Petersburg, AK

Airport Apron & Taxiway Rehabilitation

May 2015

KNIK CONSTRUCTION

State of Alaska

Department of Transportation and Public Facilities

Southeast Region

PETERSBURG JAMES A. JOHNSON AIRPORT

APRON AND TAXIWAY PAVEMENT REHABILITATION

PROJECT No. 68261
AIP NO. 3-02-0219-13-2014

September 26, 2014

The undersigned hereby certifies that this duplicated document is an exact and true copy of the original.

VICINITY MAP

DESIGN DATA

AIRPORT TYPE	PRIMARY NON-HUB
RUNWAY CATEGORY	TRANSPORT
RUNWAY INSTRUMENTATION	NON-PRECISION
RUNWAY/TAXIWAY SURFACE	ASPHALT CONCRETE
RUNWAY LIGHTING	HIGH INTENSITY RUNWAY LIGHTING (HIRL)
TAXIWAY LIGHTING	MEDIUM INTENSITY TAXIWAY LIGHTING (MITL)
AIRPORT REFERENCE CODE	C-III
AIRPORT ELEVATION (NAVD88)	113.2
AIRPORT REFERENCE POINT (ARP COORDINATES – NAD '83)	LATITUDE N 56° 48' 05.30" LONGITUDE W 132° 56' 46.44"
RUNWAY SAFETY AREA WIDTH	500'
RUNWAY OBJECT FREE AREA WIDTH	800'
TAXIWAY OBJECT FREE AREA WIDTH	186'
DESIGN AIRCRAFT	737-800

THE FOLLOWING STANDARD DRAWINGS APPLY TO THIS PROJECT:

E-1(1)(2)

INDEX

SHEET NO.	DESCRIPTION
A1	TITLE SHEET
A2	ABBREVIATIONS AND DEFINITIONS
A3	SURVEY CONTROL
A4	GENERAL LAYOUT PLAN
A5-A14	CONSTRUCTION SAFETY AND PHASING PLAN
B1	TYPICAL SECTIONS
C1	ESTIMATE OF QUANTITIES
E1	MISCELLANEOUS DETAILS
F1-F2	APRON & TAXIWAY PLAN & PROFILE
F3	HARDSTAND DETAILS
H1-H6	MARKINGS
P1	EROSION & SEDIMENT CONTROL PLAN
P2	EROSION & SEDIMENT CONTROL PLAN DETAILS
U1-U3	ELECTRICAL

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES
Southeast Region

8/6/14

APPROVED: 8/6/14
PAT CARROLL, P.E. — DATE
REGIONAL PRE-CONSTRUCTION ENGINEER

APPROVED: 8/6/14
CHUCK CORREA, P.E. — DATE
DIRECTOR OF DESIGN AND CONSTRUCTION, SOUTHEAST REGION

CERTIFIED TRUE & CORRECT AS-BUILT OF ACTUAL FIELD CONDITION

CONSTRUCTION PROJECT MANAGER — DATE

PATH: Q:\Proj\68261\Planset\68261_A1_TITLESHEET.dwg
Wed, 06/Aug/14 01:36PM

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	68261/3-02-0219-13-2014	2014	A1	31

History

- Petersburg Airport is a Design Group III, airport approach category C airport.
- Portion of Taxiway A constructed 1981
- Main Apron constructed 1987
- Existing pavement severely cracked along taxiway and apron.

