Illinois Department of Transportation
Office of Intermodal Project Implementation / Division of Aeronautics
1 Langhorne Bond Drive / Springfield, Illinois 62707-8415

January 6, 2022

SUBJECT: Marshall County Airport
Lacon, Illinois
Marshall County
Illinois Project Number: C75-4884
SBG Project Number: 3-17-SBGP-162/171
Contract No. MA032
Item No. 01A, January 21, 2022 Letting
Addendum A

NOTICE TO PROSPECTIVE BIDDERS

Attached is an addendum to the plans or proposal. This addendum involves revised and/or added material.

Reason for Addendum:
This addendum is issued to provide the soils data for the area surrounding the project.

To All Plan Holders:
This addendum provides the geotechnical report and soil borings from the soil investigation performed for the adjacent Phase 1 project (by others) and this Phase 2 project (MA032) being advertised.

Plan Changes:
None.

Special Provisions Changes:
Geotechnical report has been added to the special provisions.

Schedule of Prices Changes:
None.

Prime contractors must utilize the enclosed material when preparing their bid and must include any changes to the Schedule of Prices in their bid.

Questions on this addendum may be directed to Lindsay Hausman of Hanson Professional Services Inc. at 217.747.9314.

1701 West Market Street, Suite B
Bloomington, Illinois 61701
(309) 821-0430

Report of Soils Exploration

Reconstruct Terminal Aircraft Parking Apron
Marshall County Airport
Lacon, Illinois

Hanson Professional Services Inc.

June 19, 2019

RGE Job 19-058

REPORT OF SOILS EXPLORATION
RECONSTRUCT TERMINAL AIRCRAFT PARKING APRON
MARSHALL COUNTY AIRPORT
LACON, ILLINOIS

PREPARED FOR

HANSON PROFESSIONAL SERVICES INC.

1525 SOUTH SIXTH STREET

SPRINGFIELD, ILLINOIS 62703

PREPARED BY

RAMSEY GEOTECHNICAL ENGINEERING LLC

1701 WEST MARKET STREET

BLOOMINGTON, ILLINOIS 61701

(309) 821-0430

June 19, 2019
RGE Job 19-058

REPORT OF SOILS EXPLORATION
RECONSTRUCT TERMINAL AIRCRAFT PARKING APRON
MARSHALL COUNTY AIRPORT
LACON, ILLINOIS

INTRODUCTION

This report presents results of our site exploration which was performed to evaluate the existing pavement section and subgrade soils within the limits of the proposed reconstruction of the terminal aircraft parking apron at the Marshall County Airport in Lacon, Illinois. The geotechnical services were performed at the request of Ms. Lindsay Hausman of Hanson Professional Services Inc. (Hanson) in accordance with the scope of services outlined in Ramsey Geotechnical Engineering LLC (RGE) Proposal No. 19-033, dated February 22, 2019. Results of field and laboratory work and recommendations based upon that work are included in the following sections of this report.

PROJECT DESCIRPTION

The Marshall County Airport is located on the south side of Illinois State Route 17, directly east of County Road 1300 E, on the eastern edge of the city limits of Lacon, Illinois. The existing terminal aircraft parking apron is located on the east side of the airport east of the existing hangars and airport office. The approximate area of the hangar pavements covers 3 acres. The existing pavement will be removed and replaced with a new Hot Mix Asphalt (HMA) section. The location of the improvements is shown on the Survey and Boring Sketch prepared by Hanson which is included in the Appendix of this report.

FIELD EXPLORATION

A total of six (6) soil borings were completed on the project site across the area of the planned improvements. These borings were located in the field by Hanson personnel at the locations shown on a copy of Hanson Survey and Boring Sketch included in the Appendix of this report.

Each of the borings were located in areas that are currently paved with HMA. The pavement was cored with a diamond studded core barrel. The thickness of the HMA and aggregate base, if present, was measured prior to completion of the borings. These borings were extended to a depth of 15 feet below the existing ground surface.

Soil sampling was performed at each of these locations at 2-1/2 foot intervals to the termination depth of the borings. Samples were generally obtained in conjunction with the Standard Penetration Test (N), for which the driving resistance of a 2 inch diameter split-spoon sampler provides an indication of the relative density of granular materials and consistency of cohesive soils. In addition, composite bulk samples of the subgrade soils from directly below the existing pavement/aggregate base were collected from the auger cuttings generated while drilling. Water level readings were taken during and upon completion of the borings. Delayed water level readings were also planned 24 hours after completion of the borings, however, the airport operations personnel asked that the bore holes be backfilled upon completion.

LABORATORY TESTING

Soil samples were examined in the laboratory to verify field descriptions and to determine classifications in accordance with the Unified Classification System. Laboratory testing included moisture content determinations on all samples. Measurements of unconfined compressive strengths on natural cohesive soil samples were made. A calibrated penetrometer was also utilized to provide estimates of the unconfined compressive strength. The bulk samples were also tested to determine grain size distributions along with Atterberg Limits and shrinkage limit values. Standard Proctor tests and California Bearing Ratio (CBR) tests were also completed on the bulk samples. Selected samples of the near surface soils were tested to determine hydraulic conductivity (permeability) values.

