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SWIFT Conference
QA/QC in Airfield Pavement Construction

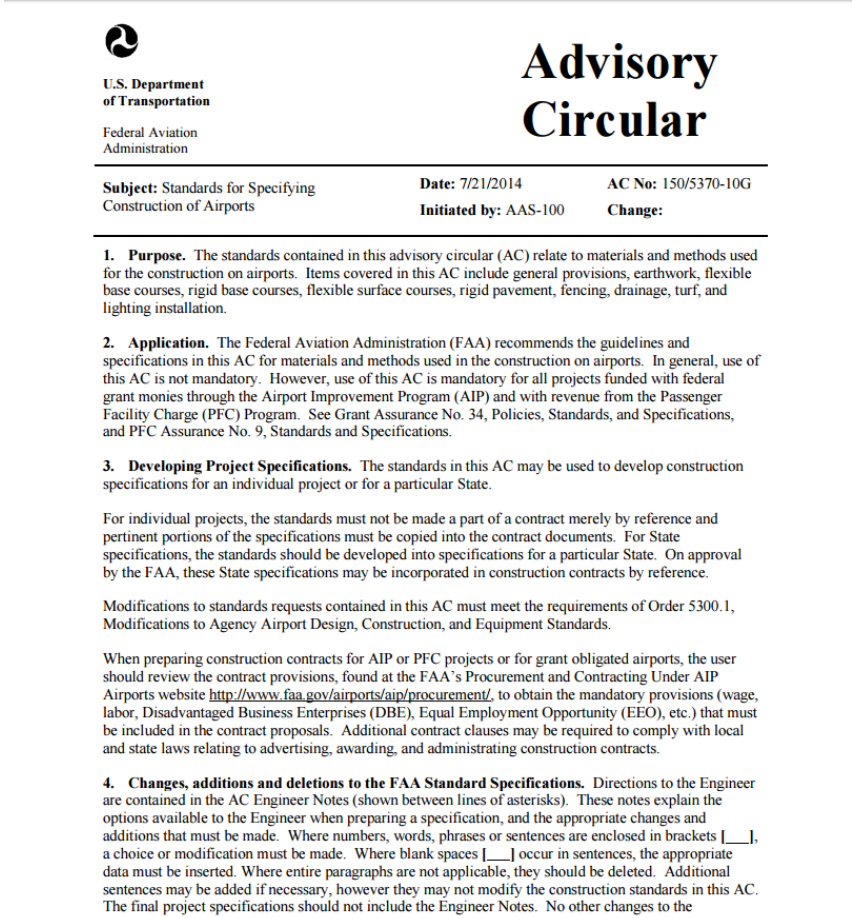
KNOWLEDGEABLE PARTNERS and RESOURCES

NATIONAL ASPHALT PAVEMENT ASSOCIATION

- NAPA
- State Asphalt Pavement Associations
- National Center for Asphalt Technology
- Association of General Contractors
- FHWA Expert Task Groups & NCHRP project panels
- Transportation Research Board

Oldcastle Materials

P401 Specification



U.S. Department of Transportation

Federal Aviation Administration

Advisory Circular

Subject: Standards for Specifying Construction of Airports

Date: 7/21/2014 **AC No:** 150/5370-10G

Initiated by: AAS-100 **Change:**

1. Purpose. The standards contained in this advisory circular (AC) relate to materials and methods used for the construction on airports. Items covered in this AC include general provisions, earthwork, flexible base courses, rigid base courses, flexible surface courses, rigid pavement, fencing, drainage, turf, and lighting installation.

2. Application. The Federal Aviation Administration (FAA) recommends the guidelines and specifications in this AC for materials and methods used in the construction on airports. In general, use of this AC is not mandatory. However, use of this AC is mandatory for all projects funded with federal grant monies through the Airport Improvement Program (AIP) and with revenue from the Passenger Facility Charge (PFC) Program. See Grant Assurance No. 34, Policies, Standards, and Specifications, and PFC Assurance No. 9, Standards and Specifications.

3. Developing Project Specifications. The standards in this AC may be used to develop construction specifications for an individual project or for a particular State.