Taxiway

Pre-construction Conditions

Apron

Pre-construction Conditions

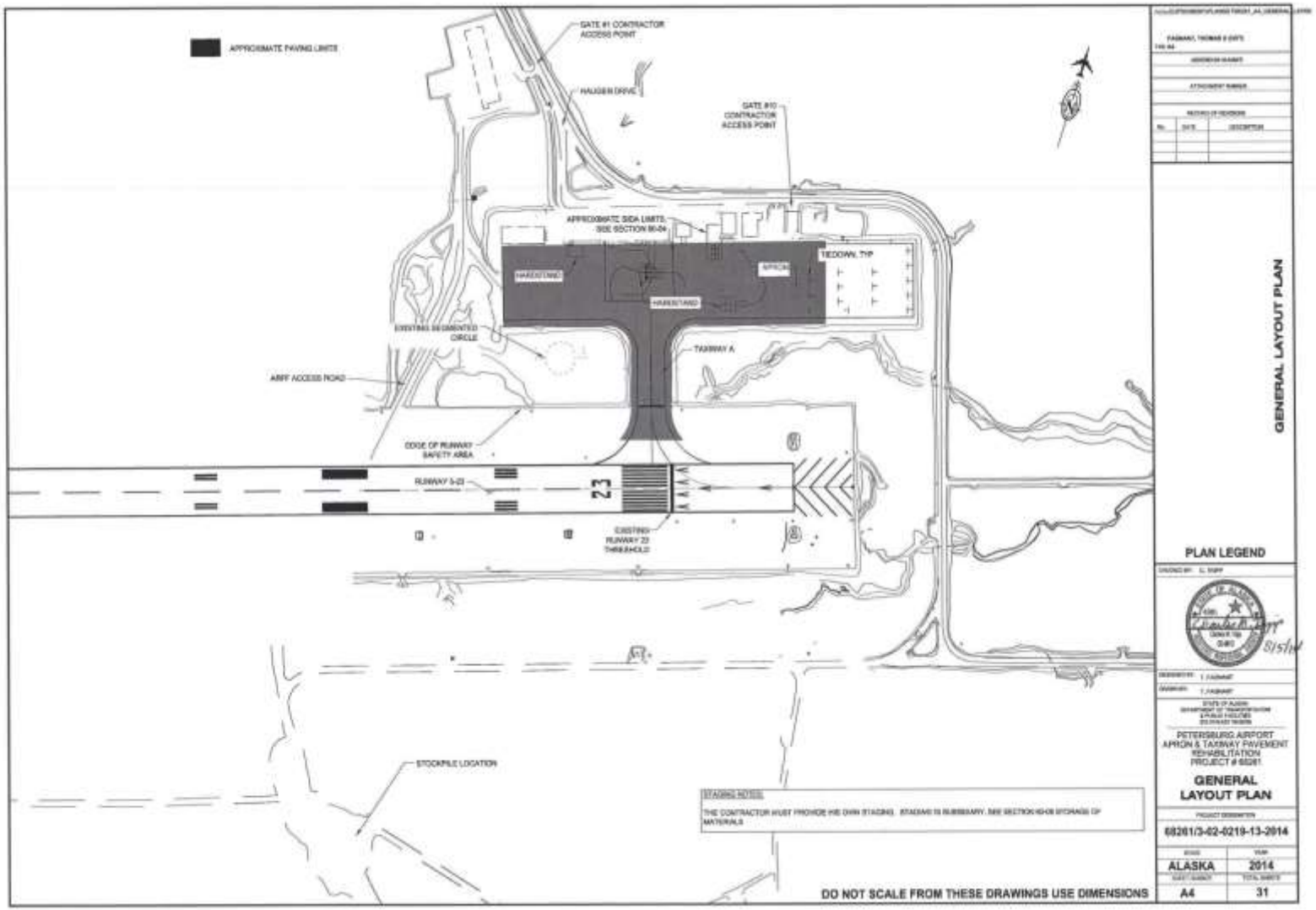
Design Elements

- Design aircraft: Boeing 737-400, maximum takeoff weight = 138,500 pounds.
- Pavement rehabilitation : 376’ x 90’ (Taxiway A), 1079’ x 243’ (Apron).
- 6” of asphalt to be placed in rehabilitated areas.
- Improvements must conform to approved Ultimate Airport Layout Plan.
- Geotechnical analysis indicated full rehabilitation, vs. overlay, was necessary.
- Portions of apron and taxiway to be temporarily closed.
- Taxiway and apron edge lighting to be adjusted.
- Work is required inside the RSA, ROFZ, and ROFA.

Project Elements

- Remove damaged pavement from airport apron and taxiway
- Remove base materials to allow for a thicker pavement section
- Make adjustments in taxiway and apron surface grade to facilitate drainage
- Repave and restripe the apron and taxiway
- Re-groove the taxiway

Proposed Design – Plan View



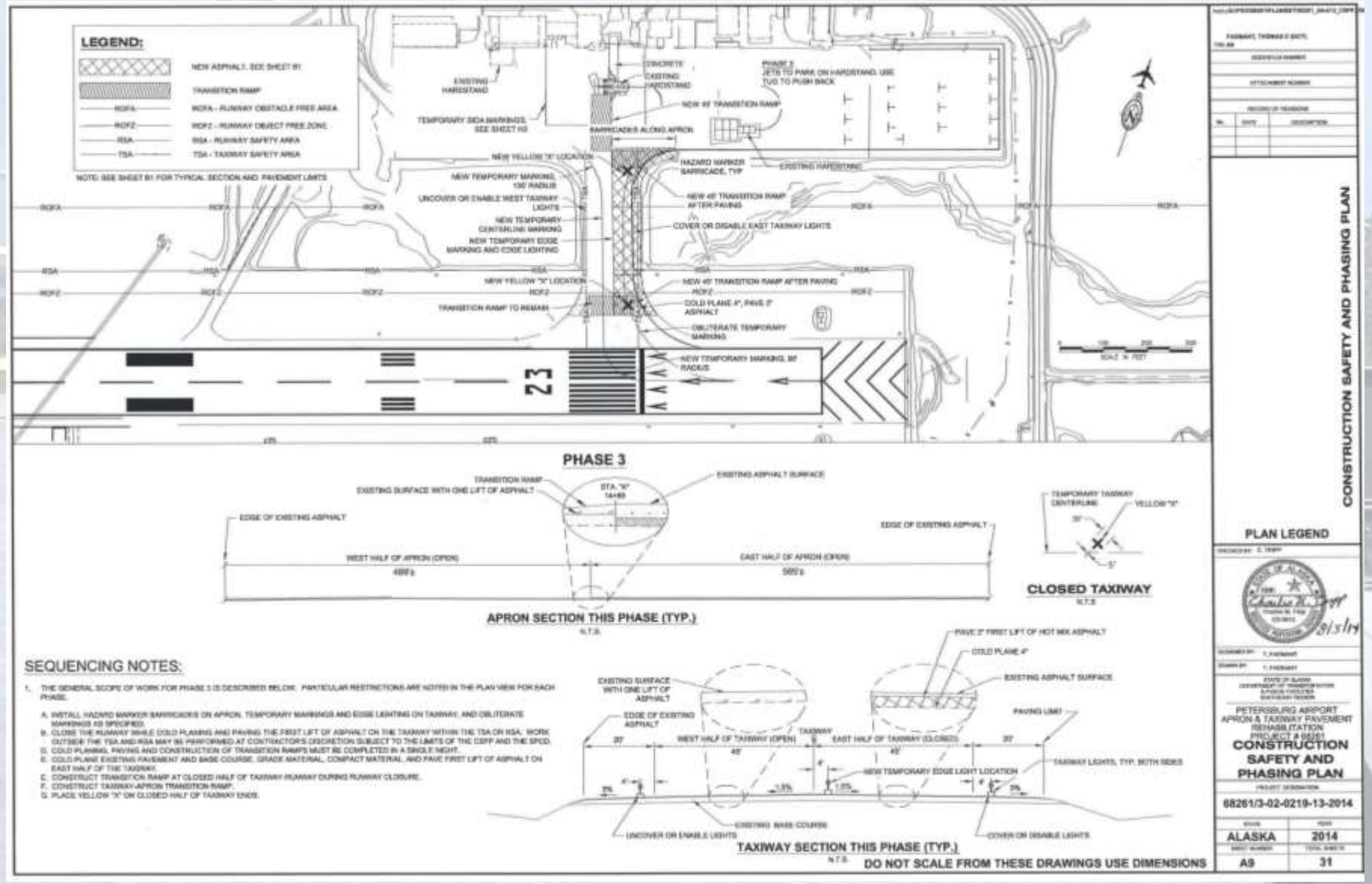
Quantities

BASIS OF ESTIMATE		
ITEM NO.	ITEM DESCRIPTION	ESTIMATING FACTOR
L-100S	LIGHT BASE EXTENSIONS	29 LIGHT BASES
P-162A	PAVEMENT COLD PLANING	34,000 S.Y.
P-401A	HOT MIX ASPHALT, TYPE II, CLASS E	117 LB./S.Y./IN.
P-401C	ASPHALT CEMENT, PG 64-28	6% OF ITEM P-401A
P-603A	TACK COAT	0.1 GAL/S.Y. & 243 GAL/TON
P-620C	RUNWAY, APRON, AND TAXIWAY PAINTING	122,300 S.F.
P-620D	INTERIM RUNWAY AND TAXIWAY PAINTING	2,000 S.F.
P-630B	PAVEMENT GROOVING	6,300 S.Y.
P-650D	REMOVAL OF EXISTING TIE-DOWNS	3 TIE-DOWNS

Construction Sequencing

- Schedules
- Airport Operations
- Equipment Staging
- Apron and Taxiway Prep; Pavement Cold Planning
- Personnel