All phases of the laboratory testing program were conducted in general accordance with applicable ASTM standards. The results of these tests are shown on the boring logs and data sheets included in the Appendix of this report.

SUBSURFACE CONDITIONS

The existing HMA pavement at the boring locations is somewhat variable ranging from 2 to 8 inches thick. The thicker sections, measuring approximately 5-1/2 to 8 inches, are along the northern and eastern portions of the pavement at the locations of Borings B-1, B-2, B-3 and B-6. At Borings B-4 and B-5, the HMA thickness is 2-3/4 to 2 inches. There is a sand and gravel aggregate base measuring approximately 3-1/2 to 10 inches thick at Borings B-1, B-2, B-5 and B-6, At the remaining locations there does not appear to be a processed coarse aggregate base course.

With the exception of Boring B-3, the soils directly below the pavement consist of sandy lean clay. The sandy clay ranges from soft to stiff in relative consistency with unconfined compressive strength values between 0.5 and 1.0 ton per square foot (tsf). Corresponding moisture content values are between approximately 15 and 20 percent. These soils extend to depths ranging from approximately 1.0 to 3.0 feet.

Deposits of fine to medium grained sand were found below the sandy clay soils and directly below the pavement at Boring B-3. These granular soils are typically loose in relative density with N values below 10 blows per foot at most locations and depths. These soils were sampled to the termination depths of the borings.

The bore holes were dry while drilling and upon completion and removal of the augers and at time intervals of up to 4 hours after completion of the borings.

The specific subsurface conditions at each location are shown on the Boring Logs and Soil Test Data sheets included in the Appendix of this report.

ANALYSIS AND RECOMMENDATIONS

Subgrade Bearing/Stability

California Bearing Ratio (CBR) values from tests completed on remolded samples of the subgrade soils encountered directly below the existing pavement range from 3.2 to 5.9. Based upon this data, we recommend that the pavement design be based upon a CBR value of 4.

Immediate Bearing Value (IBV) tests were performed while completing the Standard Proctor tests in order to determine the stability characteristics of the subgrade soils at varying moisture content values. In accordance with criteria established by the Illinois Department of Transportation (IDOT), minimum IBVs of 6 to 8 are required to provide a stable subgrade during construction. Tests completed on the subgrade soil samples indicate that IBVs at or in excess of the recommended minimum values can be achieved when the subgrade is at a moisture content that is at or less than 115 percent of the optimum moisture content. The average value representing 115 percent of the optimum moisture content for the subgrade soils is approximately 12 percent.

Depending upon the weather conditions at the time site work is completed, it is possible that reductions in the moisture content of the subgrade soils of up to 10 percentage points will be required in order to provide stable conditions. For obvious reasons, reducing the moisture content by discing and drying the subgrade is most effective in hot, dry and windy weather, which may or may not be the case at the time construction is completed. Subsequent to adjustments to the moisture content, the subgrade should be recompacted to achieve in place dry unit weight values of at least 95 percent of the maximum dry unit weight as determined by the Standard Proctor Test.

Depending upon the grain size and plasticity characteristics, subgrade soils may also generally be stabilized by the addition of lime or cement. Based upon the grain size and plasticity characteristics of the subgrade soils, it is not likely that stabilization using lime treatment will be effective. We anticipate that cement stabilization will be effective. Cement treatment can generally be completed during periods of wet weather which can reduce construction delays. Procedures outlined by IDOT for Cement Modified Soils should be implemented should this subgrade stabilization alternate be selected.

If required, stabilization can also be achieved by removal and replacement with select granular fill. We anticipate that placement of at least 12 inches of coarse aggregate will be required if this procedure is implemented. The coarse aggregate may consist of crushed stone or gravel between about 1/4 to 3 inches in size and containing no fines. IDOT gradations CA-1, CA-5 and CA-7 meet these criteria. The aggregate should be placed in maximum 12 inch lifts and compacted to a dense and stable state. A geotextile fabric cloth and/or geogrid can also be placed below the aggregate to help stabilize problem areas.

Frost Susceptibility/Drainage Characteristics

The grain size and plasticity characteristics have been reviewed as they relate to Soil Frost Groups as defined in by the Federal Aviation Administration (FAA) Advisory Circular 150/5320-6F. Based upon this criteria, we recommend that the design be based upon Soil Frost Group FG-3.

A remolded hydraulic conductivity (permeability) test has been completed on a sample of the predominate subgrade soil type encountered in the borings. This test indicates that these soils have a coefficient of permeability of 3.1×10^{-3} cm/sec. This converts to a value of approximately 8.8 ft/day.

Based upon these test results and the criteria in the referenced FAA Advisory Circular, a drainage layer will be required as a part of the pavement design.

Shrink/Swell Characteristics

The bulk subgrade samples of the sandy clay soils were tested to determine the shrinkage limit values in accordance with ASTM D4943. These shrinkage limit values range from 22 to 23 percent. The in situ moisture content values of these subgrade soils are slightly variable, ranging from 16 to 21 percent. Based upon these values, minimal amounts of volumetric shrinkage are anticipated.

