San Manuel Airport
San Manuel, AZ 85631
Operated by Pinal County, AZ
Telephone: (520) 866-6545
www.pinalcountyaz.gov

NOTICE TO OFFERORS
INVITATION FOR BIDS
San Manuel Airport Apron Reconstruction & Shade Ports
County Project No. 61790015
Bid No. PW14-15-009
ADOT Grant No. E4S1V

ADDENDUM #2

February 24, 2015

Registered Professional Engineer (Civil)
CERTIFICATE NO.
49015
RYAN W.
TONER
Date Signed 02/24/15
ARIZONA, U.S.A.
Expires 12/31/17

TO ALL PROSPECTIVE OFFERORS RESPONDING TO THE INVITATION FOR BIDS FOR THE **AIRPORT APRON RECONSTRUCTION & SHADE PORTS** PROJECT AT THE SAN MANUEL AIRPORT, as outlined in the aforementioned Invitation for Bids (INV) and available via the internet at www.pinalcountyaz.gov/PublicWorks/BidsSolicitations/Pages/home.aspx. This addendum is issued to clarify the aforementioned Invitation for Bids issued by Pinal County.

I. General

1. The Meeting Minutes from the Pre-Bid Conference held on Wednesday, February 18, 2015 are attached.

2. The Report on Pavement Investigation prepared by Speedie & Associates dated May 7, 2014 for this project is attached.

Pre-Bid Conference Meeting Minutes

Wednesday, February 18, 2015, 10:00 a.m.
San Manuel Airport Office

1. Introductions

a. Pinal County/San Manuel Airport Project Manager/Staff:
   Jim Petty – Airport Manager
   Gloria Bean – Contracts Supervisor
b. Design Engineering (Dibble Engineering/CR Engineers):
   Ryan Toner P.E. - Project Manager
   Jared Bass, P.E. – Project Engineer
   Catherine Alcorn, P.E. – Electrical Design Project Manager
c. Construction Administration (Dibble Engineering/Dibble CM/CR Engineers):
   Ryan Toner, P.E. – Project Manager
   Dibble CM – Construction Inspection
   Randy Despain – Electrical Construction Inspection

2. Bidding Process and Timeline

a. Pre-Bid Conference: February 18, 2015, 10:00 a.m.
b. Last Day for Contractor's Questions: March 4, 2015, 12:00 p.m.
c. Last Addendum: March 11, 2015, 12:00 p.m.
d. Bids Due: March 24, 2015, 2:00 p.m.
   i. *Bids must be submitted to the Pinal County Administration, Development Services Building "F" (east entrance) on 31 North Pinal Street, P.O. Box 727, Florence, Arizona 85132. Commonly referred to as the "One-Stop Shop".*
e. Bid Opening: March 24, 2015, 2:05 p.m.
f. Plans Available (**Order and Pick-up**): Pinal County Public Works
g. Bid Format: Unit Price (see Addendum No. 1)
h. Bid Price Hold: 60 days after March 24, 2015

3. Project Description

This project includes reconstruction of the asphalt concrete pavement aircraft parking apron and the installation of new aircraft shade ports ("T-shades") at San Manuel Airport.

4. Bid Schedule

a. Base Bid - Schedule I: Unit Pricing
b. Additive Alternate Bid No. 1 – Schedule II: Unit Pricing
c. Additive Alternate Bid No. 2 – Schedule III: Unit Pricing
d. Basis of Award: Lowest Responsive, Responsible Bidder

5. Schedule and Phasing

a. 70-calendar-day construction duration
b. 4 Phases – See Drawing G1.4 in Plans. Need to maintain access to hangars and fueling to the greatest extent possible.

6. Liquidated Damages

See Special Provisions section 27 Liquidated Damages.

a. $1,500 per day in excess of the allotted total Contract Time (70 Calendar Days)
b. $500 per day for each and every day in excess of the allotted phase durations for Phases A, B, C, and D as indicated in the Project Plans.

7. Access, Staging and Storage

a. Contractor Staging Area and Stockpile Area west of existing hangars at Airport (near existing electrical vault).
b. Specific access/haul roads for individual phases of work are shown on the Airport & Project Site Plan in the Construction Plans.
c. Contractor responsible for incidental grading and infrastructure necessary for temporary haul roads. Contractor to return any disturbed area to a condition better than previously disturbed.

8. Special Requirements

a. DBE Requirements and goals – DBE Goal of 3.66% of total amount of the bid

9. Airfield Safety and Security & Construction Phasing and Safety Plan

Section 48 in the Special Provisions in the Contract Documents details the airfield safety and security requirements for this project.

a. Contractor Escorts, Security/Gate Guards, Flaggers/Crossing Guards – Contractor is responsible for maintaining security of the airfield and maintaining safety for aircraft operations during construction. Requirements for escorts, security/gate guards, and flaggers/crossing guards are detailed in Section 48 in the Special Provisions.
b. Construction Phasing and Safety Plan – The successful bidder will be required to adhere to the requirements in the Construction Safety and Phasing Plan (Appendix A in the Contract Documents), and will be required to submit a Construction Safety and Phasing Plan Compliance Document prior to beginning work.
c. Vehicle Lighting and Flagging

10. Miscellaneous/Questions/Site Visit

Question #1: Can dirt and millings be left on site?

Response #1: Yes, all asphalt and earthwork removals may be left in the Contractor's Staging and Stockpiling area identified on sheet G1.3.

Question #2: Is there a water source for the Contractor to use?

Response #2: A five-minute drive from the airport there is a source by the San Manuel High School on Main Street, east of the McNab Parkway and Main Street intersection. The Contractor will need to coordinate the meter and draw-down with the County.

Question #3: Is there a soils report available?

Response #3: Yes, the soils report will be made available for viewing and downloading via the Pinal County Website.

Question #4: What is the existing pavement depth?

Response #4: Reference Technical Specification P-104, page P-104-3, sections 104-5.1 through 104-6.2. The existing pavement is estimated at a thickness of 3-1/2" or less.

Question #5: What are the DBE requirements?

Response #5: The County has a goal of 3.66%. However, the bidders are only required to show Good Faith Efforts in meeting that goal (i.e. must complete the contract DBE form). The bidders do not have to meet the goal to be considered a responsive or responsible bidder.

Question #6: Who is responsible for Construction Staking & Quality Control?

Response #6: The Contractor is fully responsible for all construction staking and layout as well as all Quality Control. The Contractors shall in no way depend on the Owner's Quality Assurance for their Quality Control.

Question #7: What is the Shade Port Structure to be made out of?

Response #7: Bidders are directed to Special Provisions Section 53 for all information regarding the Aircraft Shade Port Structure.

Statement: Gloria Bean (Pinal County) reiterated the importance of the bidders to make sure that all contract documents have been signed and dated as required upon submittal of their bid.

