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COLES COUNTY MEMORIAL AIRPORT

MATTOON, ILLINOIS

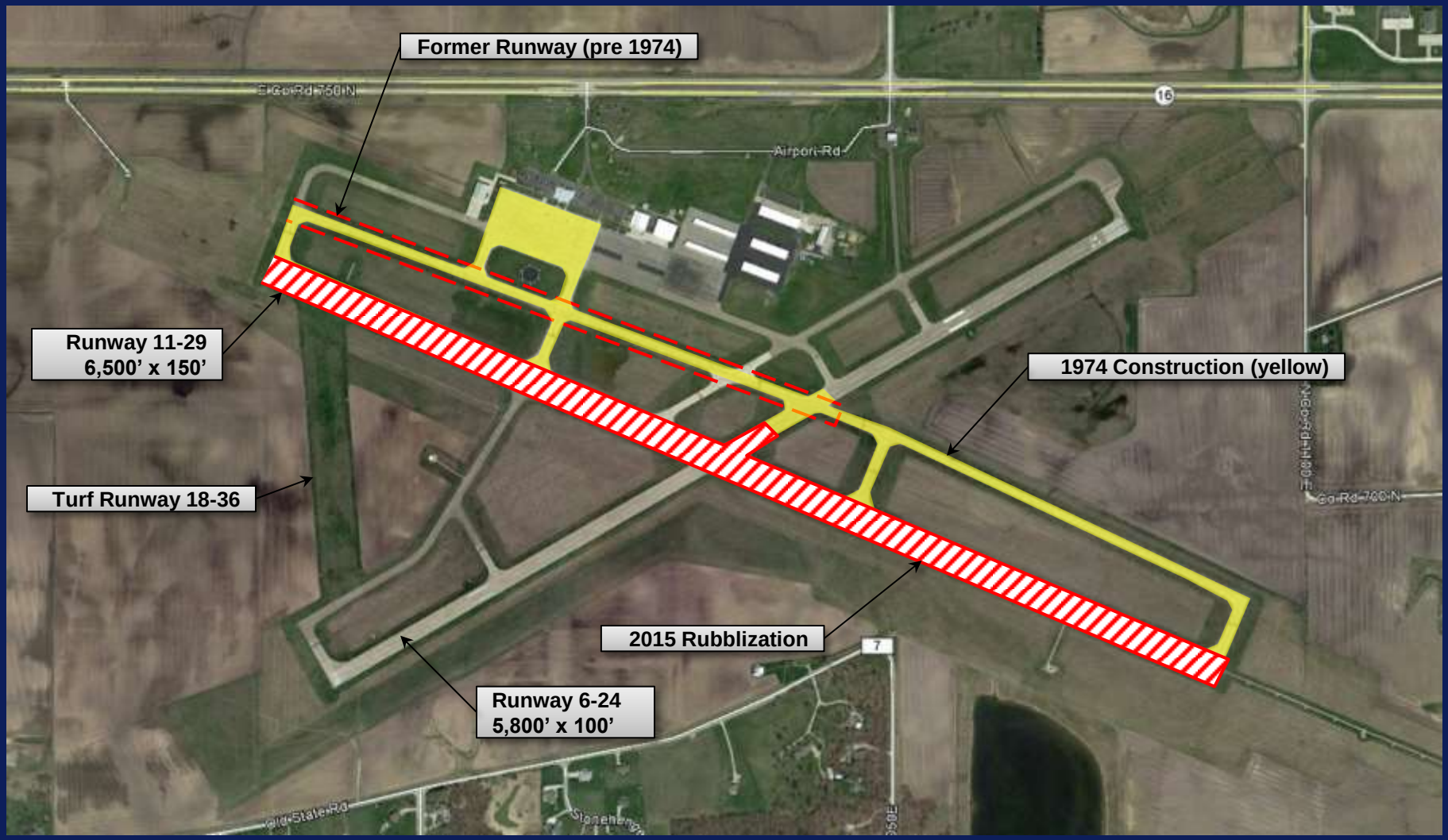
RUBBLIZATION OF RUNWAY 11-29

Airport Background

- Located on IL Route 16 between Mattoon and Charleston
- Owned and operated by Coles County Airport Authority
- Inaugural construction in 1949
- Two paved runways - 11-29 & 6-24, sod strip 18-36
- 82 based aircraft, including several corporate aircraft and a large crop dusting service
- 33,000 annual operations
- Aircraft weights up to 190k lbs
- Takeoff speeds up to 180 mph

Airport Background

Coles County Memorial Airport



Pavement History

- Runway 11-29, full parallel taxiway, and apron constructed in 1974
- 14” concrete over 7” asphalt base on subgrade
- 200,000 SY of pavement
- 80k CY concrete, 90k tons asphalt
- Project cost ~$25,000,000 in today’s dollars

Pavement History

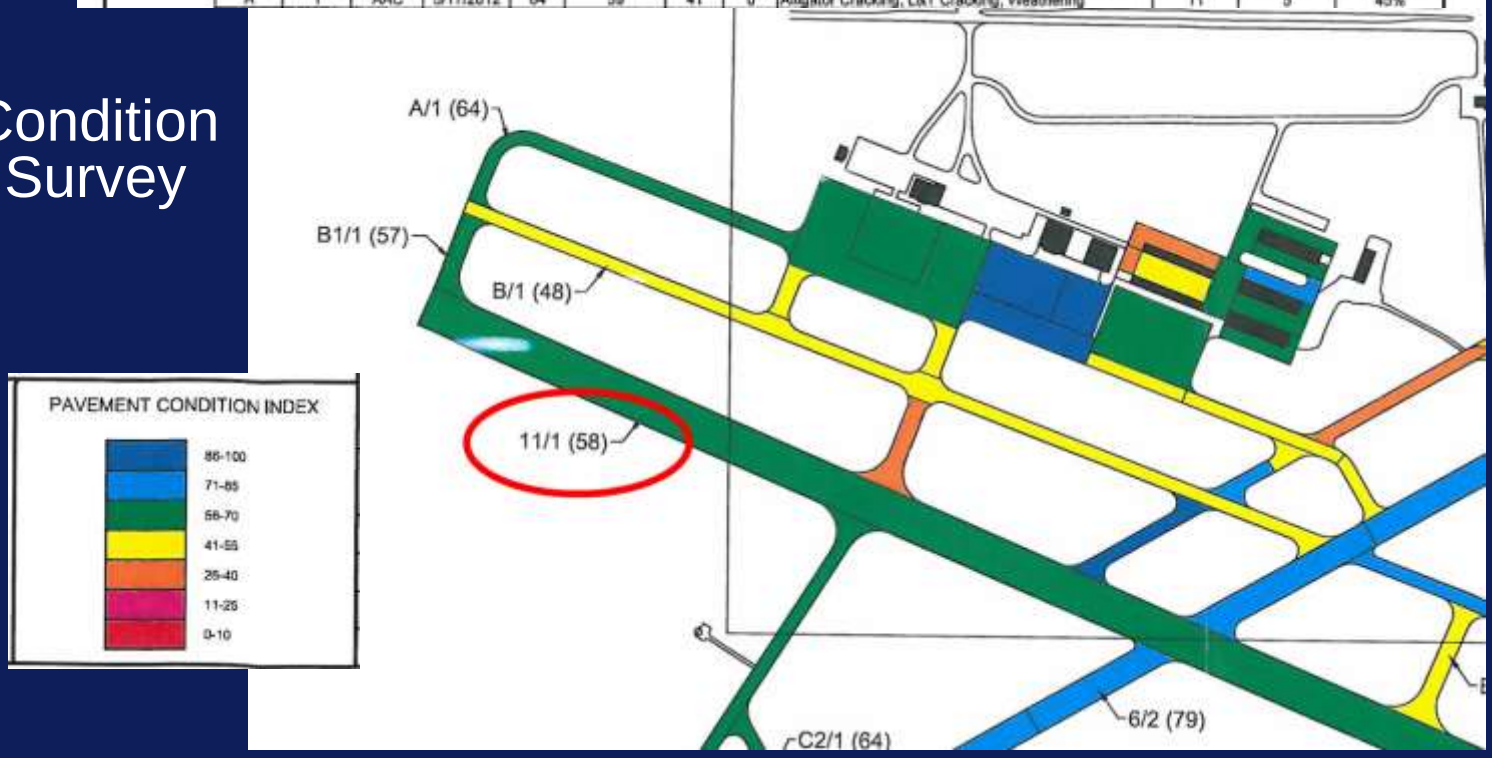
- Began showing signs of distress in mid-90’s
- 4 light rehab and patching projects over next 15 years - $1.8 million total
- Concerned with not only smoothness, but FOD (foreign object debris)