As required by the CBR test procedures, the expansion of the subgrade soils was measured after the samples had been soaked for the specified time period. Swell percentages ranging from 0.1 to 2.4 percent were measured. Based upon this data and the FAA criteria, treatment of the subgrade to prevent swelling will not be required.

CLOSURE

The analysis and recommendations submitted in this report are based upon the data obtained from the six (6) soil borings performed at the locations indicated on the Boring Location Plan. This report does not reflect any variations which may occur beyond these borings, the nature and extent of which may not become evident until during the course of construction. If variations are then identified, the recommendations contained in this report should be re-evaluated after performing on-site observations.

Douglas P. Ramsey
Licensed Professional Engineer
Illinois No. 062-040905

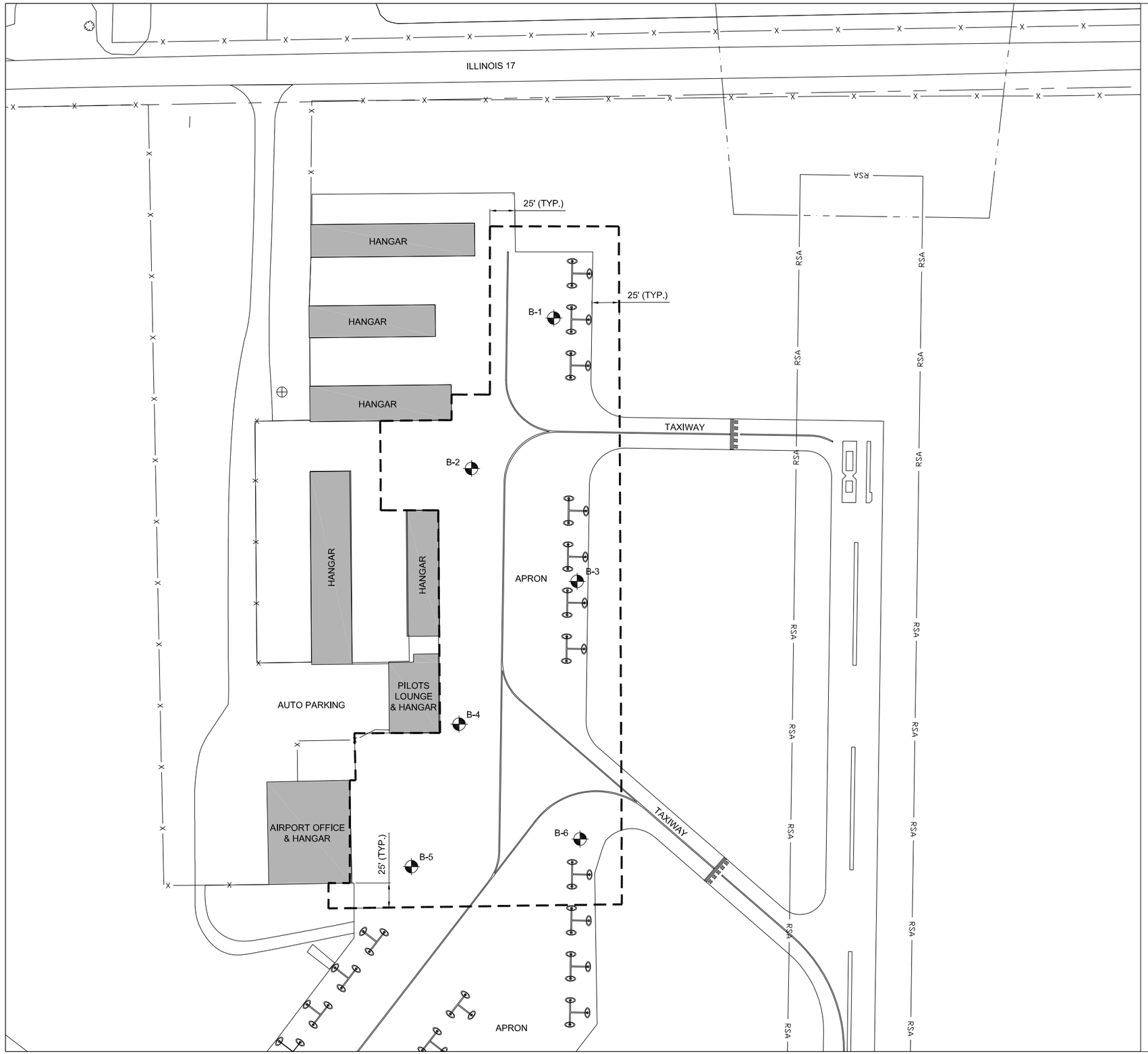
APPENDIX

SURVEY AND BORING SKETCH

BORING LOGS

SOIL TEST DATA SHEETS

MOISTURE DENSITY RELATIONSHIPS



SURVEY SCOPE:

1. VERIFY HORIZONTAL CONTROL BASED ON ILLINOIS STATE PLANE COORDINATES, EAST ZONE, NAD 83.
2. VERTICAL CONTROL BASED ON NAVD88 VERTICAL DATUM PER NGS BENCHMARKS.
3. MARK-IN-FIELD AND GRADE ELEVATIONS OF SOIL BORING LOCATIONS AS SHOWN BELOW.
4. SURVEY:
   - 4.1. LOCATION AND ELEVATION OF ALL IMPROVEMENTS.
   - 4.2. PAVEMENT SHOTS ON A MINIMUM 10-FOOT-GRID AND IN THE LOCATION OF EXISTING APRONS, ACCESS ROADS, AND VEHICLE PARKING IN THE PROJECT AREA IDENTIFIED.
   - 4.3. ADDITIONAL GROUND SHOTS WITHIN THE SURVEY LIMITS OF PROPOSED CONSTRUCTION AREA AS NEEDED TO DEFINE UNIQUE TOPOGRAPHIC FEATURES.
   - 4.4. APRON AND ROADWAY PAVEMENT MARKINGS, CURBS, AND MEDIANS.
   - 4.5. DRAINAGE STRUCTURES AND CULVERTS INCLUDING RIM, INVERT, MATERIAL, AND DIRECTION OF CULVERTS.
   - 4.6. WATER AND SEWER MARKERS, VALVE BOXES, HYDRANTS, CLEANOUTS, LIFT STATIONS, AND APPURTENANCES.
   - 4.7. ELECTRICAL MANHOLES, NUMBER, SIZE, AND DIRECTION OF CONDUIT.
   - 4.8. LOCATION OF ALL OTHER UTILITIES AND APPURTENANCES.
   - 4.9. TAXIWAY, APRON AND ROADWAY LIGHTING, SIGNAGE, AND APPURTENANCES.
   - 4.10. AIRPORT SECURITY FENCE, ACCESS GATES, AND APPURTENANCES.
   - 4.11. MISCELLANEOUS STRUCTURES WITHIN THE SURVEY LIMITS OF THE PROPOSED CONSTRUCTION AREA.

FINAL DELIVERABLES:

1. AUTOCAD FILES WITH TIN.
2. ALL ASSOCIATED DIGITAL FILES AND SURVEY FIELD NOTES.

SURVEY LIMITS

TOTAL SURVEY AREA: 3.0 ACRES

100 0 100 200
SCALE IN FEET

GEO-TECHNICAL:

B-X BORING LOCATION

BORING	NORTHING	EASTING	DEPTH (FT)
B-1	1587459.2105	2511838.5389	15
B-2	1587312.1378	2511758.0601	15
B-3	1587201.8145	2511861.2909	15
B-4	1587062.0665	2511745.9042	15
B-5	1586922.7831	2511699.2873	15
B-6	1586949.7818	2511864.1392	15

FINAL DELIVERABLES:

1. B = BORING; 10' OR 15' DEPTH
2. ALL BORINGS SHALL HAVE MEASUREMENTS FOR WATER LEVEL AT TIME OF DRILLING AND 24 HOURS AFTER.
3. GEO-TECHNICAL REPORT

HANSON
Engineering | Planning | Allied Services

Offices Nationwide
www.hanson-inc.com

Hanson Professional Services Inc.
1525 S. 6th Street
Springfield, IL 62703
phone: 217-788-2450
fax: 217-788-2503

Illinois Licensed
Professional Service Corporation
#184-001084

MARSHALL COUNTY AIRPORT BOARD

Marshall County Airport
1315 Illinois 17
Lacon, Illinois 61540
phone: 309-246-2870

RECONSTRUCT TERMINAL AIRCRAFT PARKING APRON

SBGP No: 3-17-SBGP-TBD
IDA No: C75-XXXX

Contract No. MA0XX

NO.	DATE	DESCRIPTION		
		DES	DWN	REV

ISSUE: FEBRUARY 19, 2018
PROJECT NO: 19A0006
CAD FILE: SURVEYREQUEST.DWG
DESIGN BY: LDH 2/19/19
DRAWN BY: LDH 2/19/19
REVIEWED BY: XXX XX/XX/XX

SHEET TITLE

SURVEY AND BORING SKETCH

FEB 20, 2019 10:49 AM HAUSM00682
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PROJECT **Terminal Aircraft Parking Apron, Marshall County Airport, Lacon, IL**

CLIENT **Hanson Professional Services Inc., 1525 S. Sixth St., Springfield, IL 62703**

BORING **B-1** DATE STARTED **4-18-19** DATE COMPLETED **4-18-19** JOB **19-058**

ELEVATIONS

GROUND SURFACE

END OF BORING

WATER TABLE

▼ WHILE DRILLING **DRY**

▽ AT END OF BORING **DRY**

▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		6" Hot Mix Asphalt
							0.5		7" Sand & Gravel Aggregate Base
							1.1		Soft dark brown sandy CLAY (CL)
	1	SS	5	21.0	0.57 0.5*				
							3.0		Loose to very loose brown fine to medium SAND (SP)
	2	SS	8	7.5					
	3	SS	3	10.5					
							8.0		Medium dense to loose brown fine SAND (SP)
	4	SS	10	3.9					
	5	SS	8	4.6					
	6	SS	6	4.3					
							15		End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DRILL RIG NO. **CME 45**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Terminal Aircraft Parking Apron, Marshall County Airport, Lacon, IL**

CLIENT **Hanson Professional Services Inc., 1525 S. Sixth St., Springfield, IL 62703**