Statement: Jared Bass (Dibble) reiterated the importance of all bidders to review the plans with the technical specifications and contract documents.

SPEEDIE AND ASSOCIATES
Geotechnical ▪ Environmental ▪ Materials Engineers

www.speedie.net

REPORT ON PAVEMENT INVESTIGATION

Registered Professional Engineer (Civil)
CERTIFICATE NO.
14388
GREGG ALAN
CREASER
Date Signed 5/7/14
ARIZONA, U.S.A.
Expires 06/30/14

DESIGNATION: San Manuel Airport Apron Rehabilitation

LOCATION: San Manuel Airport
Pinal County, Arizona

CLIENT: Dibble Engineering

SPEEDIE NO: 131478SA

DIBBLE NO: 101133.04

DATE: May 7, 2014

3331 East Wood Street ▪ Phoenix, AZ 85040 ▪ Phone (602) 997-6391 ▪ Fax (602) 943-5508
4025 East Huntington Drive, Suite 140 ▪ Flagstaff, AZ 86004 ▪ Phone (928) 526-6681 ▪ Fax (928) 526-6685
3125 E. 47th Street ▪ Tucson, AZ 85713 ▪ Phone (520) 514-9411 ▪ Fax (520) 514-9474

SPEEDIE AND ASSOCIATES
Geotechnical ▪ Environmental ▪ Materials Engineers

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APPENDIX A1 – Field and Laboratory Results
APPENDIX A2 – Aircraft and Fuel Truck Fleet Mix

Registered Professional Engineer (Civil)
CERTIFICATE NO.
14388
GREGG ALAN
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1.0 INTRODUCTION

This report presents the results of a pavement investigation and evaluation of the apron area at San Manuel Airport. The airport is located to the north of the intersection of Redington Road and Avenida de Aviacion, in Pinal County, Arizona.

The goal of our investigation was to evaluate and determine the current conditions of the existing asphalt apron and provide recommendations for rehabilitation or reconstruction of the pavement based on the findings from the field investigation. The asphalt apron occupies approximately 20,500 square yards. The September 2010 Pavement Management Report indicated that the apron pavement had a Pavement Condition Index (PCI) of around 79. Using standard deterioration rates, the current PCI is likely around 60-70. This value would indicate that the pavement is generally in fair condition, however observed distress indicates several large areas of that would be classified as poor condition. Most of the recorded distress can be attributed to climate or durability, rather than loading distress. It is anticipated that any improvements, rehabilitation or reconstruction, will use traditional asphalt concrete for the surface.

In addition to the apron rehabilitation/reconstruction project, there were plans to provide a temporary taxiway connector at the southeast corner of the apron. The purpose of this temporary taxiway connector was to provide apron access for the aircraft during the reconstruction of the apron. After further discussions with the owner, the decision was made to make a permanent taxiway connector in this location. The construction of the connector will be done as part of this apron reconstruction project.

We understand that this airport primarily accommodates light general aviation types of aircraft, consisting of small single engine fixed wing aircraft, a small amount of helicopters, and some ultralight types of aircraft. The airport is classified as a Rural General Aviation airport. A comprehensive traffic analysis was not conducted or available for this project. Estimated operations are based on information provided by the property owner and other available historical information, including data reported by Airnav.com. Based on the available information, Dibble Engineering provided an estimation of the airport operations. A summary of the anticipated aircraft fleet mix is included in Appendix A2. This estimated traffic data was used in providing the pavement designs in this report, including the proposed new taxiway connector. If the loading conditions change or these estimates are not accurate, additional evaluation may be necessary.

2.0 GENERAL SITE AND SOIL CONDITIONS

2.1 Site Conditions

This investigation focused on the Apron pavement located on the north side of the airport. The apron area is approximately 20,500 square yards in size and is rectangular in shape. The apron is divided into two small sections and currently contains one access point to the taxiway. The eastern half of the apron consists of open, uncovered parking with tie-downs. Part of this project may include the installation of new canopy T-hangars on this half of the apron. The western half of the apron contains two new metal frame hangar buildings. The apron area is generally surrounded by native desert and light landscaping on the north, east and west sides, and on the south by the existing taxiway and runway. Access to the airport is through a gate on the north side of the apron.

At the northwest corner of the apron there is a large concrete scupper used to discharge storm water off of the pavement, into a designated retention area. Other than the concrete scupper, adjacent taxiway access, and hangar floor slabs, the edge of pavement is generally surrounded by unpaved areas with no curb or gutter and no major fixed grade points. The proposed taxiway connector will be located at the southeast corner of the apron. This area is currently occupied by a mix of light weeds and grass. The adjacent taxiway sits slightly higher in elevation in this area. This will result in the need to provide a minimal amount of fill to bring the area up to finished grades.

It appears that that the apron area is showing various signs of age and distress. The eastern half of the apron is generally in fair condition with the aging consisting of normal longitudinal and transverse cracks, along with some oxidation, weathering, and stripping. The western half of the apron is more variable and ranges from fair to poor. The pavement south of the hangars is generally in better condition and is similar to the eastern half pavement. The pavement north of the hangars is variable and ranges from fair to poor, with evidence of stripping, potholes, and additional or secondary transverse/longitudinal cracking. In addition, it appears that a previous slurry seal or seal coat was applied and is beginning to peel up from the surface in several areas. Refer to Photos 2 and 3 in Appendix A1 for examples of this condition. The 2010 Pavement Management Report indicated a PCI of 79 for this apron. Given the current condition, especially on the western half of the apron, we anticipate that the 2013 rating, will be significantly lower and a PCI on the order of 60 to 65 is more likely. Based on this condition, it is anticipated that the pavements may need anywhere from some minor surface maintenance (east side) to major repairs such as full removal and replacement (R&R).

In order to further evaluate the existing pavement and subgrade conditions we conducted pavement coring and soil sampling on the apron. A total of eight (8) structural borings were drilled for this project. Four borings were located on the western half and four borings were located on the eastern half.

The boring locations were spread out as evenly as possible in an attempt to classify the varying conditions anticipated on the apron. The approximate locations of the borings are shown on the attached Soil Boring Location Plan.

Prior to drilling each location, the pavement was cored to allow for a more accurate measurement of the existing asphalt thickness and to document the general properties of the existing asphalt section. The pavement structural section varied significantly and there were several different pavement structural sections observed. These variations are likely due to previous maintenance and changes within the airport. Table 2.1.1 presents a summary of the findings at each test location. For additional information regarding the findings at each location, refer to the individual boring logs included in Appendix A1.