For individual projects, the standards must not be made a part of a contract merely by reference and pertinent portions of the specifications must be copied into the contract documents. For State specifications, the standards should be developed into specifications for a particular State. On approval by the FAA, these State specifications may be incorporated in construction contracts by reference.

Modifications to standards requests contained in this AC must meet the requirements of Order 5300.1, Modifications to Agency Airport Design, Construction, and Equipment Standards.

When preparing construction contracts for AIP or PFC projects or for grant obligated airports, the user should review the contract provisions, found at the FAA's Procurement and Contracting Under AIP Airports website http://www.faa.gov/airports/aip/procurement/, to obtain the mandatory provisions (wage, labor, Disadvantaged Business Enterprises (DBE), Equal Employment Opportunity (EEO), etc.) that must be included in the contract proposals. Additional contract clauses may be required to comply with local and state laws relating to advertising, awarding, and administrating construction contracts.

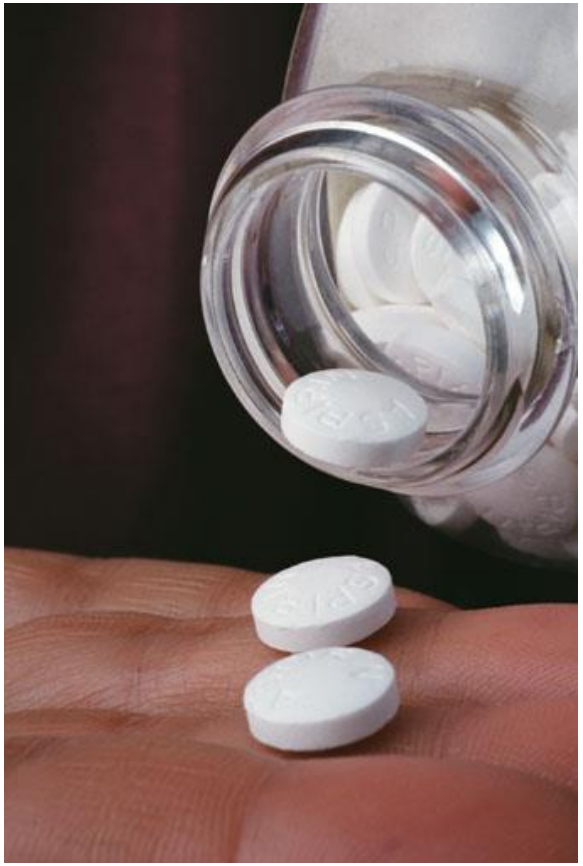
4. Changes, additions and deletions to the FAA Standard Specifications. Directions to the Engineer are contained in the AC Engineer Notes (shown between lines of asterisks). These notes explain the options available to the Engineer when preparing a specification, and the appropriate changes and additions that must be made. Where numbers, words, phrases or sentences are enclosed in brackets [___], a choice or modification must be made. Where blank spaces [___] occur in sentences, the appropriate data must be inserted. Where entire paragraphs are not applicable, they should be deleted. Additional sentences may be added if necessary, however they may not modify the construction standards in this AC. The final project specifications should not include the Engineer Notes. No other changes to the

- FAA Specifications
  - Advisory Circulars
  - http://www.faa.gov/documentLibrary/media/Advisory_Circular/**AC-150-5370-10G**-updated-201507.pdf
  - Caution- be sure to look at specification for "version"

"Advisory" Circular

- Owner's Rep Interpretation
  - "Options"
    - Quantity Exceptions
    - RAP
    - SUPERPAVE
    - Selection of Mix Design (local DOT)
    - Selection of PGB

We Got an Airport Job !



Who's the Consultant Engineer?

AC 150 5370 10G P401

- **Owner Representatives- Consultant Engineer and Quality Assurance Lab**
- ***Percent Within Limits (PWL)***
  - Air Voids
  - Mat Density
  - Joint Density
  - Stability and Flow (Test Strip- Marshall)
- **QC Test requirements**
- **No Dispute resolution**
  - Additional Cores for Mat calculation
  - Outlier

So what is PWL in simple terms?