Sequencing-Phase 3 of 7



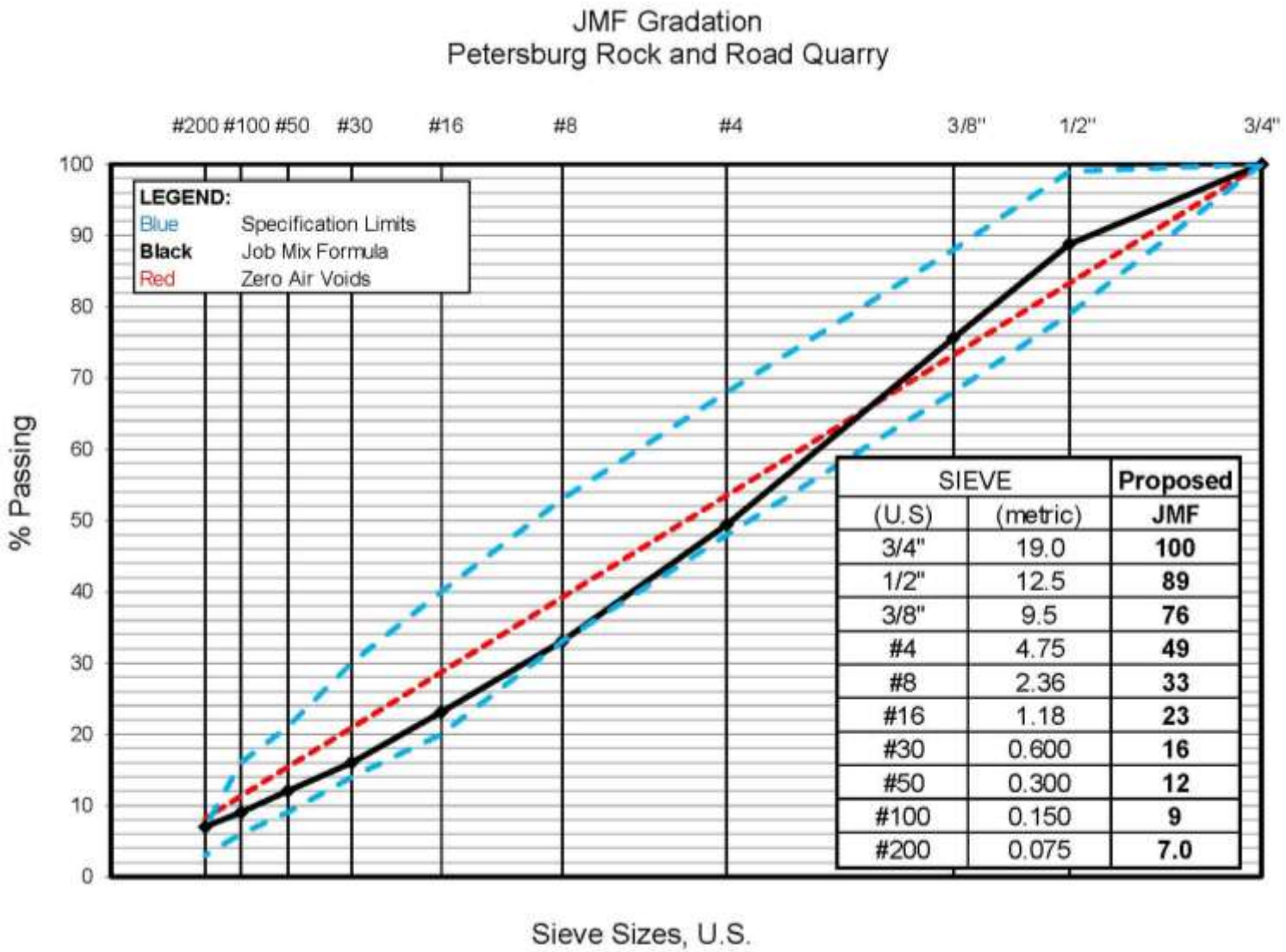
HMA

- Materials
- Mix Design
- Asphalt Plant
- Paving Equipment
- Quality Control Plan

Materials

- Local aggregate source – Rock and Road Quarry
  - Shot rock quarry
  - No history of asphalt rock from quarry
  - Other Petersburg quarries tend to have low voids high flat and elongated
- PG 64-28 with 0.25% evotherm from US Oil
- HMA design IIE

Mix Design: Type II Class E



SIEVE		Proposed
(U.S)	(metric)	JMF
3/4"	19.0	**100**
1/2"	12.5	**89**
3/8"	9.5	**76**
#4	4.75	**49**
#8	2.36	**33**
#16	1.18	**23**
#30	0.600	**16**
#50	0.300	**12**
#100	0.150	**9**
#200	0.075	**7.0**

HMA Plant

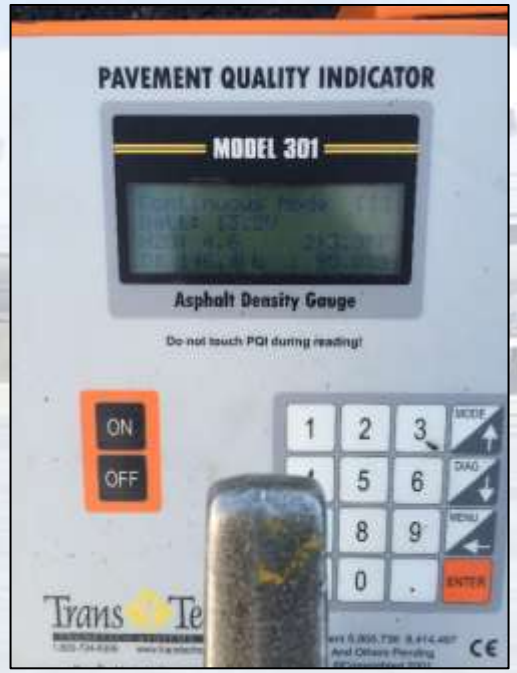
- Astec portable 350 TPH plant

Paving Train

- Paver Model: PF-5510 Blaw-Knox
- Shuttle Buggy: SB-2500C
- End dumps
- Breakdown (IC) and finish rollers

Knik Quality Control

- Know, rate, and control your variables
- Start early
- Use the right tools and right people
- Test strips are critical
- Communication is critical



Effective Quality Control Variables

Variable	Potential to cause problem or delay Low: 0 High: 10	Ability to Control Easy to Control: 0 No Control: 10	Total Score
Stockpile Moistures	3	1	4
Breakdown Asphalt Temperatures	6	2	8
Equipment/Plant Breakdown	10	10	20
Sampling/Splitting Error	8	8	16
Bad Weather	10	10	20

- Low score (less than 10) – eliminate it
- High score (10 to 19) – focus on it
- Perfect 20 – be prepared for it (and hope it doesn't happen)

Effective Quality Control Test Strips

- Can benefit the Contractor more than the Agency
- Necessary for "unknowns"
- Determine QC vs. QA
- Set temperatures and rolling patterns
- Put thought into size and location
- Sample frequently

Effective Quality Control Communication

- Communication between
  - QC Technicians and QC Administrator
  - Plant Forman and QC
  - Paving Forman and QC
  - Project Manager and QC
  - QC and QA

Knik Quality Control

KNIK CONSTRUCTION

WORK CONDUCTED TODAY:
Paved apron top lift. Approximately 1237 tons were placed.