Table 2.1.1 Pavement Thickness Measurements

Boring	Asphalt Concrete, in	Aggregate Base, in.	Notes
B-1	1.5”	2.0”	Clayey Sand, Dry to Moist
B-2	< 1.0”	-	No observed traditional aggregate base
B-3	1.5”	5.0”	Clayey Sand, Moist
B-4	2.5”	2.5”	Clayey Sand, Dry to Moist
B-5	2.25”	3.75”	Clayey Sand, Dry to Moist
B-6	2.0”	5.0”	Clayey Sand, Moist
B-7	2.25”	4.0”	Clayey Sand, Dry to Moist
B-8	2.5”	2.5”	Clayey Sand, Moist

Notes:
1. The pavement sections were highly variable, therefore it is anticipated if reconstruction or milling is planned, a separate line item will likely be required to address either additional removals if thicker sections are encountered, or a means to address ‘pop-out’ during milling of very thin sections.
2. Refer to the individual Boring Logs for additional information regarding the findings at each location.

2.2 General Subsurface Conditions

Subsoil conditions at the site consist primarily of clayey sand to the termination depth of the borings at up to 6.5 feet below existing pavement grade. The soil profile also contained subordinate amounts of gravel. The upper soils were generally classified as medium dense to very dense and no obviously loose zones were encountered in the boring locations. Standard Penetration Resistance Test (SPT) values are in the 15 to 50+ blows per foot range, with the majority of the SPT values around 30 to 40 blows per foot. No groundwater was encountered during this investigation. Based on visual and tactile observation, the upper

soils were in a 'dry to moist' or 'moist' state at shallow depths with the moisture generally decreasing with depth.

Laboratory testing indicates liquid limits on the order of 29 to 36 with plasticity indices on the order of 11 to 16. The average amount of soil passing the #200 sieve ranges from 13 to 22 percent. Using the ADOT and AASHTO methods to correlate R-values from these laboratory values results in a correlated R-value for the different samples on the order of 41 to 54. This testing results in an average R-value of 45 and an average subgrade modulus M_r of 19,000. Laboratory testing of the CBR indicates a CBR value 3.5 at 95 percent compaction of a standard proctor (ASTM D 698). This value is relatively low compared to the estimated CBR value based on correlation methods. It should be noted that the CBR test is run on a sample that has had the gravel portion of the sample removed and then saturated. Therefore the test is run on the 'fine' portion of the sample, which can sometimes result in a low or conservative value. Based on these test results, a CBR value of 7 was used for the evaluation and design of the asphalt pavements.

3.0 ANALYSIS AND RECOMMENDATIONS

3.1 Analysis

Analysis of the field and laboratory data indicates that the apron pavements are in fair to poor condition. The most recent pavement condition survey has indicated a PCI value of around 79 for the apron. However, it is anticipated the new evaluation will indicate a significantly lower value as several major signs of distress were observed during our field investigation. In addition the pavement sections were highly variable, with several areas indicating a very thin pavement structural section. The most readily available observations were of severe stripping of the surface, areas of small potholes (as a result of thin pavement sections), failure of the surface slurry seal or seal coat, and longitudinal and transverse cracking. The biggest concern is with regard to the existing pavement structural section and the variability. The western half of the pavement had areas that indicated very minimal asphalt and aggregate base. These areas will likely continue to deteriorate rapidly, unless repaired.

The subsoils below the pavement generally consist of clayey sand with subordinate amounts of gravel. Laboratory testing indicates an average R-value of 45 which equates to a subgrade modulus M_r of 19,000. Laboratory testing indicates a CBR value of 3.5 at 95 percent compaction of a standard proctor. Based on all of the laboratory results, it is our opinion that the laboratory CBR value may not be representative of the average soil condition below the pavement. Therefore, taking in all of the laboratory results, using standard correlation procedures outlined in the FAA specifications, a CBR value of 7 was assigned for determination of new structural sections where required and evaluation of the existing pavement sections.

There appears to be two main concerns with the existing asphalt apron pavement. The first and most critical concern is the variability of the pavement structural section and the areas of thin asphalt over minimal aggregate base. The northwest portion of the apron contained approximately 1 to 1.5 inches of asphalt over 2 to 5 inches of aggregate base. Portions of the pavement in this zone have cracked and 'pop outs' are occurring, resulting in pot holes and aggregate base being exposed. This is resulting in a safety and operational hazard. In addition, the pavement section is likely not sufficient for the loading conditions, even for the relatively light weight general aviation aircraft.

The second main issue and concern is the thermal block cracking and aging that is occurring on the eastern portion of the apron. Large open cracks have formed in the pavement surface. Unless maintained, these cracks provide a direct conduit for storm water penetration into the subgrade, which will result in rapid deterioration of the pavement due to loss of support in the subgrade. Due to the various pavement conditions and various pavement structural sections present, the primary option for consideration should be full removal and replacement with a new, standard pavement structural section that is designed to meet the aircraft loading. While other options such as seal coats and mill and overlay, may be feasible for portions of the apron, the variability is a long term concern.

As indicated in the borings, the existing apron pavement consists of two primary sections of pavement. The eastern half of the apron and the area south of the hangars appears to be a slightly thicker section of asphalt that is a little more uniform. The pavement in this area generally consists of 2.0 to 2.5 inches of asphalt over 2.5 to 4.0 inches of aggregate base. The pavement between the hangars and north of the hangars contained a thinner section of asphalt and aggregate base. The pavement section in this area consisted of approximately 1 to 1.5 inches of asphalt over 2 to 5 inches of aggregate base. In both areas there was some evidence of maintenance in the form of crack sealing, fog seals, and a possible slurry seal or seal coat. **It should be noted that based on the core data, variable conditions will be encountered during construction.** Since removal and replacement is recommended, it should be anticipated that additional variations will be encountered from the observed conditions in the boring locations.

These pavement sections appear to have been placed on prepared and compacted subgrade with no additional subbase. In addition, the pavement sections are highly variable, with at least one area having less than 2 inches of asphalt in place. It is likely that some of the thin pavement sections observed do not meet the FAA design standards. Therefore in order to ensure a uniform pavement thickness that meets the current FAA design requirements, it is recommended to completely remove and reconstruct the pavement to provide a suitable structural section.

Laboratory testing indicated the soils have a potential to become unstable at elevated moisture contents. While not typically a concern in pavement applications (roadways, runways, taxiways, etc.), the issue arises when cracks form in the pavement allowing moisture to infiltrate into the subgrade. Therefore it

will be critical to provide proper drainage off of the apron pavement as well as provide a maintenance program which will address the pavement aging process. As asphalt pavements age they become more ridged and eventually crack. These cracks provide a direct drainage path for water to reach the subgrade which will result in the weakening of the subgrade. This is especially a concern when the soils are more susceptible to moisture changes such as the more clayey material found in some of the borings.

