equipment storage in the active runway and active taxiway safety areas or in the infield areas. The Contractor shall remove pavers and other equipment from the active Runway and Taxiway Object Free Areas (OFA) including the infields (staging on apron areas will be allowed with prior approval) before re-opening the runway or taxiway. Stockpiled material or equipment should not be stored near aircraft turning areas or operational movement areas, aprons, or excavations and trenches. Stockpiled materials shall not be stored near NAVAIDs, visual or approach aids, nor shall they obstruct the ATCT's line of sight to any runway or taxiway. The Contractor shall ensure that stockpiled construction materials and equipment do not cause degraded or hazardous conditions to airport operations safety. This includes determining and verifying that stockpiled materials and equipment are stored or parked at an approved location, that they are properly stowed to prevent foreign object debris (FOD), attraction by wildlife, or obstruction of air operations either by their proximity to NAVAIDs or to aircraft movement areas.

36-5.9 OTHER LIMITATIONS ON CONSTRUCTION. Open flame welding or torch cutting operations are prohibited unless adequate fire and safety precautions are provided and have been approved for use by the Engineer. Under no circumstances should flare pots be used near aircraft turning areas.

36-5.10 FOREIGN OBJECT DEBRIS (FOD) MANAGEMENT. Waste and loose materials capable of causing damage to aircraft landing gear or propellers or capable of being ingested in jet engines should not be left or placed on or near active aircraft movement areas. Materials tracked onto these areas should be continuously removed during the construction project. It is also recommended that waste or loose materials which would attract wildlife be carefully controlled and removed on a continuous basis.

36-5.11 RUNWAYS AND TAXIWAYS. Nothing shall be placed upon runways, taxiways, taxilanes, or aprons without authorization from Airport Operations.

36-6.1 CONTRACTOR QUALITY CONTROL. The Contractor shall be responsible for developing and implementing a Safety Plan Compliance Document including inspections necessary to assure

compliance with the requirements of this section and the approved Construction Safety and Phasing Plan.

METHOD OF MEASUREMENT

36-7.1 All items specified in this section will be measured as one lump sum.

36-7.2 Measurement and payment for "Landside Traffic Control" and for Uniform Off-Duty Officer as specified in the Technical Special Provisions (if included) is incidental to Special Provision Item 36 Airport Safety and Security (M-003).

BASIS OF PAYMENT

36-8.1 Airport Safety and Security (M-003) shall be paid for at the contract lump sum price in a proportionate manner, on the basis of current estimates. This price shall constitute full compensation for furnishing material and equipment, including but not limited to flagpersons, temporary gates, warning markers, temporary drainage items, low level barriers, other traffic control devices and necessary equipment, safety area support material, and other material and equipment list herein, and the maintenance thereof and all other labor, materials, equipment, tools and incidentals including Landside Traffic Control and Uniform off-duty Officers necessary to accomplish this item.

Payment will be made under:

Item SP-36-8.1 Airport Safety and Security (M-003) – per lump sum

37. AIRPORT SAFETY REQUIREMENTS

37.1 CONTRACTOR GENERAL AIRPORT SAFETY REQUIREMENTS. PHX is committed to providing a safe work environment and requires contractors ensure the health and safety of its employees and the employees of its subcontractors. Hazards include but are not limited to harmful dusts, fumes, and vapors, strong acids, molten or hot metal, metal with sharp or jagged edges, electrical hazards, overhead hazards and moving vehicles. PHX requires contractors comply with all federal, state and local laws, codes and regulations as applicable to the area and type of work conducted on the airport.

37.2 SAFETY COORDINATOR All Contracts will require the Contractor to designate a Safety Coordinator(s) as the point of contact for the Project regarding Safety. Contractor shall work with the Airport's Safety section in meeting the pre-requisites to establish the Safety Coordinator. The Safety Coordinator(s) will represent the company having oversight of the project activities and the person(s) with a direct relationship with the Airport's Safety section. The Safety Coordinator(s) should at minimum be responsible for planning, implementing and overseeing company's employee safety at work. Their main duty is to ensure that the company

complies and adheres to Occupational Health and Safety (OHSA) guidelines to reduce work-related injuries and provide a direct point of contact for the Airport's Safety section.

The Safety Coordinator(s) is responsible for implementing and maintaining the safety program for areas pertaining to the project. Responsibilities may include administration and coordination of the following activities:

- Thoroughly reviewing accident investigations and initiating corrective action.
- In the event of an accident, preparing and submitting a written report, and assisting in the investigation according to requirements.
- Holding safety meetings.
- Reviewing safety performance and taking action as necessary within the areas of responsibility.
- Maintaining effective and prompt communication of safety matters.
- Monitoring compliance with established safety standards and regulations.
- Assigning duties to subcontractors, checking work areas, making housekeeping inspections, and keeping records of conditions found and corrective actions taken.
- Requiring employees to use personal protective equipment such as safety glasses, body harnesses, respiratory protection equipment and head and eyewear protection.
- Maintaining effective communication of safety matters to employees.
- Assisting in the development and communication of safe work procedures for unusual or hazardous operations.
- Maintaining compliance with the requirements of federal, state, local, and other agencies, and with the requirements of the Contractor's safety programs.

37-3.1 HAZARD IDENTIFICATION AND JOB HAZARD ANALYSIS (JHA) To ensure that safety risks are assessed, understood and controlled to reduce operational risks and exposures Contractor shall develop and maintain a procedure for the identification of hazards and effective management of risk for activities and tasks conducted within the scope of project activity. There shall be a system, based on hazard identification and risk assessment, which ensures effective controls are in place to minimize exposure to hazards.

Contractor risk assessment process will use risk matrix and include at minimum the following elements:

- hazard identification;
- credible worst-case consequence;
- risk ranking;
- risk control treatments; and
- monitoring and review of controls.

A JHA shall be undertaken for each activity and shall at minimum:

- consider the tasks to be performed;
- identify and document the hazards;
- identify control measures;
- develop and implement hazard controls and regulatory compliance;
- perform the work and monitor the effectiveness of the hazard controls;
- consider emergency response procedures;
- provide feedback to improve the process (e.g. routine workplace inspections,

auditing compliance during work performance, job briefing postings, lessons learned, etc); and
- provide for hazard assessments on new equipment or equipment where conditions change.

37-4.1 SAFETY VIOLATIONS Safety violations by Contractor employees constitute non-compliance with provisions of the contract and may result in immediate removal of the employee from airport premises. The Contractor's manager, supervisor, or other person in charge who directs or allows employees to perform unsafe acts or to work in or around unsafe conditions will be immediately removed from the airport premises.

37-5.1 SAFETY TRAINING Contractor are responsible for ensuring that employees under their supervision, direct and/or indirect, are competent, trained, understand, and comply with the requirements of OSHA and applicable ADOSH standards. Upon request and/or as applicable, contractors must show proof of training for their employees prior to commencing any work activities associated with OSHA/ADOSH regulations.

Contractor are to train their employees on the safety, health, environmental, and fire prevention requirements for the work they are to perform and enforce adherence to safe work practices and procedures.

37-6.1 SAFETY EQUIPMENT Contractor is responsible for providing their employees with the proper tools and equipment to perform the job safely, including any required personal protective equipment. Contractor must ensure that their subcontractors do the same.

Personal protective equipment shall be worn according to the hazards associated with various types of exposure (e.g. Safety glasses, ear plugs, gloves, chemical gloves, respirators, aprons, harnesses, etc.)

Contractor must supply their own equipment necessary for their employees to perform the work safely and in compliance with rules, regulations. Contractor are to arrange for the proper use, maintenance, and repair of work equipment.

37-7.1 REGULATORY COMPLIANCE Contractor shall perform all work in a manner that complies with all applicable federal, state, and local laws, rules, and regulations and complies with safety best practices (e.g., 29 CFR 1900 through 1999, Federal Aviation Administration, Transportation Security Administration, National Fire Protection Association, Arizona Department of Environmental Quality) while performing work and/or in support, direct or indirect, of the airport project,

In addition, contractors are obligated to:
- obtain/provide information on OSHA/ADOSH safety plans/procedures when affecting airport employees;
- coordinate operations with the appropriate PHX supervisor(s) should both PHX employees and Contractor personnel be working in a work area simultaneously;
- inform the Aviation Project Manager and/or Aviation Safety of any hazards encountered or created either through a debriefing or during the operation;
- the requirements are in addition to any other requirements or obligations set forth herein the Contract documents or applicable federal, state, and local laws, rules, regulations, and permits;

37-8.1 WORK PERMITS Contractor shall obtain, at their expense, all applicable work permits required to perform their work to ensure that any potential hazard takes into consideration the reduction of risk and includes safety precaution measures in place.

Work Permits shall:

- be approved for use prior to commencing the task;
- clearly define the work to be completed under the Work Permit;
- show on the permit the duration of the work.

Examples of where Work Permits are required (but not limited to):

- electrical or equipment isolations;
- confined space work;
- surface excavations;
- working at heights;
- work performed near x-ray or radioactive sources;
- high voltage work or working in proximity to high voltage;
- hot work (excluding hot work conducted in workshops).

37-9.1 SAFETY PROGRAM Contractor are responsible for establishing and implementing a safety program. This program will include maintaining and auditing safety performance for compliance with applicable federal, state, local regulations and with established safety and environmental requirements.

Contractor are responsible for planning and executing work according to the stated objectives of their safety program.

At minimum, such programs are to provide employees with information on the following topics (as applicable to the type of work required and/or exposed to):

- Construction Safety Phasing Plan
- Site Specific Safety Plan
- Hazards present in their work assignment and surrounding area.
- Personnel protective equipment requirements.
- Proper procedures for safe work and reporting unsafe job conditions.
- Hazardous Energy control (lockout/tagout).
- Confined space and powered industrial trucks.
- Fire prevention and fire extinguishers.
- Waste disposal and environmental release requirements.
- Respiratory Protection
- Hot Work
- Fall protection / Working at Heights
- Electrical safety
- Hazardous Materials / Hazard Communication
- Evacuation
- Traffic Control
- Emergency Procedures and Contacts
- Lifting and Crane Works

- Machine and Equipment Guarding
- Extreme Weather
- Work Permits
- Personal Protective Equipment (PPE)
- Hearing Conservation
- Scaffolding
- Bloodborne Pathogens
- Spill Prevention Control, and Countermeasures
- Trenching and Excavation

The Contractor shall provide, when applicable or upon request, a written safety program(s)/plan(s) to the Aviation Project Manager and/or Aviation Safety.

As it pertains to their work responsibility, the Contractor's written safety program(s)/plan(s) must meet the requirements set forth in federal (e.g., of OSHA 29 CFR 1900 through 1999, Federal Aviation Administration), state, and local regulatory entities.

Procedures used by the Contractor for intended/proposed work in a controlled area must be discussed with the Aviation Project Manager and/or Aviation Safety prior to commence of work.

37-10.1 SAFETY INSPECTIONS Contractor are to conduct regularly scheduled safety inspections of the work being conducted by the contract and/or subcontract personnel. The scope or duration of work may regulate the frequency of these inspections.

The inspection program may include but not be limited to:

- Housekeeping;
- correct use of work permits, JHAs;
- appropriate workplace behaviors;
- equipment condition;
- hazard identification;
- task observations; and
- work and environmental conditions.

Inspections must be carried out by line management to verify that employees are competent, trained, equipped and if required, certified to carry out their work in accordance with statutory and company requirements.

All inspection findings must be actioned using a formal corrective action plan that addresses identified issues.

Contractor must take immediate corrective action when a violation of job safety, fire, or environmental safety hazard is observed. Contractor are to regularly review their safety performance. Agreed corrective and preventative actions must be tracked to completion, closed out and verified as being effective. Failure to correct a problem may result in work stoppage in the related area, and work will not be permitted to resume until the problem is corrected.

Work stoppages need to be communicated to the Aviation Project Manager immediately and/or the Airport Duty Manager. Contractor are required to administer their own safety activities and are responsible for the safety of their employees.

If required by the project, Contractor and their Safety Coordinator or designee must attend a pre-work safety conference with the Aviation Project Manager and Aviation Safety (et.al as required) prior to beginning work. The conference is to review procedures, forms, record keeping and reporting, and to ensure a clear understanding of the safety program relevant to the work to be performed.

37-11.1 SAFETY RIGHTS Contractor agrees that, in addition to any other right under the Contract, the Aviation Project Manager, shall have the right to take any or all of the following actions:

- Review and approve all Contractor work plans and work specific safety requirements;
- Designate safety precautions in addition to those in use or proposed by Contractor;
- Verify Contractor have effectively planned for eliminating or controlling work hazards that may impact the safety or health of the Airports and Contractor personnel or the general public;
- Require Contractor to provide additional safeguards beyond what Contractor plans to utilize;
- Conduct and document field safety observations and inspections to verify Contractor compliance with the Contractor Safety Program, the Contract requirements, applicable federal, state, and local laws, rules, regulations, and permits;
- Stop work to ensure compliance with safe work practices and applicable federal, state and local laws, rules, and regulations;
- Suspend, terminate, or place on probationary status Contractor in the event of a safety incident or failure to comply with these program requirements; and
  Evaluate Contractor safety performance at periodically during performance of the work and at conclusion of the work.

37-12.1 SAFETY INCIDENT REPORTING Contractor shall have a formal process implemented to report, investigate, record and follow-up incidents, injuries and occupational illnesses. This must include the determination of underlying causes and to minimize the potential for the future occurrence of similar events.

All incidents including, safety, environmental, process loss, property damage, injuries, near misses and occupational illnesses that occur within the project scope must be reported by Contractor’s employees to their immediate supervisor as soon as possible and recorded on Contractor’s Incident Report form.

All incidents, injuries, near misses and occupational illnesses shall be assessed within 24 hours for actual consequence and potential risk and corrective and preventative actions planned to reduce the likelihood and potential consequence of the event.

All high potential incidents and incidents that result in recordable injuries shall be formally investigated to determine causal and contributing factors and the appropriate corrective and preventative actions.

Incident investigations shall be led by an appropriately trained person and reviewed by Contractor, Aviation Project Manager, and Aviation Safety to verify the thoroughness of the investigations, completeness of findings and suitability of the recommended actions.

Contractor shall maintain records of all project related incidents, including all investigations and associated corrective and preventative actions.

Contractor is to immediately provide such information with complete copies of all documents, photographs, witness statements, another evidence related to any of the above to the Aviation Project Manager and Aviation Safety during the course of the incident, investigation, and/or upon request.

37-13.1 SAFETY MEETINGS Contractor should hold regularly scheduled safety meetings and require attendance by employees. Accident prevention should have a prominent place on the agenda, and the meeting records should state the specific items discussed. Each supervisor should hold safety and training meetings in their work area with their on-site staff and review specific procedures pertinent to the work activity.

Safety meetings provide an opportunity to point out hazardous conditions or unsafe work practices, and discuss safety and environmental rules and regulations, safe working procedures, analysis of accidents, and potential hazards.

Records and minutes of safety meetings are encouraged, including recording attendees and subjects covered.

37-14.1 GENERAL HOUSEKEEPING Good housekeeping shall be maintained during all operations and clean up should occur at the end of work each day.

Maintaining a clean work environment is the responsibility of the contractor. The Contractor is responsible for properly managing all waste generated in the course of the project in accordance with federal, state, and local regulations. Passageways, exits, and firefighting equipment must not be blocked or obstructed.

37-15.1 INDEMINFICATION Contractor shall indemnify and hold harmless PHX from and against any and all losses, liabilities, damages, costs, fines, expenses, deficiencies, taxes and reasonable fees and expenses of counsel and agents, including any costs incurred in enforcing this contract, that PHX may sustain, suffer or incur arising from

(i) Contractor's failure or alleged failure to comply, in whole or in part, with any of its obligations hereunder the contract;
(ii) any loss of or damage to Contractor's equipment throughout the course of construction activity(ies);
(iii) any violation of laws;
(iv) any damage to any property of PHX caused by the maintenance or operation of any Contractor employees, direct or indirect;
(v) any claims by any third person with respect to death, injury or property damage caused, in whole or in part, by the maintenance or operation of any Contractor employee, direct or indirect; and
(vi) any claims resulting from or arising out of injury or death of any employee, agent of Contractor, direct or indirect, including claims alleging that PHX failed to provide a safe place

to work.

METHOD OF MEASUREMENT

37-16.1 All items specified in this section are considered incidental to the project.

BASIS OF PAYMENT

37-17.1 All items specified in this section are to be considered as incidental to the Contract. No additional payment will be made for conformance to the specifications

38. ENVIRONMENTAL COMPLIANCE.

38-1.1 GENERAL. Contractor shall, at Contractor's own expense, comply with all present and subsequently enacted Environmental Laws, and any amendments thereto, affecting Contractor's occupation and use of the Premises.

38-2.1 DEFINITIONS

1. "*Environmental Laws*" means those laws promulgated for the protection of human health or the environment, including but not limited to, the following as the same are amended from time to time: the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 [CERCLA], 42 U.S.C. Sections 9601 et seq., as amended by the Superfund Amendment and Reauthorization Act [SARA]; the Solid Waste Disposal Act [SWDA], 42 U.S.C. Sections 6901 et seq., as amended by the Resource Conservation and Recovery Act [RCRA] including Subtitle I, Underground Storage Tanks; the Toxic Substances Control Act [TSCA], 15 U.S.C. Sections 2601 et seq.; the Public Health Service Act (Title XIV) [PHSA] a.k.a. the Safe Drinking Water Act [SDWA] and SDWA Amendments of 1996, 42 U.S.C. Sections 300f et seq.; the Federal Water Pollution Control Act [FWPCA], as amended by the Clean Water Act, 33 U.S.C. Sections 1251 et seq.; the Clean Air Act, 42 U.S.C. Sections 7401 et seq.; Title 49 of the Arizona Revised Statutes, including the Arizona Environmental Quality Act, A.R.S. Sections 49-101 et seq.; the Arizona Comprehensive Air Quality Act, A.R.S. Sections 49-401 et seq.; the Arizona Solid Waste Management Act, A.R.S. Section 49-701 et seq.; the Arizona Hazardous Waste Management Act, A.R.S. Sections 49-901 et seq.; the Arizona Underground Storage Tank Regulation Act, A.R.S. Sections 49-1001 et seq.; the Occupational Safety and Health Act of 1970 as amended, 29 U.S.C. Sections 651-678 and the regulations promulgated thereunder, and, any other laws, regulations and ordinances (whether enacted by local, state or federal government) now in effect or hereafter enacted, that provide for the regulation or protection of human health or the environment, including the ambient air, ground water, surface water, and land use, including substrata soils.

2. In this Contract, the term "*regulated substances*" means:

a. Those substances identified or listed as a hazardous substance, pollutant, hazardous material, and, petroleum, in CERCLA/SARA; the Hazardous Materials Transportation Act, 49 U.S.C. Sections 5101 et seq.; RCRA, Subtitle I, Regulation of Underground Storage Tanks, 42 U.S.C. Sections 6991 through 6991i; Clean Air Act, 42 U.S.C. Section 7412 et seq.; and

in any rule or regulation adopted to implement said statutes.

b. Those substances identified or listed as a hazardous substance, pollutant, toxic pollutant, petroleum, or as a hazardous, special, or solid waste in the Arizona Environmental Quality Act, A.R.S. Sections 49-101 et seq., including but not limited to, the Water Quality Assurance Revolving Fund Act [WQARF], A.R.S. Sections 49-281 et seq.; the Arizona Comprehensive Air Quality Act, A.R.S. Sections 49-401 et seq.; the Arizona Solid Waste Management Act, A.R.S. Sections 49-701 et seq.; the Arizona Underground Storage Tank Regulation Act, A.R.S. Sections 49-1001 et seq.; A.R.S. Sections 49-851 through 49-868 pertaining to Management of Special Waste; the Arizona Hazardous Waste Management Act, A.R.S. Sections 49-921 et seq.; and in any rule or regulation adopted to implement said statutes.
c. All substances, materials and wastes that are, or that become, regulated, or that otherwise are classified as hazardous or toxic, under any Environmental Law during the term of this Contract.

3. The term "*release*" means any releasing, spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, disposing or dumping.

4. As used herein, the term "*Premises*" means Contractor's leasehold and/or any part or portion of Phoenix Sky Harbor International Airport (PSHIA), Phoenix Deer Valley Airport (DVT), Phoenix Goodyear Airport (GYR) or City owned property where Contractor or its employees or agents causes to occur a release of a regulated substance.

5. As used herein, the term "*Contractor*" means every consultant, lessee, sublessee, licensee, permittee, concessionaire, tenant or other person, firm or corporation occupying or using the Premises pursuant to an agreement and includes Contractor's heirs, personal representatives, successors-in-interest and assigns.

38-3.1. COMPLIANCE Contractor shall not cause or permit any regulated substance to be used, generated, manufactured, produced, stored, brought upon, or released on, or under the Premises, or transported to or from the Premises, by Contractor, its agents, employees, Contractor's invitees or a third party in a manner that would constitute or result in a violation of any Environmental Law or that would give rise to liability under an Environmental Law.

38-3.1.1 Contractor may provide for the treatment of certain discharges regulated under the City of Phoenix pretreatment ordinances pursuant to Chapter 28 of the Phoenix City Code or such other ordinances as may be promulgated and the Federal Clean Water Act, 33 U.S.C. Section 1251 et seq.

Contractor shall indemnify, defend and hold harmless, on demand, City of Phoenix ("City"), its successors and assigns, its elected and appointed officials, employees, agents, boards, commissions, representatives, and attorneys, for, from and against any and all liabilities, obligations, damages, charges and expenses, penalties, suits, fines, claims, legal and investigation fees or costs, arising from or related to any claim or action for injury, liability, breach of warranty or representation, or damage to persons, the environment or Premises and any and all claims or actions brought by any person, entity or governmental body, alleging or arising in connection with contamination of, or adverse effects on, human health or the environment pursuant to any Environmental Law, the common law, or other statute, ordinance, rule, regulation, judgment or order of any governmental agency or judicial entity, which are incurred or assessed as a result, whether in part or in whole, of Contractor's occupancy or use of the Premises during the term of this Contract or any previous contract or

uses of the Premises by Contractor or its owners or affiliated entities, agents, employees, invitees, visitors or licensees. Regardless of the date of termination of this Contract, Contractor's obligations and liabilities under this Section shall continue so long as City bears any liability or responsibility under the Environmental Laws arising from Contractor's occupancy or use of the Premises during the term of this Contract. This indemnification of City by Contractor includes, without limitation, costs incurred in connection with any investigation of site conditions or any cleanup, remedial actions, removal or restoration work required or conducted by any federal, state or local governmental agency or political subdivision because of regulated substances caused by Contractor to be present on or under the Premises or present in the soil or ground water on or under the Premises or present in surface waters on or adjacent to the Premises.

38-3.1.2 Without limiting the foregoing, if the release by Contractor of any regulated substance on or under the Premises, or to the air, groundwater or surface waters on or adjacent to the Premises results in any contamination of the Premises, air, groundwater or surface waters, Contractor shall promptly take all actions at its sole cost and expense that are necessary to mitigate any immediate threat to human health or the environment. Contractor shall then undertake any further action necessary to return the contaminated site to the condition existing prior to the introduction by Contractor of any regulated substance; provided that City's approval of such actions shall first be obtained. Contractor shall undertake such actions without regard to the potential legal liability of any other person; however, any remedial activities by Contractor shall not be construed to impair Contractor's rights, if any, to seek contribution or indemnity from another person.

38-3.1.3 Contractor shall, at Contractor's own cost and expense, make all tests, reports, studies and provide all information to any appropriate governmental agency as may be required pursuant to the Environmental Laws pertaining to Contractor's occupancy or use of the Premises. This obligation includes but is not limited to any requirements for a site characterization, site assessment and/or remediation plan that may be necessary due to any actual or potential spills or discharges of regulated substances on, under or from the Premises, or to the air, groundwater or surface waters on or adjacent to the Premises during the term of this Contract. At no cost or expense to City, Contractor shall promptly provide all information requested by City pertaining to the applicability of the Environmental Laws to the Premises, to respond to any governmental investigation, or to respond to any claim of liability by third parties which is related to environmental contamination.

In addition, City shall have the right to inspect, within ten (10) days of Contractor's receipt of written request, and copy any and all records, test results, studies and/or other documentation, other than trade secrets and legally privileged documents, regarding environmental conditions relating to the use, storage, or treatment of regulated substances by Contractor on, under or from the Premises or to the air, groundwater or surface waters on or adjacent to the Premises.