Pavement History

Illinois Division of Aeronautics
Airport Pavement Management System
Coles County Memorial Airport, Mattoon
2012 PCI Summary Information

Airport Name	Branch ID	Section ID	Surface Type [1]	Inspection Date	2012 PCI	Percent of Distress Due to: Climate/ Durability [2]	Load [3]	Other	Type of Distresses [4]	Total No. of Samples	No. Samples Inspected	Percent Samples Inspected [5]
	11	1	PCC	5/17/2012	58	73	8	19	Corner Break, D Cracking, Joint Seal Damage, Large	99	10	10%
	6	1	AAC	5/17/2012	78	100	0	0	L&T Cracking	42	7	17%
	6	2	AAC	5/17/2012	79	100	0	0	L&T Cracking	12	5	42%
	6	3	PCC	5/17/2012	73	55	3	42	D Cracking, Joint Seal Damage, Large Patch/Utility, LTD Cracking, Small Patch	7	5	71%
	6	4	AAC	5/17/2012	78	100	0	0	L&T Cracking	18	6	33%
	6	5	AAC	5/17/2012	76	100	0	0	L&T Cracking	24	6	25%
	A1	1	PCC	5/17/2012	50	89	0	11	D Cracking, Large Patch/Utility, Small Patch	2	2	100%
	A	1	AAC	5/17/2012	64	59	41	0	Alligator Cracking, L&T Cracking, Weathering	11	5	45%

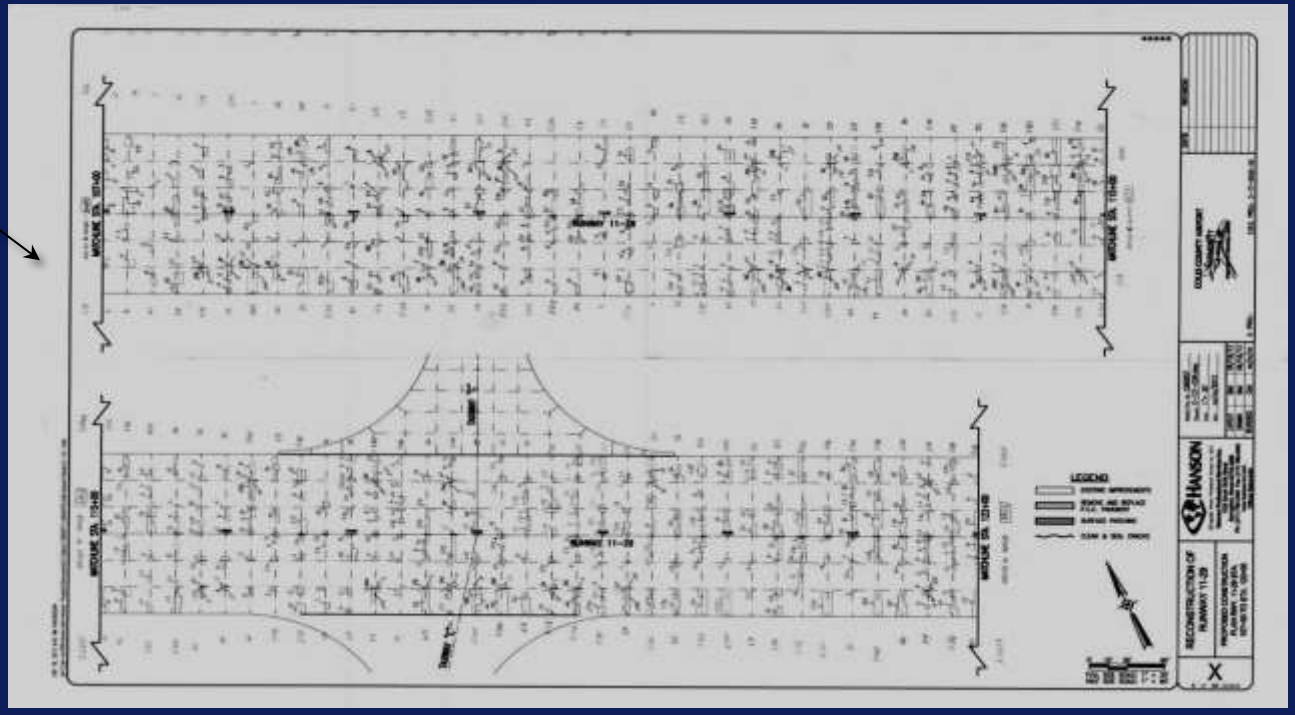
Pavement Condition Index (PCI) Survey



Pavement History

- 5th project programmed in 2013 - $1.1 million
- Full pavement survey revealed much more extensive amounts repair areas, especially full-depth joint failure, than anticipated – 1300 areas of 1-80 square feet

Sample sheet from pavement survey showing repair areas



Pavement History

- Pavement had finally become too costly to maintain – a permanent solution was now needed.
- IDA directed Hanson to perform Alternatives Analysis of reconstruction options.