INSPECTIONS CONDUCTED AND RESULTS:
Three samples were taken and split with QA for acceptance. QC informational sample was taken. One cold feed was taken at the plant. Cold feed and HMA gradations matching closely. All QC test results met project specifications.

QC and QA results continue to match closely. Within +/- 0.1% on AC results.

Densities were monitored behind breakdown and intermediate rollers. Densities averaged 94-96% MSG on density gauge. Intelligent compaction was used on the breakdown roller.

Joint heater was used on taxiway top lift. Ambient temperature was approximately 60 degrees and sunny. Joint heater was set on medium. Mat edge temperatures prior to joint heater ranged from 170-200 degrees. Mat edge temperatures after joint heater ranged from 310-350 degrees. Joint had good aggregate interlock. Because joint heater was used in place of echelon paving, only every other joint will be evaluated for joint density. Densities measured with a gauge at the joint read similar to mat densities. Reference infrared photos.

IF DEFECTS FOUND LIST LOCATION AND NATURE:
N/A

CORRECTIVE ACTIONS TAKEN OR PROPOSED:
Sample appears to be easily segregated during splitting. Caution will be taken when splitting samples.

ADDITIONAL INSTRUCTIONS RECEIVED OR GIVEN:
N/A

SIGNED BY:

ATTACHMENTS: Lot 1 Sublot 6-8, QC info, Photograph 1-4

"The 5-8-15 report is a typical daily report. I would usually get these the following morning, reflecting the previous days paving. The 5-14-15 report is Knik's end of lot report, and I would receive these reports within 2 days of the end of the lot. I have attached DOT's acceptance results for comparison." - Don Newell, AK DOT&PF

Joint Heater

Joint Heater

- Heat Design Equipment
  - JMH 500-PA – 20’ 500,000 BTU
- 100% infrared heat
- Five ceramic cartridge heating elements
- Run pressure range from 5-40 psi
- Runs off of liquid propane tanks
- Two point attachment onto paver
- Adjustable paving width (manual)

Joint Heater

- Joint heater was used on taxiway and apron top lift
- Ambient temperature was approximately 60 degrees

Joint Heater

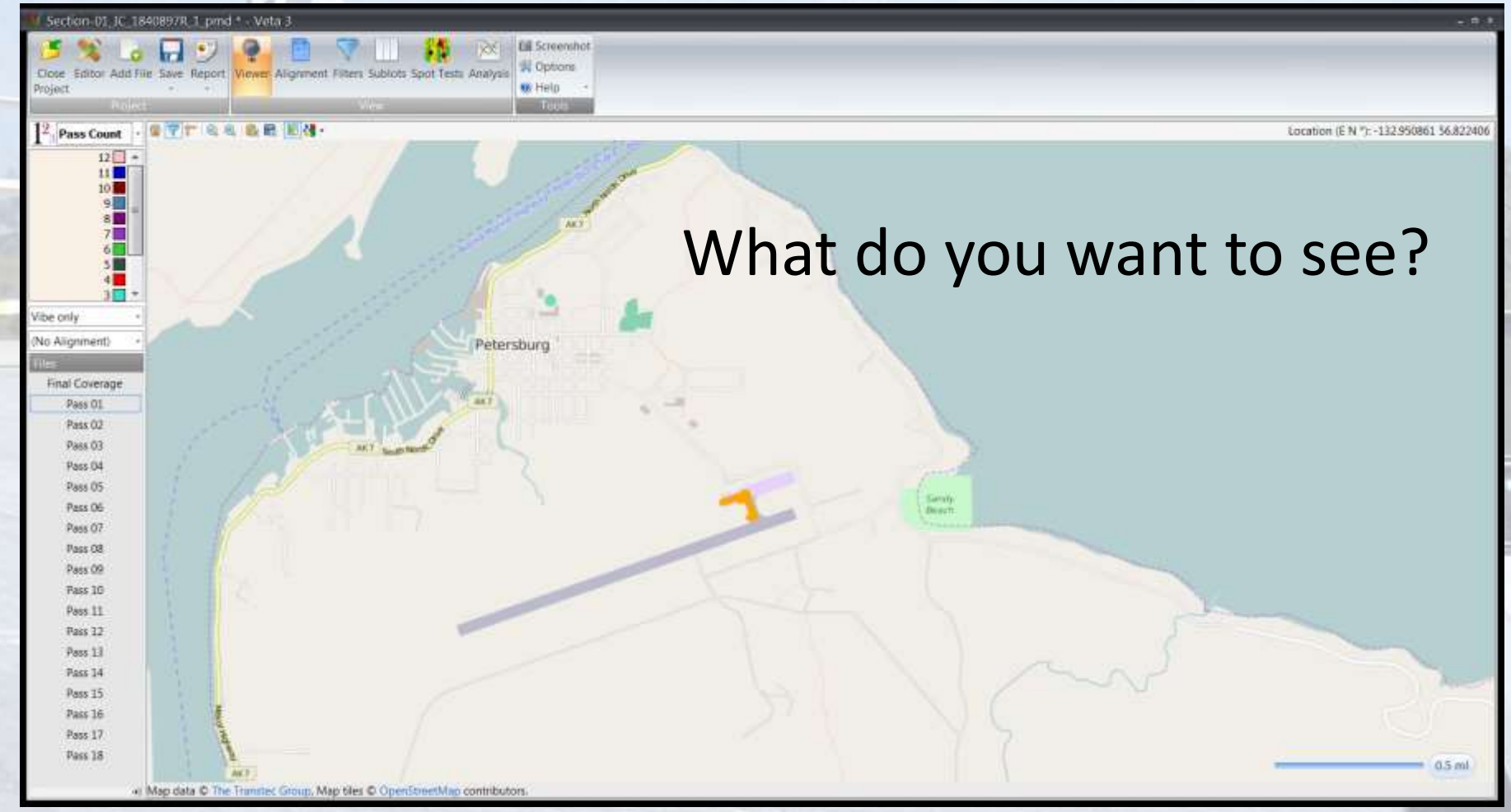
Joint Heater Benefits

- No cutting/milling panel edge
- No additional prep
- Good interlock of aggregate
- Good density
- Aesthetically pleasing
- Next best thing to echelon paving