38-3.1.4 Contractor shall notify the Aviation Director within twenty-four (24) hours upon learning of the following:

a) Any correspondence or communication from any governmental agency regarding the application of Environmental Laws to the Premises or Contractor's occupancy or use of the Premises;

b) Any change in Contractor's activities on the Premises that will change or have the potential to

change Contractor's or City's obligations or liabilities under Environmental Laws;

c) Any assertion of a claim or other occurrence for which Contractor may incur an obligation under this Section.

38-3.1.5 Contractor shall at its own expense obtain and comply with any permits or approvals that are required or may become required as result of any occupancy or use of the Premises by Contractor, its agents, employees, invitees and assigns.

38-3.1.6 Contractor shall insert the provisions of this Exhibit in any agreement or contract by which it grants a right or privilege to any person, firm or corporation under this Contract.

38-3.1.7 Contractor shall obtain and maintain compliance with any applicable financial responsibility requirements of federal, state and/or local law regarding the ownership or operation of any underground storage tank(s) or any device used for the treatment or storage of a regulated substance and present evidence thereof to the City, as may be applicable.

38-3.1.8 Contractor shall take reasonable precautions to prevent other persons not acting under Contractor's authority from conducting any activity that would result in the release of a regulated substance on, under or from the Premises or to the air, groundwater or surface waters on or adjacent to the Premises. Contractor shall also exercise due care with respect to any regulated substance that may come to be located on the Premises as a result of the actions of third parties who are not under Contractor's authority.

38-3.1.9 Contractor shall make its best efforts to minimize its production of a waste stream that includes regulated substances, and shall minimize the storage of regulated substances on, in and around the Premises.

38-4.1. TERMINATION OF AGREEMENT Contractor's failure or the failure of its agents, employees, contractors, invitees or of a third party to comply with any of the requirements and obligations of this Exhibit or applicable Environmental Law shall constitute a material breach of this Contract and shall permit the City to pursue the following remedies, in addition to all other rights and remedies provided by law or otherwise provided for in this Contract, to which the City may resort cumulatively, or in the alternative.

38-4.1.1 The City of Phoenix may, at the City's election, keep this Contract in effect and enforce all of its rights and remedies under the Contract, including (1) the right to recover rent and other sums as they become due by appropriate legal action and/or (2) the right, upon ten (10) day's written notice to Contractor, to make payments required of Contractor or perform Contractor's obligations and be reimbursed by Contractor for the cost thereof, unless such payment is made or obligation performed by Contractor within such ten (10) day period.

38-4.1.2 The City of Phoenix may, at the City's election, terminate this Contract upon written notice to Contractor. Upon the City's termination, Contractor shall immediately pay to the City an amount equal to all accrued but unpaid rents plus interest thereon calculated from the date the rent is past due at a rate equal to: (1) eighteen percent (18%) per annum or (2) the maximum interest rate permitted by state law, whichever is greater.

38-4.1.3 Notwithstanding any other provision in this Contract to the contrary, the City shall have the right of "self-help" or similar remedy in order to minimize any damages, expenses,

penalties and related fees or costs, arising from or related to a violation of Environmental Laws on, under or from the Premises or in surface waters on or adjacent to the Premises, without waiving any of its rights under this Contract.

38-4.1.4 The exercise by the City of any of its rights under Section C of this Exhibit shall not release Contractor from any obligation it would otherwise have under this Exhibit.

38-4.1.5 The covenants of this Exhibit shall survive the termination of this Contract.

38-5.1 AZPDES STORMWATER GENERAL PERMIT COMPLIANCE SUPPLEMENT Contractor shall also comply with the AZPDES Stormwater General Permit Compliance Supplement to this Exhibit as if the Supplement is fully set forth herein.

With the exception of discharges on Indian Country, stormwater discharges in Arizona are regulated by the Arizona Department of Environmental Quality through the Arizona Pollutant Discharge Elimination System (AZPDES) program. An AZPDES permit is required for any point source discharge of pollutants to waters of the United States. Because stormwater runoff can transport pollutants to either a municipal separate storm sewer system (MS4) or to waters of the United States, AZPDES permits are required for stormwater discharges.

The City of Phoenix (the “City”) and its Contractors are required to obtain AZPDES permit coverage to the extent that stormwater is discharged from the Premises. Coverage under the AZPDES General Permit for Discharges from Construction Activities to Waters of the United States (AZG2008-001) (“AZPDES Construction General Permit”) is required for stormwater discharges generated by construction activities. Coverage under the AZPDES General Permit for Stormwater Discharges Associated with Industrial Activity from Non-Mining Facilities to Waters of the United States (AZMSG2010-38) (“AZPDES Multi-Sector General Permit”) is required for stormwater discharges generated by facilities and operations engaged in certain industrial activities. Among these industries are those engaged in “air transportation” and associated activities.

The City has obtained coverage under the AZPDES Multi-Sector General Permit for its “air transportation” facilities at Phoenix Sky Harbor International Airport, Phoenix Deer Valley Airport and Phoenix Goodyear Airport (collectively hereinafter referred to as the “Airports”). The City has adopted a Stormwater Quality Protection ordinance, Phoenix City Code Ch. 32C, and has in place an “Aviation Department Stormwater Enforcement Procedures and Civil Penalty Policy” (“Aviation Stormwater Policy”), both of which were developed to comply with federal and local laws governing stormwater pollution.

38-5.1.2 COMPLIANCE GENERALLY The City adopted the Aviation Stormwater Policy to achieve compliance with the AZPDES program requirements by the Aviation Department, its contractors and permittees. Contractor is subject to the policy as a condition of its activities, operations, and location at the Airports. The City shall have the right to monitor and require compliance with the Aviation Stormwater Policy.

Contractor agrees to comply with the Aviation Stormwater Policy and to implement at its sole expense, unless otherwise agreed to in writing between City and Contractor, those requirements of the Airports’ Stormwater Pollution Prevention Plans (SWPPP) and City ordinances that pertain to its operations and activities on the Premises at the Airports. Contractor warrants that it will use its best efforts to meet all deadlines that are established by

statute, regulation, ordinance, and the Aviation Stormwater Policy, or that are agreed to by the parties. Contractor acknowledges that time is of the essence in the implementation of all City Permit requirements.

Full compliance with the AZPDES Permit Program as contained in 18 A.A.C. 9, Art. 9; Chapter 32(C) of the Phoenix City Code; and the Aviation Stormwater Policy is a material condition of this Contract, and for any breach thereof which exposes City to civil or criminal fine, penalty, sanction or remediation cost by any governmental entity, City may terminate this Contract. This remedy is in addition to any other remedies available to the City.

38-5.1.3 AZPDES CONSTRUCTION GENERAL PERMIT If Contractor elects to perform construction activities at the Airports, Contractor is required, prior to commencing those construction activities, to obtain stormwater discharge authorization from ADEQ under an AZPDES Construction General Permit. Contractor will obtain that authorization by preparing a SWPPP and filing for AZPDES Construction General Permit coverage in coordination with the City's project manager. The City will consult with and assist Contractor with regard to the filing for AZPDES Construction General Permit coverage as time and personnel allow. Contractor will also work with the City's project manager to develop pollution controls (e.g., Best Management Practices, Control Measures, schedules and procedures) for the SWPPP. Contractor is solely responsible for implementation of the pollution controls, all related costs and compliance with its AZPDES Construction General Permit obligations.

38-5.1.4 AZPDES MULTI-SECTOR GENERAL PERMIT Contractor is required, prior to commencing its operations and activities at the Airports, to obtain stormwater discharge authorization from the ADEQ under an AZPDES Multi-Sector General Permit. Contractor will obtain that authorization as a "Co-Permittee" with the City. As a Co-Permittee, the Contractor agrees to:

- Provide the City with a copy of Contractor's written Authorization to Discharge to the extent Contractor has received such from the Arizona Department of Environmental Quality; and

- Implement the Airports' SWPPP, including Best Management Practices, Control Measures, schedules, and procedures, as applicable to the Contractor's operations.

In connection with its coverage under the AZPDES Multi-Sector General Permit, the City has developed a SWPPP for the Airports to minimize the contact of storm and other precipitation event water with "significant materials" (as defined in the Regulations and City Ordinances) generated, stored, handled or otherwise used on Airport facilities. The City shall provide a copy of the SWPPP, including Best Management Practices, Control Measures, schedules, and procedures to Contractor, and Contractor shall implement that portion of the SWPPP applicable to its activities.

The City agrees that, to the extent allowed by law, Contractor shall have the right to be removed as a Co-Permittee from coverage under the AZPDES Multi-Sector General Permit should its Contract be canceled or terminated for other reasons, or due to Contractor's relocation, noncompliance with the AZPDES Multi-Sector General Permit requirements or Contractor's exercise of choice. In no event shall Contractor be relieved of its obligation to comply with the requirements of the AZPDES permit program with regard to its occupation and use of the Premises at the Airports, nor shall Contractor be excused from any obligations or indemnifications incurred and owed to City prior to Contractor's removal as a Co-Permittee

that result from a failure of Contractor to fulfill an obligation of a Co-Permittee.

38-5.1.5 POLLUTION CONTROLS City reserves the right to impose upon Contractor any Best Management Practices, Control Measures, schedules, and procedures, other action necessary to ensure City's ability to comply with its AZPDES program requirements or applicable City ordinances; however, except in "extreme emergency" conditions, Contractor shall have ten (10) days from date of receipt of written notice imposing such pollution control measures or other requirements to notify City in writing if it objects to any action it is being directed to undertake. If Contractor does not provide the specified timely notice, it will be deemed to have assented to implementation of the pollution control measures or other requirements. If Contractor provides City with timely written notice of its objections, the parties agree to negotiate a prompt resolution of their differences. Contractor warrants that it will not serve a written notice of objections for purposes of delay or avoiding compliance.

As used herein, "*extreme emergency conditions*" means:

a) Conditions that impose an immediate impact on waters of the United States (e.g., Salt River) resulting from an emergency situation such as fire, spill, release or explosion, such that the facility responsible for the release must immediately begin appropriate response activities independently of City's direction or oversight;

b) An emergency such that a facility has to close because of a catastrophic event, where the facility can extend the ten (10) day notice period, but must implement pollution control measures before it reopens;

c) A collapse of the storm sewer system or other event which forecloses the Airports and/or City from performing its obligations under the City Permit due to lack of capacity.

38-5.1.5 COVENANT OF GOOD FAITH City and Contractor covenant to act in good faith to implement any AZPDES program requirements imposed on them pursuant to 18 A.A.C. 9, Art. 9. City and Contractor acknowledge that close cooperation will be necessary to ensure compliance with any AZPDES Multi-Sector General Permit requirements to promote safety and minimize costs, and each party agrees to a candid exchange of information necessary to coordinate a stormwater management and monitoring plan.

38-5.1.6 INDEMNIFICATION The covenants of insurance and indemnification in favor of City imposed by other provisions of the Contract shall extend to, and are incorporated into, the provisions of this Supplement to Exhibit 3.

38-5.1.5 COVENANT OF GOOD FAITH City and Contractor covenant to act in good faith to implement any AZPDES program requirements imposed on them pursuant to 18 A.A.C. 9, Art. 9. City and Contractor acknowledge that close cooperation will be necessary to ensure compliance with any AZPDES Multi-Sector General Permit requirements to promote safety and minimize costs, and each party agrees to a candid exchange of information necessary to coordinate a stormwater management and monitoring plan.

38-6.1 DISPOSAL OF SURPLUS MATERIAL All surplus and/or waste material must be disposed of off the Airport property at the Contractor’s discretion, subject to the following conditions:

If the City landfills are used, the Contractor will pay the normal dumping fee.

If private property within the City limits is used, the Contractor will obtain written permission from the property owner and deliver a copy of this agreement to the City prior to any hauling dumping. If the surplus material is disposed of outside City limits, the Contractor will comply with all applicable laws/ordinances of the agency concerned and be responsible for all costs incurred.

38-7.1 ASBESTOS/LEAD BASED PAINT IDENTIFICATION AND REMEDIATION Asbestos and lead based paint identification and/or remediation will be performed by the City of Phoenix unless otherwise indicated by an authorized City of Phoenix representative. Prior to starting Work, the Contractor should obtain a copy of the asbestos and lead based paint survey of the affected area, and contact the City of Phoenix Aviation Environmental Division Manager prior to the disturbance of any building materials that contain or potentially contain asbestos or lead based paint. Building materials that could potentially contain asbestos include any materials that are not wood, metal or glass. Any building materials that will be disturbed during renovation or demolition projects that have not been previously inspected will be inspected by an Asbestos Hazard Emergency Response Act (AHERA) certified building inspector approved by the City of Phoenix. Any asbestos and lead based paint remediation activities will be conducted by contractors licensed to perform asbestos and lead based paint remedial activities and will be approved by the City of Phoenix. All asbestos and lead based paint inspection and remedial work will be performed in compliance with all applicable local, state and federal regulations regarding asbestos, lead based paint and general construction.

METHOD OF MEASUREMENT

38-8.1 All items specified in this section are considered incidental to the project.

BASIS OF PAYMENT

38-9.1 All items specified in this section are to be considered as incidental to the Contract. No additional payment will be made for conformance to the specifications

END OF TECHNICAL SPECIAL PROVISION SPECIFICATIONS

SECTION III-C

CIVIL TECHNICAL SPECIFICATIONS

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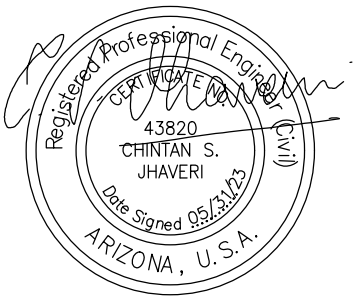

Item C-100 Contractor Quality Control Program (CQCP)

100-1 General. Quality is more than test results. Quality is the combination of proper materials, testing, workmanship, equipment, inspection, and documentation of the project. Establishing and maintaining a culture of quality is key to achieving a quality project. The Contractor shall establish, provide, and maintain an effective Contractor Quality Control Program (CQCP) that details the methods and procedures that will be taken to assure that all materials and completed construction required by this contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified here and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

The Contractor shall establish a CQCP that will:

a. Provide qualified personnel to develop and implement the CQCP.

b. Provide for the production of acceptable quality materials.

c. Provide sufficient information to assure that the specification requirements can be met.

d. Document the CQCP process.

The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the CQCP has been reviewed and approved by the Resident Project Representative (RPR). No partial payment will be made for materials subject to specific quality control (QC) requirements until the CQCP has been reviewed and approved.

The QC requirements contained in this section and elsewhere in the contract technical specifications are in addition to and separate from the quality assurance (QA) testing requirements. QA testing requirements are the responsibility of the RPR or Contractor as specified in the specifications.

A Quality Control (QC)/Quality Assurance (QA) workshop with the Engineer, Resident Project Representative (RPR), Contractor, subcontractors, testing laboratories, and Owner's representative must be held prior to start of construction. The QC/QA workshop will be facilitated by the Contractor. The Contractor shall coordinate with the Airport and the RPR on time and location of the QC/QA workshop. Items to be addressed, at a minimum, will include:

a. Review of the CQCP including submittals, QC Testing, Action & Suspension Limits for Production, Corrective Action Plans, Distribution of QC reports, and Control Charts.

b. Discussion of the QA program.

c. Discussion of the QC and QA Organization and authority including coordination and information exchange between QC and QA.

d. Establish regular meetings to discuss control of materials, methods and testing.

e. Establishment of the overall QC culture.

100-2 Description of program.

a. General description. The Contractor shall establish a CQCP to perform QC inspection and testing of all items of work required by the technical specifications, including those performed by subcontractors. The CQCP shall ensure conformance to applicable specifications and plans with respect to materials, off-site fabrication, workmanship, construction, finish, and functional performance. The CQCP shall be effective for control of all construction work performed under this Contract and shall specifically include surveillance and tests required by the technical specifications, in addition to other requirements of this section and any other activities deemed necessary by the Contractor to establish an effective level of QC.

b. Contractor Quality Control Program (CQCP). The Contractor shall describe the CQCP in a written document that shall be reviewed and approved by the RPR prior to the start of any production, construction, or off-site fabrication. The written CQCP shall be submitted to the RPR for review and approval at least 21 calendar days before the CQCP Workshop. The Contractor's CQCP and QC testing laboratory must be approved in writing by the RPR prior to the Notice to Proceed (NTP).

The CQCP shall be organized to address, as a minimum, the following:

1. QC organization and resumes of key staff
2. Project progress schedule
3. Submittals schedule
4. Inspection requirements
5. QC testing plan
6. Documentation of QC activities and distribution of QC reports
7. Requirements for corrective action when QC and/or QA acceptance criteria are not met
8. Material quality and construction means and methods. Address all elements applicable to the project that affect the quality of the pavement structure including subgrade, subbase, base, and surface course. Some elements that must be addressed include, but is not limited to mix design, aggregate grading, stockpile management, mixing and transporting, placing and finishing, quality control testing and inspection, smoothness, laydown plan, equipment, and temperature management plan.

The Contractor must add any additional elements to the CQCP that is necessary to adequately control all production and/or construction processes required by this contract.

100-3 CQCP organization. The CQCP shall be implemented by the establishment of a QC organization. An organizational chart shall be developed to show all QC personnel, their authority, and how these personnel integrate with other management/production and construction functions and personnel.

The organizational chart shall identify all QC staff by name and function, and shall indicate the total staff required to implement all elements of the CQCP, including inspection and testing for each item of work. If necessary, different technicians can be used for specific inspection and testing functions for different items of work. If an outside organization or independent testing laboratory is used for implementation of all or part of the CQCP, the personnel assigned shall be subject to the qualification requirements of paragraphs 100-03a and 100-03b. The

organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

The QC organization shall, as a minimum, consist of the following personnel:

a. Program Administrator. The Contractor Quality Control Program Administrator (CQCPA) must be a full-time employee of the Contractor, or a consultant engaged by the Contractor. The CQCPA must have a minimum of five (5) years of experience in QC pavement construction with prior QC experience on a project of comparable size and scope as the contract.

Included in the five (5) years of paving/QC experience, the CQCPA must meet at least one of the following requirements:

(1) Professional Engineer with one (1) year of airport paving experience.

(2) Engineer-in-training with two (2) years of airport paving experience.

(3) National Institute for Certification in Engineering Technologies (NICET) Civil Engineering Technology Level IV with three (3) years of airport paving experience.

(4) An individual with four (4) years of airport paving experience, with a Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology or Construction.

The CQCPA must have full authority to institute any and all actions necessary for the successful implementation of the CQCP to ensure compliance with the contract plans and technical specifications. The CQCPA authority must include the ability to immediately stop production until materials and/or processes are in compliance with contract specifications. The CQCPA must report directly to a principal officer of the construction firm. The CQCPA may supervise the Quality Control Program on more than one project provided that person can be at the job site within two (2) hours after being notified of a problem.

b. QC technicians. A sufficient number of QC technicians necessary to adequately implement the CQCP must be provided. These personnel must be either Engineers, engineering technicians, or experienced craftsman with qualifications in the appropriate field equivalent to NICET Level II in Civil Engineering Technology or higher, and shall have a minimum of two (2) years of experience in their area of expertise.

The QC technicians must report directly to the CQCPA and shall perform the following functions:

(1) Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by paragraph 100-6.

(2) Performance of all QC tests as required by the technical specifications and paragraph100-8.

(3) Performance of tests for the RPR when required by the technical specifications.

Certification at an equivalent level of qualification and experience by a state or nationally recognized organization will be acceptable in lieu of NICET certification.

c. Staffing levels. The Contractor shall provide sufficient qualified QC personnel to monitor each work activity at all times. Where material is being produced in a plant for incorporation into the work, separate plant and field technicians shall be provided at each plant and field placement location. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity. The CQCP shall state where different technicians will be required for different work elements.

100-4 Project progress schedule. Critical QC activities must be shown on the project schedule as required by Section 80, paragraph 80-03, *Execution and Progress*.

100-5 Submittals schedule. The Contractor shall submit a detailed listing of all submittals (for example, mix designs, material certifications) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include as a minimum:

a. Specification item number

b. Item description

c. Description of submittal

d. Specification paragraph requiring submittal

e. Scheduled date of submittal

100-6 Inspection requirements. QC inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor as specified by paragraph 100-9.

Inspections shall be performed as needed to ensure continuing compliance with contract requirements until completion of the particular feature of work. Inspections shall include the following minimum requirements:

a. During plant operation for material production, QC test results and periodic inspections shall be used to ensure the quality of aggregates and other mix components, and to adjust and control mix proportioning to meet the approved mix design and other requirements of the technical specifications. All equipment used in proportioning and mixing shall be inspected to ensure its proper operating condition. The CQCP shall detail how these and other QC functions will be accomplished and used.

b. During field operations, QC test results and periodic inspections shall be used to ensure the quality of all materials and workmanship. All equipment used in placing, finishing, and compacting shall be inspected to ensure its proper operating condition and to ensure that all such operations are in conformance to the technical specifications and are within the plan dimensions, lines, grades, and tolerances specified. The CQCP shall document how these and other QC functions will be accomplished and used.

100-7 Contractor QC testing facility.

a. For projects that include Item P-401, Item P-403, and Item P-404, the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference standards, are provided that meet requirements in the following paragraphs of ASTM D3666, *Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials*:

- 8.1.3 Equipment Calibration and Checks;
- 8.1.9 Equipment Calibration, Standardization, and Check Records;
- 8.1.12 Test Methods and Procedures

b. For projects that include P-501, the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference standards, are provided that meet requirements in the following paragraphs of ASTM C1077, Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation:

- 7 Test Methods and Procedures
- 8 Facilities, Equipment, and Supplemental Procedures

100-8 QC testing plan. As a part of the overall CQCP, the Contractor shall implement a QC testing plan, as required by the technical specifications. The testing plan shall include the minimum tests and test frequencies required by each technical specification Item, as well as any additional QC tests that the Contractor deems necessary to adequately control production and/or construction processes.

The QC testing plan can be developed in a spreadsheet fashion and shall, as a minimum, include the following:

a. Specification item number (e.g., P-401)

b. Item description (e.g., Hot Mix Asphalt Pavements)

c. Test type (e.g., gradation, grade, asphalt content)

d. Test standard (e.g., ASTM or American Association of State Highway and Transportation Officials (AASHTO) test number, as applicable)

e. Test frequency (e.g., as required by technical specifications or minimum frequency when requirements are not stated)

f. Responsibility (e.g., plant technician)

g. Control requirements (e.g., target, permissible deviations)

The QC testing plan shall contain a statistically-based procedure of random sampling for acquiring test samples in accordance with ASTM D3665. The RPR shall be provided the opportunity to witness QC sampling and testing.

All QC test results shall be documented by the Contractor as required by paragraph 100-9.

100-9 Documentation. The Contractor shall maintain current QC records of all inspections and tests performed. These records shall include factual evidence that the required QC inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken.

These records must cover both conforming and defective or deficient features, and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these records shall be furnished to the RPR daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the CQCPA.

Contractor QC records required for the contract shall include, but are not necessarily limited to, the following records:

a. Daily inspection reports. Each Contractor QC technician shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations. These technician's daily reports shall provide factual evidence that continuous QC inspections have been performed and shall, as a minimum, include the following:

(1) Technical specification item number and description

(2) Compliance with approved submittals

(3) Proper storage of materials and equipment

(4) Proper operation of all equipment

(5) Adherence to plans and technical specifications

(6) Summary of any necessary corrective actions

(7) Safety inspection.

(8) Photographs and/or video

The daily inspection reports shall identify all QC inspections and QC tests conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

The daily inspection reports shall be signed by the responsible QC technician and the CQCPA. The RPR shall be provided at least one copy of each daily inspection report on the work day following the day of record. When QC inspection and test results are recorded and transmitted electronically, the results must be archived.

b. Daily test reports. The Contractor shall be responsible for establishing a system that will record all QC test results. Daily test reports shall document the following information:

(1) Technical specification item number and description

(2) Test designation

(3) Location

(4) Date of test

(5) Control requirements

(6) Test results

(7) Causes for rejection

(8) Recommended remedial actions

(9) Retests

Test results from each day's work period shall be submitted to the RPR prior to the start of the next day's work period. When required by the technical specifications, the Contractor shall maintain statistical QC charts. When QC daily test results are recorded and transmitted electronically, the results must be archived.