Alternatives Analysis

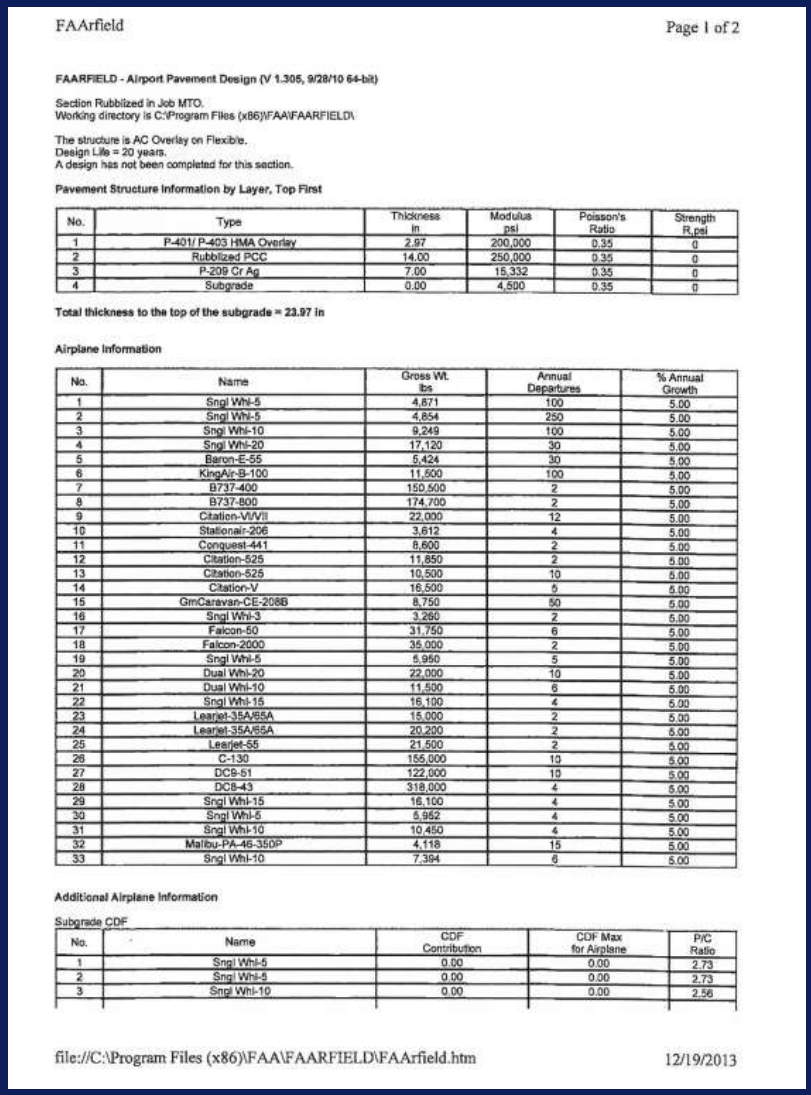
Pavement Cores & Geotechnical Investigation

Alternatives Analysis

- Overlay Existing Runway
  - Extensive amounts of full-depth failure, or “D” Cracking, and likelihood of more in the future, made for prohibitive use as base
- Remove and Replace
  - Most expensive, major operational impact
- **Rubblize and Overlay**
  - Mitigates existing concrete pavement failures
  - Save time, material, and cost by repurposing onsite material

Pavement Structure

- Pavement design using FAA guidance materials and FAARFIELD software
- Projected fleet mix
- Rubblize with 4” min. asphalt overlay - $4.9 million projected cost



FAArfield Page 1 of 2

FAARFIELD - Airport Pavement Design (V 1.305, 9/28/10 64-bit)

Section Rubblized in Job MTO.
Working directory is C:\Program Files (x86)\FAA\FAARFIELD\

The structure is AC Overlay on Flexible.
Design Life = 20 years.
A design has not been completed for this section.

Pavement Structure Information by Layer, Top First

No.	Type	Thickness in	Modulus psi	Poisson's Ratio	Strength R,psi
1	P-401/ P-403 HMA Overlay	2.97	200,000	0.35	0
2	Rubblized PCC	14.00	250,000	0.35	0
3	P-209 Cr Ag	7.00	15,332	0.35	0
4	Subgrade	0.00	4,500	0.35	0

Total thickness to the top of the subgrade = 23.97 in

Airplane Information

No.	Name	Gross Wt. lbs	Annual Departures	% Annual Growth
1	Sngl Whl-5	4,871	100	5.00
2	Sngl Whl-5	4,854	250	5.00
3	Sngl Whl-10	9,249	100	5.00
4	Sngl Whl-20	17,120	30	5.00
5	Baron-E-55	5,424	30	5.00
6	KingAir-B-100	11,500	100	5.00
7	B737-400	150,500	2	5.00
8	B737-800	174,700	2	5.00
9	Citation-VI/VII	22,000	12	5.00
10	Stationair-206	3,612	4	5.00
11	Conquest-441	8,600	2	5.00
12	Citation-525	11,850	2	5.00
13	Citation-525	10,500	10	5.00
14	Citation-V	16,500	5	5.00
15	GrnCaravan-CE-208B	8,750	50	5.00
16	Sngl Whl-3	3,280	2	5.00
17	Falcon-50	31,750	6	5.00
18	Falcon-2000	35,000	2	5.00
19	Sngl Whl-5	5,950	5	5.00
20	Dual Whl-20	22,000	10	5.00
21	Dual Whl-10	11,500	6	5.00
22	Sngl Whl-15	16,100	4	5.00
23	Learjet-35A/65A	15,000	2	5.00
24	Learjet-35A/65A	20,200	2	5.00
25	Learjet-55	21,500	2	5.00
26	C-130	155,000	10	5.00
27	DC9-51	122,000	10	5.00
28	DC8-43	318,000	4	5.00
29	Sngl Whl-15	16,100	4	5.00
30	Sngl Whl-5	5,952	4	5.00
31	Sngl Whl-10	10,450	4	5.00
32	Malibu-PA-46-350P	4,118	15	5.00
33	Sngl Whl-10	7,394	6	5.00