Groundwater is not expected to be a factor in the design or construction of new apron pavements (if selected as an option). Based on the boring and laboratory testing there is a minor concern for soft moist soils beneath the apron. Isolated zones of elevated moisture were indicated in several of the borings. However, given the sandy nature of the subgrade, it is anticipated that the soils will dry relatively rapidly once exposed after the asphalt surface is removed. The moisture contents may change depending on the season work commences and prior rainfall activity. As a result, removal and re-construction of the apron pavement may require additional earthwork to stabilize the subgrade soils to provide access for equipment and provide an adequate base for new pavements. Excavation operations should be relatively straightforward using conventional equipment. A representative of the geotechnical engineer should examine the excavation prior to backfilling to ensure removal of loose wet soils.

3.2 Site Preparation

For the complete reconstruction and the new taxiway connector, the entire area to be occupied by the proposed new construction should be stripped of all vegetation, debris, rubble and obviously loose surface soils. Carefully remove all concrete and other elements and any deleterious materials that may be encountered. Any existing asphaltic concrete may be cold-milled in-place to a gradation similar to that of an ABC and it, along with the existing aggregate base, stockpiled for possible reuse under paved areas as sub-base or used to stabilize any wet/loose zones found.

Sufficient materials should be removed as necessary to allow placement of the new structural sections. All resulting excavations should be widened as necessary to allow access for compaction equipment. The exposed area should be proof-rolled with a heavy rubber tire vehicle (fully loaded water truck or dump truck). If unstable soil conditions are present, it may be necessary to deepen the over-excavation to remove all deleterious material and soft soil. If any utility is located within 5 feet of any finished pavement grade, relocation of the utility should be provided. They should be removed and replaced with engineered fill.

The soils encountered below the apron pavements were generally of medium-dense to dense consistency with moisture contents near optimum moisture. It is not anticipated, based on the boring data, that significant areas of unstable or soft subgrade will be encountered. If isolated zones of unstable or soft subgrade are found during site grading, there are several options available to help stabilize these conditions. The first option would be to remove the unstable soils to a depth on the order of 2 feet below the finished

subgrade; deeper excavations may be required if the loose areas extend deeper. The soils may be set aside to dry (if necessary) and be re-compacted once they have dried sufficiently, or other local soils may be imported or use the asphalt millings from the old apron.

As an alternate to complete removal of the soils, the soils can be mixed with either a chemical lime slurry or dry cement. Since using lime or cement is only to dry and stabilize the soils, not part of the structural design, it is recommended to follow M.A.G. 309 for lime stabilization and M.A.G. 311 for cement stabilization using a standard proctor (ASTM D-698) for compaction requirements. It is recommended that a minimum of 8 inches of cement or lime stabilized soils be used below the pavement structural section.

It is assumed that the reconstruction of the apron will require some cutting to provide space for the new, slightly thicker pavement sections. For the proposed taxiway connector minor cutting or filling may be required, depending on final site grades. Prior to placing structural fill in pavement areas subject to aircraft traffic, the exposed subgrade should be compacted to 95 percent of maximum dry density as determined by ASTM D-698 to a depth of 8 inches.

3.3 Fill and Backfill

No filling or backfilling is planned for this project. Native soils are suitable for engineered subgrade fill if required. In the event loose soft soils are encountered at the surface, the procedures as outlined above should be followed or this office should be contacted for alternate options to stabilize. If imported fill for the apron is required, it should be granular fill meeting the following gradation and plasticity requirements.

Sieve Size	Percent Passing
3 inch	100
No. 4	20-60
No. 40	10-40
No. 200	0-30

The maximum plasticity index per ASTM D-4318 should not exceed 8. A higher plasticity index may be approved at the discretion of the engineer provided that the percent passing the No. 40 sieve and No. 200 sieve does not exceed 20 percent and 10 percent respectively.

Fill should be placed on subgrade that has been properly prepared and approved by a Soils Engineer. Fill must be wetted and thoroughly mixed to achieve optimum moisture content, ±2 percent, be placed in horizontal lifts of 8-inch thickness (or as dictated by compaction equipment) and compacted to 100 percent of maximum dry density per **ASTM D-698** (Standard Proctor).

3.4 New Pavement (Aircraft)

We understand that this airport operates as a rural general aviation airport. As a result, the primary aircraft that use the airport consist of privately owned, lightly loaded single engine aircraft. A comprehensive traffic analysis was not conducted or available for this project. Estimates of the number of operations and types of aircraft were obtained by a review of available documentation, discussions with Pinal County staff, and information provided by AirNav.com. We anticipate that the majority of the operations come from single wheel, general aviation aircraft with loading of 3,000 to 12,500 pounds. AirNav.com estimates approximately 38 operations per day at this airport (2012 data). Dibble Engineering has provided an anticipated Aircraft Fleet mix, based on the available information, as shown in Appendix A2. These estimated traffic operations were used in providing the following new pavement design. If the loading conditions change or these estimates are not accurate, additional evaluation may be necessary.

The pavement sections were calculated using procedures outlined in FAA Advisory Circular AC 150/5320-6E and the FAA computer program FAARFIELD. The designs are based on the assumption that the controlling subgrade will consist of the compacted native soils materials meeting the requirements presented herein. A single pavement section is provided based on the lightly loaded Aircraft Fleet Mix provided. The provided pavement section will be adequate to support the proposed apron as well as the taxiway connector given the anticipated aircraft loading.

Laboratory testing indicates an average correlated R-value of 45 which equates to a subgrade modulus M_r of 19,000. A laboratory saturated CBR value of 3.5 was obtained on a sample that had the coarse gravel portion screened out. Using these laboratory tested values and engineering correlations, a CBR value of 7 was selected for use in the determination of the new pavement structural sections. Since this may be a ‘private’ project and the pavements are designed for aircraft less than 30,000 pounds, materials may meet local governing agency (M.A.G.) specifications rather than FAA material requirements. If this is not the case or materials meeting FAA specifications are to be used, this office should be notified so that the appropriate adjustments can be made.

These new pavements are being constructed on medium dense clayey sand, shallow groundwater is not an issue, drainage is good (therefore subbase is not saturated), the climate is dry and there is no frost. The following table presents the recommended pavement section based on the provided Aircraft Fleet Mix and using the guidelines of the FAA Advisory Circular AC 150/5320-6E.

Table 3.4.1 - New Asphalt Pavement - Apron

Location	Total Pavement Thickness, inches	Flexible Pavement		
		AC Surface, inches	Aggregate Base, inches	Compacted Subgrade, inches
Apron	9.0”	3.0”	6.0”	8.0”

Notes:
1. This design is based on FAA Advisory Circular AC 150/5370-10F Standards for Specifying Construction of Airports.
2. Section minimum according to FAARFIELD and Advisory Circular No. 150/5320-6E
3. Designs are based upon the provided Aircraft Fleet Mix.