100-10 Corrective action requirements. The CQCP shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control. The requirements for corrective action shall include both general requirements for operation of the CQCP as a whole, and for individual items of work contained in the technical specifications.

The CQCP shall detail how the results of QC inspections and tests will be used for determining the need for corrective action and shall contain clear rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

When applicable or required by the technical specifications, the Contractor shall establish and use statistical QC charts for individual QC tests. The requirements for corrective action shall be linked to the control charts.

100-11 Inspection and/or observations by the RPR. All items of material and equipment are subject to inspection and/or observation by the RPR at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate QC system in conformance with the requirements detailed here and the applicable technical specifications and plans. In addition, all items of materials, equipment and work in

place shall be subject to inspection and/or observation by the RPR at the site for the same purpose.

Inspection and/or observations by the RPR does not relieve the Contractor of performing QC inspections of either on-site or off-site Contractor's or subcontractor's work.

100-12 Noncompliance.

a. The Resident Project Representative (RPR) will provide written notice to the Contractor of any noncompliance with their CQCP. After receipt of such notice, the Contractor must take corrective action.

b. When QC activities do not comply with either the CQCP or the contract provisions or when the Contractor fails to properly operate and maintain an effective CQCP, and no effective corrective actions have been taken after notification of non-compliance, the RPR will recommend the Owner take the following actions:

(1) Order the Contractor to replace ineffective or unqualified QC personnel or subcontractors and/or

(2) Order the Contractor to stop operations until appropriate corrective actions are taken.

METHOD OF MEASUREMENT

100-13 Basis of measurement and payment. Contractor Quality Control Program (CQCP) is for the personnel, tests, facilities and documentation required to implement the CQCP. The CQCP will be paid as a lump sum with the following schedule of partial payments:

- **a.** With first pay request, 25% with approval of CQCP and completion of the Quality Control (QC)/Quality Assurance (QA) workshop.
- **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 20%.
- **d.** When 75% or more of the original contract is earned, an additional 20%
- **e.** After final inspection and acceptance of project, the final 10%.

BASIS OF PAYMENT

100-14 Payment will be made under:

Item C-100 Contractor Quality Control Program (CQCP)

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.

National Institute for Certification in Engineering Technologies (NICET)

ASTM International (ASTM)

ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

END OF ITEM C-100

Item C-102 Temporary Air and Water Pollution, Soil Erosion, and Siltation Control

DESCRIPTION

102-1.1 General. This project is subject to the terms and conditions of Arizona Pollutant Discharge Elimination System (AZPDES) General Permit No. AZG2020-001 for Storm Water Discharges from Construction Activities. Under the provisions of the AZPDES General Permit, both the City of Phoenix and the Contractor shall be designated as operators, and both must ensure compliance with the terms and conditions of the AZPDES General Permit. AZPDES General Permit No. AZG2020-001 was issued by the Arizona Department of Environmental Quality (ADEQ), became effective on July 1, 2020 and expires at midnight of June 30, 2025.

Work under this item shall consist of preparing all required documents and certifications, performing inspections, and furnishing all materials, labor, and equipment necessary to comply with all requirements of AZPDES General Permit No. AZG2020-001 for Storm Water Discharges from Construction Activities. The work shall also include providing, installing, maintaining, removing and disposing of erosion and sediment control measures such as gravel filter berms, dikes, catch basin inlet protection, end-of pipe filtering devices, silt fences, dams, sediment traps and basins, netting, straw bale barriers, slope drains, and other erosion control devices or methods.

PERMIT REQUIREMENTS

102-2.1 Please note that the terms and conditions of AZPDES General Permit No. AZG2020-001, except to the extent that more explicit or more stringent requirements are written directly into the contract documents, have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.

Both the City of Phoenix and the Contractor are designated as operators of the construction site, and both must complete a Notice of Intent (NOI) to comply with the terms and conditions of AZPDES General Permit No. AZG2020-001 for Storm Water Discharges from Construction Activities. The NOIs must be signed in accordance with the signatory requirements of the AZPDES General Permit, and must contain all required eligibility certifications. The Project Manager for the City of Phoenix will ensure that both the Contractor's and the City's completed and signed NOIs are submitted to the ADEQ. A blank NOI form is attached to these project specifications for use by the Contractor.

It shall be the responsibility of both the City of Phoenix and the Contractor to prepare a joint Storm Water Pollution Prevention Plan (SWPPP) and ensure its compliance with the minimum conditions of the AZPDES General Permit, including measures to protect impaired or unique waters, measures to protect threatened and/or endangered species, and measures to protect properties eligible for protection under the National Historic Preservation Act. The SWPPP must reflect the Contractor's entire scope of activities at the job_ site as anticipated for the duration of the construction activities. The Contractor must indicate in the SWPPP those changes in job site requirements and/or the order of work performance that will require modifications to the SWPPP, and include those modifications in the SWPPP.

Once completed, it shall be the responsibility of the City of Phoenix to review and approve the joint SWPPP prior to the start of work. The preconstruction conference shall not be held and the Contractor shall not be allowed to start work until the City of Phoenix has approved the SWPPP as being adequate and in accordance with the requirements of the AZPDES General Permit. The City of Phoenix shall approve or not approve the SWPPP within seven (7) calendar days after receipt of the SWPPP from the Contractor for purposes of review. Failure of the Contractor and the City of Phoenix to reach agreement on the adequacy of the SWPPP prior to the preconstruction conference will delay the start of work. The Contractor shall not be entitled to additional compensation for costs that result from such delay in the construction start date.

The SWPPP is not to be submitted to the ADEQ unless directed to do so by the City's Project Manager or in response to a direct request from the ADEQ Director (or authorized representative). If the SWPPP must be submitted to the ADEQ for review and approval, authorization to discharge under the AZPDES General Permit may be withheld by ADEQ for up to thirty-two (32) business days after receipt of the SWPPP.

It shall be the responsibility of the Contractor to implement the SWPPP, and ensure day-to-day compliance with the terms and conditions of the SWPPP and the AZPDES General Permit. The Contractor shall, with the approval of the City's Project Manager, update and revise the SWPPP as necessary throughout the duration of the project to ensure compliance with the AZPDES General Permit requirements.

The Contractor shall retain a copy of the SWPPP and the AZPDES General Permit at a central location on the job site for the use of all operators whenever they are on the construction site. A copy of the signed SWPPP must be retained on the construction site or at another location easily accessible during normal working hours.

All subcontractors and construction site operators having control over only a portion of the construction site shall comply with the requirements of the AZPDES General Permit and the common SWPPP under the supervision of the Contractor. The Contractor shall ensure that all partial site operators having day-to-day operational control of activities necessary to ensure compliance with the SWPPP or other permit requirements submit NOIs to ADEQ as required by the AZPDES General Permit. Subcontractors and partial site operators shall ensure that their activities do not render any other party's pollution prevention plan measures ineffective.

The Contractor shall obtain and incorporate into the SWPPP copies of all NOIs required by the AZPDES General Permit. The Contractor shall ensure that all required documents are complete and accurate, and all required NOIs are received by ADEQ at least two (2) business days before a contractor, subcontractor, or partial site operator is allowed to perform any work at the construction site.

The Contractor shall submit the Contractor's completed and signed NOI form to the ADEQ at the following address:

Arizona Department of Environmental Quality

Water Permits Section/Stormwater NOI (5415 B-3)

1110 West Washington Street

Phoenix, Arizona 85007

Or fax to (602) 771-4674

The Contractor shall provide a copy of the Contractor's completed and signed NOI form to the City's Project Manager at the preconstruction conference. The City's Project Manager shall

ensure that a copy of the Contractor's completed NOI form along with a copy of the City's completed NOI form is incorporated into the SWPPP.

Failure by the Contractor to provide copies of the required completed NOI forms by the time of the preconstruction conference shall cause a delay in the construction start date. The Contractor shall not be entitled to additional compensation for costs that result from such delay in the construction start date.

The Project Manager for the City of Phoenix shall also send copies of the completed NOI forms to:

Development Services Department

City of Phoenix

200 West Washington Street, 3rd Floor

Phoenix, Arizona 85003-1611

The Contractor must submit an amended NOI if ADEQ provides notification that the previously submitted NOI is incomplete. The amended NOI must be submitted to the ADEQ, the City's Project Manager, and if so directed by the City's Project Manager, to the Development Services Department.

The Contractor may assume coverage under the AZPDES General Permit two (2) business days after receipt of the NOI by ADEQ; unless ADEQ provides notification that the NOI needs additional evaluation. Such notification may be made in writing, electronically, by fax, or by phone; and will typically be made within two (2) business days after receipt of the NOI. The Contractor cannot assume coverage under the permit and must delay the start of construction for a period of thirty-two (32) business days after receipt of the NOI by ADEQ, unless additional notice is received from ADEQ during this time period. If there is no additional notice, the Contractor may assume coverage under the AZPDES General Permit and initiate construction activities at the end of the 32 business days.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP) REQUIREMENTS

102-3.1 The SWPPP must be prepared prior to submitting the NOI to ADEQ for coverage under AZPDES General Permit, and the Contractor must implement the SWPPP as written from the initial commencement of construction activity until final stabilization is complete. The SWPPP must be prepared in accordance with good engineering practice, and must:

(a) Identify potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges from the construction site;

(b) Identify, describe and ensure implementation of best management practices (BMPs) that will be used to reduce the amount of pollutants in storm water discharges from the construction site;

(c) Assure compliance with the terms and conditions of AZPDES General Permit No. AZG2020-001 for Storm Water Discharges from Construction Activities; and

(d) Identify the party responsible for on-site implementation of the SWPPP.

Specific requirements for the contents of the SWPPP include identification of all operators of the project site, and the areas over which each operator has control. The SWPPP must also provide a description of the nature of the construction activity that includes:

(a) A description of the project and its intended use after the Notice of Termination (NOT) is filed (e.g. a municipal park, a municipal building, high density housing, a city street, a water treatment plant, a municipal airport, etc.);

(b) A description of the intended sequence of activities that disturb the soil at the site (e.g. grubbing, excavation, grading, utilities, infrastructure installation, etc.);

(c) The total area of the site, and an estimate of the total area of the site expected to be disturbed by excavation, grading, or other activities, including off-site barrow and fill areas;

(d) An estimate of the runoff coefficient of the site for both the pre-construction and post-construction conditions, and data describing the soil and any existent data on the quality of any discharge from the site;

(e) A general location map (e.g. U.S.G.S quadrangle map, a portion of a city or county map, or other map) with enough detail to identify the location of the construction site and the receiving waters within one mile of the site.

The SWPPP must contain a legible site map completed to scale that shows the entire site, and identifies:

(a) The directions of storm water flow (e.g. use arrows to show which way or ways storm water will flow on, through, and off the site), and the approximate slopes anticipated after major grading activities;

(b) Areas of soil disturbance and areas of no soil disturbance;

(c) Locations of structural and non-structural controls identified in the SWPPP;

(d) Locations where stabilization practices are expected to occur;

(e) Locations of off-site material, waste, borrow areas, or equipment storage areas;

(f) Locations of all surface water bodies (including wetlands);

(g) Locations where storm water discharges to surface water (including dry washes) and to the City's storm sewer system;

(h) Locations and registration numbers of on-site drywells;

(i) Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.

The SWPPP must identify the nearest receiving water or waters, including ephemeral and intermittent streams, dry sloughs, and arroyos. If applicable, the SWPPP must also identify the areal extent and describe any wetlands near the site that could be disturbed or that could potentially receive discharges from the disturbed areas of the project.

The SWPPP must identify the location and describe any storm water or non-storm water discharges at the site associated with activity other than construction and other pollutant sources, such as fueling operations, on-site material storage areas, waste piles, etc. This includes discharges from dedicated asphalt plants and dedicated concrete plants that are covered by the AZPDES General Permit.

The SWPPP must identify and address off-site storage areas or borrow areas that are used solely for this construction project.

The SWPPP must describe all pollution control measures that will be implemented as part of the construction project to control pollutants in storm water discharges. For each major activity identified

in the project description, the SWPPP must clearly describe appropriate control measures; the general sequence during the construction process when the measures will be implemented; and identify the construction site operator responsible for the implementation of the described control measures.

Off-site material storage areas (including overburden and stockpiles of dirt, borrow areas, etc.) used solely by the Contractor for the permitted construction project are considered a part of the project and must be addressed in the SWPPP.

For purposes of controlling erosion and sediment, the SWPPP must address the following:

(a) Erosion and sediment controls must be designed to retain sediment on the construction site to the extent practicable.

(b) All control measures must be properly selected, installed, and maintained per the manufacturer's specifications and good engineering practices. If periodic inspections or information is discovered that indicates a control has been used inappropriately, or installed incorrectly, the Contractor must replace or modify the control for site situations as soon as practicable and before the next anticipated storm event.

(c) When sediment escapes the construction site, off-site accumulations of sediment must be routinely removed at a frequency sufficient to ensure no adverse effects on water quality.

The SWPPP must describe good housekeeping procedures to prevent litter, construction debris, and construction chemicals exposed to storm water from becoming a pollutant source for storm water discharges.

The SWPPP must include a description of and identify interim and permanent stabilization practices for the construction site, including a schedule of when the practices will be implemented. The SWPPP shall document those areas where existing vegetation will be preserved.

The Contractor must initiate stabilization measures within 14 calendar days in those areas where construction activities have temporarily or permanently ceased, except:

(a) Where stabilization by the 14^{th} day is precluded by snow cover or frozen ground conditions, stabilization measures must be initiated as soon as practicable.

(b) Where construction activity on a portion of the site has temporarily ceased, but earth disturbing activities will resume in that area within the 14 days. In this event, temporary stabilization measures do not have to be initiated on that portion of the site.

(c) When the site is using vegetative stabilization measures and it is during seasonally arid conditions, vegetative stabilization measures must be initiated as soon as practicable.

The Contractor must maintain the following records as part of the SWPPP:

(a) Dates when major grading activities occur;

(b) Dates when construction activities temporarily or permanently cease on a portion of the site;

(c) Dates when stabilization measures are initiated and completed, and the reasons for any delay.

The SWPPP must describe structural practices to divert flows from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable. Placement of structural practices in floodplains should be avoided to the degree

attainable. A combination of sediment and erosion control measures is required to achieve maximum pollutant removal. Sediment basins and velocity dissipation devices must be utilized and placed in accordance with Part IV.D.5 of the AZPDES General Permit.

The SWPPP must include a description of post-construction storm water management measures that will be installed during the construction process to control pollutants in storm water discharges after construction operations have been completed. Structural measures shall be placed on upland soils to the degree attainable, and must be designed and installed consistent with applicable City of Phoenix storm water management requirements.

The SWPPP must identify all allowable sources of non-storm water discharges listed in Part I.C.2 of AZPDES General Permit No. AZG2020-001 for Storm Water Discharges from Construction Activities except for flows from fire fighting activities. Non-storm water discharges are to be eliminated or reduced to the extent feasible. The Contractor must implement appropriate best management practices (BMPs) to minimize pollutants in any non-storm water discharges, and must describe those BMPs in the SWPPP. Except if used in emergency firefighting, super-chlorinated wastewaters must be held on-site until the chorine dissipates, or otherwise de-chlorinated prior to discharge.

The SWPPP must describe:

(a) Measures to prevent the discharge of solid materials, including building materials, to waters of the United States, except as authorized by a permit issued under section 404 of the Clean Water Act;

(b) Measures to minimize off-site vehicle tracking of sediments, to the extent practicable, and the generation of on-site dust;

(c) Construction and waste materials expected to be stored on-site with updates as appropriate. The SWPPP must also include a description of the controls to reduce pollutants from these materials including storage practices to minimize exposure of the materials to storm water, and spill prevention and response practices;

(d) Any pollutant sources from areas other than construction (including storm water discharges from dedicated asphalt plants, dedicated concrete plants, and/or any other non-construction pollutant sources), with details of controls and measures that will be implemented at those sites to minimize pollutant discharges; and

(e) Measures to sufficiently stabilize soil at culvert locations to prevent the formation of rills and gullies during construction.

The SWPPP must include a copy of AZPDES General Permit No. AZG2020-001 for Storm Water Discharges from Construction Activities. Copies of the NOIs submitted to ADEQ and/or copies of the certificates received from ADEQ specifying the authorization numbers must also be incorporated into the SWPPP as they become available. If any other agreements with state, federal, or local officials exist that would affect the provisions or implementation of the SWPPP, copies of these agreements must also be included in the SWPPP. (Please note, these types of agreements would include grading and drainage approvals and/or permits, and storm water management approvals and/or permits issued by the City of Phoenix, Development Services Department.)

The SWPPP must be consistent with applicable federal, state, and local requirements for soil and erosion control or storm water management. The SWPPP may incorporate by reference the appropriate elements of soil and erosion or storm water management plans required by other agencies. A copy of these requirements incorporated by reference must be provided as an attachment to the SWPPP, and must be updated as necessary to remain consistent with any revisions made to the requirements by the responsible agency or agencies. Examples of

appropriate requirements include the Phoenix Grading and Drainage Ordinance (Chapter 32A of the Phoenix City Code) and the Phoenix Storm Water Management Ordinance (Chapter 32C of the Phoenix City Code).

A schedule for routine inspections of the construction site must be included in the SWPPP. This schedule must comply with Part IV.H.1 and Part IV.H.2 of the AZPDES General Permit.

The Contractor must sign the SWPPP in accordance with Part VII.K of the AZPDES General Permit. A copy of the signed SWPPP must be retained on the construction site or at another location easily accessible during normal working hours.

SWPPP IMPLEMENTATION AND CONSTRUCTION REQUIREMENTS

102-4.1 The Contractor shall not begin any construction activity until all applicable SWPPP controls, devices, and practices have been put into place.

In accordance with the terms and conditions of the AZPDES General Permit, the Contractor shall post the following documents at the construction site near the main entrance:

(a) The AZPDES authorization number for the project or a copy of the NOI if an authorization number has not yet been assigned,

(b) The name and telephone number of a local office or site contact person,

(c) A brief description of the construction project, and

(d) The location of the SWPPP if the site is inactive or does not have an on-site location to store the plan, and the name of the contact person for accessing the SWPPP.

The Contractor shall provide adequate and timely maintenance of vegetation, erosion and sediment control measures, and other protective measures and/or best management practices (BMPs) identified in the site plan or SWPPP to ensure that they remain in effective operating condition. Maintenance needs identified through inspections or other means shall be accomplished as soon as practicable and before the next anticipated storm event. If existing protective measures need to be modified or additional measures added, implementation of these changes must be completed before the next anticipated storm event, if practicable. If not practicable, implementation must be completed as soon as it is practicable. Sediment and debris must be removed from sediment traps, sediment ponds, trash racks, and similar structures when the design capacity of the structure has been reduced by fifty (50) percent.

The Contractor shall employ qualified personnel as defined by Part IV.H.3 of the AZPDES General Permit to inspect construction site areas in accordance with the requirements of Part IV.H.4 of the AZPDES General Permit. All inspection results shall be documented in reports that, at a minimum, include:

(a) The inspection date;

(b) The name, title, and qualifications of the person or persons performing the inspection. The qualifications must be either on or attached to the report. Alternatively, if the SWPPP documents the qualifications of the person or persons performing the inspection, then that portion of the SWPPP may be referenced;

(c) The weather information for the period since the last inspection (or since the start of construction if this is the first inspection), including the best estimate of the beginning of each storm event, the duration of each event, the time that has elapsed since the last storm event, and the approximate amount of rainfall for each event in inches;

(d) The location or locations of discharges of sediment or other pollutants from the site;

(e) The location or locations and identification of BMPs that need to be maintained, failed to operate as designed, or proved inadequate;

(f) The location or locations where additional BMPs that do not exist at the time of the inspection need to be implemented;

(g) Any corrective actions required, including any changes to the SWPPP that are needed, and the dates for implementation;

(h) Identification of all sources of non-storm water and their associated pollution prevention control measures; and

(i) Identification of material storage areas, and any evidence of or potential for pollutant discharge from such areas.

The Contractor must retain the inspection reports and any records of follow-up actions taken for a period of at least three (3) years from the date permit coverage expires or is terminated. Inspection reports must identify any instance of non-compliance with the terms and conditions of the AZPDES General Permit. Where no instance of non-compliance is identified, the report must contain a certification that the construction project or site is being operated in compliance with the SWPPP and AZPDES General Permit No. AZG2020-001. The report shall be signed in accordance with Part VII.K of the permit. Copies of all inspection reports shall be provided to the City's Project Manager at least once each month throughout the duration of the project.

Based on the results of the inspection, the Contractor must modify the SWPPP to include additional or modified BMPs designed to correct problems identified. These revisions must be completed within seven (7) calendar days following the inspection. If existing BMPs need to be modified, or if additional BMPs are needed, implementation must be completed before the next anticipated storm event. If implementation before the next anticipated storm event is not practicable, implementation must occur as soon as it is practicable.

The Contractor, with the approval of the City's Project Manager, must amend the SWPPP within fifteen (15) business days whenever:

(1) There is a change in design, construction, operation, or maintenance at the construction site that has a significant effect on the discharge of pollutants to the waters of the United States, and such effect has not been previously addressed in the SWPPP; or

(2) Inspections, monitoring (if required), or investigations by the Contractor, the City of Phoenix, state officials, or federal officials determine the discharges are causing or contributing to water quality exceedances, or the SWPPP is ineffective in eliminating or significantly minimizing pollutants in storm water discharges from the construction site.

The SWPPP and all reports required under this contract shall be available to the public in accordance with the requirements of section 308(b) of the Clean Water Act. The Contractor shall make plans and reports available upon request to the ADEQ Director (or authorized representative); State, Tribal, or local agency with approval authority for sediment and erosion control plans, grading plans, or storm water management plans; local government officials; or to the operator of a municipal separate storm sewer receiving discharges from the site in accordance with the terms and conditions of the AZPDES General Permit.

The ADEQ Director (or authorized representative) may notify the Contractor and/or the City of Phoenix at any time that the SWPPP is inadequate, or does not meet one or more of the

requirements of Part IV of AZDES General Permit. Within fifteen (15) business days of receipt of such notification from ADEQ (or as otherwise provided by ADEQ), the Contractor must make the required changes to the SWPPP and submit to the ADEQ a written certification that the requested changes were made and implemented. The ADEQ may request submittal or re-submittal of the SWPPP to verify that all deficiencies have been adequately addressed.

No condition of the AZPDES General Permit or the SWPPP shall release the Contractor from any responsibilities or requirements under any other environmental statutes or regulations, including requirements for the prevention or minimization of the discharge of hazardous substances or oil. If there is a release containing a hazardous substance or oil in an amount equal to or greater than the reportable quantities established under federal regulations that has the potential to impact storm water discharges from this site, the Contractor must report the release to the regulatory agencies in accordance with regulatory requirements. In addition, the Contractor must modify the SWPPP within fourteen (14) calendar days after gaining knowledge of the release to provide a description of the release, the circumstances leading to the release, and the date of the release. The SWPPP must identify measures to minimize and/or prevent the occurrence of such releases, and appropriate measures for responding to such releases. The AZPDES General Permit does not authorize the discharge of any substance resulting from on-site spills, or the discharge of oil or chemicals.

The SWPPP (including a copy of AZPDES General Permit No. AZG003-001) shall be kept on the project site from the date of commencement of construction activities to the date of submittal of the Notice of Termination (NOT). A copy of the SWPPP and the permit shall be retained by the Contractor for a period of at least three (3) years following the date of final stabilization of the construction site. The Contractor shall also retain for the same three-year period all reports required by the AZPDES General Permit and all records of data used to complete the NOI.

It shall be the responsibility of the Contractor to ensure that copies of all documents and records retained by the Contractor in accordance with requirements of the AZPDES permit are also provided to the City's Project Manager.

Within thirty (30) days of the date of final stabilization of the construction site, the Contractor shall submit a completed and properly signed Notice of Termination (NOT) form to the City's Project Manager. The City of Phoenix will also complete a NOT form, and will submit both the Contractor's and the City's NOT to the ADEQ at the address specified on the NOT form; thereby terminating the Contractor's and the City's AZPDES permit coverage for the project. Copies of the NOT will also be sent to those agencies that received a copy of the NOI. A blank NOT form is enclosed with these project specifications for use by the Contractor.