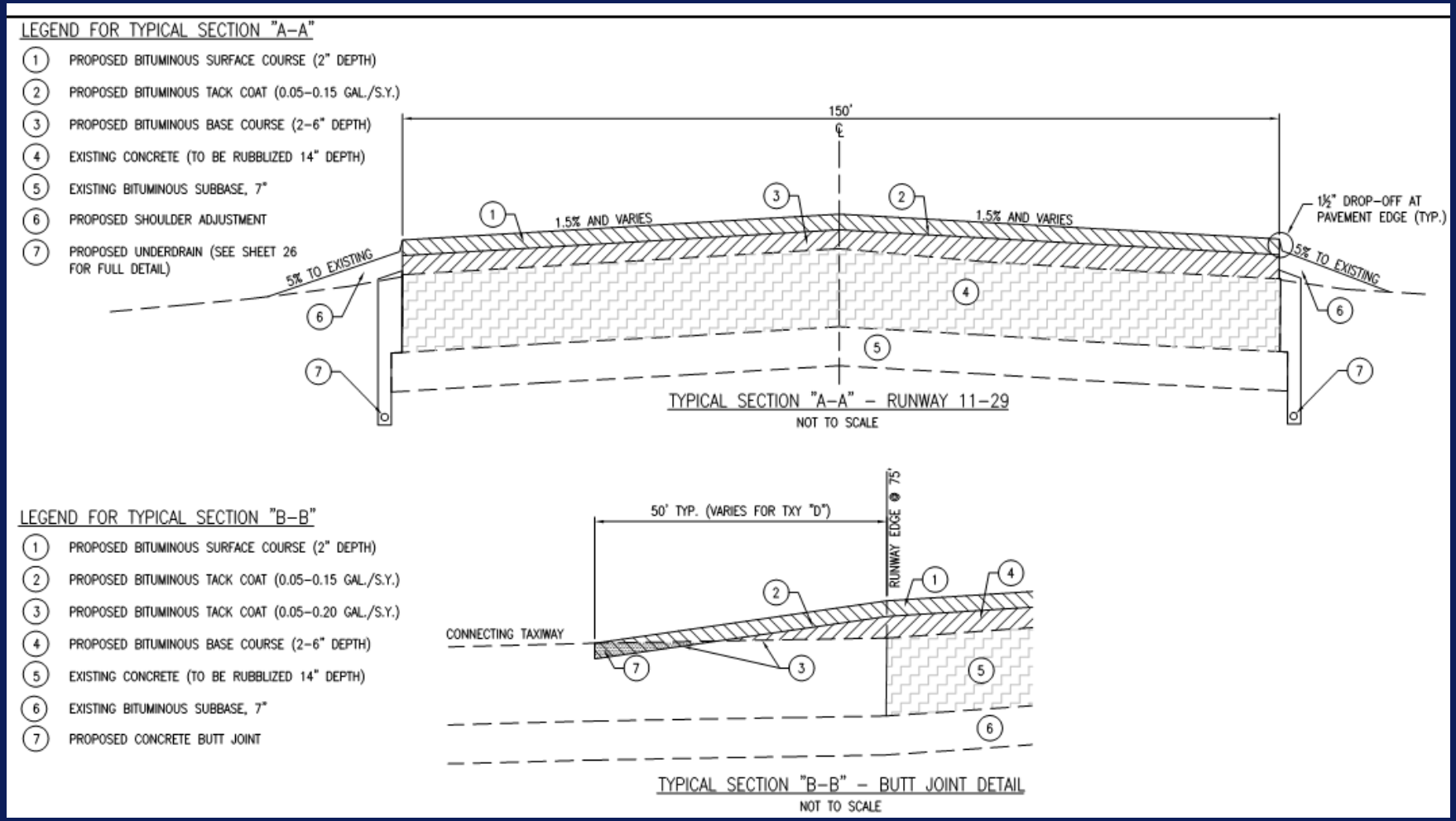
Additional Airplane Information

Subgrade CDF

No.	Name	CDF Contribution	CDF Max for Airplane	P/C Ratio
1	Sngl Whl-5	0.00	0.00	2.73
2	Sngl Whl-5	0.00	0.00	2.73
3	Sngl Whl-10	0.00	0.00	2.56

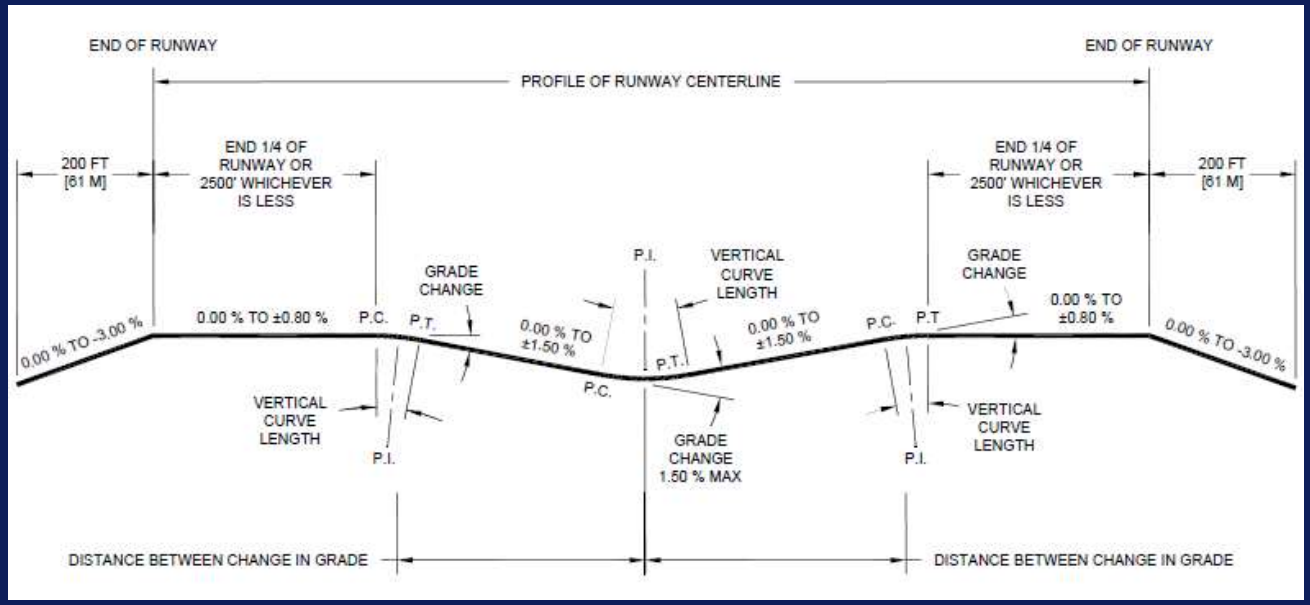
file://C:\Program Files (x86)\FAA\FAARFIELD\FAArfield.htm 12/19/2013