This design is based on materials meeting FAA Advisory Circular AC 150/5370-10F Standards for Specifying Construction of Airports. Asphalt concrete subject to direct plane traffic should consist of FAA Specification P-401 (or modified M.A.G. 710 with the approval of FAA and/or Pinal County). The mix design should be based for light to moderate aircraft using PG 64-22 asphalt oil, as this binder is readily available and used on municipal projects. A recommended maximum aggregate size of ¾ should be used for the design. The maximum aggregate size depends on lift thickness. Typically the minimum lift thickness should be at least two (2) times the maximum aggregate size with a maximum lift thickness of 3 inches. Pavement installation should be carried out under applicable portions of M.A.G. Section 321 and municipality standards. The asphalt supplier should be informed of the pavement use and be required to provide a mix that will provide stability and be aesthetically acceptable. Some of the newer M.A.G. mixes are very coarse and could cause placing and finish problems. A mix design should be submitted for review to determine if it will be acceptable for the intended use.

4.0 GENERAL

The scope of this investigation and report does not include regional considerations such as seismic activity and ground fissures resulting from subsidence due to groundwater withdrawal, or any considerations of hazardous releases or toxic contamination of any type.

Our analysis of data and the recommendations presented herein are based on the assumption that soil conditions do not vary significantly from those found at specific sample locations. Our work has been performed in accordance with generally accepted engineering principles and practice; this warranty is in lieu of all other warranties expressed or implied.

We recommend that a representative of the Soils Engineer observe and test the subgrade preparation and paving portions of this project to ensure compliance to project specifications and the field applicability of subsurface conditions which are the basis of the recommendations presented in this report. If any significant changes are made in the scope of work or type of construction that was assumed in this report, we must review such revised conditions to confirm our findings if the conclusions and recommendations presented herein are to apply.

Respectfully submitted,
SPEEDIE & ASSOCIATES, INC.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
43813
TODD B.
HANKE
Date Signed 5/7/14
ARIZONA, U.S.A.
Expires 03/31/15

Todd B. Hanke, P.E.

Registered Professional Engineer (Civil)
CERTIFICATE NO.
14388
GREGG ALAN
CREASER
Date Signed 5/7/14
ARIZONA, U.S.A.
Expires 06/30/14

Gregg A. Creaser, P.E.

APPENDIX A1

FIELD AND LABORATORY INVESTIGATION

SOIL BORING LOCATION PLAN

SOIL LEGEND

LOG OF TEST BORINGS

TABULATION OF TEST DATA

MOISTURE-DENSITY RELATIONS

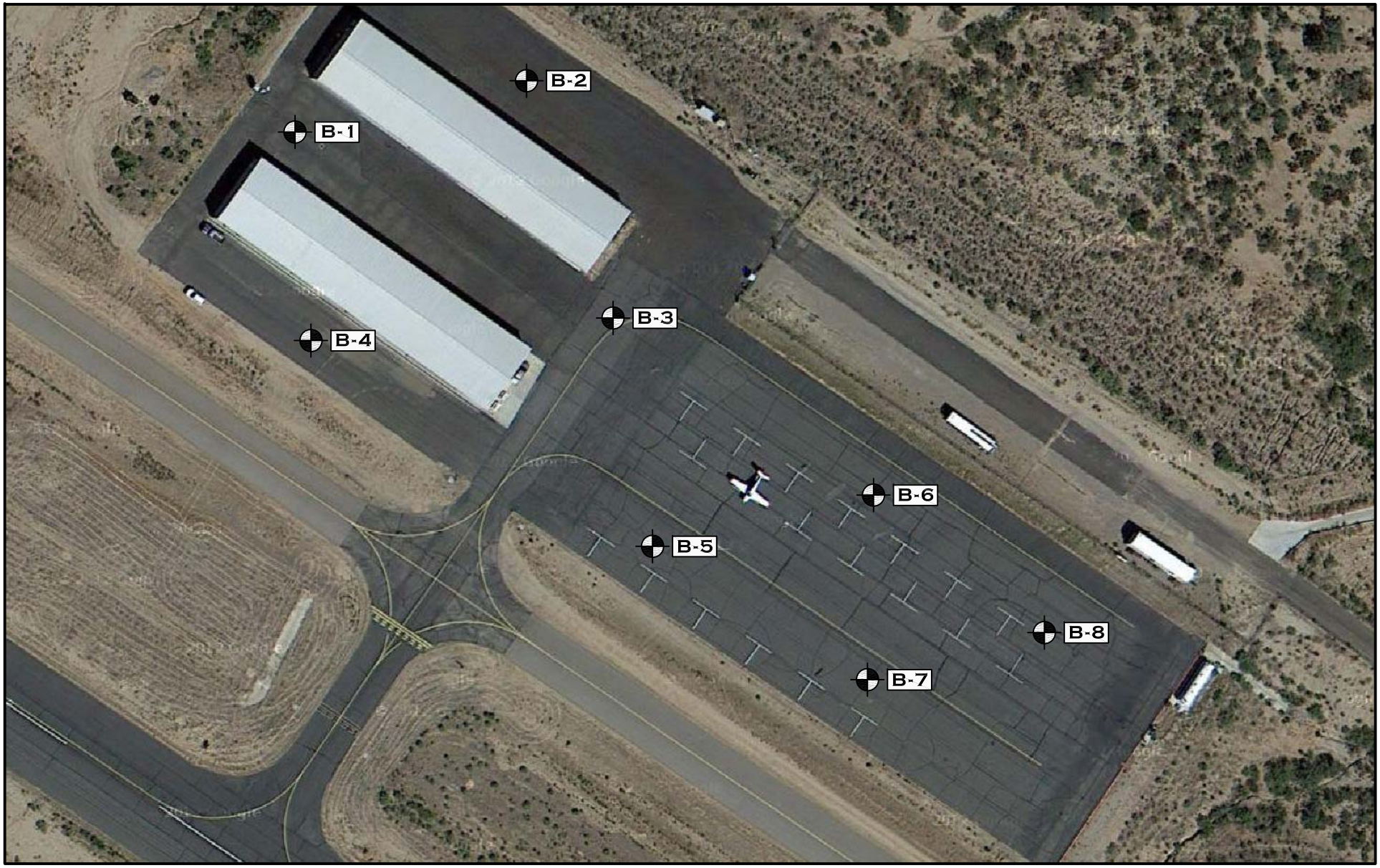
CBR RESULTS

SITE PHOTOGRAPHS

FIELD AND LABORATORY INVESTIGATION

On October 21, 2013 soil test borings were drilled at the approximate locations shown on the attached Soil Boring Location Plan. All exploration work was carried out under the full-time supervision of our staff engineer, who recorded subsurface conditions and obtained samples for laboratory testing. The soil borings were advanced with a truck-mounted CME-75 drill rig utilizing a 7-inch diameter hollow stem flight auger. Detailed information regarding the borings and samples obtained can be found on an individual Log of Test Boring prepared for each drilling location.

Laboratory testing consisted of moisture content, grain-size distribution, plasticity (Atterberg Limits), and CBR tests for classification and pavement design parameters. All field and laboratory data is presented in this appendix.