METHOD OF MEASUREMENT

102-5.1 General. The Contractor shall obtain an Earthmoving Permit from the Maricopa County Air Quality Division which must be renewed on an annual basis. The Contractor shall also furnish all labor, equipment and means required to carry out effective measures wherever and as often as necessary to prevent his operations from producing dust in amounts damaging to property, cultivated vegetation and domestic animals, or which would cause a nuisance to persons living or occupying buildings in the vicinity. Airborne dust shall not exceed 20 percent visible emissions as stipulated by Rules 300 and 310 of the Maricopa County Air Pollution Control Rules and Regulations. The Contractor shall be responsible for any damage resulting from any dust originating from activities on or around the excavation sites. Dust abatement measures shall be continued until the Contractor has met the requirements of the County ordinance and is relieved of further responsibility by the Engineer. This dust abatement program shall include provisions to prevent excessive airborne dust in levels determined to be detrimental to aircraft operations by Phoenix Sky

Harbor International Airport and its representatives. Contractor's operations may be halted if aircraft operations are determined to be unsafe. The Contractor shall take the following measures, at a minimum, to control and prevent a dust problem:

1. To control dust on roadways, stockpiles and around the site, the areas shall be treated, as required, with dust suppressants approved by the Aviation Department Environmental Section.
2. Temporary access roads shall be planned so travel on unpaved roads is minimized.
3. Multiple vacuum sweepers shall be required on all paved access roads for dust control.

A Dust Control Plan shall be submitted at the Pre-construction Conference. The plan should include a description of the equipment required, manpower and methods for dust control. Any chemical additives used must be approved by the Aviation Department Environmental Section. The Contractor shall also address in the Dust Control Plan, a method to keep public thoroughfares free of mud, dust and debris at all times.

102-5.2 Site Preparation. The Contractor shall use water trucks at all times to minimize dust to supplement other control measures. The Contractor shall cover trucks when hauling materials, and shall stabilize the surface of stockpiles when not relocating immediately.

102-5.3 Construction. The Contractor shall provide a copy of the Air Quality Management Plan/Dust Control Plan to all adjacent site contractors and subcontractors. The Contractor must also post a copy of the Air Quality Management Plan/Dust Control Plan in a weather resistant location at the construction site where it may be seen by the workers.

The Contractor shall cover trucks when transferring materials and shall use dust suppressants on traveled paths, construction parking and staging areas that are fine grained materials and not paved. The Contractor shall also minimize unnecessary vehicular and machinery activities to reduce dust and shall minimize soil track-out on paved roads and streets by cleaning trucks and equipment before leaving non-paved roads.

102-5.4 Post Construction. The Contractor shall stabilize non-paved areas as required and shall remove unused materials and stockpiles at the end of construction.

BASIS OF PAYMENT

102-6.1 An allowance for the Contractor's participation in the preparation of the Storm Water Pollution Prevention Plan (SWPPP), the implementation of the SWPPP, and the modification of the SWPPP as necessary for compliance with AZPDES General Permit No. AZG2020-001 for the duration of this construction project is included in these contract documents. Payment shall be made monthly with equal payment during the entire construction period with any retention required by the terms and conditions of the construction contract to be paid after filing of the Notice of Termination (NOT).

No separate measurement or direct payment will be made for preparing the Notice of Intent (NOI), the Notice of Termination (NOT), Inspection and Maintenance Reports, or other documentation required to perform the work, the cost being considered as included in the allowance.

Payment will be made under:

Item C-102-6.1 Stormwater Pollution Prevention – per Lump Sum

END OF ITEM C-102

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 4 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:

Item C-105 Mobilization

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 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 2 inches. 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 underlaying material that is to remain in place, shall be recompacted 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.

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 ¼ inch (6 mm). Any excess joint or crack sealer shall be removed from the pavement surface.

Wider cracks (over 1-1/2 inch wide (38 mm)), along with soft or sunken spots, indicate that the pavement or the pavement base should be repaired or replaced as stated below.

Cracks and joints may be filled with a mixture of emulsified asphalt and aggregate. The aggregate shall consist of limestone, volcanic ash, sand, or other material that will cure to form a hard substance. The combined gradation shall be as shown in the following table.

Gradation

Sieve Size	Percent Passing
No. 4 (4.75 mm)	100
No. 8 (2.36 mm)	90-100
No. 16 (1.18 mm)	65-90
No. 30 (600 µm)	40-60
No. 50 (300 µm)	25-42
No. 100 (150 µm)	15-30
No. 200 (75 µm)	10-20

Up to 3% cement can be added to accelerate the set time. The mixture shall not contain more than 20% natural sand without approval in writing from the RPR.

The proportions of asphalt emulsion and aggregate shall be determined in the field and may be varied to facilitate construction requirements. Normally, these proportions will be approximately one part asphalt emulsion to five parts aggregate by volume. The material shall be poured or placed into the joints or cracks and compacted to form a voidless mass. The joint or crack shall be filled to within +0 to -1/8 inches (+0 to -3 mm) of the surface. Any material spilled outside the width of the joint shall be removed from the pavement surface prior to constructing the overlay. Where concrete overlays are to be constructed, only the excess joint material on the pavement surface and vegetation in the joints need to be removed.

101-3.3 Removal of Foreign Substances/Contaminates Prior to Overlay, Seal-Coat, or 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 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 underlaying 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. The milling machine shall have a minimum width of 7 feet (2 m) and it shall be equipped with electronic grade control devices that will cut the surface to the grade specified. The tolerances shall be maintained within +0 inch and -1/4 inch (+0 mm and -6mm) of the specified grade. The machine must cut vertical edges and have a positive method of dust control. The machine must have the ability to remove the millings or cuttings from the pavement and load them into a truck. All millings shall be removed and disposed of off the airport.

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 off Airport property.

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-604 or 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. Widen crack with router or random crack saw by removing a minimum of 1/16 inch (2 mm) from each side of crack. Immediately before sealing, cracks will be blown out with a hot air lance combined with oil and water-free compressed air.

101-3.9.2 Removal of Existing Crack Sealant. Existing sealants will be removed by routing or random crack saw. Following routing or sawing any remaining debris will be removed by use of a hot lance combined with oil and water-free compressed air.

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.

b. Removal of Inlets/Manholes. Where indicated on the plans or as directed by the RPR, inlets and/or manholes shall be removed and legally disposed of off-site in a timely fashion after removal. Excavations after removal shall be backfilled with material equal or better in quality than adjacent embankment. When under paved areas must be compacted to 95% of ASTM D1557, when outside of paved areas must be compacted to 95% of ASTM D698.

c. Not used.

METHOD OF MEASUREMENT

101-4.1 Pavement Removal. The unit of measurement for pavement removal shall be the number of square yards (square meters) removed by the Contractor. Any pavement removed outside the limits of removal because the pavement was damaged 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 saw cutting. Saw cutting shall be incidental to pavement removal. Dowel bar installation shall be incidental to pavement removal.

101-4.2 Not Used.

101-4.3 Not Used.

101-4.4 Not Used.

101-4.5 Not Used.

101-4.6 Cold milling. The unit of measure for cold milling shall be up to 3 inches of milling per square yard (square meter). The location and average depth of the cold milling shall be as shown on the plans. If the initial cut does not correct the condition, the Contractor shall re-mill the area and will be paid for the total depth of milling.

101-4.7 Removal of Pipe and other Buried Structures. The unit of measurement for removal of pipe and other buried structures will be made at the contract unit price for each completed and accepted item. This price shall be full compensation for all labor, equipment, tools, and incidentals necessary to complete this item in accordance with paragraph 101-3.9.4.

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, hauling, and placing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item.

Item P 101-5.1	Not Used.
Item P 101-5.2	Not Used.

Item P 101-5.3 Not Used.

Item P-101-5.4 Not Used.

Item P-101-5.5 Not Used.

Item P-101-5.6 Not Used.

Item P-101-5.7 Remove Existing Catch Basin (Double Grate)– 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 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-151 Clearing and Grubbing

DESCRIPTION

151-1.1 This item shall consist of clearing or clearing and grubbing, including the disposal of materials, for all areas within the limits designated on the plans or as required by the Engineer.

Clearing and grubbing shall consist of clearing the surface of the ground of the designated areas of all brush, undergrowth, hedges, heavy growth of grass or weeds, structures, debris, and rubbish of any nature, natural obstructions or such material which in the opinion of the Engineer is unsuitable for the foundation of strips, pavements, or other required structures, including the disposal from the project of all spoil materials resulting from clearing and grubbing by burning or otherwise.

Clearing and grubbing does not include removal of items specifically included under Technical Special Provision Specifications.

CONSTRUCTION METHODS

151-2.1 General. The areas denoted on the plans to be cleared or cleared and grubbed shall be staked on the ground by the Engineer. The clearing and grubbing shall be done at a satisfactory distance in advance of the grading operations.

All spoil materials removed by clearing or by clearing and grubbing shall be disposed of at an approved off-site location by the Contractor.

Broken concrete or masonry cannot be used in construction, and all other materials not considered suitable for use elsewhere, shall be disposed of by the Contractor. In no case shall any discarded materials be left in windrows or piles adjacent to or within the airport limits. The manner and location of disposal of materials shall be subject to the approval of the Engineer and shall not create an unsightly or objectionable view. When the Contractor is required to locate a disposal area outside the airport property limits at his/her own expense, he shall obtain and file with the Engineer, permission in writing from the property owner for the use of private property for this purpose.

151-2.2 Clearing and Grubbing. In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials shall be removed.

All holes remaining after the grubbing operation in embankment areas shall have the sides broken down to flatten out the slopes, and shall be filled with acceptable material, moistened and properly compacted in layers to the density required in Item P-152. The same construction procedure shall be applied to all holes remaining after grubbing in excavation areas where the depth of holes exceeds the depth of the proposed excavation.

METHOD OF MEASUREMENT

151-3.1 No separate measurement will be made for clearing and grubbing as it will be paid for on a lump sum basis.

BASIS OF PAYMENT

151-4.1 Payment. Payment shall be made at the contract unit price per lump sum clearing and grubbing. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-151-4.1 Clearing and Grubbing – per Lump Sum

END OF ITEM P-151

Item P-152 Excavation, Subgrade, and Embankment

DESCRIPTION

152-1.1 General. This item covers excavation, transportation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, taxilanes, aprons, and intermediate as well as other areas for drainage, airfield electrical backfill, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical section(s) shown on the plans. This item also includes providing materials to stabilize subgrade upon the removal of unsuitable materials.

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 as Over Excavation of Unsuitable Material and backfill with approved materials, such as items, P-152-7.2 thorough P-152-7.4. The unclassified excavation calculated volumes for payment, include all existing pavements, base and subbase materials. All unclassified excavation that is not used in the formation of embankments shall become property of the Contractor, and hauled off-site, and not stockpiled on the Airport.

b. Over Excavation of Unsuitable Material. Over excavation of unsuitable material, or undercut excavation, shall consist of the removal of material that is unsuitable and unsatisfactory for use as subgrade to a depth of one foot below existing grade, or an additional depth as directed by the Engineer. Contractor shall protect existing utilities while excavating unsuitable material. This material may be made up of rock, hardpan, loose rock, boulders, muck, clay, wet clay and silt or other unsuitable materials. Over excavation of unsuitable materials includes the installation of Tensar TriAx® TX160 (or approved equal), then the replacement with select material meeting the requirements of Table 1 of this item or material approved by the Engineer and Airport.

c. Contaminated Soil Removal and Backfill. If contamination is encountered, the Contractor shall suspend that portion of the work and notify the Engineer immediately. Within seven (7) calendar days, the City will determine if the material is hazardous and poses a threat to human health. There shall be no claims made for delay as a result of the determination period or the ensuing contaminated soil excavation. If the material is not deemed hazardous or poses no danger, the City will direct the Contractor to proceed without change. If the material is deemed hazardous and special handling of the material is necessary to accomplish the work, the City will employ an On-Call Contractor to handle the removal and disposal of contaminated soil.

d. Borrow Excavation. Borrow excavation shall consist of approved material required for the construction of embankments or for other portions of the work in excess of the quantity of usable material available from required excavations. Borrow material shall be obtained from areas designated by the Airport Operations within the limits of the airport property but outside the normal limits of necessary grading, or from areas outside the airport boundaries.

152-1.3 Unsuitable Excavation. Any material containing vegetable or organic matter, such as muck, clay, wet clay and silt, peat, organic silt, sod, grass, brush, or materials containing concrete, tires, petroleum contamination, asbestos, wood, metal or any materials that decompose shall be considered unsuitable for use in embankment construction.

152-1.4 Contractor's Response to Discovery of Suspect Materials. Materials that may be encountered and classified as suspect material may include transite pipe from the removal of existing waterlines. It is the Contractor's responsibility to provide the necessary workers and supervisors qualified to carry out the activities specified in this Contract. The Contractor will direct all of his contract/subcontract operations, which will have the necessary training as outlined in the Contractor's Safety Program. Such monitoring will conform to the requirements of 29 CFR 1910.120 and 29 CFR 1926.58 and will include personnel monitoring when asbestos materials (transite pipe) are identified. The Contractor shall place all asbestos materials into Contractor furnished roll-off containers. The Contractor shall be required to furnish and install wrapping for the roll-off containers, and completely close the wrapping when the roll-off container is full. The City of Phoenix will be responsible for manifest documentation.

MATERIALS

152-2.1 Select Backfill Material. Material designated for select backfill shall have a plasticity index not exceeding eight (8) and shall meet the gradation requirements of Table 1, as follows:

TABLE 1 – Gradation for Select Backfill Materials.

Sieve Size	Percent Passing by Weight
3-inch	100
No. 4	30-85
No. 200	0-25

152-2.2 Geogrid. Geogrid reinforcement material for subgrade applications shall be a bi- or triaxial polymer grid structure (Tensar BX1200, TriAx® TX160 or approved equal), specifically fabricated for use as a subgrade reinforcement. The geogrid shall be one of the following structure types:

A structure comprised of punched and drawn polypropylene or high density polyethylene sheet to form a grid.

(A) A structure comprised of high density polyethylene or polypropylene extruded to form a grid.

The geogrid shall have high tensile strength and modulus in both principal directions, perpendicular to each other. The geogrid polymer materials shall contain stabilizers or inhibitors or shall be coated or encapsulated to prevent degradation of properties due to ultraviolet light exposure. The polymer shall also be inert to all naturally occurring alkaline and acidic soil conditions.

CONSTRUCTION METHODS

152-3.1 General. Before beginning excavation, grading, and embankment operations in any area, the area shall be completely cleared in accordance with Item P-151.

The suitability of material to be placed in embankments shall be subject to approval by the Engineer. All unsuitable material shall be transported to and disposed of at an off-site location (landfill) at the time the material is excavated, at no additional cost to the City of Phoenix.

There are no waste areas available on the Airport.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued. At the direction of the Engineer, 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. The City of Phoenix will employ an archaeological representative to monitor excavation and trenching work for the presents of historical or archaeological significance.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, and 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 Engineer, and the Contractor shall arrange for their removal as necessary. The Contractor shall, at his/her own expense, satisfactorily repair or pay the cost of all damage to such facilities or structures which may result from any of the Contractor's operations during the period of the contract.

The Contractor shall take precautions to protect and de-water excavations and subgrade work as necessary, prior to the placement of subbase, stabilized base and pavements.

a. Blasting. Blasting shall not be allowed.

152-3.2 Excavation. No excavation shall be started until the work has been staked out by the Contractor and the Engineer has obtained elevations and measurements of the ground surface. All suitable excavated material shall be used in the formation of embankment, subgrade, or for other purposes shown on the plans. All unsuitable material shall be disposed of off site (approved landfill) and at the Contractor's expense.

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 shall be disposed of at an off-site location and at the Contractor's expense. There are not any waste areas on the Airport for this project. All excess or surplus materials shall be become the property of the Contractor and removed from the Airport at the time the material is excavated. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from borrow areas.

The entire construction site shall be maintained so that the surface is well drained at all times. When necessary, temporary drains and drainage ditches shall be installed to intercept or divert surface water that may affect the work. The Contractor shall provide temporary drainage at no additional cost to the City of Phoenix. Schedule and costs impacts associated with inadequate temporary drainage shall be the Contractor's responsibility.

a. Over Excavation of Unsuitable Material. Rock, hardpan, loose rock, boulders, muck, clay, wet clay and silt or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas shall be excavated to a minimum depth of twelve (12) inches, or to the depth specified by the Engineer, below the subgrade. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be transported to and disposed of at an offsite location (landfill) at the time the material is excavated at no additional cost to the City of Phoenix. This material shall not be temporarily stockpiled. The excavated area shall be backfilled as directed by the Engineer in accordance with section P-152-1.2. All costs incidental to placing in layers, compacting and other necessary undercut and backfill operations shall be included in the respective contract unit prices for Over Excavation of Unsuitable Materials and backfilled with select backfill material.

b. Removal of Utilities. The Contractor will accomplish the removal of existing structures and utilities required to permit the orderly progress of work. See Civil Technical Specification Item P-151, “Clearing and Grubbing”. All existing foundations shall be excavated full depth, unless noted

otherwise on the plans, and the material shall be transported and disposed of at an off-site location (landfill) as the material is excavated at no additional costs to the City of Phoenix.

c. Compaction Requirements. The subgrade under areas to be paved shall be compacted to a depth of 6 inches and to a density of not less than 95 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 6 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 ±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 ¾ inch sieve, follow the methods in ASTM D1557. Tests for moisture content and compaction will be taken at a minimum 1,000 cubic yards. of subgrade. All quality assurance testing shall be done by the Contractor's laboratory in the presence of the Engineer, and density test results shall be furnished upon completion to the Engineer 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.

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 Engineer and the finished subgrade shall be maintained.

For cohesive soils in cut sections, the top six (6) inches of the subgrade shall be compacted to 95 percent maximum density, as determined by ASTM D 1557. For cohesive materials that cannot be compacted to achieve 95 percent of ASTM D 1557, the Contractor will be required to blend these materials with asphalt millings, where the amount of millings will be determined by the Contractor's Quality Control program, and re-compacted to 100 percent of ASTM D 1557. The cost of blending millings and re-compaction will be at no additional costs to the City of Phoenix.

For non-cohesive soils in cut sections, the top six (6) inches of subgrade shall be compacted to 100 percent maximum density and the next eighteen (18) inches of subgrade shall be compacted to 95 percent maximum density, as determined by ASTM D 1557. Material exceeding the compaction requirements of ASTM D 1557 shall be compacted to non-movement with equipment specified for proof rolling. Proof rolling of subgrade shall be performed with a pneumatic-tired rolling equipment, developing a load of 30 to 50 tons. Proof rolling shall only be performed in the presence of the Engineer. In a systematic manner acceptable to the Engineer, the equipment shall perform a minimum of three (3) passes over the designated areas(s). When proof rolling of the subgrade shows an area to be unstable as determined by the Engineer, the unstable material shall be removed and replaced to the limits designated by the Engineer. Removal and replacement shall be in accordance with Section 152-3.2a, Over Excavation of Unsuitable Material.

Non-cohesive soils are defined as material with a plastic index less than 8 and the percent passing a No. 200 sieve less than 30 percent.

The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D 2167. Stones or rock fragments larger than four (4) inches in their greatest dimension will not be permitted in top six (6) inches of the subgrade. The finished grading operations, conforming to the typical cross section, shall be completed and maintained at least 1,000 feet ahead of the paving operations.

In cuts, all loose or protruding rocks on the back slopes shall be barred loose or otherwise removed to line of finished grade of slope. 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 Engineer.

152-3.3 Borrow Excavation. There are no borrow sources within the boundaries of the airport property. The Contractor shall locate and obtain borrow sources, subject to the approval of the Engineer. The Contractor shall notify the Engineer at least 15 days prior to beginning the excavation so necessary measurements and tests can be made by the Engineer. All borrow pits shall be opened to expose the various strata of acceptable material to allow obtaining a uniform product. Borrow areas shall be drained and left in a neat, presentable condition with all slopes dressed uniformly. Borrow areas shall not create a hazardous wildlife attractant.

152-3.4 Preparation of Cut Areas of Areas where Existing Pavement has been Removed. In those areas on which a subbase or base course is to be placed, the top six (6) inches of subgrade shall be compacted to not less than 95% of maximum density as determined by ASTM D 1557.

152-3.5 Preparation of Embankment Area. Where an embankment is to be constructed, all sod and vegetable matter shall be removed from the surface upon which the embankment is to be placed, and the cleared surface shall be completely broken up by plowing or scarifying to a minimum depth of six (6) inches. This area shall then be compacted as indicated in Paragraph 152-3.2c.

Where embankments are to be placed on natural slopes steeper than 3 to 1, horizontal benches shall be constructed.

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

152-3.6 Formation of Embankments. Embankments shall be formed in successive horizontal layers of not more than eight (8) inches in loose depth for the full width of the cross section, unless otherwise approved by the Engineer.

The grading operations shall be conducted, and the various soil strata shall be placed, to produce a soil structure as shown on the typical cross sections, or as directed. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Operations on earthwork shall be suspended at any time when satisfactory results cannot be obtained because of rain, freezing, or other unsatisfactory conditions of the field. The Contractor shall drag, blade, or slope the embankment to provide proper surface drainage.

The material in the layer shall be within plus or minus two (+/-2) percent of optimum moisture content before rolling to obtain the prescribed compaction. In order to achieve uniform moisture content throughout the layer, wetting or drying of the material and manipulation shall be required when necessary. Should the material be too wet to permit proper compaction or rolling, all work on all of the affected portions of the embankment shall be delayed until the material has dried to the required moisture content. Sprinkling of dry material to obtain the proper moisture content shall be done with approved equipment that will sufficiently distribute the water. Sufficient equipment to furnish the required water shall be available at all times.

Samples of all embankment materials for testing, both before and after placement and compaction, will be taken for each 1,000 cubic yards. Based on the results of the Contractor's quality control test results, the Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content in order to achieve the correct embankment density. Upon completion of Contractor's acceptable Quality Control test results, quality acceptance testing shall be performed by the City of Phoenix Materials Laboratory.

Rolling operations shall be continued until the embankment is compacted to not less than 95 percent of maximum density as determined by ASTM D 1557.

Under all areas to be paved in fill conditions, the embankments shall be compacted to a density of not less than 95 percent of the maximum density as determined by ASTM D 1557.

The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM 6938 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.

Compaction areas shall be kept separate, and no layer shall be covered by another until the proper density and moisture content is obtained.

During construction of the embankment, the Contractor shall route his/her equipment at all times, both when loaded and when empty, over the layers as they are placed and shall distribute the travel evenly over the entire width of the embankment. The equipment shall be operated in such a manner that hardpan, cemented gravel, clay, or other chunky soil material will be broken up into small particles and become incorporated with the other material in the layer.

In the construction of embankments, layer placement shall begin in the deepest portion of the fill; as placement progresses, layers shall be constructed approximately parallel to the finished pavement grade line.

When rock and other embankment material are excavated at approximately the same time, the rock shall be incorporated into the outer portion of the embankment and the other material shall be incorporated under the future paved areas. Stones or fragmentary rock larger than four (4) inches in their greatest dimensions will not be allowed in the top six (6) inches of the subgrade. Rockfill shall be brought up in layers as specified or as directed and every effort shall be exerted to fill the voids with the finer material forming a dense, compact mass. Rock or boulders shall not be disposed of outside the excavation or embankment areas, except at places and in the manner designated by the Engineer.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in layers of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in layers not exceeding two (2) feet in thickness. Each layer shall be leveled and smoothed with suitable leveling equipment and by distribution of spalls and finer fragments of rock. These type lifts shall not be constructed above an elevation four (4) feet below the finished subgrade.

Where soils are too coarse to be tested by conventional procedures, they shall be compacted using a minimum roller specification. The backfill shall be placed in loose lifts having a thickness not exceeding eight (8) inches. Each lift of embankment or backfill shall be subjected to ten (10) coverages of a vibratory roller with a total static weight of at least 25,000 pounds. The weight of the vibratory portion (including drum, shaft and internal machinery) should be at least 12,000 pounds. The frequency of the vibration during operation should be between 1,100 and 1,500 cycles per minute and the dynamic force at the operating frequency should not be less than 40,000 pounds. The maximum roller speed during operations should be no greater than 1.5 miles per hour. The soil should be thoroughly wetted during the compaction process. The compaction equipment shall be subject to the approval of the City of Phoenix Materials Laboratory.