Pavement Structure

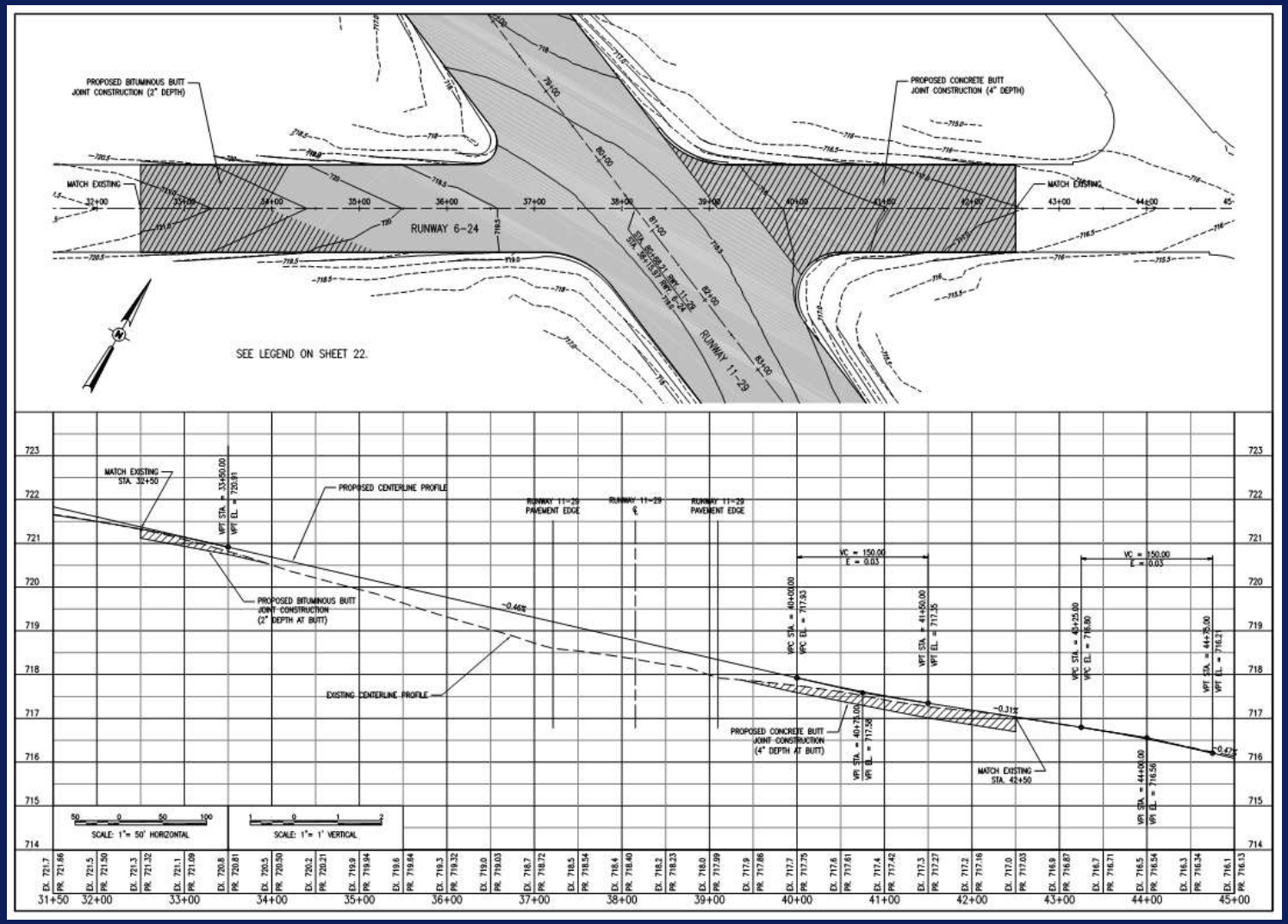


Design Considerations

- Profile Geometry, Tie-ins
  - Variable depth base course (2-6”) to make minor profile and cross-slope corrections, account for unevenness after rubblizing
  - Shoulder adjustments greater than 4” affect runway lighting
  - Runway intersection area is critical



Design Considerations



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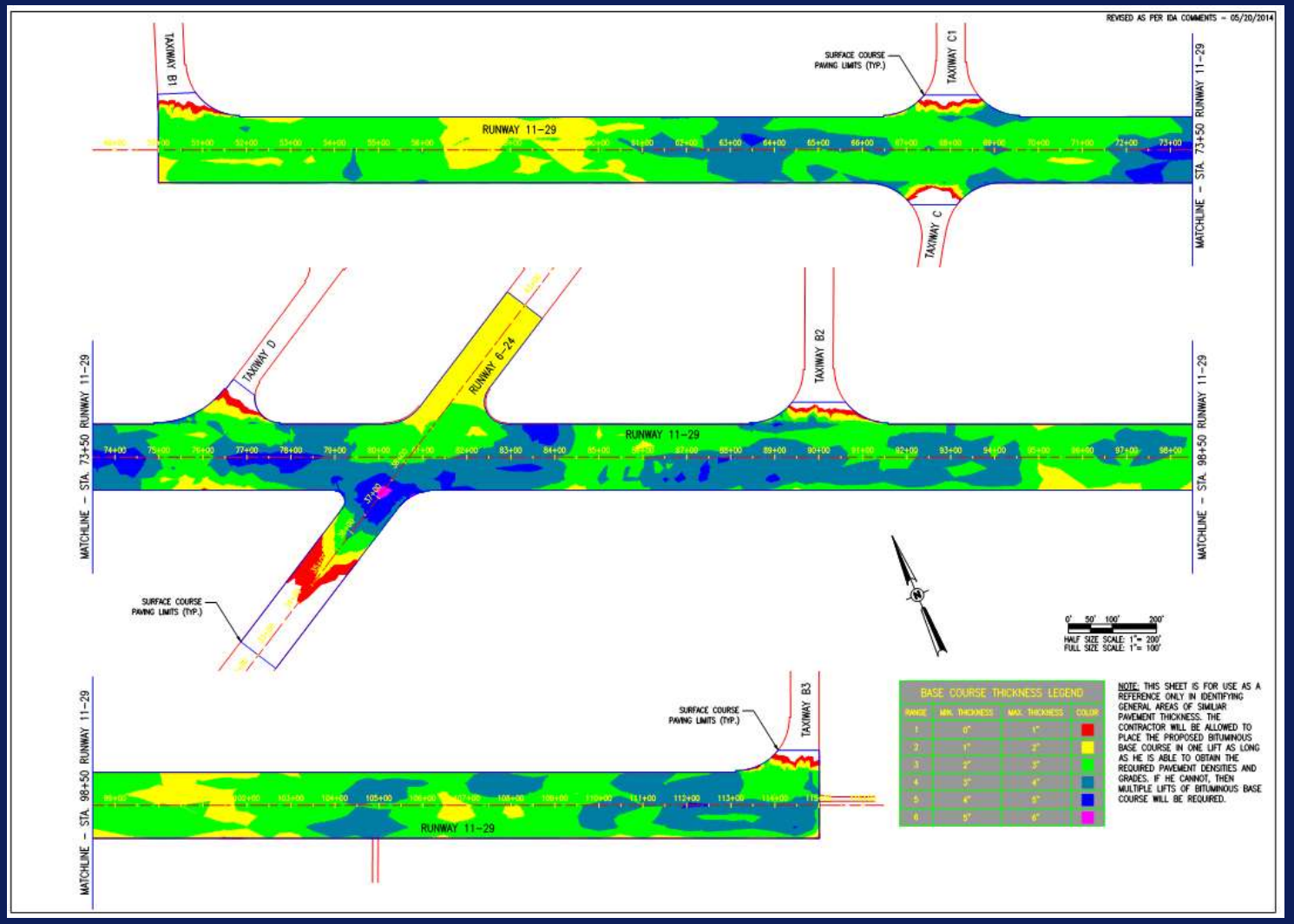
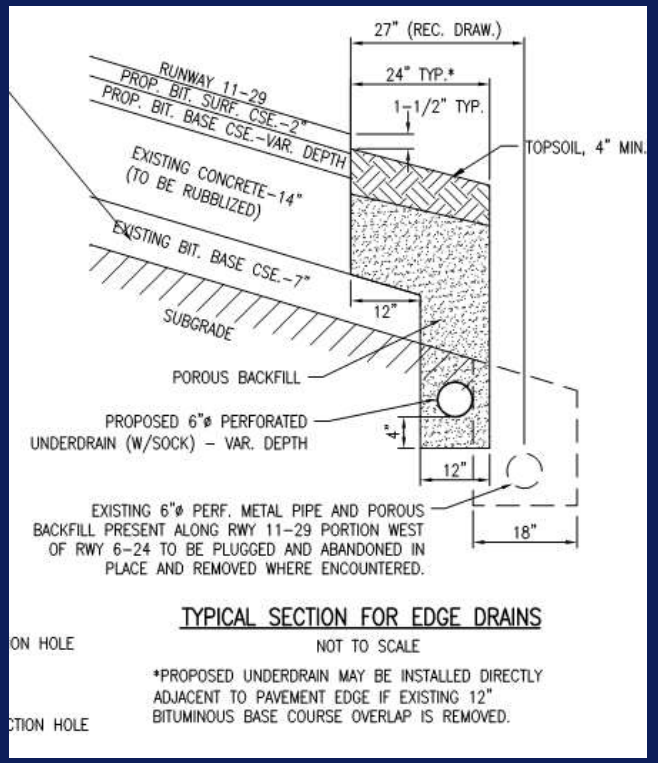