BORING **B-2** DATE STARTED **4-18-19** DATE COMPLETED **4-18-19** JOB **19-058**

ELEVATIONS

GROUND SURFACE

END OF BORING

WATER TABLE

▼ WHILE DRILLING **DRY**

▽ AT END OF BORING **DRY**

▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0		8" Hot Mix Asphalt
							0.7		6" Sand & Gravel Aggregate Base
							1.2		Stiff dark brown sandy CLAY (CL)
	1	SS	6	15.7	1.0*				
							3.0		Loose brown fine to medium SAND (SP)
	2	SS	5	8.7					
	3	SS	6	5.1					
	4	SS	7	5.1					
	5	SS	8	5.0					
	6	SS	7	5.2					
							15.0		End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DRILL RIG NO. **CME 45**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Terminal Aircraft Parking Apron, Marshall County Airport, Lacon, IL**

CLIENT **Hanson Professional Services Inc., 1525 S. Sixth St., Springfield, IL 62703**

BORING **B-3** DATE STARTED **4-18-19** DATE COMPLETED **4-18-19** JOB **19-058**

ELEVATIONS

GROUND SURFACE

END OF BORING

WATER TABLE

WHILE DRILLING **DRY**

AT END OF BORING **DRY**

24 HOURS

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.6		5-1/2" Hot Mix Asphalt
									Loose brown fine to medium SAND (SP)
	1	SS	8	6.6					
	2	SS	5	4.6					
	3	SS	9	5.0					
	4	SS	7	3.4					
	5	SS	9	4.5					
	6	SS	8	4.6					
									End of Boring at 15.0'

0
5
10
15
20

DRILL RIG NO. **CME 45**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Terminal Aircraft Parking Apron, Marshall County Airport, Lacon, IL**

CLIENT **Hanson Professional Services Inc., 1525 S. Sixth St., Springfield, IL 62703**

BORING **B-4** DATE STARTED **4-18-19** DATE COMPLETED **4-18-19** JOB **19-058**

ELEVATIONS

GROUND SURFACE

END OF BORING

WATER TABLE

▼ WHILE DRILLING **DRY**

▽ AT END OF BORING **DRY**

▼ 24 HOURS

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.3		2-3/4" Hot Mix Asphalt Stiff brown lean CLAY, trace sand (CL)
	1	SS	10	18.4	1.0*				
							3.0		Loose to very loose brown fine to medium SAND (SP)
	2	SS	5	8.4					
	3	SS	4	17.1					
	4	SS	4	21.3					
	5	SS	6	15.4					
	6	SS	5	9.1					
									End of Boring at 15.0'

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DRILL RIG NO. **CME 45**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Terminal Aircraft Parking Apron, Marshall County Airport, Lacon, IL**

CLIENT **Hanson Professional Services Inc., 1525 S. Sixth St., Springfield, IL 62703**

BORING **B-5** DATE STARTED **4-18-19** DATE COMPLETED **4-18-19** JOB **19-058**

ELEVATIONS

GROUND SURFACE

END OF BORING

WATER TABLE

WHILE DRILLING **DRY**

AT END OF BORING **DRY**

24 HOURS

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.2		2" Hot Mix Asphalt 10" Sand & Gravel Aggregate Base
							1.0		Stiff dark brown sandy CLAY (CL)
	1	SS	5	18.2	1.0*				
							3.0		Loose to very loose brown fine to medium SAND (SP)
	2	SS	8	7.9					
	3	SS	4	13.3					
	4	SS	5	14.3					
	5	SS	8	17.2					
	6	SS	9	3.9					
									End of Boring at 15.0'

DISTANCE BELOW SURFACE IN FEET

0
5
10
15
20

* Approximate unconfined compressive strength based on measurements with a calibrated pocket penetrometer.

DRILL RIG NO. **CME 45**

Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

PROJECT **Terminal Aircraft Parking Apron, Marshall County Airport, Lacon, IL**

CLIENT **Hanson Professional Services Inc., 1525 S. Sixth St., Springfield, IL 62703**

BORING **B-6** DATE STARTED **4-18-19** DATE COMPLETED **4-18-19** JOB **19-058**

ELEVATIONS

GROUND SURFACE

END OF BORING

WATER TABLE

WHILE DRILLING **DRY**

AT END OF BORING **DRY**

24 HOURS

DISTANCE BELOW SURFACE IN FEET

LENGTH RECOVERY	SAMPLE NO.	SAMPLE TYPE	N	WC	Qu	γ_{DRY}	DEPTH	ELEV.	SOIL DESCRIPTIONS
							0.5		5-1/2" Hot Mix Asphalt
							0.8		3-1/2" Sand & Gravel Aggregate Base
							1.1		Stiff dark brown sandy CLAY (CL)
	1	SS	8	10.2					Loose to very loose brown fine to medium SAND (SP)
	2	SS	4	13.9					
	3	SS	3	18.9					
	4	SS	4	18.7					
	5	SS	5	11.5					
	6	SS	6	8.0					
									End of Boring at 15.0'