There will be no separate measurement of payment for compacted embankment, and all costs incidental to placing in layers, compacting, disking, watering, mixing, sloping, and other necessary operations for construction of embankments will be included in the contract price for excavation, borrow, or other items.

Excess material that is excavated and is not used to form embankment on the project shall be become property of the Contractor and transported and disposed of at an off site location. There are not any waste areas for this material on the Airport site.

152-3.7 Finishing and Protection of Subgrade. After the subgrade has been substantially completed the full width shall be conditioned by removing any soft or other unstable material which will not compact properly. The resulting areas and all other low areas, holes or depressions shall be brought to grade with suitable select material. 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.

Grading of the subgrade shall be performed so that it will drain readily. Schedule impacts and costs incurred due to improper drainage shall be borne by the Contractor. The Contractor shall take all precautions necessary to protect the subgrade from damage. He/she shall limit hauling over the finished subgrade to that which is essential for construction purposes.

All ruts or rough places that develop in a completed subgrade shall be smoothed and re-compacted.

No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been approved by the Engineer for density, moisture, grade and smoothness.

152-3.8 Haul. All hauling will be considered a necessary and incidental part of the work. Its cost shall be considered by the Contractor and included 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.

152-3.9 Tolerances. In those areas upon which a subbase or base course is to be placed, the top of the subgrade shall be of such smoothness that, when tested with a sixteen feet (16') straightedge applied parallel and at right angles to the centerline, it shall not show any deviation in excess of ½-inch, or shall not be more than 0.05-feet from true grade as established by grade hubs. Any deviation in excess of these amounts shall be corrected by loosening, adding, or removing materials; reshaping; and re-compacting by sprinkling and rolling. Hubs shall be placed on each side of every proposed paving pass at forty (40) feet intervals.

On safety areas, intermediate and other designated areas, the surface shall be of such smoothness that it will not vary more than 0.10 foot from true grade as established by grade hubs. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

152-3.10 Stockpiles. Stockpiled Material shall be temporary and is limited as specified in the Special Provision Specification "Stockpiled Material."

CONTRACTOR QUALITY CONTROL

152-5.1 Quality Control Program. The Contractor shall develop a Quality Control Program in accordance with Section 100 of the General Provision Specifications. The program shall address all elements that affect the quality of the embankment(s) being formed.

A P-152 Quality Control Testing Plan shall be developed as part of the Quality Control Program.

152-5.2 Testing Frequency. The Contractor shall establish a minimum testing frequency of one (1) density and moisture test per ASTM D 1556, for each of the following conditions:

a. For each one thousand (1,000) cubic yards of embankment formed, and;

b. For each eight (8) inch loose lift.

152-5.3 Quality Control Testing. The Contractor shall perform all quality control tests necessary to control the production and construction processes applicable to this specification and as set forth in the Quality Control Program. The testing program shall include, but not be limited to tests for material density, material moisture content, rolling patterns, and embankment lift thickness.

a. Material Density. The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D 2167. Nuclear moisture and density methods meeting ASTM D 6938 may be used, provided that at least one (1) out of ten (10) tests are conducted using the ASTM D 1556 method to correlate test results.

b. Material Moisture Content. The material in each layer shall be within plus or minus two (2) percent of optimum moisture content before rolling to obtain the prescribed compaction.

c. Rolling Patterns. Where soils are too coarse to be tested by conventional procedures, they shall be compacted using a minimum roller specification. Each lift shall be subjected to ten (10) coverages with a vibratory roller as specified under "Formation of Embankments" of this section.

d. Embankment Lift Thickness. Embankments and backfill constructed shall be formed in successive horizontal layers of not more than eight (8) inches in loose depth for the full width of the cross section. Samples of embankment materials for quality control testing, both before and after placement and compaction, will be taken for each 1,000 cubic yards.

e. Imported Materials. For materials imported, the Contractor shall submit the name and address of the supplier; approximate amount of material to be imported; location from which the material was excavated or recovered; the gradation and plastic index of the material and a written certification from the material supplier that the borrow material(s) are free of hazardous materials and or substances as defined by local, state and federal environmental regulations. When written certification is not available from the commercial source or the Contractor source that states that the material is free of hazardous materials and/or substances, the Contractor shall arrange for the materials to be tested in accordance with the latest edition of EPA SW846 "Test Methods for Evaluation Solid Waste". Material testing shall include, but not be limited to EPA test methods 8015 petroleum hydrocarbons, 8260 (VOCs), 8270 (SVOCs), 8081/8082 (pesticides/PCBs), 8310 (PAHs), and 6010/7000 series (priority pollutant metals). All sample collections and analysis shall be performed by a state certified laboratory. The Contractor shall submit the material supplier(s) certifications and/or the certified laboratory results in the Quality Control Report for approval prior to importing any borrow materials onto Phoenix Sky Harbor International Airport.

f. Fugitive Dust. The Contractor shall supply and operate all necessary equipment and personnel to meet the requirements for dust control. The Contractor shall document dust control procedures in the daily Quality Control reports.

METHOD OF MEASUREMENT

152-6.1 The quantity of Unclassified Excavation to be paid for shall be the number of cubic yards measured in its original position. Measurement shall not include the quantity of materials excavated without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed, nor shall it include excavation for removals of existing improvements, proposed drainage excavation, or any other proposed utility excavation.

152-6.2 The quantity of Over Excavation of Unsuitable Materials and Backfill with Select Material shall be the number of cubic yards measured in its original position and authorized to be removed and replaced with the material as ordered by the Engineer. Measurement of Over Excavation of Unsuitable Materials and Backfill with Select Material for payment shall be by the cubic yard of in-place volume of unsuitable material removed.

The quantity shown for bid purposes is a projected amount that could have to be replaced, the actually amount may vary based on actual field conditions at the time of construction.

152-6.3 Excavation to construct haul roads shall not be measured for payment.

152-6.4 Stockpiled material and temporary stockpiled material shall not be measured for payment.

152-6.5 For payment specified by the cubic yard, volumetric measurement for all excavation shall be computed by a digital terrain model (DTM), by comparing the existing surface terrain to the proposed pavement subgrade terrain. The comparison of the existing surface terrain to the proposed pavement subgrade terrain is that bound by the original ground line established by field survey and the final theoretical pay line established by the cross sections as shown on the plans, subject to verification by the Engineer. The DTM used to calculate the volume of unclassified excavation includes existing asphaltic concrete and Portland cement concrete pavements that are proposed to be removed.

152-6.6 After completion of all excavation operations and prior to the placing of base or subbase material, the final excavation may be verified by the Engineer by means of field cross sections taken randomly at intervals not exceeding 500 linear feet. Final field cross sections may be employed if the following changes have been made:

a. Plan width of embankments or excavations are changed by more than plus or minus 1.0 foot, or;

b. Plan elevations of embankments or excavations are changed by more than plus or minus 0.5 foot.

152-6.7 The quantity of Borrow Excavation to be paid for shall be the number of cubic yards of suitable borrow excavation measured in place.

BASIS OF PAYMENT

152-7.1 For Unclassified Excavation payment shall be made at the unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item, including stockpiling the material and re-handling as necessary to accommodate the construction phasing and sequencing.

152-7.2 For Over Excavation of Unsuitable Material and Backfill with Select Materials, payment shall be made at the unit price per cubic yard. This price shall be full compensation for furnishing all materials (including geotextile fabric), labor, equipment, tools, and incidentals necessary to complete the item. The amount of the allowance is determined by the Owner and is not subject to individual bid pricing. It shall be understood that this allowance is an estimate only. It is further understood that authorized work, if any, may be less than the allowance item. The Over Excavation of Unsuitable Material and Backfill with Select Materials item will be measured and paid for based on the actual costs billed to the project by the contractors used to complete the work that is deemed necessary by the Owner.

152-7.3 The Unforeseen Soil Conditions item is provided for the purpose of encumbering funds to cover costs of improving poor soil conditions that may be encountered during construction. This item may also be used to repair or modify drainage conditions that are different than anticipated. The amount of the allowance is determined by the Owner and is not subject to individual bid pricing. The Contractor shall incorporate the amount pre-entered in the bid proposal and shall reflect the same in the total amount bid for this project. It shall be understood that this allowance is an estimate only. It is further understood that authorized work, if any, may be less than the allowance item. The

Unforeseen Soil Conditions item will be measured and paid for based on the actual costs billed to the project by the contractors used to complete the work that is deemed necessary by the Owner.

Payment will be made under:

Item P-152-7.1	Unclassified Excavation – per Cubic Yard
Item P-152-7.2	Over Excavation of Unsuitable Materials and Backfill with Select Material – per Allowance
Item P-152-7.3	Unforeseen Soil Conditions (Allowance) – per Allowance

TESTING REQUIREMENTS

ASTM D 698	Test for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-pound Rammer and 12-inch drop
ASTM D 1556	Test for Density of Soil In Place by the Sand-Cone Method
ASTM D 1557	Test for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10-pound Rammer and 18-inch Drop
ASTM D 2167	Test for Density and Unit Weight of Soil In Place by the Rubber Balloon Method
ASTM D 6938	In-place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods
EPA SW846	Test Methods for Evaluating Solid Waste
EPA 8240/8270	Volatile Organic Compounds
EPA 8080	Pesticides and PCB's
EPA 6010/7000	Priority Pollutant Metals

END OF ITEM P-152

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

DESCRIPTION

153-1.1 The work covered by this specification consists of furnishing all materials, labor and equipment for the placement of controlled low strength material (CLSM).

CLSM is a mixture of Portland cement, aggregate and water that, as the cement hydrates, forms a soil replacement. CLSM is a self-compacting, flowable, cementitious material that is primarily used as a backfill or structural fill in lieu of compacted fill or unsuitable native material. The type of backfill to be used shall be as specified in the special provisions, plans or by the Engineer.

MATERIALS

153-2.1 Portland Cement, coarse and fine aggregates, and water shall conform to the requirements as set forth in Item P-610 “Structural Portland Cement Concrete”. Portland cement shall be Type II.

153-2.2 Proportioning of Mixtures and Production Tolerances. The aggregates for CLSM shall be Aggregate Base conforming to MAG Section 702. Proportioning of the mixture shall comply with MAG Section 725.7 to conform to the requirements of Table 1 below. A mix design shall be submitted with test data for the Engineer’s approval prior to the excavation for which the material is intended for use.

TABLE 1 – CSLM Proportioning.

Cement Content (lbs/cu yd)	Slump (inches)	Compressive Strength at 28 days, psi
47.5	8” min.	Between 70 and 100 (max.)

Notes for Table 1:

1. The values specified in the table are for both mix design requirements and field production. The deviations are for production, testing and sampling tolerances.
2. Slump shall be tested in accordance with ASTM C-143. Flow consistency test can be substituted for the slump test. When used the CLSM shall have a flow consistency of 8 inches as tested in accordance with ASTM D- 6103.
3. Compressive strength shall be tested in accordance with ASTM D-4832. The supplier shall provide laboratory and/or field test data to verify the design strength.
4. Sampling shall be in accordance with ASTM D-4832.
5. Unit weight shall be obtained by ASTM D-6023.
6. Temperature shall be taken in accordance with ASTM C-1064.
7. Cement content shall be tested in accordance with ASTM D- 5982.

Where CLSM is to be used as backfill around gas pipelines (totally encapsulating the gas pipeline), the material shall meet a minimum permeability coefficient (k) of 1×10^{-5} cm/sec or more, based on ASTM D-5982.

153-2.3 Mixing. The total elapsed time between the addition of the water and placement of the complete mix shall not exceed 90 minutes. The Engineer may waive this limitation if the slump is such that the material can be placed without addition of water.

Mixing shall continue until the cementitious material and water are thoroughly dispersed throughout the material. Mixes shall be homogeneous, readily placeable, and uniformly workable. Proportioning of ingredients shall produce consistency, durability, workability, and other required properties appropriate for the intended usage. When the CLSM is mixed other than at the project site, the mixing shall comply with MAG Section 725.7. When the CLSM is mixed at the job site, the Contractor shall submit for Engineer's approval, the methods, equipment, and procedures for proportioning and mixing of the material.

CONSTRUCTION METHODS

153-3.1 Placement. The controlled low strength material shall be placed directly into the excavation or pipe to be filled. The CLSM shall be placed in a uniform manner that will prevent voids in or segregation of the material. Foreign material which falls into the trench prior to and during placing of CLSM shall be immediately removed. The CLSM shall have consistency, workability, plasticity, flow characteristics and pumpability (when required) such that the material when placed is self-compacting. Mechanical compacting or vibration may be used to consolidate around structures, pipes, multiple conduits, etc., otherwise no mechanical compaction or vibration shall be required.

When CLSM is used for backfill around pipes or conduits, the CLSM shall be placed equally on both sides of pipe or conduit to prevent lateral displacement. Also, the CLSM shall be placed in lifts. The height of each lift shall not exceed the depth that will cause floating of the pipe or conduit. When placing the CLSM in greater lift depths, sufficient anchorage shall be provided so the pipe or conduit will not float. The maximum lift thickness shall not exceed four (4) feet under any circumstances.

When CLSM is used for backfill around pipes or conduits with a depth less than 20 feet, the width of the excavation shown on the plans may be reduced so that the minimum clear distance between the outside of the pipe or conduit and the side of the excavation (each side) shall be 12 inches for pipes or conduits 42 inches and larger, 6 inches for pipes or conduits between 4 inches and 42 inches and 3 inches for pipes or conduits 4 inches and smaller.

When CLSM is used behind retaining walls, the depth of each lift shall be limited so it will not induce hydraulic loads greater than the design loads.

For long trenches or installations which require a large amount of CLSM, bulkheads of wood, dirt, sand bags, etc. can be used for control the material's flowability. The bulkhead shall be removed prior to the continuation the backfilling.

CLSM shall NOT be permitted to come in contact with aluminum, copper or brass materials, aluminum pipes or culverts, copper water pipe, native material, import material, etc. or provide a protective covering or wrapping such a polyethylene wrap per MAG Section 610.5. Pipes that are smaller than 4 inches can be completely wrapped with tape as per MAG Section 610.5.

153-3.2 Protection. When CLSM is placed within the traveled way or otherwise to be covered by paving or embankment materials, the materials shall achieve a penetration resistance of 3 inches (indentation diameter) or less with 5 drops at a drop distance of 5 inches prior to covering and opening to traffic or the installation of the surface be delayed for 12 hours, whichever occurs first. Penetration resistance shall be as measured by ASTM Test Method D-6024.

When CLSM is placed in foundation excavations, the material shall be protected from foundation loading and placement of foundation concrete prior to having reached initial set per ASTM C-403, or allowed to set in place for 24 hours, whichever comes first.

Where the Engineer has identified soils as being moisture sensitive, a drainage notch or drain wick shall be placed longitudinally along the centerline of the trench or CLSM placement. The notch or wick shall be constructed within the first hour following placement. Drainage water shall be collected and removed at the end of notch or wick.

153-3.3 Acceptance. CLSM shall be considered deficient and may be rejected at the discretion of the Engineer if:

(A) The CLSM is outside of the limits specified in Table 1 and/or

(B) The aggregate gradation is outside the limits specified in MAG section 702-2.2 - Table 702-1 Aggregate Base

Rejected material not placed shall be immediately removed from the job site. Rejected material shall be removed and replaced with acceptable material. Removing and disposing of the rejected material shall be at no additional cost to the Contracting Agency.

CONTRACTOR QUALITY CONTROL

153-4.1 The Contractor shall be responsible for developing and implementing a Contractor Quality Control Program including inspection and testing to assure compliance with the requirements of this section in accordance with General Provisions Section 100.

METHOD OF MEASUREMENT

153-5.1 No separate measurement for CLSM will be made. Payment for backfilling trenches, structures and filling abandoned pipes shall be incidental to the specific work function.

BASIS OF PAYMENT

153-6.1 Payment. No separate payment will be made for CLSM. The cost for placing the material shall be included in the unit price bid for the specific work function (laying pipe, placing structure foundation, construction retaining wall, filling abandoned pipe, etc.).

TESTING REQUIREMENTS

ASTM D 6024	Standard Test Method for Ball Drop on Controlled Low Strength Material to Determine Suitability for Load Application.
ASTM C 143.03	Standard Test Method for Slump of Hydraulic Cement Concrete
ASTM D 6103.97	Standard Test Method for Flow Consistency of Controlled Low Strength Material (CLSM)
ASTM D 4832-02	Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.

ASTM D 5982-02	Standard Test Method for Determining Cement Content of Fresh Soil-Cement (Heat of Neutralization Method)
ASTM D 6023-02	Standard Test Method for Unit Weight, Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low Strength Material (CLSM)
ASTM C 403-99	Standard Test Method for Time of Setting of Concrete Mixtures of Penetration Resistance

END OF ITEM P-153

Item P-403 Asphalt Mix Pavement

DESCRIPTION

403-1.1 This item shall consist of a surface course composed of mineral aggregate and bituminous materials mixed in a central mixing plant and placed on a prepared course in accordance with MAG Section 321 and 710 and shall conform to the lines, grades, thicknesses, and typical cross sections shown on the plans. Each course shall be constructed to the depth, typical sections, and elevations required by the plans and shall be rolled, finished, and approved before the placement of the next course.

MATERIALS AND MANUFACTURER

403-2.1 General. Materials and manufacture shall conform to MAG Section 710 for the type specified, except as specified in this specification.

403-2.2 Job Mix Formula. No bituminous mixture for payment shall be produced until a job mix formula has been approved by the Engineer. The job mix formula for the mixes shall be as shown in MAG Section 710 Marshall Mix Design Criteria (low traffic mix), using Performance Grade Asphalt PG 70-10 and a targeted 1/2-inch nominal maximum aggregate size.

403-2.3 Recycled Asphalt Concrete. Recycled Asphalt Pavement (RAP) will not be allowed on this project.

403-2.4 Test Section. Prior to full production, the Contractor shall prepare and place a quantity of bituminous mixture according to the job mix formula. The amount of mixture shall be sufficient to construct a test section 300 feet long and 20 feet wide, placed in two lanes, with a longitudinal cold joint, and shall be of the same depth specified for the construction of the course which it represents. A cold joint is an exposed construction joint at least 4 hours old or whose mat has cooled to less than 1600 F. The underlying grade or pavement structure upon which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment used in construction of the test section shall be the same type and weight to be used on the remainder of the course represented by the test section.

The test section shall be evaluated for acceptance as a single lot in accordance with the acceptance criteria set in section 403-4.1. The test section shall be divided into equal sublots. As a minimum, the test section shall consist of 3 sublots.

The test section shall be considered acceptable if the average mat and joint density of the test section is greater or equal to 95 percent. If the initial test section should prove to be unacceptable, the necessary adjustments to the job mix formula, plant operation, placing procedures, and/or rolling procedures shall be made. A second test section shall then be placed. If the second test section also does not meet specification requirements, both sections shall be removed at the Contractor’s expense. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. Any additional sections that are not acceptable shall be removed at the Contractors’ expense. Full production shall not begin until an acceptable section has been constructed and accepted in writing by the Engineer. Once an acceptable test section

has been placed, payment for the initial test section and the section that meets specifications requirements shall be made in accordance with section 403-7.1.

Job mix control testing shall be performed by the Contractor at the start of plant production and in conjunction with the calibration of the plant for the job mix formula. If the aggregates produced by the plant do not satisfy the gradation requirements of produce a mix that does not meet JMF the JMF, it will be necessary to reevaluate and redesign the mix using plant-produced aggregates. Specimens shall be prepared and the optimum bitumen content determined in the same manner as for the original design tests

CONSTRUCTION METHODS

403-3.1 Weather and Moisture Conditions. Asphalt concrete shall be placed only when the surface is dry, and when the atmospheric temperature in the shade is forty degrees Fahrenheit (40°F) or above. Asphalt Concrete for surface course which is less than two inches (2-inches) in thickness shall be placed only when the surface is dry, and when the surface temperature is equal to or greater than fifty degrees Fahrenheit (50°F).

No asphalt concrete shall be placed when the weather is foggy or rainy, or when the base on which the material is to be placed contains moisture in excess of the optimum. Asphalt concrete shall be placed only when the Engineer determines weather conditions are suitable.

403-3.2 Application of Tack Coat. If the Contractor places multiple layers of asphaltic concrete pavement, a tack coat shall be applied to all existing or new bituminous surface prior to the placing of a succeeding layer of bituminous mixed material. The preparation, material, and application of tack coat shall comply with MAG Standard Specifications 329, 330, 333 & 713.

The same material that is specified above for the tack coat shall be applied to the vertical surfaces of existing pavements, curbs, and gutters, against which asphalt concrete is to be placed. The surface to be covered may require repair or patching as directed by the Engineer.

There shall be no separate measurement or payment for the application of any tack coat, but shall be considered incidental to the associated item of work.

403-3.3 Placing, Spreading, and Finishing. Asphalt concrete shall be delivered and placed within the job mix formula limits specified in MAG Section 710, unless otherwise shown within this specification. Tarpaulins shall be furnished and used to cover all loads during transportation if delivered temperature of the mixture is below two hundred-sixty degrees Fahrenheit (260°F). The temperature shall be taken by the Contractor's Quality Control personnel, at a point six inches (6-inches) below the exposed surface of the material, in the truck, on the job site, and just prior to placement. When releasing agents are placed in the truck beds, no free fluid shall be present in the truck bodies at the time of asphalt concrete is loading. Diesel fuel shall not be used as a releasing agent.

The handling of the completed mixture shall at all times be such as to prevent segregation, and the material as spread shall be free from areas of excess course or fine material. Float rock developed in the process of raking shall be placed on an underlying course or otherwise disposed of. In no case shall it be scattered over the surface of a final course.

Placement shall begin on pavement at points farthest from the source of supply, and progress continuously toward the source of supply, unless otherwise ordered by the Engineer, and no more than one-half (1/2)-day's delivery to the project shall be placed in any one lane in advance of other lanes. Transverse joints in adjacent lanes shall be offset a minimum of ten (10) feet.

At locations where the mixture is to be placed over areas inaccessible to the required spreading or compacting equipment or over areas where the use of the required spreading and compacting equipment would not be practicable, the mixture may be spread or compacted by other means approved by the Engineer.

a. Base Preparation. The base on which the asphalt concrete is to be placed shall be prepared by the Contractor per Civil Technical Specification P-152.

b. Spreading and Finishing Equipment. Self-propelled mechanical spreading and finishing equipment shall be provided with a vibrating screed or strike off type of assembly capable of distributing not less than the full width of a paving lane or trench width. The term screed includes any strike-off device which operates by cutting, crowding, or other practical action which is effective on mixtures at workable temperatures without tearing, shoving, or gouging, and which will produce a finished surface of the smoothness and texture required. The screed shall be adjustable to the required template and elevation. The forward speed of operation of mechanical spreading and finishing equipment shall be so regulated so no irregularities will result in the surface texture or smoothness of the mat due to excessive forward speed of the spreading machine. The forward speed of operation shall not exceed fifty-five (55) feet per minute, unless the Contractor can demonstrate to the satisfaction of the Engineer higher speeds will not affect the smoothness of the mat.

All material within the mechanical spreading and finishing equipment shall be handled to prevent segregation of the aggregate. This includes but is not limited to devices such as augers, screws or slat conveyors. These devices shall extend to the final or termination point where the material is being transported within the equipment. If any of the devices fail to function, the paving operation shall be terminated immediately until repairs are completed. In the case of the screed, auger extensions and vibrators shall be installed wherever the screed is extended more than one (1) foot beyond the end of the base auger or auger extension. However, when placing material against an extremely uneven edge over a short distance, the Engineer may waive the auger extensions and vibrators.

Self-propelled mechanical spreading and finishing equipment shall be equipped with control system capable of automatically maintaining the screed elevation as specified herein.

The control system shall be automatically actuated from a laser system of mechanical sensors or sensor directed mechanisms or devices which will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. The transverse slope controller shall be capable of maintaining the screed at the desired slope within plus or minus 0.1 percent. When directed by the Engineer, the transverse slope control system shall be made inoperative and the screed shall be controlled by sensor directed automatic mechanisms which will independently control the elevation of each end of the screed from reference lines or surfaces.