Design Considerations

- Underdrains
  - Needed to keep subgrade dry during rubblization
  - Old, but functional underdrain present on Runway 11 side – replaced afterwards.
  - New underdrain to be installed on Runway 29 side prior to rubblizing



Design Considerations

Multi-Head Drop-Hammer Breaker

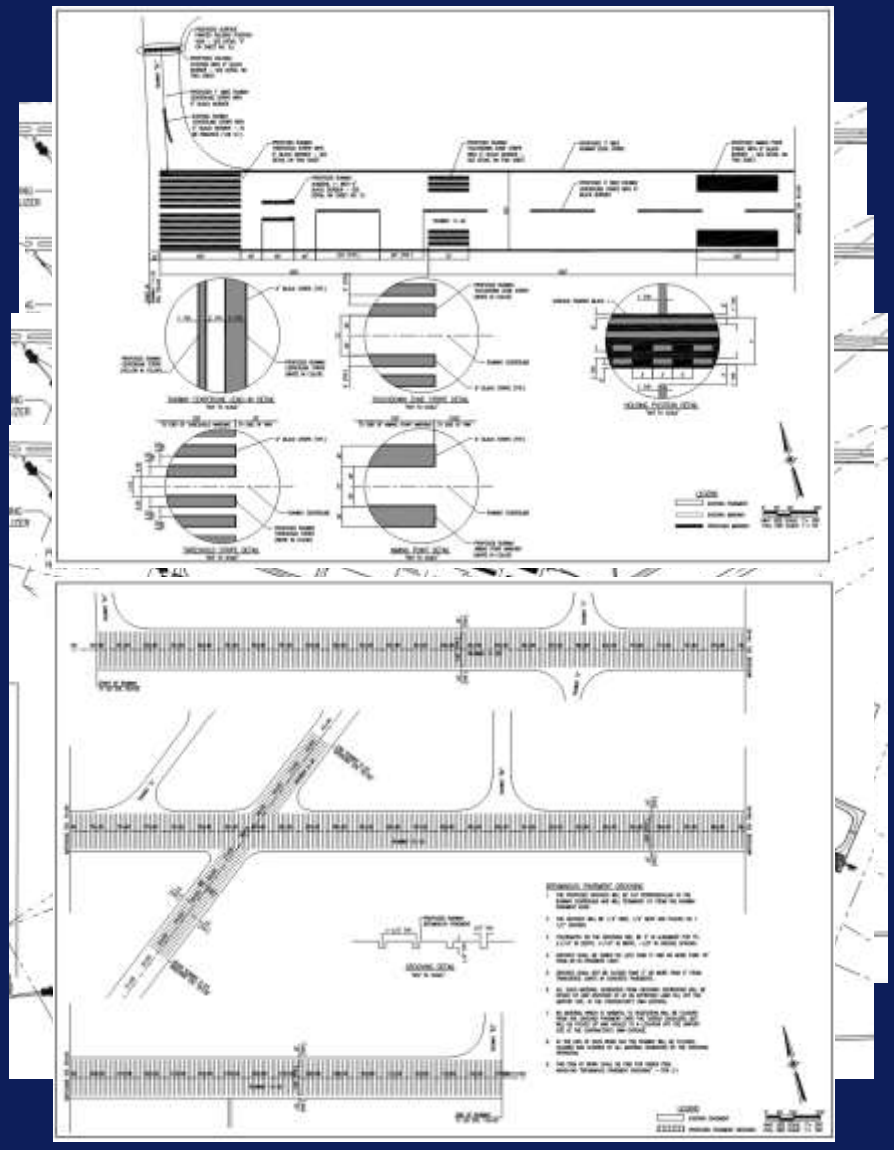
Resonate Breaker

Design Considerations

- Rubblization Performance Specification
  - 75% of top half material under 3” size
  - 75% of bottom half material under 12” size

Design Considerations

- Staging
  - 11-29 closed for project duration ➔ Critical to minimize 6-24 closures and overall project time
  - Work on both sides concurrently, rubblize and place base course on 11 End, install underdrain on 29 End
  - Switch sides
  - Intersection work
  - Surface course last
  - Groove and final mark after 30 days curing



Construction Contract

- Plan Quantities
  - 112,500 SY Concrete Pavement Rubblization
  - 18,600 tons HMA Base Course
  - 14,200 tons HMA Surface Course
  - 11,300 LF of Underdrain
  - 110,000 SF of Waterborne Pavement Marking
- 6,500’ x 150’ runway ➔~15 lane miles
- 113 Calendar Days Allotted
- Awarded to Howell Paving, Inc.
- Bid of $4.71 million
- N.T.P. issued July 6, 2015

Post Construction Testing

Post Construction Testing

HWD – DATA ANALYSIS

IMPULSE STIFFNESS MODULUS (ISM)

ISM = HWD LOAD(KIPS)/MAX Δ(ins)
ISM: KIPS/IN

AVERAGE ISM DATA

LANE	LOAD (KIPS)	DEF. (MILS)	AVG. ISM (KIPS/IN)	STD. DEV (COV-%)
RT. C/L	25	11.6	2151	378 (17.5)
	35	16.2	2164	372 (17.2)
	45	20.1	2231	384 (17.2)
LT.C/L	25	13	2033	508 (25)
	35	17.4	2084	501 (24)
	45	22.4	2116	514 (24.3)