0
5
10
15
20

DRILL RIG NO. **CME 45**

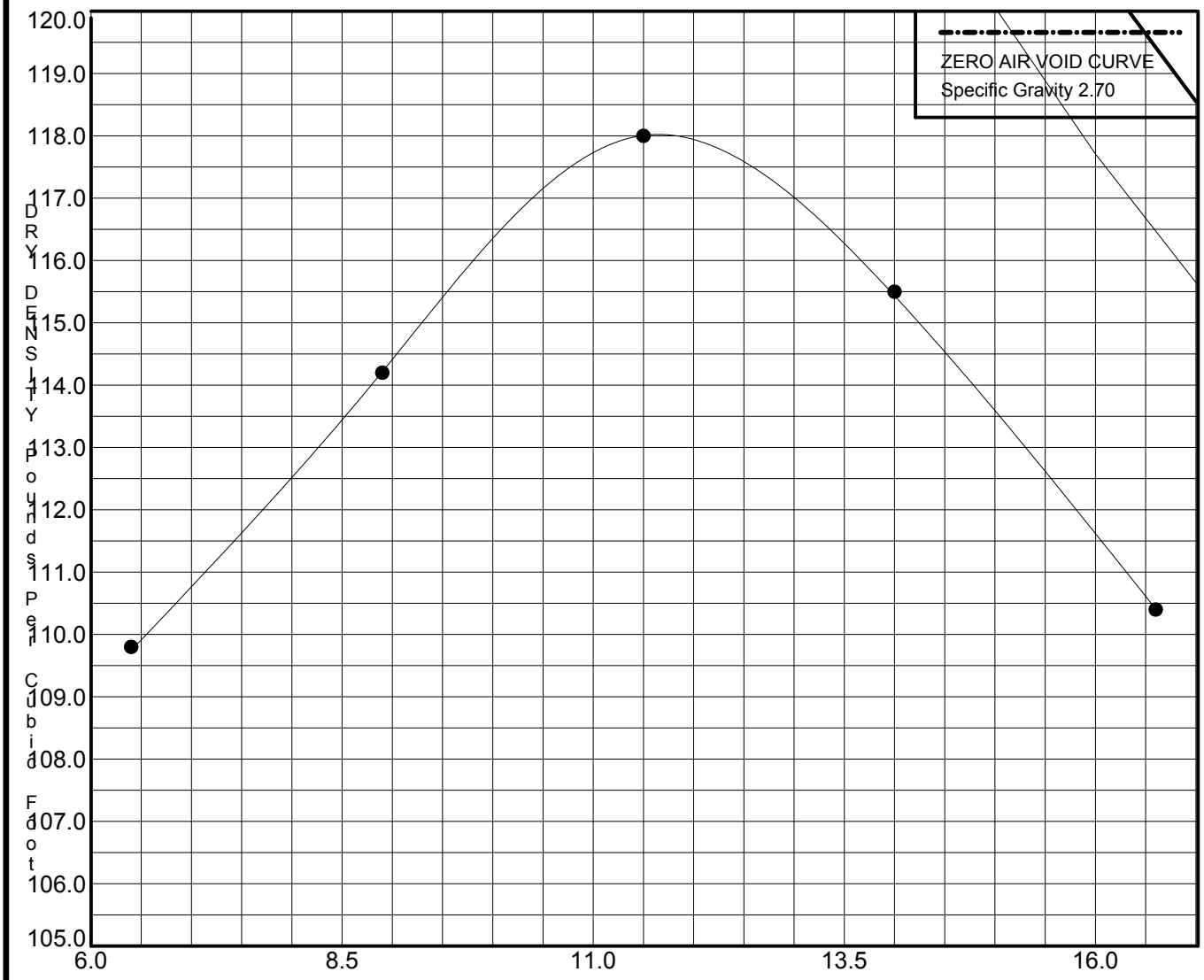
Division lines between deposits represent approximate boundaries between soil types; in-situ, the transition may be gradual.

RGE Job 19-058
June 18, 2019

RAMSEY GEOTECHNICAL ENGINEERING
1701 W. Market Street, Suite B, Bloomington, IL 61701-2641 - 309-821-0430 - FAX 309-821-1242

Soil Test Data
Reconstruct Terminal Aircraft Parking Apron
Marshall County Airport
Lacon, Illinois

Lab Number	1	2	3		
Boring Number	B-1	B-3	B-5		
Depth	1' – 3'	1' – 3'	1' – 3'		
FAA Frost Group	FG-3	FG-2	FG-3		
Grain Size Classification	SANDY LEAN CLAY (CL)	FINE TO MEDIUM SAND (SP-SM)	SANDY LEAN CLAY (CL)		
Gradation - Passing 1" Sieve %					
¾" Sieve %					
½" Sieve %					
3/8" Sieve %					
#4 Sieve %					
#10 Sieve %	100	100	100		
#16 Sieve %	97	97	94		
#40 Sieve %	69	46	72		
#100 Sieve %	59	9	56		
#200 Sieve %	58	7	54		
Sand %	42	93	46		
Silt %	34	5	34		
Clay %	24	2	20		
Liquid Limit	41	NP	31		
Plasticity Index	25	NP	19		
Bearing Ratio	3.3	3.2	5.9		
Standard Dry Density PCF	118.1	108.3	123.0		
Optimum Moisture %	11.7	10.6	10.1		
IBV at Optimum Moisture	12.5	24.0	11.5		
IBV at 105 % of Optimum	11.9	22.4	10.9		
IBV at 110 % of Optimum	10.5	19.5	9.5		
IBV at 115 % of Optimum	9.0	17.0	8.1		
IBV at 120 % of Optimum	5.6	12.9	4.2		