When trucks are backed into the self-propelled mechanical spreading and finishing equipment, it shall be in such a manner that the equipment will not be jarred excessively or moved out of line. Once in position, the truck shall be securely attached to the equipment during spreading and finishing.

When the Engineer deems that the automatic screed control operation is not practical under a particular set of conditions, he/she may order the use of manual control in lieu thereof. However, the machine shall be equipped with the automatic device.

Use of the spreader boxes will be permitted by the Engineer only in writing, under certain conditions, such as in narrow paving projects where it is not practical to use self-propelled

equipment. The spreader box will be equipped with a readily adjustable strike off blade. In order to obtain a smooth surface manipulation of the controls of the spreader box shall be held to a minimum. Trucks shall be backed into the spreader box in such a manner that the box will not be jarred excessively or moved out of line and the trucks shall be securely attached to the spreading and finishing.

The asphaltic concrete materials shall not be placed with a self-propelled pneumatic tired blade grader.

c. Compaction Equipment. All rollers used in compaction of asphalt concrete shall be self- propelled and reversible, with a minimum weight of eight (8) tons. All rollers shall be maintained to insure smooth operation in respect to steering, the ability to stop, start and reverse. All rollers shall be equipped with an automatic device or devices capable of properly dispensing an approved releasing agent on the wheels to prevent the wheels from picking up the asphalt concrete. Diesel fuel shall not be used as a releasing agent. All rollers shall be equipped with scrapers to keep the wheels clean from asphalt and other debris.

Pneumatic-tired rollers shall be of the two (2)-axle tandem type having a rolling width of not less than five (5) feet. All tires shall not be less than twenty (20) inches in diameter, shall be of the same size and shall have treads satisfactory to the Aviation Department and the RPR. The roller shall be so constructed that the operating weight per tire shall not be less than two thousand (2,000) pounds and the tires shall be spaced so that the entire gap between adjacent tires will be covered by the tread of the following tire. Except as otherwise specified, each tire shall be inflated to ninety (90) psi and at all times the air pressure in each tire shall not vary more than five (5) psi from the specified pressure. Pneumatic-tired rollers shall be equipped with skirt-type devices mounted around the tires so that the temperature of the tires will be maintained during the rolling process.

Steel-wheeled tandem rollers or steel-wheeled vibratory rollers shall also be used for final compaction of the new asphalt surface course. In all cases, the larger of the two roller wheels will be operated in the forward position. The steel wheels shall be straight, free from grooves and/or pits. Vibratory rollers shall be operated in accordance with standard practices and manufacturer recommendations.

d. Asphalt Surface Course. Asphalt surface course (MAG D-1/2) shall be spread and finished by means of mechanical spreading and finishing equipment as described and specified above, except as otherwise noted. The compacted thickness of layers placed shall be as shown on the plans, but in no case shall the compacted thickness of each lift be below 2 inches or exceed 2-1/2 inches.

When more than one (1) course is placed, longitudinal joints of each course shall be staggered not less than one (1) foot with relation to the longitudinal joints of the underlying course. Transverse joints in adjacent lanes shall be offset a minimum of ten (10) feet.

Before another course is placed adjacent to cold transverse construction joint, the joint shall be trimmed to a vertical face by saw cutting the material back to its full depth to expose a fresh surface. The joint shall be cut on a ten-degree (10°) to fifteen-degree (15°) skew from a line perpendicular to the center line of the paveway. The joint formed when the fresh mixture is placed shall be dense and well sealed. The transverse surface joints shall be tested with a sixteen (16)-foot straightedge and shall conform to the requirements herein for surface smoothness. For short overnight intermissions in paving, a full depth bulkhead (e.g., wooden member) can be placed near the end of the day’s pavement. The bulkheads and excess material will be removed just prior to the placement of the following day’s pavement.

An approved joint heater shall be used on cold transverse or longitudinal joints where conditions are such that it is deemed necessary by the Engineer. The joint heater shall be capable of heating the joint to a minimum temperature of two hundred degrees Fahrenheit (200°F).

Emulsified asphalt shall be applied to the exposed edge before new pavement is placed against the joint. The application of an emulsified bituminous material shall be in accordance with MAG Specifications Section 329 and 713. The bituminous tack coat shall meet the requirements of SS-1 per MAG Specification 713.

Sufficient rolling equipment shall be furnished to satisfactorily compact and finish the amount of mixture being placed. However, there shall be a minimum of two (2) rollers with two (2) operators on the project at all times. Upon direction of the Engineer, one of the rollers may be a pneumatic-tire roller. During rolling operations, the speed of the roller(s) shall not exceed 3 miles per hour. If an ample number of rollers are not present, the Contractor shall adjust the asphalt placement rate to accommodate the roller(s) speed. The type and required number of rollers shall be on the project and in acceptable operating condition, prior to the placement of any asphalt material. All rollers shall be operated continuously from the breakdown through finish rolling. The Contractor may use vibratory rollers in lieu of the steel-wheeled roller, however when the thickness of the asphalt is one inch (1- inch) or less, all rolling will be done in the static mode.

When more than one width of asphalt concrete material will be placed, a six inch (6-inch) strip adjacent to the area on which future material is to be laid shall not be rolled until such material has been placed but shall not be left unrolled more than two (2) hours after being placed, unless the six (6)-inch unrolled strip is first heated with a joint heater. After the first strip or width has been compacted, the second width shall be placed, finished and compacted as provided for the first width, except that rolling shall be extended to include the six inches (6-inches) of the first width not previously completed.

At any place not accessible to the roller, the mixture shall be thoroughly compacted with tampers and finished, where necessary, with a hot smoothing iron to provide a uniform and smooth layer over the entire area compacted in this manner.

Breakdown rolling shall begin as soon as the mixture will bear the roller without undue displacement. Rolling shall be longitudinal, overlapping on successive trips by at least thirty-four percent (34%) but not more than the width of the rear wheels. Alternate trips of the roller shall be of slightly different lengths. The motion of the roller shall at all time be slow enough to avoid displacement of the mixture.

Breakdown and compaction rolling shall be done by either steel-wheel or pneumatic-tire rollers. The Aviation Department and the RPR may require a pneumatic-tire roller for one of the rolling operations. Rolling shall continue until the specific gravity of the compacted mixture is not less than ninety-five percent (95%) of the specific gravity of specimens composed of the same materials in similar proportions or composed of the same mixture compacted in the laboratory by the seventy-five (75) blow method of AASHTO T-245 if the mix was designed by the Marshall method.

Finish rolling shall be done by means of steel-wheeled roller or a vibratory steel-wheel roller operated in the static mode.

The completed surfacing shall be thoroughly compacted, smooth and true to grade and cross-section and free from ruts, humps, depressions or irregularities. The surface shall not vary by more than one-quarter (1/4)-inch from the lower edge of a sixteen (16)-foot straightedge when the straightedge is placed parallel to grade breaks, and shall not vary by more than three-eighths (3/8)- inch from the lower edge of a sixteen (16)-foot straightedge when the straightedge is placed perpendicular, or in any other direction. This straightedge smoothness requirement

applies to aprons, Taxiways, service roads, and other paved surfaces. The straightedge shall be furnished by the Contractor and shall be acceptable to the Engineer.

All areas paved shall be water tested by the Contractor for drainage in the presence of the RPR or designated representative before final acceptance. Any areas not draining properly shall be corrected to the Engineer's satisfaction at the Contractor's expense. Water for this testing shall be provided and paid for by the Contractor.

When deviations in excess of the above tolerance are found, humps or depressions shall be corrected to meet the specified tolerance, or shall be saw cut out along neat straight lines and replaced with fresh hot mixture and thoroughly compacted to conform with and bond to the surrounding area. Materials and work necessary to correct such deviations shall be at no additional cost to the City of Phoenix.

MATERIAL ACCEPTANCE

403-4.1 Acceptance Sampling and Testing. The asphalt concrete surface course shall be accepted as provided below. The Contractor shall make corrective requirements for deficiencies in thickness, density, asphalt cement content and mineral aggregate.

a. Thickness. When, in the opinion of the Engineer, there is reason to believe that the pavement may be deficient in thickness, cores will be taken by the Contractor, as directed by the Engineer. One (1) core shall be taken every ten (10) feet until the deficiency in thickness has been no longer determined. When a deficiency of more than one-quarter (1/4)-inch is found, the average of these cores will be used to determine the amount of the deficiency, and the cost of additional corrective and investigative actions shall be borne entirely by the Contractor. Thickness of the cores shall be determined by the Engineer, and by using the average caliper measurement. Where pavement thickness is deficient by one-quarter (1/4)-inch or less, it will be paid for at the contract unit price.

Where the pavement is deficient in thickness by more than one-quarter (1/4)-inch but not more than one-half (1/2) inch, payment will be reduced per Table 1 below.

TABLE 1. PAVEMENT THICKNESS PAYMENT REDUCTION, ASPHALT CONCRETE

Specified Mat Thickness	Reduction in Payment
Less than 1.50”	50%
1.50” to 1.99”	33%
2.00” to 2.49”	25%
2.50” to 2.99”	20%
3.00” and Over	17%

When the deficiency of the pavement thickness exceeds 1/2-inch, the pavement shall be milled and overlaid on the area affected, but in no case less than the area that was cored, for the full width of pavement, with a new mat of material, equal in thickness to the deficiency but not less than one- and-one-half (1-1/2) inches in any instance. This is to be done at no additional cost to the City of Phoenix.

b. Density. Nuclear densities shall be taken per ASTM D 2950 for acceptance. A minimum of eight (8) nuclear density tests per shift's production shall be taken. If the average density falls below ninety-five percent (95%) then two (2) cores shall be taken by the Contractor, as directed by the Engineer, to determine final density for that shift's production.

TABLE 2. PAVEMENT DENSITY PAYMENT REDUCTION, ASPHALTIC CONCRETE

Deviation Below Specification	Reduction in Payment
2% points	2%
2 to 3% points	5%
3 to 5% points	10%

c. Asphalt Cement Content. When the asphalt cement content exceeds the limits established in MAG Section 405-2.2, two (2) additional core tests will be made for each deficient test taken, and the average of all three (3) tests made shall be used to determine the asphalt cement content.

When the asphalt cement content is in excess of that permitted, the Contractor shall remove any areas of bleeding, but in no case less than the specified roller width, as directed by the Engineer, and replace the affected material with new material meeting the specification requirements for the mix type involved. This shall be done, any time within a period of one (1) year until the bleeding has been corrected, at no additional cost to the City of Phoenix. Should the stability of the mix be affected by the excess asphalt cement to such an extent that the pavement is displaced under normal traffic loads, within a period of one (1) year, the areas affected shall be removed and replaced with new material, at no additional cost to the City of Phoenix.

When the asphalt cement content deviates from 0.0 to 0.2 percent (%) points, weight of the total mixed material less than the minimum permitted in this specification, then payment to the Contractor for asphalt concrete pavement will be reduced per Table 3 below.

TABLE 3. ASPHALT CEMENT CONTENT PAYMENT REDUCTION, ASPHALTIC CONCRETE

Deviation from that Permitted	Payment Reduction
0.0 to 0.1% points	3%
Over 0.1 to 0.2% points	5%
Greater than 0.2% points	25%

The above corrective work, due to deviations from the requirements for asphalt content, shall be done at no additional cost to the City of Phoenix.

d. Mineral Aggregate. When the mineral aggregate gradation deviates from the requirements of this specification in an amount which, in the opinion of the Engineer, will affect the stability or durability of the mix, the Contractor shall remove the asphalt concrete and replace it with material meeting the requirements of this specification.

The above corrective work, due to deviations from the requirements for mineral aggregate, shall be done at no additional cost to the City of Phoenix.

CONTRACTOR QUALITY CONTROL

403-5.1 General. The Contractor shall develop a Quality Control Program in accordance with Technical Provisions Section 100. The program shall address all elements that affect the quality of the pavement including, but not limited to:

a. Mix Design

b. Aggregate Grading

c. Quality of Materials

d. Stockpile Management

e. Proportioning

f. Mixing and Transportation

g. Placing and Finishing

h. Joints

i. Compaction and density

j. Surface smoothness

403-5.2 Testing Laboratory. The Contractors' laboratory used to develop the job mix formula shall meet the requirements of ASTM D 3666 including the requirement to be accredited by a national authority such as the National Voluntary Laboratory Accreditation Program (NVLAP), the American Association for Laboratory Accreditation AALA) or AASHTO Accreditation Program (AAP). A certification signed by the manager of the laboratory stating that it meets these requirements shall be submitted to the RPR prior to the start of construction. The certification shall contain as a minimum:

a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians

b. A listing of equipment to be used in developing the job mix.

c. A copy of the laboratory's quality control system.

d. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program

e. Evidence the laboratory is accredited, for the test methods required herein, by a nationally recognized laboratory accreditation organization.

403-5.3 Quality Control Testing. The Contractor shall perform all quality control tests necessary to control the production and construction processes applicable to these specifications and as set forth in the MAG specs.

403-5.4 Sampling. The Contractor shall sample and test any material that appears inconsistent with similar material being sampled, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

METHOD OF MEASUREMENT AND PAYMENT

403-6.1 Measurement. Asphaltic concrete pavement for MAG D-1/2" asphaltic concrete surface course, (to the depths shown within the typical sections in the plans), will be measured by the Ton, computed to the nearest Ton, for the mixture actually used as allowed above. No separate measurement will be made for the required quantities of mineral aggregates, filler material, asphalt cement and sand. Weighmaster's Certificates shall be provided by the Contractor. The weighing shall be done on certified platform scales sealed by the State Inspector as defined by ARS Sections 4/"2112 and 44- 2116. The Contractor shall furnish the Engineer with duplicate weighmaster's certificates showing the actual net weights together with the information required by ARS Section 44-2142.

The price per square ton for MAG D-1/2" Asphalt Concrete Pavement surface course shall include the cost of the asphalt cement in the percentages as specified in these specifications.

BASIS OF PAYMENT

403-7.1 Payment. The asphalt concrete measured as provided above will be paid for at the contract price per Ton, (to the depths shown within the typical sections in the plans), and that price shall be full compensation for the item complete, as herein described and specified. The price shall be compensation for furnishing all materials, including bituminous material, for all preparation, mixing, transportation and placement of these materials, and for all labor, equipment, tools and incidentals necessary to complete the item. No separate payment will be made for corrective work. No payment will be made for any overrun in quantity of asphaltic concrete in excess of ten percent (10% based on actual field measurement of area covered, design thickness, and a unit weight of one hundred-fifty (150) pounds per cubic foot).

Payment will be made under:

Item P-403-7.1 Asphalt Concrete Pavement (MAG D-1/2-Inch) – per Ton

TESTING REQUIREMENTS

ASTM C 29	Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C 88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	Materials Finer than 75 um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 127	Specific Gravity and Absorption of Coarse Aggregate
ASTM C 131	Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C 183	Sampling and the Amount of Testing of Hydraulic Cement
ASTM C 566	Total Evaporable Moisture Content of Aggregate by Drying
ASTM D 75	Sampling Aggregates
ASTM D 979	Sampling Bituminous Paving Mixtures
ASTM D 995	Mixing Plants for Hot-Mixed Hot-Laid Bituminous Paving Mixtures
ASTM D 1073	Fine Aggregate for Bituminous Paving Mixtures

ASTM D 1074	Compressive Strength of Bituminous Mixtures
ASTM D 1188	Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
ASTM D 1461	Moisture or Volatile Distillates in Bituminous Paving Mixtures
ASTM D 2041	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2419	Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 2489	Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D 2726	Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D 2950	Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D 3203	Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D 3665	Random Sampling of Construction Materials
ASTM D 3666	Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D 4125	Asphalt Content of Bituminous Mixtures by the Nuclear Method
ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 4791	Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D 4867	Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D 5444	Mechanical Size Analysis of Extracted Aggregate
ASTM D 5581	Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus (6” Diameter Specimen)
ASTM D 6926	Preparation of Bituminous Specimens Using MARSHALL Apparatus (6” Diameter Specimen)
ASTM D 6927	MARSHALL Stability and Flow of Bituminous Mixtures
ASTM E 11	Wire-Cloth Sieves for Testing Purposes
ASTM E 178	Dealing with Outlying Observations

AASHTO T 30	Mechanical Analysis of Extracted Aggregate
AASHTO T 110	Moisture or Volatile Distillates in Bituminous Paving Mixtures]
The Asphalt Institute's Manual No. 2 (MS-2)	Mix Design Methods for Asphalt Concrete

MATERIAL REQUIREMENTS

ASTM D 242	Mineral Filler for Bituminous Paving Mixtures
ASTM D 946	Penetration Graded Asphalt Cement for Use in Pavement Construction
ASTM D 3381	Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 4552	Classifying Hot-Mix Recycling Agents
AASHTO MP1	Performance Graded Binder Designation

END OF SECTION P-403

Item P-610 Concrete for Miscellaneous Structures

DESCRIPTION

610-1.1 This item shall consist of plain and reinforced structural Portland Cement Concrete, for use in concrete structures such as storm drain and electrical structures, prepared and constructed in accordance with these specifications, at the locations and of the form and dimensions shown on the plans.

MATERIALS

610-2.1 General. Only approved materials, conforming to the requirements of these specifications, shall be used in the work. They may be subjected to inspection and tests at any time during the progress of their preparation or use. The source of supply of each of the materials shall be approved by the Engineer before delivery or use is started. 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 insure the 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 therein.

In no case shall the use of pit-run or naturally mixed aggregates be permitted. Naturally mixed aggregate shall be screened and washed, and all fine and coarse aggregates shall be stored separately and kept clean. The mixing of different kinds of aggregates from different sources in one storage pile or alternating batches of different aggregates will not be permitted.

610-2.2 Coarse Aggregate. The coarse aggregate for concrete shall meet the requirements of ASTM C 33, #57 rock. All coarse aggregate shall be washed.

610-2.3 Fine Aggregate. The fine aggregate for concrete shall meet the requirements of ASTM C 33. The fine aggregate shall be well graded from fine to coarse and shall meet the requirements of Table 1, when tested in accordance with ASTM C 136. All fine aggregate shall be washed and shall have a sand equivalent value of not less than 75.

TABLE 1 - GRADATION FOR FINE AGGREGATE.

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
3/8 inch	100
No. 4	95-100
No. 16	45-80
No. 30	25-55
No. 50	10-30
No. 100	2-10

Blending will be permitted, if necessary, in order to meet the gradation requirements for fine aggregate. Fine aggregate deficient in the percentage of material passing the No. 50 mesh sieve may be accepted, provided that such deficiency does not exceed 5% and is remedied by the addition of pozzolanic or cementitious materials other than Portland Cement, as specified in 610-2.6 on admixtures, in sufficient quantity to produce the required workability as approved by the Engineer.

610-2.4 Cement. Cement shall conform to the requirements of ASTM C-150 Type II. The Contractor shall furnish vendors' certified test reports for each carload, or equivalent, of cement shipped to the project. The report shall be delivered to the Engineer before permission to use the cement is granted. All such test reports shall be subject to verification by testing sample materials received for use on the project.

610-2.5 Water. The water used in concrete shall be free from sewage, oil, acid, strong alkalies, vegetable matter, and clay and loam. Unless potable water is used, water shall be tested in accordance with AASHTO T 26.

610-2.6 Admixtures. The use of any material added to the concrete mix shall be approved by the Engineer. Before approval of any material, the Contractor shall be required to submit the results of complete physical and chemical analyses made by an acceptable testing laboratory. Subsequent tests shall be made of samples taken by the Engineer 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.

Pozzolanic admixtures shall be Class F fly ash meeting the requirements of ASTM C 618.

Air-entraining admixtures shall meet the requirements of ASTM C 260. Air-entraining admixtures shall be added at the mixer in the amount necessary to produce the specified air content.

Water-reducing, set-controlling admixtures shall meet the requirements of ASTM C 494, Type A, water-reducing or Type D, water-reducing and retarding. Water-reducing admixtures shall be added at the mixer separately from air-entraining admixtures in accordance with the manufacturer's printed instructions.

610-2.7 Premolded Joint Material. Premolded joint material for expansion joints shall meet the requirements of ASTM D1751.

610-2.8 Joint Filler. The types of joint fillers and joint seals shall be as shown on the plans or as required by the Specifications. The Contractor shall submit proposed joint filler material for the Engineer’s review.

610-2.9 Steel Reinforcement. Reinforcing shall consist of Bar Mats, Welded Wire Fabric, or deformed Grade 60 rebar, conforming to the requirements of ASTM A 185, ASTM A 184, and ASTM A 615, respectively.

610-2.10 Cover Materials for Curing. Curing materials shall conform to the following specification: Liquid Membrane-Forming Compounds for Curing Concrete, ASTM C 309, Type 2.

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 herein. All machinery and equipment owned or controlled by the Contractor, which he proposes to use on the work, shall be of sufficient size to meet the requirements of the work, and shall be such as to produce satisfactory work; all work shall be subject to the inspection and approval of the Engineer.

610-3.2 Concrete Composition. The concrete shall develop variable compressive strengths up to 4,000 psi (depending on application) in 28-days as determined by test cylinders made in accordance with ASTM C 31 and tested in accordance with ASTM C 39. Unless otherwise noted, 4,000 psi concrete shall be used. The concrete shall contain not less than 470 pounds of cement

per cubic yard. The concrete shall have a slump of not more than 4-inches as determined by ASTM C 143.

610-3.3 Acceptance Sampling and Testing. Concrete for each structure will be accepted on the basis of the compressive strength specified in paragraph 3.2. The concrete shall be sampled in accordance with ASTM C 172. Compressive strength specimens shall be made in accordance with ASTM C 31 and tested in accordance with ASTM C 39.

Concrete cylindrical test specimens shall be made in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The Contractor shall cure and store the test specimens under such conditions as directed. The Engineer will make the actual tests on the specimens at no expense to the Contractor.

610-3.4 Proportioning and Measuring Devices. When package cement is used, the quantity for each batch shall be equal to one or more whole sacks of cement. The aggregates shall be measured separately by weight. If aggregates are delivered to the mixer in batch trucks, the exact amount for each mixer charge shall be contained in each batch compartment. Weighing boxes or hoppers shall be approved by the Engineer and shall provide means of regulating the flow of aggregates into the batch box so that the required and exact weight of aggregates can be readily obtained.

610-3.5 Consistency. The consistency of the concrete shall be checked by the slump test specified in ASTM C 143.

610-3.6 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 C 94.

610-3.7 Mixing Conditions. The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40 degrees Fahrenheit without permission of the Engineer. If permission 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 degrees Fahrenheit, nor more than 90 degrees Fahrenheit. 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/her expense.

Re-tempering of concrete by adding water or any other material shall not be permitted.

The delivery of concrete to the job shall be in such a manner that batches of concrete will be deposited at uninterrupted intervals.

610-3.8 Forms. Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the Engineer. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as designed 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 Contractor shall bear responsibility for their adequacy. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes. The internal ties shall be arranged so that, when the forms are removed, no metal will show in the concrete surface or discolor the surface when exposed to weathering. All forms shall be wetted with water or with a non-staining mineral oil which shall be applied shortly before the concrete is placed. Forms shall be constructed so that they can be removed without injuring the concrete or concrete surface. The forms shall not be removed before the expiration of at least 30-hours from vertical faces, walls, slender columns, and similar structures; forms supported by falsework under slabs, beams, girders, arches, and similar construction shall not be removed until tests indicate that at least 60% of the design strength of the concrete has developed.

610-3.9 Placing Reinforcement. All reinforcement shall be accurately placed, as shown on the plans, and shall be firmly held in position during concreting. 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.

610-3.10 Embedded Items. Before placing concrete, any items that are to be embedded shall be firmly and securely fastened in place as indicated. All such items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The Contractor shall no embed wood into the concrete. The concrete shall be spaded and consolidated around and against embedded items.

610-3.11 Placing Concrete. All concrete shall be placed during daylight, unless otherwise approved. The concrete shall not be placed until the depth and character of foundation, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved. Concrete shall be placed as soon as practical after mixing and in no case later than 1-hour after water has been added to the mix. The method and manner of placing shall be such to avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. Dropping the concrete a distance of more than 5-feet, or depositing a large quantity at one point, will not be permitted. Concrete shall be placed upon clean, damp surfaces, free from running water, or upon properly consolidated soil.