CURRENT SECTION

5.8 HMA SURFACE
12.8-INCH RUBBLIZED PCCP
7-IN HMA SUBBASE
SUBGRADE CBR ~ 10
FWD DATA (35 KIP LOAD) ARE SUMMARIZED FOR CENTERLINE IN THE PPT SLIDE
LEFT C/L – AVERAGE ISM =2084
RIGHT C/L – AVERAGE ISM = 2164

SECTION A

5.8 HMA SURFACE
12.8-INCH CRUSHED STONE BASE
7-IN HMA SUBBASE
SUBGRADE CBR ~ 10
SURFACE DEFLECTION (35 KIP LOAD) = 37 MILS
ISM = 945 KIPS/INCH

SECTION B

5.8 HMA SURFACE
19.8-INCH CRUSHED STONE BASE
SUBGRADE CBR ~ 10
SURFACE DEFLECTION (35 KIP LOAD) = 46 MILS
ISM = 760 KIPS/INCH

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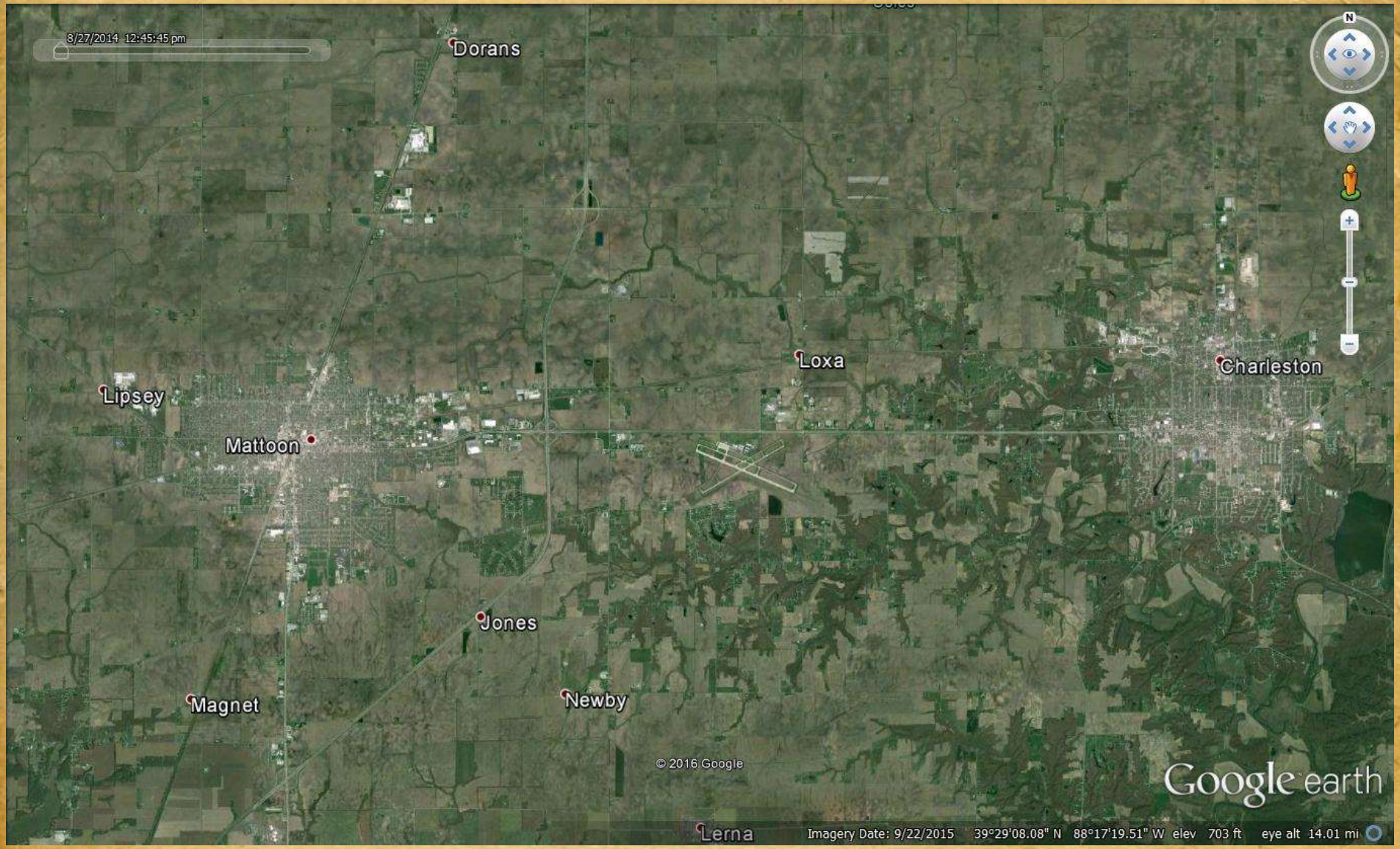
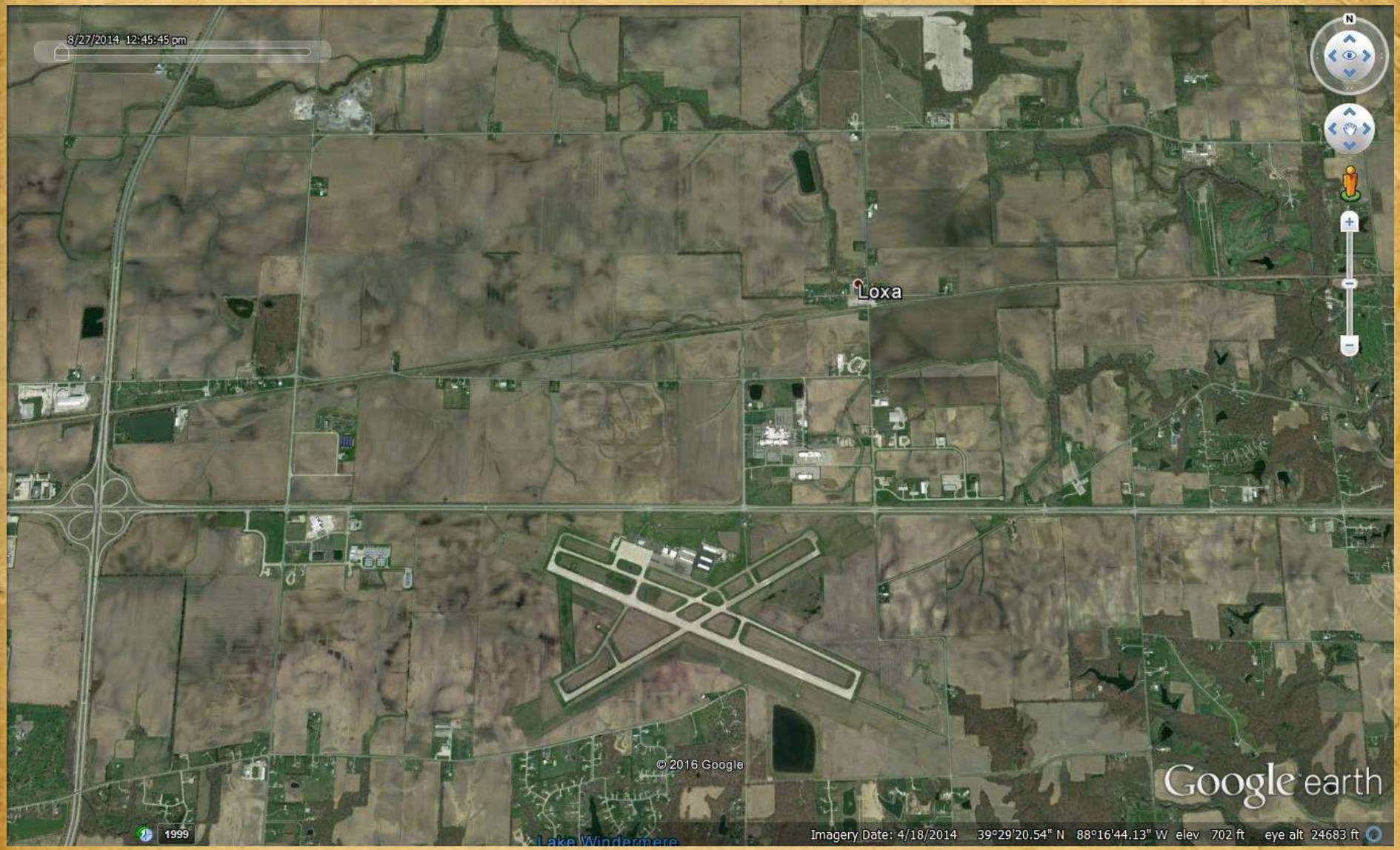
Illinois Asphalt Pavement Association