SPECIMEN IDENTIFICATION	CLASSIFICATION
Sample No. 1	Dark brown sandy CLAY (CL)

MOISTURE/DENSITY RELATIONSHIP		NOTES :
x	Standard ASTM D698/AASHTO T99	Subgrade sample from Boring B-1.
	Modified ASTM D1557/AASHTO T180	
Maximum Dry Density (PCF)	**118.1**	
Optimum Water Content (%)	**11.7**	

PROJECT **Marshall County Airport** JOB NO. **19-058**

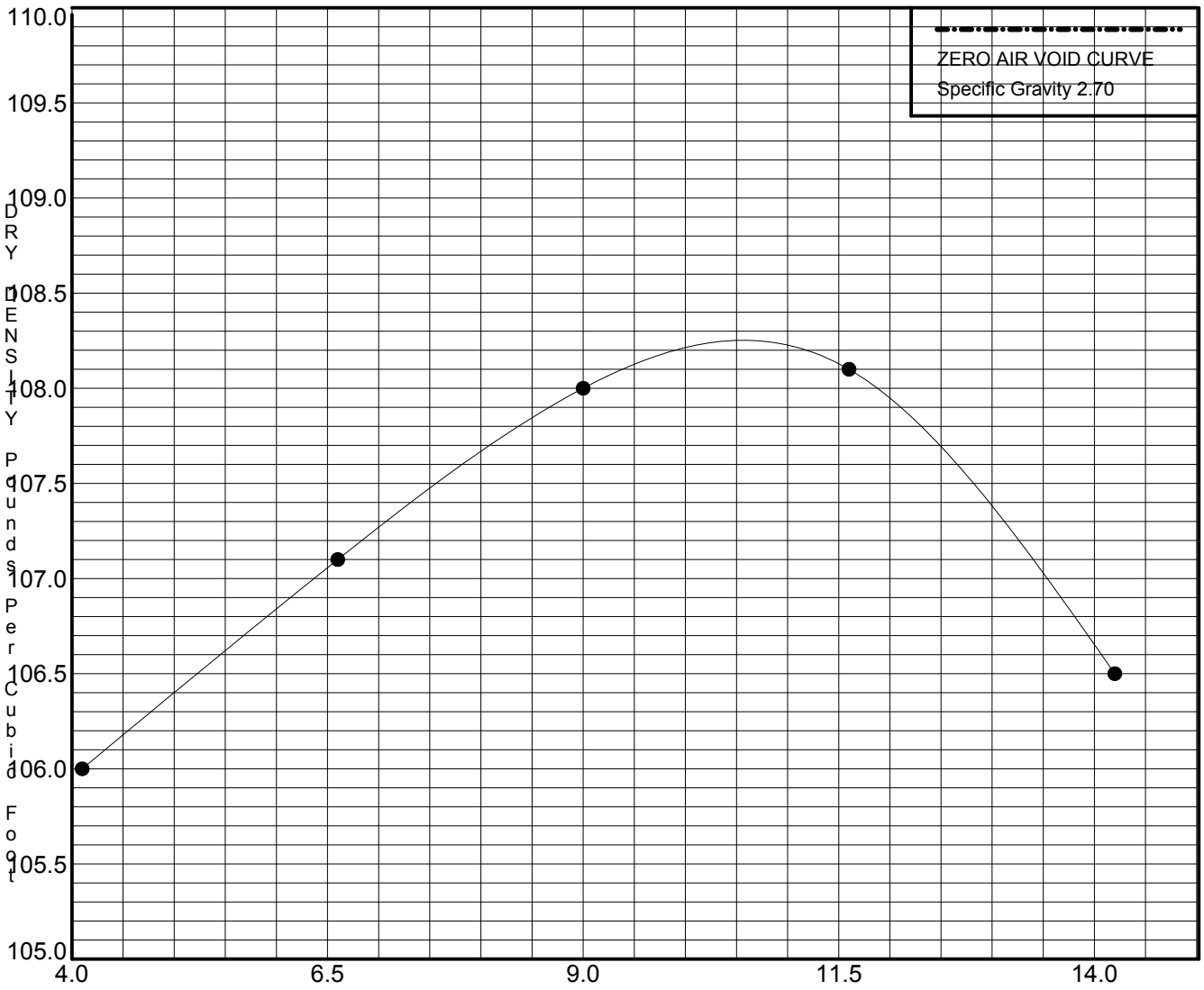
LOCATION **Lacon, Illinois** DATE **April 23, 2019**

1

MOISTURE-DENSITY RELATIONSHIP

Ramsey Geotechnical Engineering

Bloomington, IL 61701



SPECIMEN IDENTIFICATION	CLASSIFICATION
Sample No. 2	Brown fine to medium SAND (SP)