Intelligent Compaction

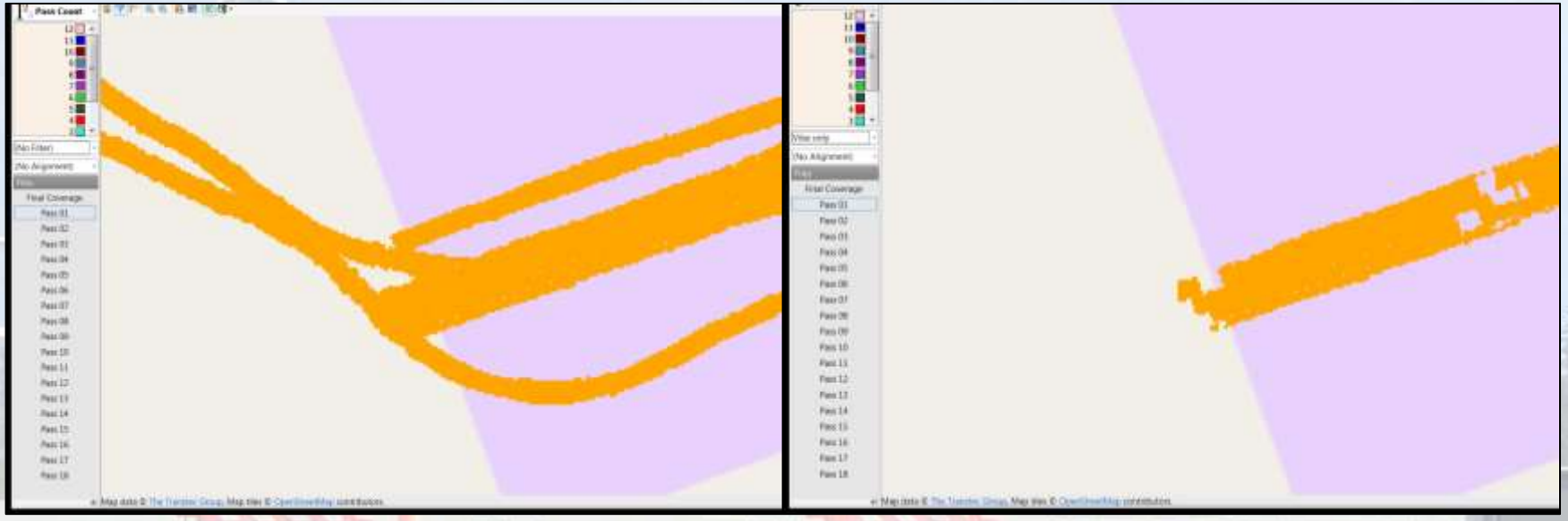
- Equipment
  - HAMM
  - HD+140 VO
- Topcon GPS
- Data analysis
- Pre-paving mapping
- Paving QC tool