The concrete shall be compacted with suitable mechanical vibrators operating within the concrete. When necessary, vibrating shall be supplemented by hand spading with suitable tools to assure proper and adequate compaction. Vibrators shall be manipulated so as to work the concrete thoroughly around the reinforcement and embedded fixtures and into corners and angles of the forms. The vibration at any joint shall be of sufficient duration to accomplish compaction but shall not be prolonged to the point where segregation occurs. Concrete deposited under water shall be carefully placed in a compact mass in its final position by means of a tremie, a closed bottom dump bucket, or other approved method and shall not be disturbed after being deposited.

The minimum frequency of mechanical vibrators shall be 8,000 vibration cycles per minute. Application of vibrators shall be at points uniformly spaced and not farther apart than twice the radius over which the vibration is visibly effective. The Contractor shall provide sufficient equipment to insure uninterrupted and continuous vibration of concrete.

610-3.12 Construction Joints. When the placing of concrete is suspended, necessary provisions shall be made for joining future work before the placed concrete takes its initial set. For the proper bonding of old and new concrete, such provisions shall be made for grooves, steps, keys, dovetails, reinforcing bars or other devices as may be prescribed. The work shall be arranged so that a section begun on any day shall be finished during daylight of the same day. Before depositing new concrete on or against previously placed concrete, surfaces that have been in place for eight (8) hours or more shall be cleaned by abrasive blast methods. Surfaces of concrete that have been in place for less than eight (8) hours may be cleaned with air and water jets provided that the surface laitance and curing compound is removed.

610-3.13 Expansion Joints. Expansion joints shall be constructed at such points and of such dimensions as may be indicated on the drawings. The premolded filler shall be cut to the same shape as that of the surfaces being joined. The filler shall be fixed firmly against the surface of the concrete already in place in such manner that it will not be displaced when concrete is deposited against it.

610-3.14 Defective Work. Any defective work disclosed after the forms have been removed shall be immediately removed and replaced. If any dimensions are deficient, or if the surface of the concrete is bulged, uneven, or shows honeycomb, which in the opinion of the Engineer cannot be

repaired satisfactorily, the entire section shall be removed and replaced at the expense of the Contractor.

610-3.15 Surface Finish. All exposed concrete surfaces shall be true, smooth, free from open or rough spaces, depressions, or projections. The concrete in horizontal plane surfaces shall be brought flush with the finished top surface at the proper elevation and shall be struck-off with a straightedge and floated. Mortar finishing shall not be permitted, nor shall dry cement or sand-cement mortar be spread over the concrete during the finishing of horizontal plane surfaces.

When directed, the surface finish of exposed concrete shall be a rubbed finish. If forms can be removed while the concrete is still green, the surface shall be pointed and wetted and then rubbed with a wooden float until all irregularities are removed. If the concrete has hardened before being rubbed, a carborundum stone shall be used to finish the surface. When approved, the finishing can be done with a rubbing machine.

610-3.16 Curing and Protection. All concrete shall be properly cured and protected by the Contractor. The work shall be protected from the elements, flowing water, and from defacement of any nature during the building operations. The concrete shall be cured as soon as it has sufficiently hardened by covering with an approved material. If curing compound method is used, it shall be applied to the concrete immediately following the surface finishing operation in one or more applications totaling a rate of not less than on (1) gallon per 150 square feet.

Water-absorptive coverings shall be thoroughly saturated when placed and kept saturated for a period of at least three (3) days. All curing mats or blankets shall be sufficiently weighted or tied down to keep the concrete surface covered and to prevent the surface from being exposed to currents of air. Where wooden forms are used, they shall be kept wet at all times until removed to prevent the opening of joints and drying out of the concrete. Traffic shall not be allowed on concrete surfaces for seven (7) days after the concrete has been placed.

610-3.17 Drains or Ducts. Drainage pipes, conduits, and ducts that are to be encased in concrete shall be installed by the Contractor before the concrete is placed. The pipe shall be held rigidly so that it will not be displaced or moved during the placing of the concrete.

610-3.18 Cold Weather Protection. When concrete is placed at temperatures below 40 degrees Fahrenheit, the Contractor shall provide satisfactory methods and means to protect the mix from injury by freezing. The aggregates, or water, or both, shall be heated in order to place the concrete at temperatures between 50 and 90 degrees Fahrenheit.

Calcium chloride shall not be used in any concrete containing steel reinforcement or steel embedded items.

610-3.19 Filling Joints. All joints that require filling shall be thoroughly cleaned, and any excess mortar or concrete shall be cut out with proper tools. Joint filling shall not be started until after final curing and shall be done only when the concrete is completely dry. The cleaning and filling shall be carefully done with proper equipment and in a manner to obtain a neat looking joint free from excess filler.

CONTRACTOR QUALITY CONTROL

610-4.1 The Contractor shall be responsible for developing and implementing a Contractor Quality Control Program including inspection and testing to assure compliance with the requirements of this section in accordance with General Provisions Section 100.

METHOD OF MEASUREMENT

610-5.1 Portland Cement Concrete shall not be measured, and shall be incidental to the structure or item into which is incorporated.

610-5.2 Reinforcing steel shall not be measured, and shall be considered incidental to the structure or item into which it is incorporated.

TESTING REQUIREMENTS

ASTM C 31	Making and Curing Test Specimens in the Field
ASTM C 39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C 136	Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM C 138	Unit Weight, Yield, and Air Content of Concrete
ASTM C 143	Slump of Portland Cement Concrete
ASTM C 231	Air Content of Freshly Mixed Concrete by the Pressure Method

MATERIAL REQUIREMENTS

ASTM A 184	Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 185	Welded Steel Wire Fabric for Concrete Reinforcement
ASTM A 497	Specification for Welded Deformed Steel Wire Fabric for Concrete Pavement
ASTM A 615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 33	Concrete Aggregates
ASTM C 94	Ready-Mixed Concrete
ASTM C 150	Portland Cement
ASTM C 171	Sheet Materials for Curing Concrete
ASTM C 260	Air-Entraining Admixtures for Concrete
ASTM C 309	Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 595	Blended Hydraulic Cements
ASTM C 618	Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
ASTM D 1751	Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D 1752	Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

END OF ITEM P-610

Item D-701 Pipes for Storm Drains and Culverts

DESCRIPTION

701-1.1 This item shall consist of the construction of pipe culverts and storm drains in accordance with these specifications and in close conformity with the lines and grades shown on the plans.

MATERIALS

701-2.1 Materials shall meet the requirements shown on the plans and specified below.

701-2.2 Pipe. Pipe shall be of the size called for on the plans and be rubber gasketed reinforced concrete D-load pipe (RGRCP) conforming to the requirements of MAG Section 735 and ASTM C 655.

701-2.3 Concrete. Concrete for pipe collars shall have a minimum compressive strength of 4,000 psi at 28 days and conform to the requirements of Civil Technical Specification Item P-610.

701-2.4 Rubber Gaskets. Rubber gaskets for rigid pipe shall conform to the requirements of MAG Section 618.

701-2.5 Joint Mortar. Pipe joint mortar shall consist of one part Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C 150, Type I. The sand shall conform to the requirements of ASTM C 144.

701-2.6 Pipe Bedding. All pipe bedding shall conform to MAG Section 702 base material.

CONSTRUCTION METHODS

701-3.1 Excavation. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe, but it shall not be less than the external diameter of the pipe plus 6 inches on each side, Conform to MAG Section 601.

Where rock, hardpan, or other unyielding material is encountered, the Contractor shall remove it from below the foundation grade for a depth of at least 12 inches or one-half inch for each foot of fill over the top of the pipe (whichever is greater) but for no more than three-quarters of the nominal diameter of the pipe.

The contractor shall over excavate the pipe trench below the pipe and provide bedding consisting of MAG 702 crushed aggregate base course placed to a depth of 4” or 1/12 of the outside diameter of the pipe, whichever is greater. The compaction density of the bedding material shall be 90% per ASTM D698.

701-3.2 Laying Pipe. The pipe laying shall begin at the lowest point of the trench and proceeding upgrade. The lower segment of the pipe shall be in contact with the bedding throughout its full length. Bell or groove ends of rigid pipes and outside circumferential laps of flexible pipes shall be placed facing upgrade.

Paved or partially lined pipe shall be placed so that the longitudinal center line of the paved segment coincides with the flow line.

701-3.3 Joining Pipe. Joints shall be sealed as specified in MAG Section 618.

701-3.4 Backfilling. Pipes shall be inspected before any backfill is placed; any pipes found to be out of alignment, unduly settled, or damaged shall be removed and re-laid or replaced at the Contractor's expense.

a. Under Aircraft Loaded Paved surfaces and/or as Shown on the Plans within Runway and Taxiway Safety Areas. For pipes placed under taxiway, connecting taxiway, aprons or associated shoulder pavements, backfill shall consist of ½ sack CLSM conforming to, and placed in accordance with, Item P-153 placed from the top of the pipe bedding to one foot above the top of the pipe. The remaining backfill in these areas shall be select material meeting the requirements of, and placed in accordance with, Item P-152 compacted to not less than 100% density as determined by ASTM D 1557. The select backfill shall be placed up to the bottom of the overlying pavement base course.

b. Non-aircraft loaded pavements. For pipes placed under infields or other non-aircraft loaded pavements, backfill shall consist of ½ sack CLSM conforming to, and placed in accordance with, Item P-153 placed from the top of the pipe bedding to one foot above the top of the pipe. The remaining backfill shall be 6” minus native material and shall be placed and compacted in layers not exceeding 8” in compacted thickness. The native material shall be placed from the top of the CLSM to the bottom of millings in paved infields, bottom of P-209 base course under non-aircraft loaded pavements or within 6” of the top of the trench in unpaved areas. The top 6” in unpaved areas shall contain 3” minus material with minimal compactive effort in unpaved areas. All native backfill material shall be compacted to a minimum of 95% maximum density per ASTM D698.

CONTRACTOR QUALITY CONTROL

701-4.1 The Contractor shall be responsible for developing and implementing a Contractor Quality Control Program including inspection and testing to assure compliance with the requirements of this section in accordance with General Provisions Section 100.

METHOD OF MEASUREMENT

701-5.1 The length of pipe shall be measured by linear feet of pipe in place, completed, and approved. It shall be measured along the centerline of the pipe from end or centerline of structure, whichever is applicable. The several classes, types and size shall be measured separately as noted below. All fittings and pipe cradles shall be included in the footage as typical pipe sections in the pipe being measured. Pipe collars shall be measured per each.

BASIS OF PAYMENT

701-6.1 Payment will be made at the contract unit price per linear foot for each kind of pipe of the type and size designated.

These prices shall fully compensate the Contractor for furnishing all materials and for the preparation, excavation, and installation of these materials; bedding, backfill, and for all labor, equipment tools, and incidentals necessary to complete the item. Unless surplus excavated material can be incorporated into other work, the surplus excavated material shall become the property of the Contractor and hauled and disposed of offsite. Hauling and disposal of surplus excavated material shall be included in the unit bid prices.

Payment will be made under:

Item D-701-6.1	18-inch RGRCP, Class V- per Linear Foot
Item D-701-6.2	24-inch RGRCP, Class V- per Linear Foot
Item D-701-6.3	18-inch Concrete Pipe Collar per MAG Std Dtl 505 – per Each
Item D-701-6.4	24-inch Concrete Pipe Collar per MAG Std Dtl 505 – per Each

MATERIAL REQUIREMENTS

ASTM C 94-04	Standard Specification for Ready Mixed Concrete
ASTM C 144-03	Standard Specification for Aggregate for Masonry Mortar
ASTM C 150-04	Standard Specification for Portland Cement
ASTM C 443-03	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C 655-02	Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe
ASTM D 1056-00	Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber
AASHTO M 198	Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets

REFERENCES

MAG 618	Storm Drain Construction with Concrete Pipe
P-153	Controlled Low-Strength Material
D-701	Reinforced Concrete Pipe

TESTING REQUIREMENTS

ASTM D698-00ae1	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM D1557-02e1	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort

END ITEM D-701

Item D-751 Manholes, Trench Drains, Junction Structures and Catch Basins

DESCRIPTION

751-1.1 This item shall consist of the construction of new manholes, new trench drains, and new catch basins, in accordance with these specifications, at the specified locations and conforming to the lines, grades, and dimensions shown on the plans or required by the Engineer.

MATERIALS

751-2.1 Brick. The brick shall conform to the requirements of ASTM C 32, Grade SM.

751-2.2 Mortar. Mortar shall consist of one part Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C 150, Type I. The sand shall conform to the requirements of ASTM C 144.

751-2.3 Concrete. Plain and reinforced concrete used in structures, connections of pipes with structures, and the support of structures or frames shall conform to the requirements of Civil Technical Specification Item P-610, 4000 psi.

751-2.4 Precast Concrete Pipe Manhole Rings. Precast concrete pipe manhole rings shall conform to the requirements of ASTM C 478. Unless otherwise specified, the risers and offset cone sections shall have an inside diameter of not less than 36 inches nor more than 48 inches.

751-2.5 Frames, Covers, and Grates. The castings shall conform to one of the following requirements:

a. Gray iron castings shall meet the requirements of ASTM A 48, Class 30B and 35B.

b. Malleable iron castings shall meet the requirements of ASTM A 47.

c. Steel castings shall meet the requirements of ASTM A 27.

d. Structural steel for grates and frames shall conform to the requirements of ASTM A 283, Grade D.

e. Ductile iron castings shall conform to the requirements of ASTM A 536.

f. Austempered ductile iron castings shall conform to the requirements of ASTM A 897.

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings, aircraft gear configuration and/or direct loading, specified.

Each frame and cover or grate 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 A 123.

CONSTRUCTION METHODS

751-3.1 Unclassified Excavation.

a. The Contractor shall do all excavation for structures and structure footings to the lines and grades or elevations, shown on the plans or as staked. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximately only; and the Engineer may order, in writing, changes in dimensions or elevations of footings necessary to secure a satisfactory foundation. For trench drains, the depth of the trench shall be sufficient to permit satisfactory installation and jointing of the drain and placing of a low slump concrete under and around the drain as detailed on the plans. The contractor shall over excavate below the bottom of the structure and provide bedding consisting of MAG 702 ABC placed to a depth as shown on the plans. The compaction density of the bedding material shall be 90% per ASTM D698.

b. Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or 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 Engineer. All seams or crevices shall be cleaned out and grouted. All loose and 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, and excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

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

d. Unless otherwise provided, bracing, sheathing, or 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 which will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

e. After each excavation is completed, the Contractor shall notify the Engineer to that effect; and concrete or reinforcing steel shall be placed after the Engineer has approved the depth of the excavation and the character of the foundation material.

751-3.2 Concrete Structures. Concrete structures shall be built on prepared foundations, conforming to the dimensions and form indicated on the plans. The construction 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 Engineer before the concrete is poured.

All invert channels shall be constructed and shaped accurately so as to be smooth, uniform, and cause minimum resistance to flowing water. The interior bottom shall be sloped downward toward the outlet.

751-3.3 Precast Concrete Pipe Structures. Precast concrete pipe structures shall be constructed on prepared or previously placed slab foundations and shall conform to the dimensions and locations shown on the plans. All precast concrete pipe sections necessary to build a completed structure shall be furnished. The different sections shall fit together readily, and all jointing and connections shall be cemented with mortar. The top of the upper precast concrete pipe member shall be suitably formed and dimensioned to receive the metal frame and cover or grate, or other cap, as required. Provision shall be made for any connections for lateral pipe, including drops and leads that may be installed in the structure. The flow lines shall be smooth, uniform, and cause minimum resistance to flow.

751-3.4 Inlet and Outlet Pipes. Inlet and outlet pipes shall extend through the walls of the structures

for a sufficient distance beyond the outside surface to allow for connections but shall be cut off flush with the wall on the inside surface, unless otherwise directed. For concrete or brick structures, the mortar shall be placed around these pipes so as to form a tight, neat connection. Replacement of any damaged pipe or pipe that is necessary for installation of drainage structures shall be in accordance with Item D-701 “Pipe for Storm Drains and Culverts”. There shall be no separate measurement or payment for such pipe, and the cost of such pipe shall be incidental to the cost of the structure.

751-3.5 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 Engineer, 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.

When frames or fittings are to be placed upon previously constructed masonry, the bearing surface or masonry shall be brought true to line and grade and shall present an even bearing surface in order that the entire face or back of the unit will come in contact with the masonry. The unit shall be set in mortar beds and anchored to the masonry as indicated on the plans or as directed and approved by the Engineer. All units shall set firm and secure.

After the frames or fittings have been set in final position and the concrete or mortar has been allowed to harden for seven (7) days, then the grates or covers shall be placed and fastened down.

751-3.6 Backfilling.

a. Under Aircraft Loaded Pavements. For structures placed within runway, taxiway, connecting taxiway, aprons, or associated shoulder pavements, backfill shall consist of select materials meeting the requirements of and placed in accordance with Item P-152 compacted to not more than 100% density as determined by ASTM D 1557. The select backfill shall be placed up to the bottom of the overlaying pavement base course.

b. Non-Aircraft Loaded Pavements. For structures placed within infields or other non-aircraft loaded pavements, backfill shall consist of 6” minus native material and shall be placed and compacted in layers not exceeding 8” in compacted thickness. The native materials shall be placed to the bottom of millings in paved infields, bottom of P-209 base course under non-aircraft loaded pavements or within 6” of the top of finished grade in unpaved areas. The top 6” in unpaved areas shall contain 3” minus material. All native backfill material shall be compacted to a minimum of 95% maximum density per ASTM D 698.

c. After a structure has been completed, the area around it shall be filled with approved native material, in horizontal layers not to exceed eight (8) inches in loose depth, and compacted to the density required 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 Engineer.

d. Backfilling shall not be placed against any structure until permission is given by the Engineer. In the case of concrete, such permission shall not be given until the concrete has been in place 7 days, or until tests made by the laboratory under supervision of the Engineer 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.

e. Backfill shall not be measured for direct payment. Performance of this work shall be considered as a subsidiary obligation of the Contractor covered under the contract unit price for the structure involved.

751-3.7 Cleaning and Restoration of Site. After the backfill is completed, the Contractor shall

dispose of all surplus material, dirt, and rubbish from the site. Surplus soil may be deposited in embankments, shoulders, or as ordered by the Engineer provided the surplus material conforms to the embankment quality requirements. The Contractor shall restore all disturbed areas to their original condition.

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

CONTRACTOR QUALITY CONTROL

751-4.1 The Contractor shall be responsible for developing and implementing a Contractor Quality Control Program including inspection and testing to assure compliance with the requirements of this section in accordance with the General Provisions Section 100.

METHOD OF MEASUREMENT

751-5.1 Manholes, catch basins, and junction structures shall be measured by the unit.

BASIS OF PAYMENT

751-6.1 The accepted quantities of manholes, catch basins, 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 such specials and connections to pipes 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.

Payment will be made under:

Item D-751-6.1	Construct Concrete Catch Basin Per MAG Std Dtl 535 – per Each
Item D-751-6.2	Construct Shallow Storm Drain Manhole per MAG Std Dtl 522 – per Each

MATERIAL REQUIREMENTS

ASTM A 27-03	Standard Specifications for Steel Castings, Carbon, for General Application
ASTM A 47-99	Standard Specifications for Ferritic Malleable Iron Castings
ASTM A 48-03	Standard Specifications for Gray Iron Castings
ASTM A 123-02	Standard Specifications for Zinc (Hot Dip-Galvanized) Coatings on Iron and Steel Products
ASTM A 283-03	Standard Specifications for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A 536-84e1	Standard Specifications for Ductile Iron Castings
ASTM A 897-03.	Standard Specifications for Austempered Ductile Iron Castings

ASTM C 32-04	Standard Specifications for Sewer and Manhole Brick (Made from Clay or Shale
ASTM C 144-03	Standard Specifications for Aggregate for Masonry Mortar
ASTM C 150-04	Standard Specifications for Portland Cement
ASTM C 478-03a	Standard Specifications for Precast Reinforced Concrete Manhole Sections

TESTING REQUIREMENTS

ASTM D 698-00ae1	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.

END OF SECTION D-751

SECTION IV

ELECTRICAL SPECIFICATIONS

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ELECTRICAL SPECIFICATIONS

ITEM L-100 ELECTRICAL GENERAL REQUIREMENTS

DESCRIPTION

100-1.1 GENERAL.
This Item includes furnishing and installing all material, equipment and apparatus, and all labor, tools, services and equipment required for the demolition and salvage/removal of portions of the existing airfield lighting systems, as specified in this specification and as shown in the drawings.

This item also includes furnishing and installing all material, equipment and apparatus, and all labor, tools, services and equipment required for the installation of concrete sign bases, sign base extensions and re-installation of existing airfield guidance signs, as specified in this specification and as shown in the drawings.

Installation shall be in accordance with Specifications FAA-C-1217 and FAA-C-1391, except as specified herein. Perform all work not included in the FAA Specifications in accordance with the National Electrical Code, applicable local and Phoenix Sky Harbor International Airport (PSHIA) standards and regulations.

100-1.2 DEMOLITION AND SALVAGE.

a. Demolition, removal and/or salvage of airfield electrical elements is included under this Item shall include the intent, but not be limited to the specific elements, of the following:
- Concrete Sign Bases: Remove and dispose of in accordance with local ordinances.
- Underground conduits and duct banks, both concrete encased and direct earth buried. Remove and dispose of in accordance with local ordinances.
- Airfield Lighting Cable
- Airfield Guidance Signs: Salvage for re-installation.

b. Removal of other elements associated with the airfield electrical system is included under Item P-151 “Removal of Existing Facilities”. Elements covered shall include the intent, but not be limited to the specific elements, of the following:

- Grading and backfill associated with removal of the foregoing elements shall be covered under other Items of these specifications (P-152, “Excavation and Embankment”).

100-1.3 RELATED DOCUMENTS.
The General Provisions of the Contract, including General and Special Conditions, apply to work specified in this Item.

a. Conflicts between Drawing and Specifications (Contract Documents) and between Contract Documents and references within the Contact Documents: Drawings and specifications are complementary. Work called for by one is binding as if called for by both. No allowance shall subsequently be made to the Contractor by reason of his/her failure to have brought said discrepancies to the attention of the Consultant during the bidding period or by reason of any error on the Contractor's part.

100-1.4 SPECIFICATIONS AND STANDARDS.
As a supplement to the installation requirements of this item, the following standard specifications and regulations of the issues in effect on the date of this solicitation are incorporated herein by reference and are made a part hereof for electrical work and installation and splicing of underground cables.

NEC	National Electrical Code
FAA-STD-019e	Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities
FAA-C-1391c	Installation, Termination, Splicing, and Transient/Surge Protection of Underground Electrical Distribution System Power Cables
Local Governing Bodies' Codes and Regulations	Public Works Department, City of Phoenix, Maricopa Association of Governments (MAG)

100-1.5 SHOP DRAWINGS AND MATERIAL LISTS.
Prior to the installation of any material and equipment and within 30 days of contract award, the Contractor shall submit to the Owner for approval six (6) copies of manufacturers' brochures or electronic PDFs containing complete dimensional and performance characteristics, wiring diagrams, installation and operation instructions, etc., for the equipment listed in the individual L-Series specification Items.

A materials list shall be submitted listing each specification paragraph number and stating whether the materials proposed are as specified or are substitutions. If the item is a substitute item, a complete submittal as described in the above paragraph shall be provided for that item.

The submittal shall be complete and made in one submission in booklet form with hardbound cover. Partial submissions will not be reviewed or considered. Prior to the installation of any material and equipment and within 30 days of contract award, the Contractor shall submit to the Owner for approval six (6) copies of manufacturer's brochures or electronic PDFs containing complete dimensional and performance characteristics, wiring diagrams, installation and operation instructions, etc., for the following equipment:

a. Concrete Sign Mounting Screws / Anchor Bolts
b. Ground Rods
c. Bronze Sign Base Markers
d. Bare Copper GROUND, #6 AWG Solid and Stranded

e. Exothermic Welds and Molds

100-1.6 CONCRETE SIGN BASES.
Contractor may opt to submit on precast sign bases; however due to existing underground utilities and obstructions, cast in place sign bases are recommended. Cast in place concrete sign bases shall be constructed in accordance with the Plans and Specifications complete with transformer housings, covers, gaskets, drains, bronze circuit ID markers and grounding. Concrete mix designs shall be submitted in accordance with Civil Specifications, Item P-610.