MOISTURE/DENSITY RELATIONSHIP		NOTES :
x	Standard ASTM D698/AASHTO T99	Subgrade sample from Boring B-3.
	Modified ASTM D1557/AASHTO T180	
Maximum Dry Density (PCF)	**108.3**	
Optimum Water Content (%)	**10.6**	

PROJECT **Marshall County Airport** JOB NO. **19-058**

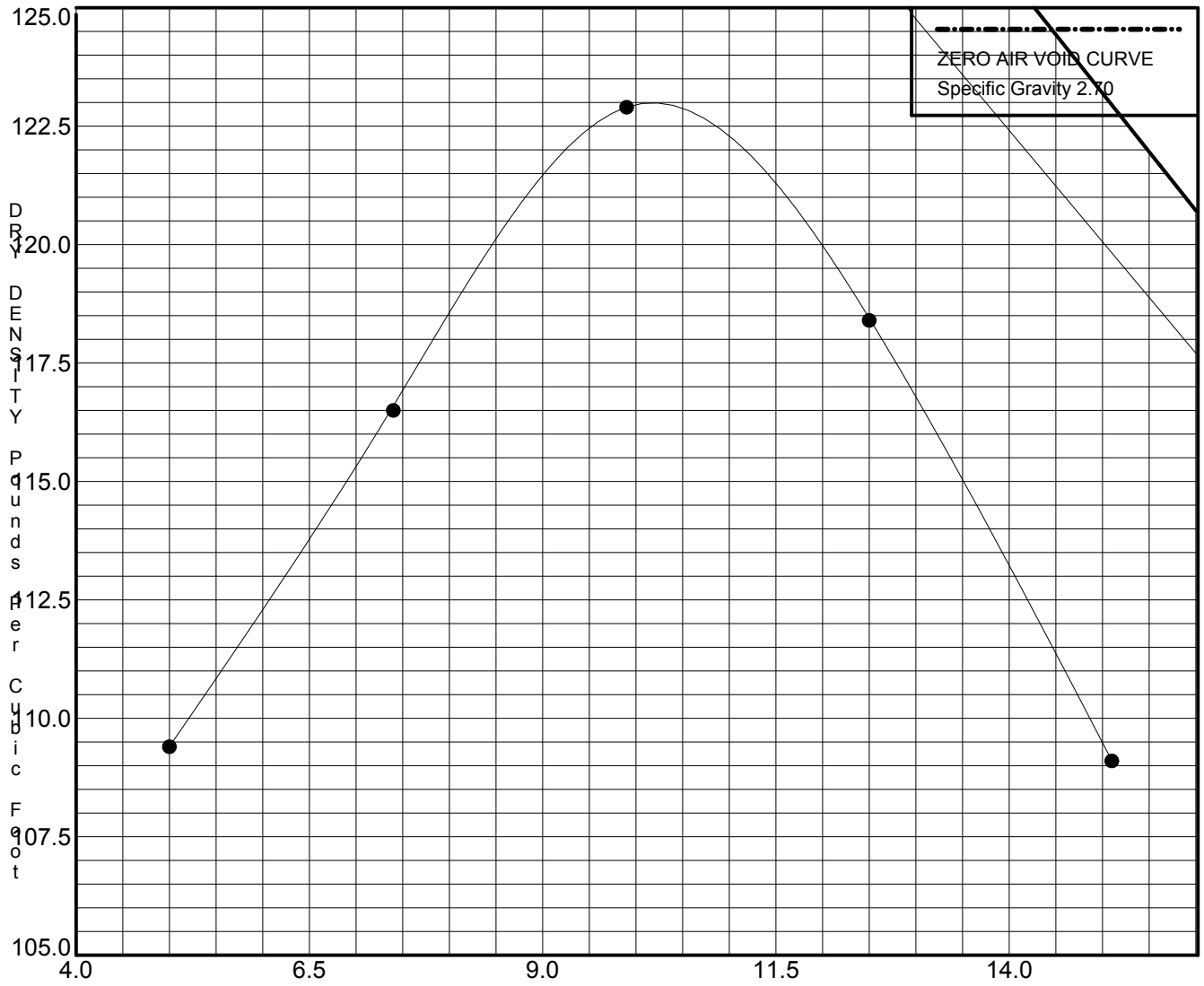
LOCATION **Lacon, Illinois** DATE **April 23, 2019**

2

MOISTURE-DENSITY RELATIONSHIP

Ramsey Geotechnical Engineering

Bloomington, IL 61701



SPECIMEN IDENTIFICATION	CLASSIFICATION
Sample No. 3	Dark brown sandy CLAY (CL)

MOISTURE/DENSITY RELATIONSHIP		NOTES :
x	Standard ASTM D698/AASHTO T99	Subgrade sample from Boring B-5
	Modified ASTM D1557/AASHTO T180	
Maximum Dry Density (PCF)	**123.0**	
Optimum Water Content (%)	**10.1**	

PROJECT **Marshall County Airport** JOB NO. **19-058**

LOCATION **Lacon, Illinois** DATE **April 23, 2019**

3

MOISTURE-DENSITY RELATIONSHIP

Ramsey Geotechnical Engineering

Bloomington, IL 61701