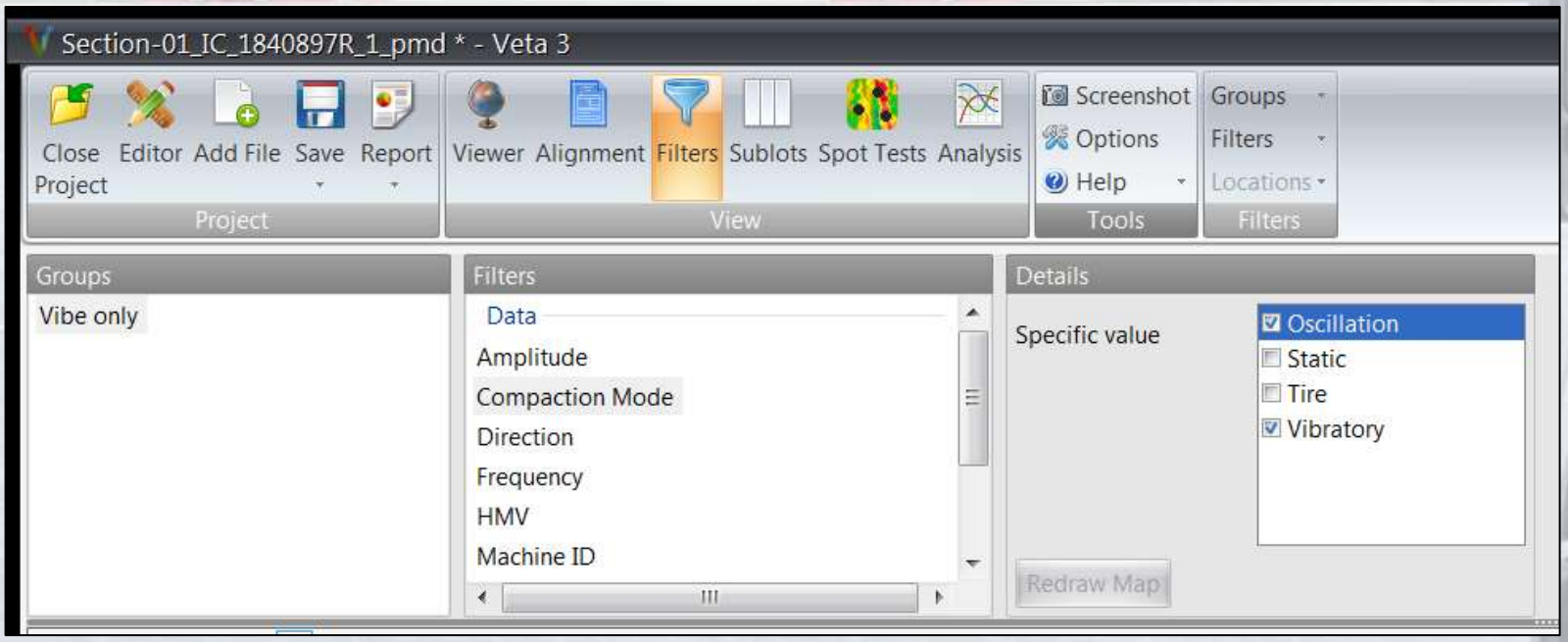
Intelligent Compaction
Veta



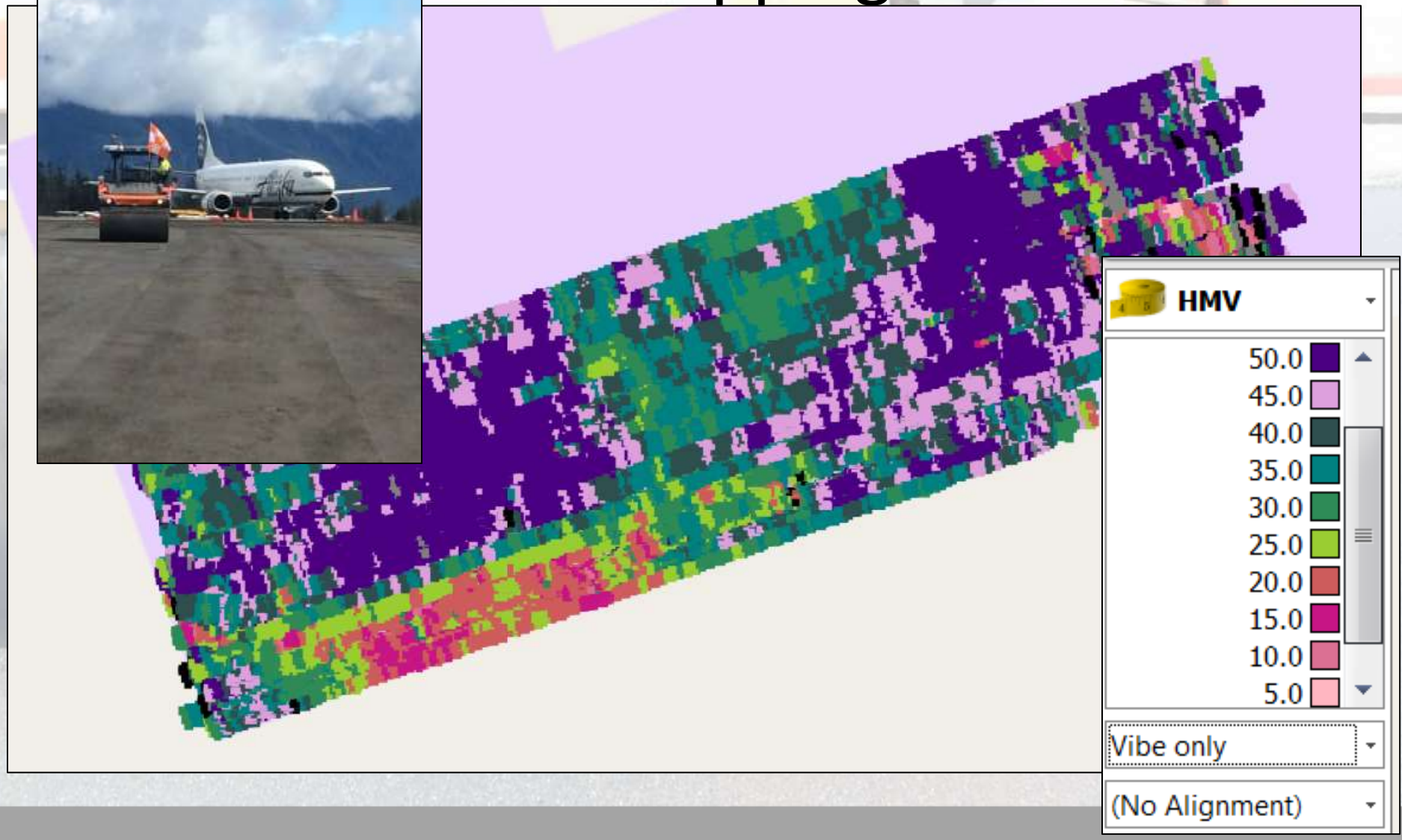
What do you want to see?