- PROPOSED SOIL BORING LOCATIONS

N

IMAGE COURTESY OF: GOOGLE MAPS

SOIL BORING LOCATION PLAN

DR: TSW	CHK:	REV:	DATE: 10/07/2013	PROJECT NO. 131478SA

SAN MANUEL AIRPORT
APRON REHABILITATION
SAN MANUEL, ARIZONA

SPEEDIE AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIALS ENGINEERS
3331 E. WOOD ST. PHOENIX, ARIZONA 85040 (602) 997-6391

SOIL LEGEND

SAMPLE DESIGNATION		DESCRIPTION	
	AS	**Auger Sample**	A grab sample taken directly from auger flights.
	BS	**Large Bulk Sample**	A grab sample taken from auger spoils or from bucket of backhoe.
	S	**Spoon Sample**	Standard Penetration Test (ASTM D-1586) Driving a 2.0 inch outside diameter split spoon sampler into undisturbed soil for three successive 6-inch increments by means of a 140 lb. weight free falling through a distance of 30 inches. The cumulative number of blows for the final 12 inches of penetration is the Standard Penetration Resistance.
	RS	**Ring Sample**	Driving a 3.0 inch outside diameter spoon equipped with a series of 2.42-inch inside diameter, 1-inch long brass rings, into undisturbed soil for one 12-inch increment by the same means of the Spoon Sample. The blows required for the 12 inches of penetration are recorded.
	LS	**Liner Sample**	Standard Penetration Test driving a 2.0-inch outside diameter split spoon equipped with two 3-inch long, 3/8-inch inside diameter brass liners, separated by a 1-inch long spacer, into undisturbed soil by the same means of the Spoon Sample.
	ST	**Shelby Tube**	A 3.0-inch outside diameter thin-walled tube continuously pushed into the undisturbed soil by a rapid motion, without impact or twisting (ASTM D-1587).
	--	**Continuous Penetration Resistance**	Driving a 2.0-inch outside diameter "Bullnose Penetrometer" continuously into undisturbed soil by the same means of the spoon sample. The blows for each successive 12-inch increment are recorded.

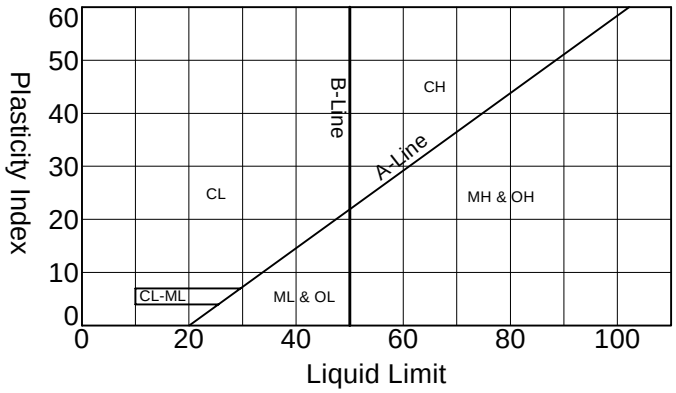
CONSISTENCY			RELATIVE DENSITY	
Clays & Silts	Blows/Foot	Strength (tons/sq ft)	Sands & Gravels	Blows/Foot
Very Soft	0 - 2	0 - 0.25	Very Loose	0 - 4
Soft	2 - 4	0.25 - 0.5	Loose	5 - 10
Firm	5 - 8	0.5 - 1.0	Medium Dense	11 - 30
Stiff	9 - 15	1 - 2	Dense	31 - 50
Very Stiff	16 - 30	2 - 4	Very Dense	> 50
Hard	> 30	> 4		

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL OR MODIFIED SYMBOLS MAY BE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS OR TO PROVIDE A BETTER GRAPHICAL PRESENTATION OF THE SOIL

MATERIAL SIZE	PARTICLE SIZE Lower Limit mm	Lower Limit Sieve Size ◆	Upper Limit mm	Upper Limit Sieve Size ◆
SANDS				
Fine	0.075	#200	0.42	#40
Medium	0.420	#40	2.00	#10
Coarse	2.000	#10	4.75	#4
GRAVELS				
Fine	4.75	#4	19	0.75" ×
Coarse	19	0.75" ×	75	3" ×
COBBLES	75	3" ×	300	12" ×
BOULDERS	300	12" ×	900	36" ×

◆U.S. Standard ×Clear Square Openings



Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	1.5" of Asphalt	0.1					
	2" of Aggregate Base	0.3					
	Medium Dense Brown CLAYEY SAND (SC-Dry to Moist)		S-1	2.5	NT	NT	
			BS-2	5.0	NT	NT	
5							
		6.5	S-3	6.5	NT	NT	
	End of Boring						
10							

Boring Date: **10-21-13**
Field Engineer/Technician: **B. Amos**
Driller: **R. Thornburg**
Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-1**

Apron Rehabilitation

San Manuel Airport

San Manuel, Arizona

Project No.: **131478SA**

_SPEEDIE 131478SA.GPJ GENGEO.GDT 11/11/13

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification	Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	<1" AC					
	0.1 Very Dense Brown SILTY, POORLY-GRADED SAND (SP/SM-Dry to Moist)					
	1.0 Medium Dense Brown CLAYEY SAND (SC-Dry to Moist) with Trace to Some Gravel	RS-1	1.8	6.6	115.4	50/10"
5						
	6.5 End of Boring	S-2	6.5	NT	NT	
10						

Boring Date: **10-21-13**
Field Engineer/Technician: **B. Amos**
Driller: **R. Thornburg**
Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-2**

Apron Rehabilitation

San Manuel Airport

San Manuel, Arizona

Project No.: **131478SA**

_SPEEDIE 131478SA.GPJ GENGEO.GDT 11/11/13

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	1.5" of Asphalt	0.1					
	5" of Aggregate Base	0.6					
	Dense Brown CLAYEY SAND (SC-Moist)		RS-1	2.0	10.8	112.6	
			BS-2	5.0	8.2	NT	
5	Very Dense						
		6.5	S-3	6.5	NT	NT	53/12"
	End of Boring						
10							

Boring Date: **10-21-13**
Field Engineer/Technician: **B. Amos**
Driller: **R. Thornburg**
Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-3**

Apron Rehabilitation

San Manuel Airport

San Manuel, Arizona

Project No.: **131478SA**

_SPEEDIE 131478SA.GPJ GENGEO.GDT 11/11/13

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	2.5" of Asphalt	0.2					
	2.5" of Aggregate Base	0.4					
	Dense Brown CLAYEY SAND (SC-Dry to Moist) with Little Gravel		RS-1	2.0	NT	NT	
5	Dense Black with Trace Gravel						
		6.5	S-2	6.5	NT	NT	
	End of Boring						
10							

Boring Date: **10-21-13**
Field Engineer/Technician: **B. Amos**
Driller: **R. Thornburg**
Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-4**