100-1.7 CAST-IN-PLACE CONCRETE SIGN BASE EXTENSIONS.
Cast in place concrete base extensions shall be constructed in accordance with the Plans and Specifications. Concrete mix designs shall be submitted in accordance with Civil Specifications, Item P-610.

100-1.8 AIRFIELD LIGHTING SYSTEM OPERATIONAL TESTS.
The Contractor is required to reconnect the affected airfield lighting circuits in existing hand holes or junction structures after the removal of existing cables to maintain operation of circuits during construction. The Contractor shall test and operate the effected airfield lighting and miscellaneous power circuits to verify correct operation as required by Airport Maintenance and Operations.

EQUIPMENT AND MATERIALS

100-2.1 EQUIPMENT.
Conduits, conduit fittings, conductors, connectors, boxes, and wiring devices, shall meet requirements of Specification FAA-C-1217.

110-2.2 5KV WIRE.
All 5kV cables for airfield lighting are specified in Item L-108.

100-2.3 CONDUIT, UNDERGROUND.
Conduits run underground are specified in Item L-110 of these specifications.

100-2.4 CONDUIT FITTINGS.
Each PVC conduit entrance to sign base transformer housing shall be fitted with end bells in accordance with item L-110 of these specifications.

100-2.5 SLURRY-ENCASED DUCT.
Slurry-encased PVC duct shall be provided as detailed on the plans. Slurry shall be provided with a Detectable Foil warning tape as detailed on the plans and specified in Item L-110.

100-2.6 CONCRETE.
Structural concrete for Cast In-Place Sign Bases shall be as specified in FAA Specifications P-610 “Structural Portland Cement Concrete”, Concrete Class B for 4000 PSI strength at 28 days and installed as detailed on drawings.

100-2.7 CONTROLLED LOW STRENGTH MATERIAL (CLSM).
CLSM (aka. Flowable Fill) shall be as specified in FAA Specification P-153, “Controlled Low-Strength Material (CLSM)” and installed as detailed on drawings.

100-2.8 CONCRETE HANDHOLES.
Handholes and manholes are existing. Refer to Civil Plans for elevation adjustments, new lids and ID plaque removal and installation for electrical structures.

100-2.9 LIGHT BASES AND TRANSFORMER HOUSING.
Transformer housings and covers for sign bases shall be as specified in 150/5345-42 and as detailed on drawings.

CONSTRUCTION METHODS

100-3.1 EXISTING UTILITIES.
Prior to any excavation or trenching, locate any existing cables and utilities, which will be crossed by the trench. Ensure these utilities are permanently disconnected if they are going to be demolished. The existing service lines shall be exposed by hand digging in those areas that will be crossed and shall be protected from any possible damage. If any damage occurs, it shall be the Contractor's responsibility to notify the Owner and to immediately repair such damage with materials and methods approved by the Owner and in compliance with applicable codes and standards, at no additional cost to the Owner. Existing utilities to be abandoned or removed at the point of crossing as shown on the drawings.

100-3.2 DEMOLITION.

a. General Airfield Lighting.

(1) Removal of indicated power cables from conduits and ducts, shall be as shown on plans. Contractor shall reconnect the affected circuits within each manhole or junction structure to maintain circuit operation. Contractor may use existing removed cable for temporary power to signs during sign base reconstruction as required by Airport Operations.

(2) Demolish indicated conduits, ducts and concrete sign bases per the requirements of Civil Specifications. Elements covered shall include the intent, but not be limited to the specific elements, of the following:

- Concrete sign bases, encased L-867 transformer housings and miscellaneous concrete footings.
- PVC conduit / ducts, both direct buried and concrete encased.

(3) Remove demolished material from site and dispose of according to local regulations.

(4) Provide backfill meeting the requirements of P-152, “Excavation and Embankment”. Unless otherwise required for general Civil excavation and embankment, replacement backfill and paving repair shall be incidental to the demolition item.

100-3.3 CAST-IN-PLACE CONCRETE SIGN BASES.
The Contractor shall survey and stake the new location for New Concrete Sign Base with an offset point for proper orientation. Surveyed point represents (Taxiway/Inboard) end of sign as indicated on Plans. Base shall be laid out to extend approximately 24" additional at Taxiway/ Inboard end, to provide for transformer housing, conduit stubs, ground sleeve and base marker as detailed in the Plans. Power stub to Sign Leg from L-867B transformer housing shall be at least 18" from center of housing to prevent sign end from obstructing access to transformer. The overall length of base shall extend from the 24" adjustment at transformer housing end. Base shall be formed level on compacted base and at 1' above new grade to bottom of chamfered edge at highest point of surrounding finished grade. Existing or new conduit to feed sign shall be connected to transformer housing. Spare conduit stubs from base can shall be provided for future connections with unused ends, fitted with female couplings against wall of excavation and sealed to prevent infiltration of concrete and debris. The L-867 transformer housing, conduit stub to power leg of sign and ground sleeve shall be secured to form to prevent moving during concrete placement. Concrete shall be placed and agitated with vibrator to prevent any voids and finished to provide level, uniform surface. Any portion of base exceeding 1" above grade shall be provided with asphalt pavement tapered into existing grade as required. Concrete shall be allowed to cure prior to installation of sign.

100-3.4 CAST-IN-PLACE CONCRETE SIGN BASE EXTENSIONS.
Cast in place concrete base extensions shall be constructed level with existing sign base on compacted surface. Existing signs may remain in place, if possible, during installation of base extension and protected from damage, concrete splatter and / or asphalt sealant overspray. End of existing cast in place sign base shall be cut off straight, if required, to provide uniform surface for drilling to receiving dowels, or to remove unsuitable material at cold joint between existing and new concrete. Reinforcing steel shall be doweled into the end of existing sign base a minimum of 6". Surface of the extension shall be finished level and uniform. Edges of new extension shall be finished with beveled edge or rounded to match existing. Any portion of base extension exceeding 1" above grade shall be provided with asphalt pavement tapered into existing grade as required.

100-3.5 GROUNDING.
All metal support structures and metal enclosures shall be grounded in accordance with the requirements of the Specifications FAA-C-1217, FAA-C-1391, and FAA-STD-019, and as indicated on the drawings.

100-3.6 GROUND RODS.
Grounding rods shall be 3/4-inch diameter by 10 feet long copper-jacketed steel. Grounding connections shall be by the exothermic weld process, Cadweld or equal. **Extruded, drawn or stamped-type ground clamps will not be acceptable.** The resistance to ground shall not exceed 25 ohms.

100-3.7 GROUND CONDUCTORS.
Equipment grounding conductors shall be as specified in L-108. Ground conductors shall be insulated copper, except where shown on the project drawings to be bare and sized #6 AWG as shown on the project drawings. Solid copper shall be used for counterpoise and where embedded in concrete or direct buried. 7-Strand bare copper conductor shall be used in conduit with L-824 cables, per PSHIA standards. All grounds will be shown in accordance

with Article 250 of the National Electrical Code and with FAA-STD-019. Attachment of wire to signs shall be accomplished using approved ground lug attached with a separate stainless steel screw, lock washer and nut. Screws used for support of the electrical enclosure shall not be used for connection of the ground wire. Pipe straps shall not be used for ground purposes.

COLOR CODING OF GROUND CONDUCTORS

TYPE OF GROUND CONDUCTOR	COLOR OF INSULATION
Grounding Electrode Conductor	Bare, solid – No Insulation
Equipment Grounding Conductor	Green (safety) or Bare 7-Strand

100-3.8 IDENTIFICATION.
Sign Base circuit identification markers shall be as detailed on the drawings. Cable tagging and markers shall be identified as per FAA-C-1391, Sections 5.11.1 and 2.

100-3.9 AIRFIELD LIGHTING VAULT LOCK-OUT/TAG-OUT POLICY.
The purpose of this procedure is to standardize the lockout tag out procedures between Electrical Contractors, PSHIA Electricians, Operations and PSHIA Air Traffic Control Tower (ATCT).

a. Sky Harbor electricians responding to a lock-out/tag-out request will coordinate with the ATCT through Operations.

b. After Operations notifies electricians of closures, the Sky Harbor electricians will turn off the closed runways/taxiways using the airfield computer system.

c. The Contractor will supply an approved breaker-locking device and lock, then lock off the individual breakers for the circuits to be locked out. These items will remain in the vaults in a lock box provided by Sky Harbor Electrical Section.

d. The Sky Harbor Electric Section will lock the panel doors shut with a hasp and an Electrical Section Lock.

e. The S-1 cutouts will be pulled, locked and placed on the corresponding regulator by the electrical Contractor.

f. The electrical contractor and Sky Harbor electricians **must fill out lock-out forms** before leaving the vault.

g. Upon completion of the lockout, the Contractor will remove all locks and install the load breaks. All circuits **must be verified operational** in the manual mode on the regulator. Operations will perform a complete check the lights in the field, to verify actual operation.

h. When that has been completed, Sky Harbor electricians will notify Operations when lock-in is complete and regulators are in remote control; Operations will notify the ATCT that they have control of the airfield lighting.

i. Complete lock-out/lock-in forms.

This procedural checklist must be followed to the letter.

METHOD OF MEASUREMENT

100-4.1 ELECTRICAL SERVICES.
The electrical services to be paid under this Item shall include:

a. The quantity to be measured shall be for remove and salvage of existing signs and isolation transformers, including demolition and disposal of indicated concrete sign bases. Existing signs shall be safely stored until reinstallation.

b. Removal of existing airfield lighting cable

c. Removal of existing conduits, both direct buried and concrete / slurry encased.

d. Installation of salvaged Airfield Guidance Signs and isolation transformers on new concrete sign bases.

e. Installation of concrete sign base extensions on existing sign bases (If Applicable).

f. Providing and installing new manhole identification plaques per the plans.

BASIS OF PAYMENT

100-5.1 ELECTRICAL SERVICES.
Payment will be made at the contract price for the electrical services completed and accepted. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete this Item. Removal of existing conduits and conductors associated with demolished items shall be incidental to the costs. The unit price of each of these items shall also include the Contractor's overhead, profit and markup.

Payment will be made under:

Item L-100-5.1	Remove and Salvage Existing Airfield Guidance Sign and Isolation Transformer, Remove Concrete Sign Base – per each
Item L-100-5.2	Remove Existing Cable, Conduit to Remain – per linear foot
Item L-100-5.3	Excavate and Remove Existing Conduit (Contingency Item) – per linear foot

Item L-100-5.4 Install Salvaged Runway Distance Remaining Sign and Isolation Transformer on New 7.5', Size 4 RDR Concrete Sign Base – per each

Item L-100-5.5 Install Salvaged Airfield Guidance Sign and Isolation Transformer on New 10.5', 2-Module Concrete Sign Base – per each

Item L-100-5.6 Install Salvaged Airfield Guidance Sign and Isolation Transformer on New 14', 3-Module Concrete Sign Base – per each

Item L-100-5.7 Install New Manhole ID Plaque on New or Existing Manhole Cover – per each

Item L-100-5.8 Remove Existing Abandoned Sign Base, Reconnect Existing Conduit – per each

END OF ITEM L-100

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 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 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 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 steel. The ground rods shall be of the length and diameter specified on the plans, but in no case be less than 10 feet long and 3/4 inch 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 wide) and Scotch™ 130C® linerless rubber splicing tape (2-inch 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 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 5 feet 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 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 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. (NOT USED) 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 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 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 unless otherwise specified.
- Minimum cable depth when crossing under a railroad track, shall be 42 inches unless otherwise specified.

The Contractor shall excavate all cable trenches to a width not less than 6 inches. 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 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 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 deep, loose measurement; and shall be either earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch sieve. This layer shall not be compacted. The second layer shall be 5 inches deep, loose measurement, and shall contain no particles that would be retained on a one-inch sieve. The remaining third and subsequent layers of backfill shall not exceed 8 inches of loose measurement and be excavated or imported material and shall not contain stone or aggregate larger than 4 inches 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 with controlled low strength material (CLSM) in accordance with P-153.

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 above the direct-buried cable or the counterpoise wire if present. A 3-6-inch 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 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 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 with controlled low strength material (CLSM) in accordance with P-153. 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. (NOT USED) The location of direct buried circuits shall be marked by a concrete slab marker, 2 feet square and 4-6-inch thick, extending approximately one inch 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 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 high and 3 inches wide, with width of stroke 1/2 inch and 1/4 inch 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 on each side of the joint (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches 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 on each side of the joint. (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches 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 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 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 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 contaminates 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 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. – may be used by the RPR for areas that have high rates of lightning strikes. The counterpoise size is determined by the RPR. 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 minimum or 12 inches 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.

b. Isolation – used in areas where lightning strikes are not common. Counterpoise size is selected by the RPR. 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 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 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 100 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 Cable or counterpoise wire installed in trench, duct bank or conduit shall be measured by the number of linear feet installed with primary connector kits, grounding conductor and grounding connectors ready for operation, and accepted by Owner / Engineer. Separate measurement shall be made for each single cable (1/C), cable pair (2/C) or feeder set, installed in duct bank or conduit with associated ground wire and connections included in Contractor’s price. The measurement for this item shall include additional quantities required for slack. No separate measurement will be made to multiply the number of individual conductors installed in a single conduit, in one installation effort.

108-4.2 Counterpoise wire and connections are considered incidental to the installation of duct bank or conduit, per item L-110. No separate payment will be made.

108-4.3 Ground rods shall be considered incidental to the installation of counterpoise, light base, transformer housing, sign or other grounding. No separate payment will be made.

BASIS OF PAYMENT

108-5.1 Payment will be made at the contract unit price for cable and equipment ground installed in duct bank or conduit, in place by the Contractor and accepted by the Engineer. 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:

Item L-108-5.1	L-824, Type C, 2/C #8 AWG, 5kV Cable (w/ Bare #6 Stranded Cu. Ground) – 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

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. Concrete shall be proportioned, placed, and cured per state department of transportation structural concrete with minimum 25% Type F fly ash, and a minimum allowable compressive strength of 4,000 psi (28 MPa).

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 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 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 per 100 feet. 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 below the subgrade; in other locations, the top of the duct bank or underground conduit shall be not less than 18 inches 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 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 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.

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, taxi-lanes, 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 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 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.

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 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 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 beyond the edges of the pavement or 3 feet 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 thick prior to its initial set. The Contractor shall space the conduits not less than 3 inches 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 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 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 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 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 wide tape, 8 inches minimum below grade above all underground conduit or duct lines not installed under pavement. Utilize the 3-inch wide tape only for single conduit runs. Utilize the 6-inch wide tape for multiple conduits and duct banks. For duct banks equal to or greater than 24 inches 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 nor more than 12 inches 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 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 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 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 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 apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches 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 apart (measured from outside wall to outside wall) in a horizontal direction and lot less than 6 inches 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 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 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 square and 4 - 6 inches thick extending approximately one inch 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 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 high and 3 inches wide with width of stroke 1/2 inch and ¼-inch 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 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 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 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 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 sodding, top-soiling, fertilizing, liming, seeding, or mulching as 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. Removed cable may become property of the Contractor and recycled or disposed of off-site, in accordance with local ordinances (as specified in L-100).

METHOD OF MEASUREMENT

110-4.1 MEASUREMENT. Underground conduits and duct banks shall be measured by the linear feet of conduits and duct banks installed, including encasement, counterpoise conductor, ground rods and connections, locator tape, trenching and backfill with designated material 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. 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, for drain lines and the termination at the drainage structure. 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 per the provisions and intent of the plans and specifications.

Payment will be made under:

Item L-110-5.1	Single-way, (1) - 2" Conduit, Slurry Encased (Contingency Item) – 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-867 LIGHT BASE AND TRANSFORMER HOUSING

DESCRIPTION

867-1.1 RELATED DOCUMENTS. The General Provisions of the Contract, including General and Special Conditions apply to work specified in this Item.

867-1.2 GENERAL. This Item is for reference for transformer housings for airfield guidance sign bases.

The Federal Aviation Administration (FAA) Type designation of the light bases, extensions, elevated light covers and elevated light stake mountings are as follows:
Type L-867 Bases and extensions for applications subject to occasional light vehicular loading but no aircraft or other heavy vehicular loading.

The following class designations apply to Type L-867:
Class IA Bases, extensions and elevated light covers that are fabricated from metal in exact conformance to the critical dimensions and requirements necessary for standardization between parts specified herein.

The size refers to the nominal diameter of the light base and cover plates. Sizes and applicable types are as follows:

Size / Type
Size B - 12 inch Type L-867

Type L-867 is used as a mounting base for airport light fixtures, as a transformer housing and as an electrical junction box. The Type L-867 base must be designed to withstand occasional light vehicular loads. It is subject to direct earth burial with and without concrete backfill.

867-1.3 SHOP DRAWINGS AND MATERIAL LISTS. Prior to the installation of any material and equipment and within 30 days of contract award, the Contractor shall submit to the Owner for approval six (6) copies of manufacturers' brochures containing complete dimensional and performance characteristics, installation and operation instructions, etc., for the following equipment:

- **a.** L-867B Galvanized Steel Base Cans
- **b.** Blank cover plates and gaskets.
- **c.** Stainless Steel Bolts
- **d.** Rubber Grommets
- **c.** Grounding Clamps and Lugs.

867-1.4 LOCATION/ELEVATION. Concrete Sign Bases shall be laid out as indicated on the drawings. Longitudinal tolerance is +/- 6 inches.

Elevation of new sign bases shall be coordinated with new grading and drainage conditions. The +/- 1 inch tolerance for the finished surface of the concrete shall be considered when

installing the base cans so that the transformer housing flange may be placed flush with concrete.

867-1.5 LIGHT BASE AND LIGHT INSTALLATION ALIGNMENT TOOL. Junction cans and transformer housings shall be securely fastened to forms with steel strut or equivalent, flush with foundations or ½" maximum above sono-tube forms and leveled prior to placement of concrete.

867-1.6 TEMPORARY BLANK COVER PLATES. Plywood covers are to be used to protect the bases during shipping, installation and construction. For all galvanized bases, a gasket shall be installed between the base and plywood cover to eliminate the bonding action of the plywood and zinc and to seal the inside of the base to protect during shipping and from construction materials. Plywood should be exterior grade ½ inch (13 mm) thick Bb/Cc or other material equal strength and weather resistance for Type L-867 light bases.

867-1.7 CIRCUIT IDENTIFICATION NUMBERS. On the plans circuit identification numbers have been assigned to each circuit to be installed. The circuit ID assigned shall apply during construction. Upon completion of the project the circuit ID shall be affixed to junction cans. The placing of these ID numbers shall be accomplished by use of 2–inch diameter nonferrous metal tag, with the numerals approximately ¼ inch in height, stamped in, embedded in the concrete as detailed on the drawings.

MATERIALS

867-2.1 GENERAL. Airport lighting equipment and materials covered by FAA specifications shall have the prior approval of the Federal Aviation Administration, Airports Service Washington, D.C. 20590.

867-2.2 CONSTRUCTION. Construction of airport light bases, transformer housings and junction cans shall meet the requirements of latest version of AC 150/5345-42 Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories.

- **a.** Steel shall be used in the construction of L-867 bases, extensions, and accessories and shall meet the requirements of ASTM A-36. All welds shall be continuous to provide water tightness.
- **b.** Construction of PVC or polyethylene plastic on other non-metallic materials for L-867 and L-868 bases will not be accepted.

867-2.3 FABRICATION AND MATERIALS. Bases and related accessories, designed to function as light bases, transformer housings, and junction boxes, must be fabricated of suitable material to meet the following standards. Appropriate separation material must be used between dissimilar metals to prevent galvanic action between flange rings, spacer rings etc. Copper ground components and stainless steel bolts are exempted. This separation material must not deform at 450 psi (a load equivalent to the L-868 load test) to prevent compression and subsequent loosening of bolts.

867-2.4 HARDWARE. Bolts and lock washers shall be supplied with each base and extension assembly. The bolts shall conform to dimensions specified in the AC - Manufacturer furnished fully threaded (tap bolts) 18-8 stainless steel, hex head 3/8" bolts (or

coated bolts per Engineering Brief 83) sufficiently long to provide full thread engagement into the mounting surface. Install with high temperature anti-seize compound.

867- 2.5 SHIPPING COVERS. Plywood covers are used to protect bases during shipping and installation and are to be installed on all base or base extension shipments.

- For all galvanized bases, a 3 mil (0.003 inch) polyethylene shipping gasket may be installed between the base and plywood cover or, as an alternative, the plywood cover should be waxed on the bottom surface to eliminate the bonding action of the plywood and zinc.
- The Type L-868 plywood cover should also be waxed on the OD edge to facilitate easy removal from any surrounding embedment material.
- Plywood should be exterior grade 1/2 inch (13 mm) thick Bb/Cc or other material of equal strength and weather resistance for Type L-867 light bases.

867-2.6 "MUD" COVERS. Mud covers may stand alone or may be used in conjunction with plywood covers on Type L-867 and Type L-868 bases to protect the base flange during construction, and to include surface marking to facilitate locating the center of the base when coring out to locate the base after pavement overlay. Mud covers are appropriately sized for the specific bases they are to protect.

867-2.7 BLANK COVERS. Blank covers are used to provide a cover for bases when no light fixture is to be installed. For Type L-867B and Type L-867D non-load bearing bases, the cover must be a minimum of 3/8 inches. For Type L-867E bases, the cover must be a minimum of 1/2 inch.

867-2.8 GROMMETS. Grommets supplied for duct entrances into bases shall be sized to provide a watertight connection and be made of a material suitable for direct earth burials or encasement by asphalt, Portland cement concrete, or epoxy sealers. The grommet material shall have a hardness of 50 - 2240.

867-2.9 GROUNDING LUGS. To provide maintenance personnel electrical safety, the manufacturer must install both an internal and external ground strap. The ground strap functions as a means to connect a ground lug that is connected to an earth ground or a safety ground conductor. For Class I bases, a metallic ground connector or strap must be welded to the interior and exterior wall of each base before applying surface protection. The details and location of the grounding lug are shown on the plans. The location of the lug may be varied to meet specified conditions. A three-hole copper or two stacked lay-in copper ground connector lugs shall be bolted to the steel lug by Contractor and should not be fastened to the ground connector or strap until after the base surface protection is applied.

Note: Under no circumstances should an exothermic weld be used to attach a ground or counterpoise connection to a galvanized light base because of the potential for heat damage to the galvanized coating. Under field conditions, repairs to the zinc coating after an exothermic weld are usually ineffective. If the galvanized coating is compromised, the corrosion of exposed light base steel will accelerate.

867-2.10 DRAINS. The conduit/base system should have drains installed in all the bases

and at low points in the system to provide for drainage of water and deicing fluids away from the base and conduit system. If water and deicing fluids are allowed to pool for long periods of time in the light base, they will hasten corrosion of both the conduit and base system.

CONSTRUCTION METHODS

867-3.1 TRANSFORMER HOUSING. Light bases shall be installed for each new concrete sign base at the locations shown on the plans. The bases shall be installed per the details shown on the plans. The standard base can configuration shall include four drilled openings toward the bottom of the base for the installation of the conduit grommets and a ¾" hole in bottom for drain. The Contractor shall drill, in the appropriate location(s), any additional openings for additional conduit entries. Installation and connection of ground rods at each concrete sign base as detailed on the plans for the grounding system shall be incidental to the respective pay item.

867-3.2 CONDUIT CONNECTIONS. Prior to concrete encasement, conduit connections shall be made with rubber grommets at the base to form a watertight connection as shown on the plans.

867-3.3 EXCAVATION AND BACKFILL. Each light base location shall be carefully excavated by widening the conduit trench to the outer dimension of the concrete encasement. After the casement has set and conduits are connected to the base, the trench and base excavation shall be backfilled and compacted to the requirements of Item P-152. The cover-plates shall be visible and free of debris following completion of the backfill.

METHOD OF MEASUREMENT

867-4.1 TRANSFORMER HOUSING. The quantity to be measured shall be per each for the provision and installation of each L-867B junction can for each sign base in accordance with the plans and specifications and as accepted by the Owner.

BASIS OF PAYMENT

867-5.1 TRANSFORMER HOUSING. Payment for transformer housing installations shall be part of payment for the various types of airfield guidance signage bases installed.

REFERENCED PUBLICATIONS

867-6.1 FAA Specifications referenced in L-867.

AC 150/5345-42	Specification for Light Base and Transformer Housing, Junction Boxes and Accessories

END OF ITEM L-867

END OF ELECTRICAL SPECIFICATIONS