Intelligent Compaction

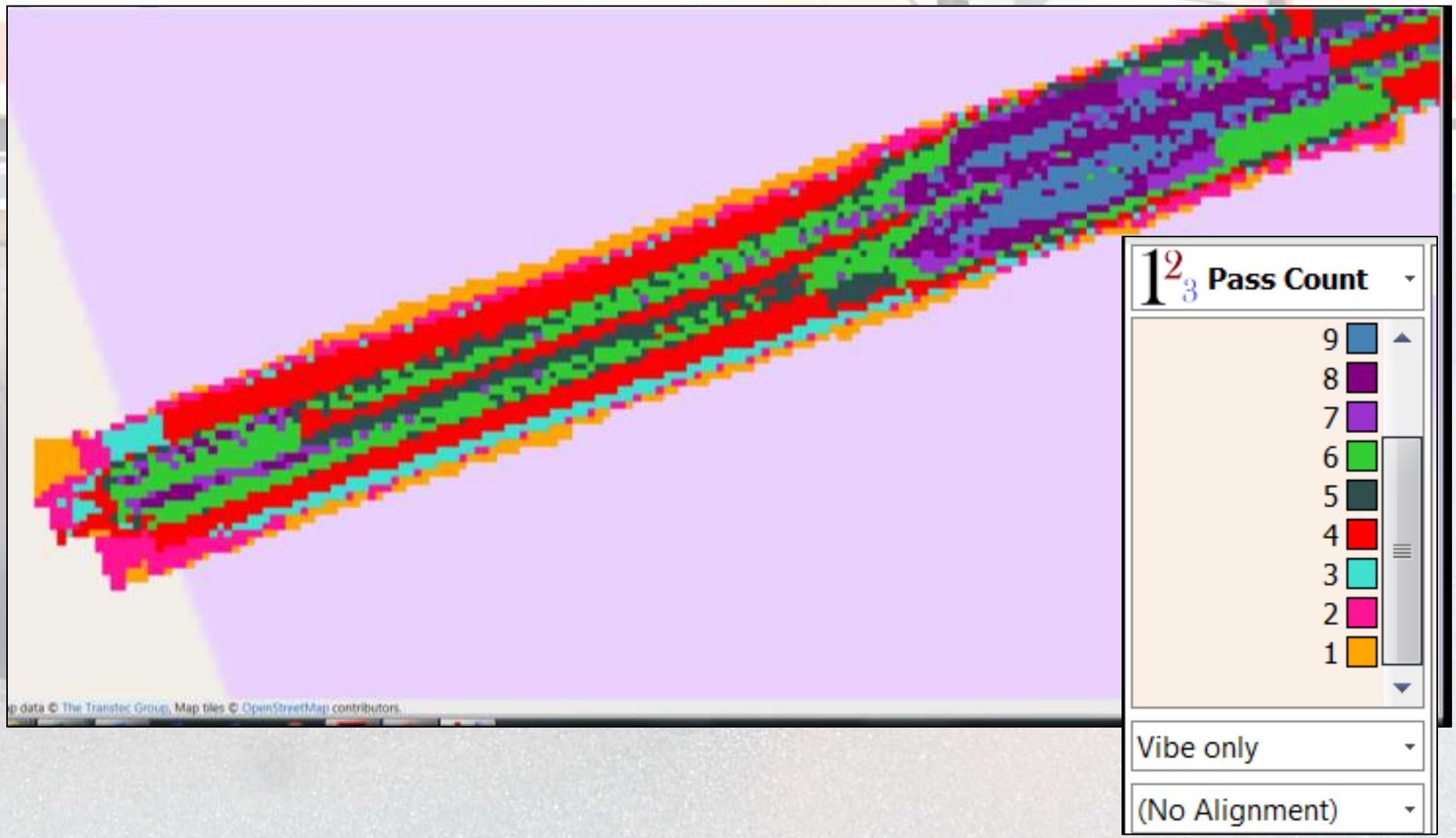




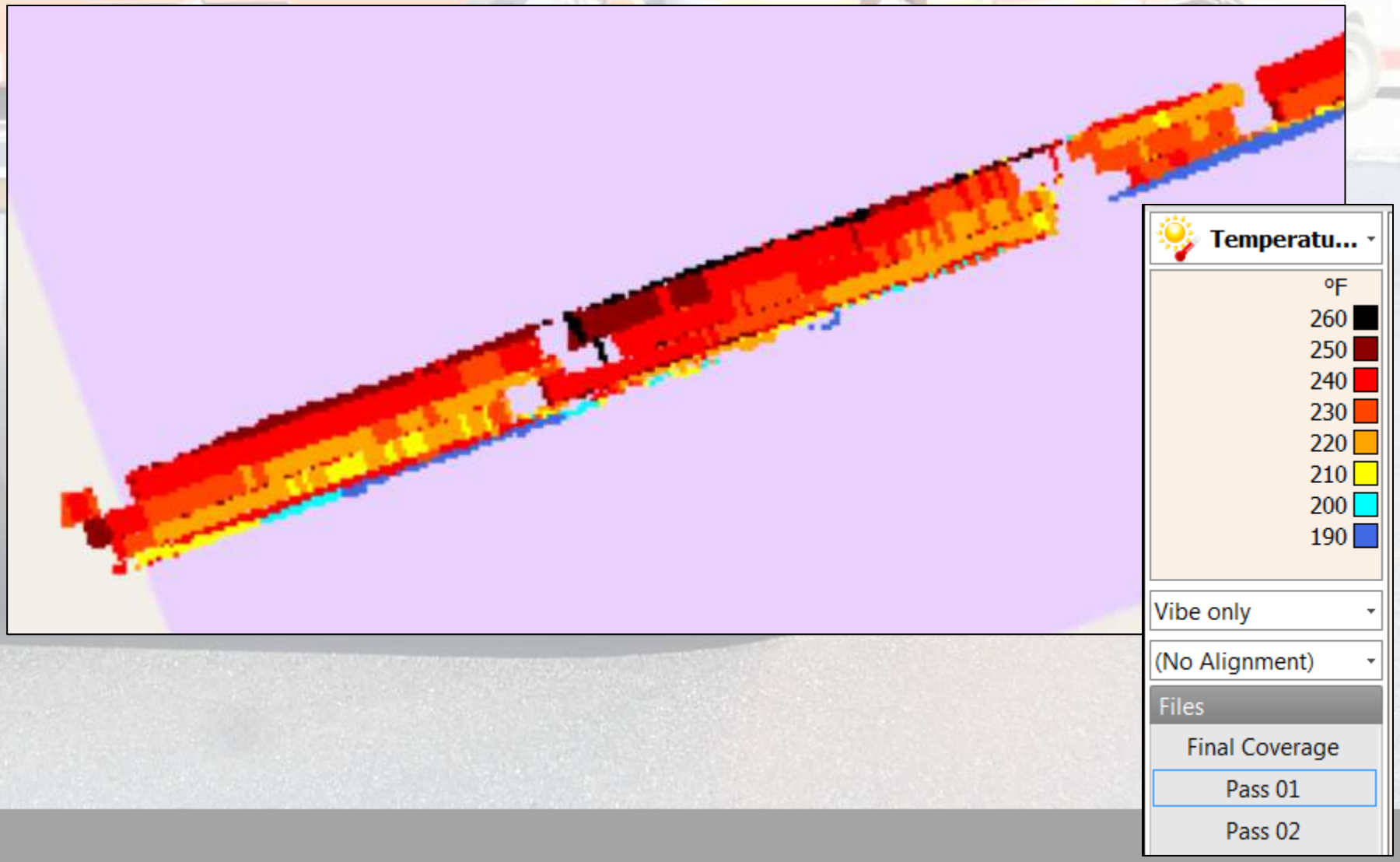
Intelligent Compaction Pre-mapping



Intelligent Compaction
Pass Count



Intelligent Compaction Breakdown Temperatures



Intelligent Compaction Benefits

- Training tool
- Coverage assurance
- Density troubleshooting
- Subgrade/ subbase assurance

Intelligent Compaction

"Note the JD-1(M-6) Joint density was below the required 92% required on top lift joints. Upon receiving this result, Knik's QC administrator (Amanda) had the Intelligent compaction (IC) roller operator increase the number of joint passes by one pass in oscillation vibe, and one pass in static vibe. Obviously it was adequate to achieve the desired joint density. Knik then added this additional pass in the IC roller program so the IC roller operator would continue to do the added pass." – Don Newell, AK DOT&PF

STATE OF ALASKA
DOT & PF
CONSTRUCTION

State of Alaska
Department of Transportation and Public Facilities
ASPHALT PAVEMENT REPORT

PROJECT# AIP 3-02-0219-13-20 # 68261 PROJECT NAME: PSG AIRPORT APRON & TAXIWAY PAVEMENT REH
LOT NO. 1 AGGREGATE: 22/20/58 ROCK &ROAD QUARRY ASPHALT CEMENT SOURCE: US OIL
ITEM NO. 401a MATERIAL: HMA TYPE II, CLASS E ASPHALT CEMENT TYPE: TYPE II
COURSE: LIFT 2 DATES FROM: 5/7/15 TO: 5/10/15

Hours of Construction	Lane & Width	Station to Station	Distance (Station)	Pounds of Material	Yield	Asphalt Used	Asphalt Ratio

MIX DESIGN NUMBER: 15C-154

SPECIFICATION LIMITS	Percent Fracture	Asphalt Aggregate - GRADATION 1"	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200	Asphalt Content	% Compaction
UPPER														98.0
TARGET														
LOWER														90.0

Sample No.	Date	Lot MSG	TEST RESULTS	Mix Design MSG = 2.528
JD-1 (M-6)	5/8/15	2.528		90.9
JD2- (M-7)	5/9/15	2.528		93.9
JD-3 (M-8)	5/10/15	2.528		93.3
JD- 4(M-9)	5/10/15	2.528		94.4
JD- 5(M-10	5/10/15	2.528		93.9
JD- (M-)				
JD- (M-)				
JD- (M-)				
JD- (M-)				
JD- (M-)				
JD- (M-)				
JD- (M-)				
JD- (M-)				
JD- (M-)				
JD- (M-)				
JD- (M-)				
JD- (M-)				
JD- (M-)				
AVERAGE TEST RESULT				93.3

NUMBER OF SAMPLES | JOINT DENSITY: 5

Sample Number	SE Results	SE Spec	Sample Number	LL Results	PL Results	PI Results	PI Spec

REMARKS: Quantity replacements 5000 Ton

Quantity Represented: Input Checked By: Date: 5/11/15
Copy to Contractor: Time: 5/11/15 8:57 am Materials Inspector: Date: 5/11/15
Project Engineer: Date: 5/11/15