Apron Rehabilitation

San Manuel Airport

San Manuel, Arizona

Project No.: **131478SA**

_SPEEDIE 131478SA.GPJ GENGEO.GDT 11/11/13

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	2.25" of Asphalt	0.2					
	3.75" of Aggregate Base	0.6					
	Dense Brown CLAYEY SAND (SC-Dry to Moist) with Little Gravel		S-1	2.5	11.6	NT	
5			BS-2	5.0	NT	NT	
		6.5	S-3	6.5	NT	NT	
	End of Boring						
10							

Boring Date: **10-21-13**
Field Engineer/Technician: **B. Amos**
Driller: **R. Thornburg**
Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-5**

Apron Rehabilitation

San Manuel Airport

San Manuel, Arizona

Project No.: **131478SA**

_SPEEDIE 131478SA.GPJ GENGEO.GDT 11/1/13

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	2" of Asphalt	0.2					
	5" of Aggregate Base	0.6					
	Medium Dense Brown CLAYEY SAND (SC-Moist) with Little Gravel		S-1	2.5	NT	NT	
5	Dry to Moist						
		6.5	S-2	6.5	NT	NT	
	End of Boring						
10							

Boring Date: **10-21-13**
Field Engineer/Technician: **B. Amos**
Driller: **R. Thornburg**
Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-6**

Apron Rehabilitation

San Manuel Airport

San Manuel, Arizona

Project No.: **131478SA**

_SPEEDIE 131478SA.GPJ GENGEO.GDT 11/11/13

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	2.25" of Asphalt	0.2					
	4" of Aggregate Base	0.6					
	Medium Dense Brown CLAYEY SAND (SC-Dry to Moist) with Little to Some Gravel		S-1	2.5	NT	NT	
5	Dense						
		6.5	S-2	6.5	NT	NT	
	End of Boring						
10							

Boring Date: **10-21-13**
Field Engineer/Technician: **B. Amos**
Driller: **R. Thornburg**
Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-7**

Apron Rehabilitation

San Manuel Airport

San Manuel, Arizona

Project No.: **131478SA**

_SPEEDIE 131478SA.GPJ GENGEO.GDT 11/11/13

Rig Type: **CME-75**
Boring Type: **Hollow Stem Auger**
Surface Elevation: **N/A**

Depth (feet)	Visual Classification		Sample Number	Depth of Sample	Natural Water Content (%)	In-place Dry Density (P.C.F.)	Penetration Resistance Blows per Foot (0 – 25 – 50)
0	2.5" of Asphalt	0.2					
	2.5" of Aggregate Base	0.4					
	Very Dense Brown CLAYEY SAND (SC-Moist)		RS-1	2.0	11.8	117.1	50/12"
			BS-2	5.0	NT	NT	
5	Medium Dense and Dry to Moist						
		6.5	S-3	6.5	NT	NT	
	End of Boring						
10							

Boring Date: **10-21-13**
Field Engineer/Technician: **B. Amos**
Driller: **R. Thornburg**
Contractor: **Geomechanics SW**

Water Level

Depth	Hour	Date
Free Water was Not Encountered		

NT = Not Tested

SPEEDIE AND ASSOCIATES

Log of Test Boring Number: **B-8**

Apron Rehabilitation

San Manuel Airport

San Manuel, Arizona

Project No.: **131478SA**

_SPEEDIE 131478SA.GPJ GENGEO.GDT 11/11/13

TABULATION OF TEST DATA

SOIL BORING or TEST PIT NUMBER	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE INTERVAL (ft)	NATURAL WATER CONTENT (Percent of Dry Weight)	IN-PLACE DRY DENSITY (Pounds Per Cubic Foot)	PARTICLE SIZE DISTRIBUTION (Percent Finer)					ATTERBERG LIMITS			UNIFIED SOIL CLASSIFICATION	SPECIMEN DESCRIPTION
						#200 SIEVE	#40 SIEVE	#10 SIEVE	#4 SIEVE	3" SIEVE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
B-2	RS-1	RING	1.0 - 1.8	6.6	115.4	13	30	63	84	100	29	18	11	SC	CLAYEY SAND with GRAVEL
B-3	BS-2	BULK	0.6 - 5.0	8.2	NT	21	38	72	90	100	33	18	15	SC	CLAYEY SAND
B-3	RS-1	RING	1.0 - 2.0	10.8	112.6	NT	NT	NT	NT	NT	NT	NT	NT		
B-5	S-1	SS	1.0 - 2.5	11.6	NT	19	37	62	82	100	36	20	16	SC	CLAYEY SAND with GRAVEL
B-8	BS-2	BULK	0.5 - 5.0	NT	NT	22	40	74	91	100	33	19	14	SC	CLAYEY SAND
B-8	RS-1	RING	1.0 - 2.0	11.8	117.1	NT	NT	NT	NT	NT	NT	NT	NT		

Sieve analysis results do not include material greater than 3". Refer to the actual boring logs for the possibility of cobble and boulder sized materials.

NT=Not Tested

Sheet 1 of 1

Apron Rehabilitation
San Manuel Airport
San Manuel, Arizona
Project No. 131478SA

SPEEDIE AND ASSOCIATES

MOISTURE-DENSITY RELATIONS

PROJECT: Apron Rehabilitation

PROJECT NO.: 131478SA

LOCATION: San Manuel Airport

DATE: 10/21/13

BORING NO.: B-3 SAMPLE NO.: BS-2 SAMPLE DEPTH: 0.6 to 5

LABORATORY NO.:

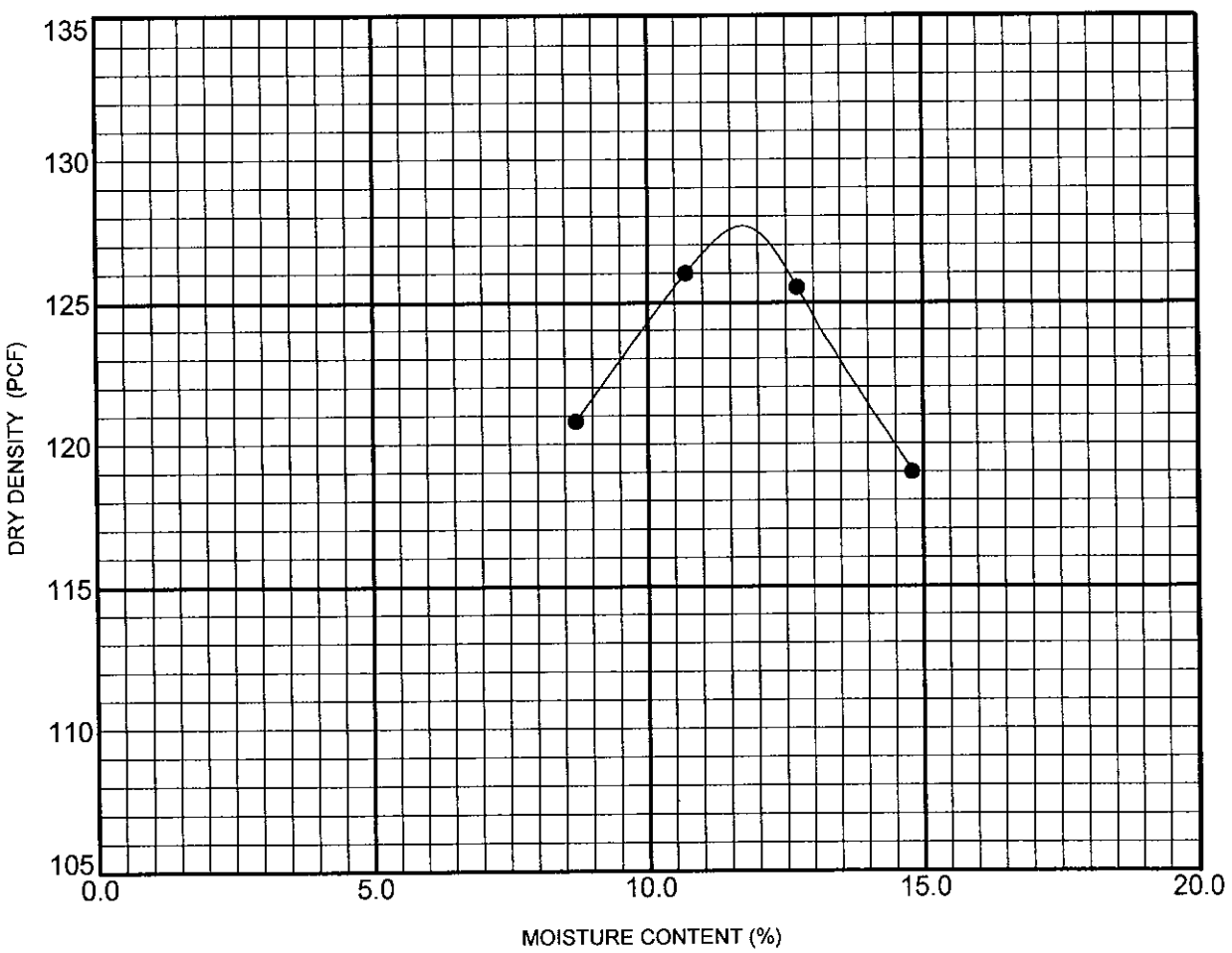
METHOD OF COMPACTION: D698A

LIQUID LIMIT: 33 PLASTIC LIMIT: 18 PLASTICITY INDEX: 15

CLASSIFICATION: SC ASTM SOIL DESCRIPTION: CLAYEY SAND

MAXIMUM DRY DENSITY: 127.7 PCF

OPTIMUM MOISTURE CONTENT: 11.7%



SPEEDIE AND ASSOCIATES

GEOTECH PROCTOR 131478SA.GPJ 10/29/13

SPEEDIE AND ASSOCIATES
Geotechnical ▪ Environmental ▪ Materials Engineers
3331 EAST WOOD STREET • PHOENIX, ARIZONA 85040

C.B.R. (ASTM D 1883)

CLIENT: **Dibble Engineering**
Ryan Toner
7500 N. Dreamy Draw Drive, Suite 200
Phoenix, AZ 85020-4660

PROJECT NO: **131478SA**
LAB NO: **MV931**
DATE: **11/18/2013**

PROJECT: **San Manuel Airport Apron Rehabilitation**
LOCATION: **San Manuel Airport**
SAMPLE ID: **B-3 BS-2 @ 1'**

PENETRATION (inches)	10 BLOWS Load (lbs.)	10 BLOWS STRESS (psi)	30 BLOWS Load (lbs.)	30 BLOWS STRESS (psi)	65 BLOWS Load (lbs.)	65 BLOWS STRESS (psi)
0.000	0	0.0	0	0.0	0	0.0
0.025	16	5.4	12	4.1	7	2.4
0.050	27	8.9	56	18.8	61	20.3
0.075	37	12.3	100	33.2	117	38.9
0.100	45	14.9	122	40.7	166	55.5
0.125	52	17.4	143	47.6	212	70.5
0.150	59	19.8	154	51.3	247	82.2
0.175	68	22.6	166	55.5	276	92.0
0.200	73	24.3	176	58.8	303	101.2
0.300	94	31.3	263	87.5	371	123.8
0.400	119	39.7	372	123.9	520	173.3
0.500	142	47.3	444	148.0	704	234.6

	DD - BT	DD - AT	% MOIST. BT	% MOIST. AT	TOP 1" % MOIST.	AVE % MOIST - AS	% SWELL	CORR. C.B.R.
10 BL.	118.0	116.9	12.0	13.8	15.4	14.6	0.1	1.6
30 BL.	123.4	123.1	11.7	11.5	13.8	12.7	0.1	4.8
65 BL.	128.8	128.6	10.3	10.4	12.7	11.6	0.3	7.1

MAXIMUM DRY DENSITY (ASTM D 698 "C") = 127.6 pcf
OPTIMUM MOISTURE CONTENT = 11.7 %

CORRECTED FINAL C.B.R. @ 95 % COMPACTION = 3.5

Laboratory test results reported herein apply only to the specific sample on which the test was run. SA warrants that this work was performed under the appropriate standard of care, including the skill and judgement that is reasonably expected from similarly situated professionals. No other warranty, guaranty, or representation, either express or implied is included or intended.

Reviewed by: _____

Site Photographs

Photo No. 1: North of the hangar buildings, pot hole and very thin pavement.

Photo No. 2: North of hangar building, surface pealing up.

Photo No. 3: Northwest corner of apron near entrance gate, note areas of surface seal pealing up.

Photo No. 4: Looking east, eastern half pavement conditions

Photo No. 5: Concrete scupper at northwest corner of apron

Photo No. 6: Pavement between hangers on western half of apron

APPENDIX A2

AIRCRAFT FLEET MIX

San Manuel Ramp Rehabilitation		AIRCRAFT FLEET MIX				12/3/2013
Aircraft Type	ARC	Wingspan (ft)	Length (ft)	Max. Take-off Weight (lbs.)	Total Ops/Year (0-5 yrs future)	Total Ops/Year (11-20 years)
Jets						
Cessna 500/501	B-I	47	44	12,000	595	964
Turbo-Props						
Beech King Air 100	B-I	46	40	11,800	396	322
Beech King Air C90/200/B300	B-II	54.5	44	12,500	0	321
Propeller						
SINGLE - Cessna 172/180	A-I	36	27	2,450	16255	26357
MULTI - Cessna 402	B-I	39.8	36.1	6,300	1784	2893
Total					19,030	30,857