March 14-15, 2016

Rubilization of Coles County Memorial Airport Runway 11-29



Located between Mattoon & Charleston



Built in 1951-52, Dedicated in 1953

Runway 11-29 built in 1973

Surface Cracking, Spaulding, & excessive Joint Repair led to Rubilization

Implemented Staging Area in Three parts to allow Airport to remain open as long as possible

Closing of Runways

Thickness required use of Guillotine Breakers first

Followed by Piano Breakers

Test Hole to ensure Complete Rubilization

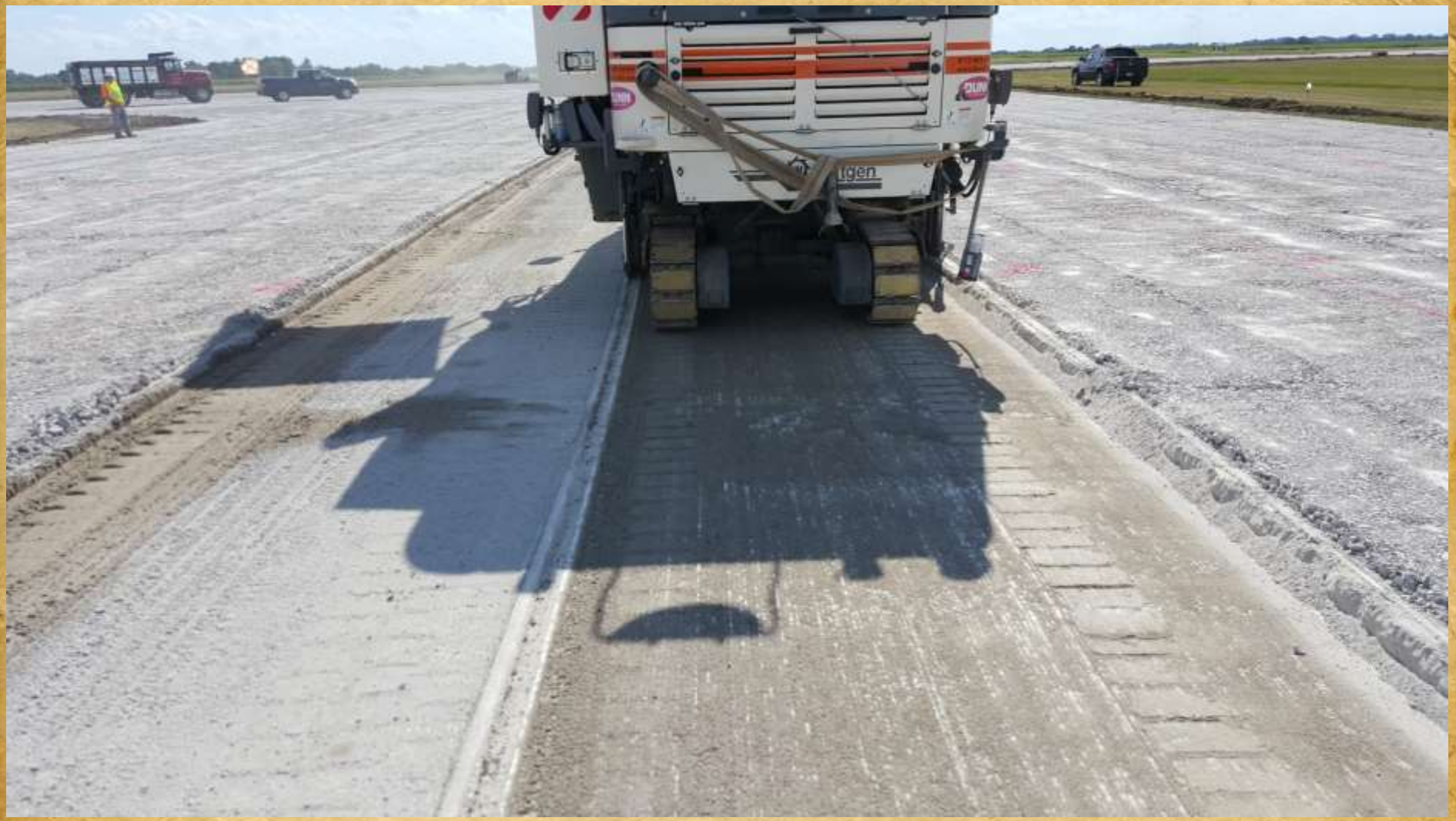
“Z” Rollers after Rubilization

Multiple Breakers to Expedite Project

- 3D file of plans created
- Reshot Runway after Rubilization & Created File
- Sitech created a Paving File
  - Grade Control
  - Takes into account Roll Down
- Utilized a Robotic Total Station
  - For Grade Control instead of Stringline
  - Three Setups for Entire Length of Runway

Coles County Memorial Airport Runway 11-29

Milled Rubilized to Correct for Cross Runways



Allowed us to Maintian Thickness & Profile

Coles County Memorial Airport

Mix Came from our Coles County Plant

Hand Held “Pole” to Check Grade

First Lift Bit. Base Ty B AERO N40
(2 – 6 inches)

No String For Grade Control

Paving Program adjusted for Roll Down

Except for First Pass 2-60’ Skii’s were used on Surface Mix (2” Lift Thickness)

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Coles County Memorial Airport Questions