Intelligent Compaction

STATE OF ALASKA
DOT & PF
CONSTRUCTION

State of Alaska
Department of Transportation and Public Facilities
ASPHALT PAVEMENT REPORT

PROJECT# AIP 3-02-0219-2014 # 68261 PROJECT NAME: PSG AIRPORT REHAB
LOT NO. 1 AGGREGATE: 22/20/58 ROCK & ROAD ASPHALT CEMENT SOURCE: US oil
ITEM NO. 401a MATERIAL: HMA ASPHALT CEMENT TYPE: PG 64-28
COURSE: LIFT 2 DATES FROM: 5/5/15 TO: 5/9/15

Hours of Construction	Lane & Width	Station to Station	Distance (Station)	Pounds of Material	Yield	Asphalt Used	Asphalt Ratio
							5

MIX DESIGN NUMBER: 15C-154

SPECIFICATION LIMITS	Percent Fracture	1"	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200	Asphalt Content	% Compaction
		Asphalt Aggregate - GRADATION												
UPPER			100	95	82	55	39	28	21	17	13	9	5.5	98
TARGET			100	89	76	49	33	23	17	13	10	7.0	5.1	94
LOWER	90-100			83	70	43	27	18	13	9	7	5	4.7	92

Sample No.	Date	(Circle all out-of-spec. results)	1"	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200	Asphalt Content	% Compaction
		TEST RESULTS												MSG for Lot =	2.528
1	5/5/15	100		100	88	71	46	30	21	15	12	9	7.2	5.0	96
2	5/5/15	100		100	89	74	46	29	20	15	11	9	7.2	5.0	94
3	5/6/14	100		100	89	74	47	32	22	16	12	10	7.9	5.1	96
4	5/7/15	100		100	85	65	40	27	19	14	11	8	6.6	4.7	94
5	5/7/15	100		100	88	73	45	30	20	15	11	9	7.1	4.9	95
6	5/8/15	100		100	92	78	49	32	21	15	12	9	7.1	5.2	93
7	5/8/15	100		100	92	75	46	31	21	16	12	9	7.4	5.0	97
8	5/8/15	100		100	90	76	48	32	22	16	12	9	7.5	5.0	98
9	5/9/15	100		100	90	76	49	32	21	16	12	9	7.3	5.0	96
10	5/9/15	100		100	89	76	50	33	22	16	12	10	7.7	5.0	97
AVERAGE TEST RESULT				100	89	74	47	31	21	15	12	9	7.3	5.0	95

NUMBER OF SAMPLES GRADATION: 10 OIL CONTENT: 10 DENSITY: 10

Sample Number	SE Results	SE Spec	Sample Number	LL Results	PL Results	PI Results	PI Spec

REMARKS: Quantity represent 5000 ton

Quantity Represented: Input Checked By: Date: 05/10/15
Copy to Contractor/Signature: Date/Time: 5/11/15 8:57 am Materials Inspector: Date: 5/10/15
Project Engineer: Date: 5/11/15

"[We] noticed little deviation in both mat and joint densities and mix properties (Oil content and Gradation) once Knik's QC team dialed in on a project. It was true on the Sitka Airport Overlay and it was again the case at Petersburg. This demonstrates Knik's QC program is proactive, has good process control and is utilizing both the IC rollers and the QC program to provide the Department with a quality, consistent product."- Don Newell, AK DOT &PF

Final Inspection

Apron

Before

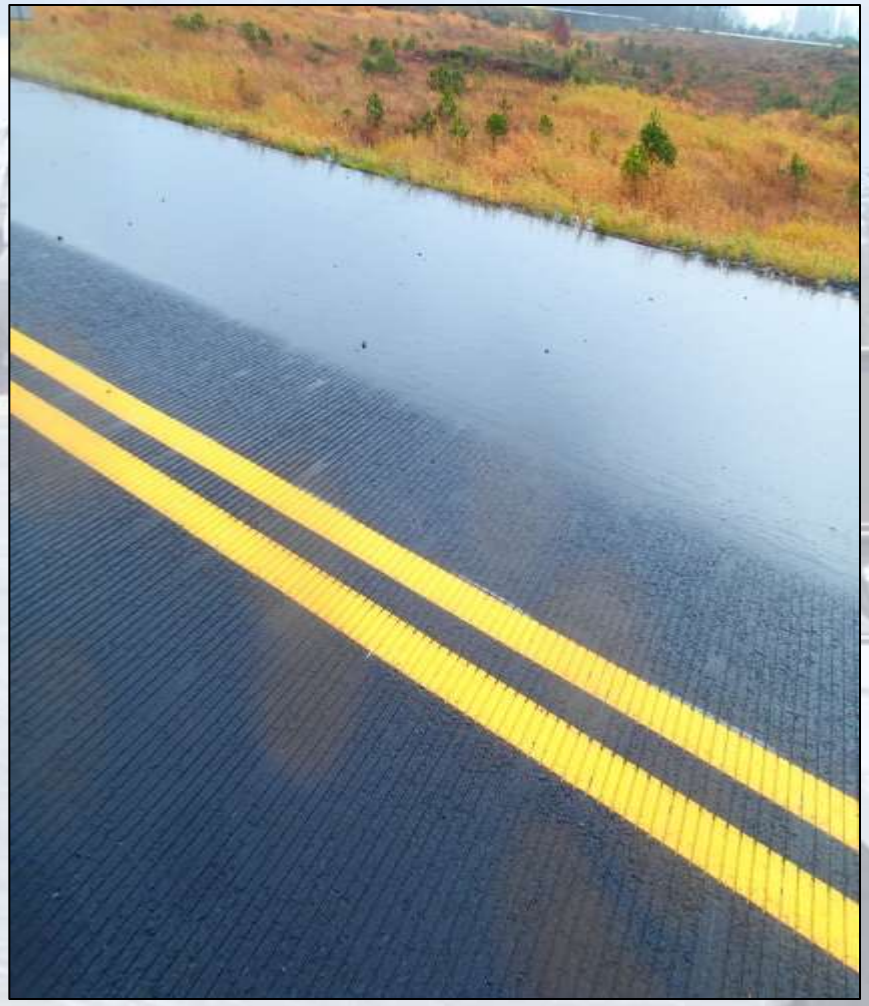
After

Apron

Taxiway A

Before

After



Taxiway A

Project Costs

- **Contract Amount: $2,987,200**
- **Final Construction Costs: $2,855,000**

- **Cost per yd^2, design: $27**
- **Cost per yd^2, construction: <u>$86</u>**
- **Approx Total Cost per yd^2 : $113**

Takeaways

- Proactive & collaborative QC program
- Positive relationship and good communication with owner and contractor
- Joint Heater and IC provided means to achieve mat and joint densities

Thank you.