- Percent within Limits
  - Mathematical LAWS of Normal distribution (empirical rule) to predict % of material in-spec or out of specification

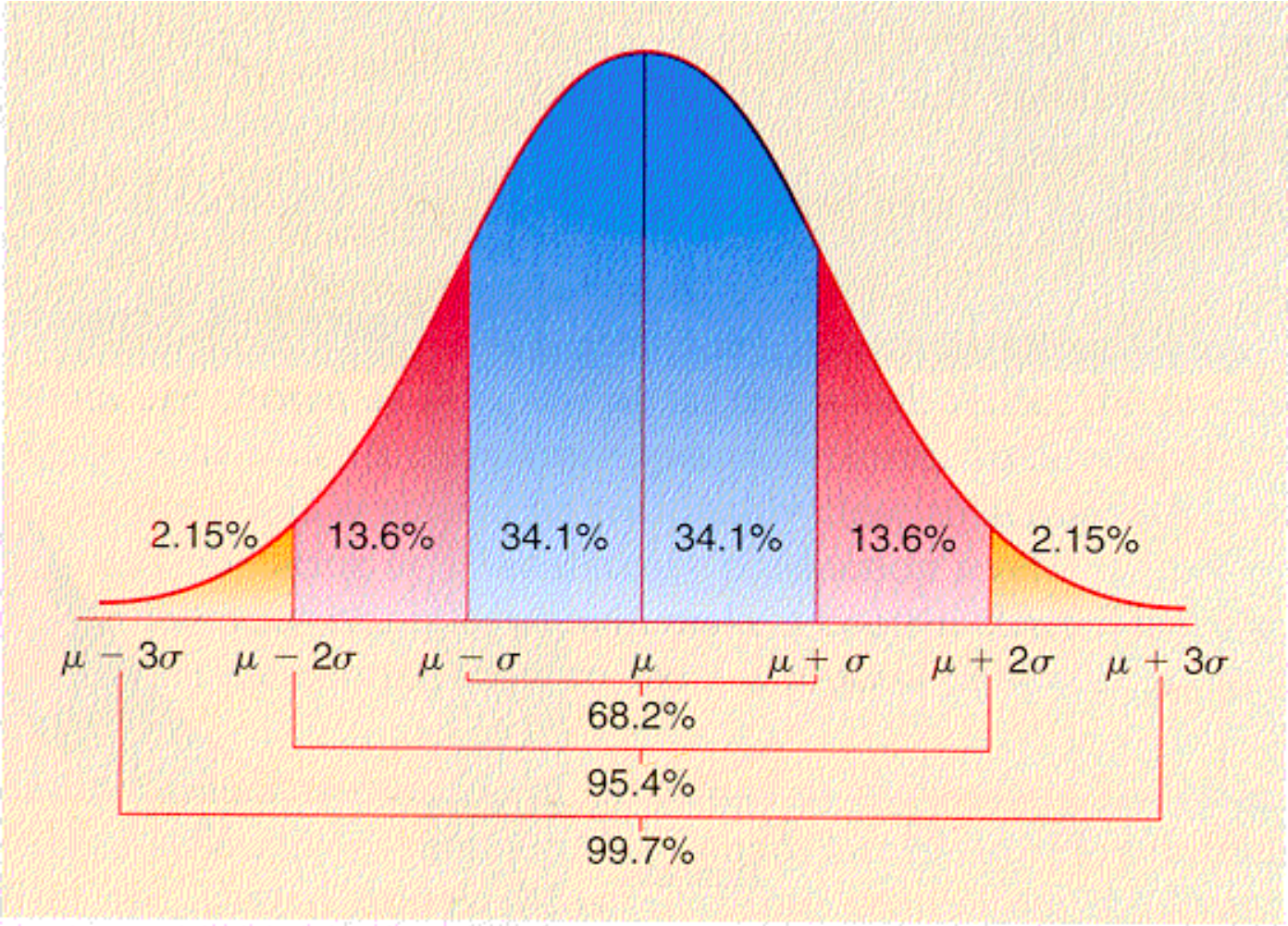
LSL = JMF – Lower Tolerance

USL = JMF + Upper Tolerance

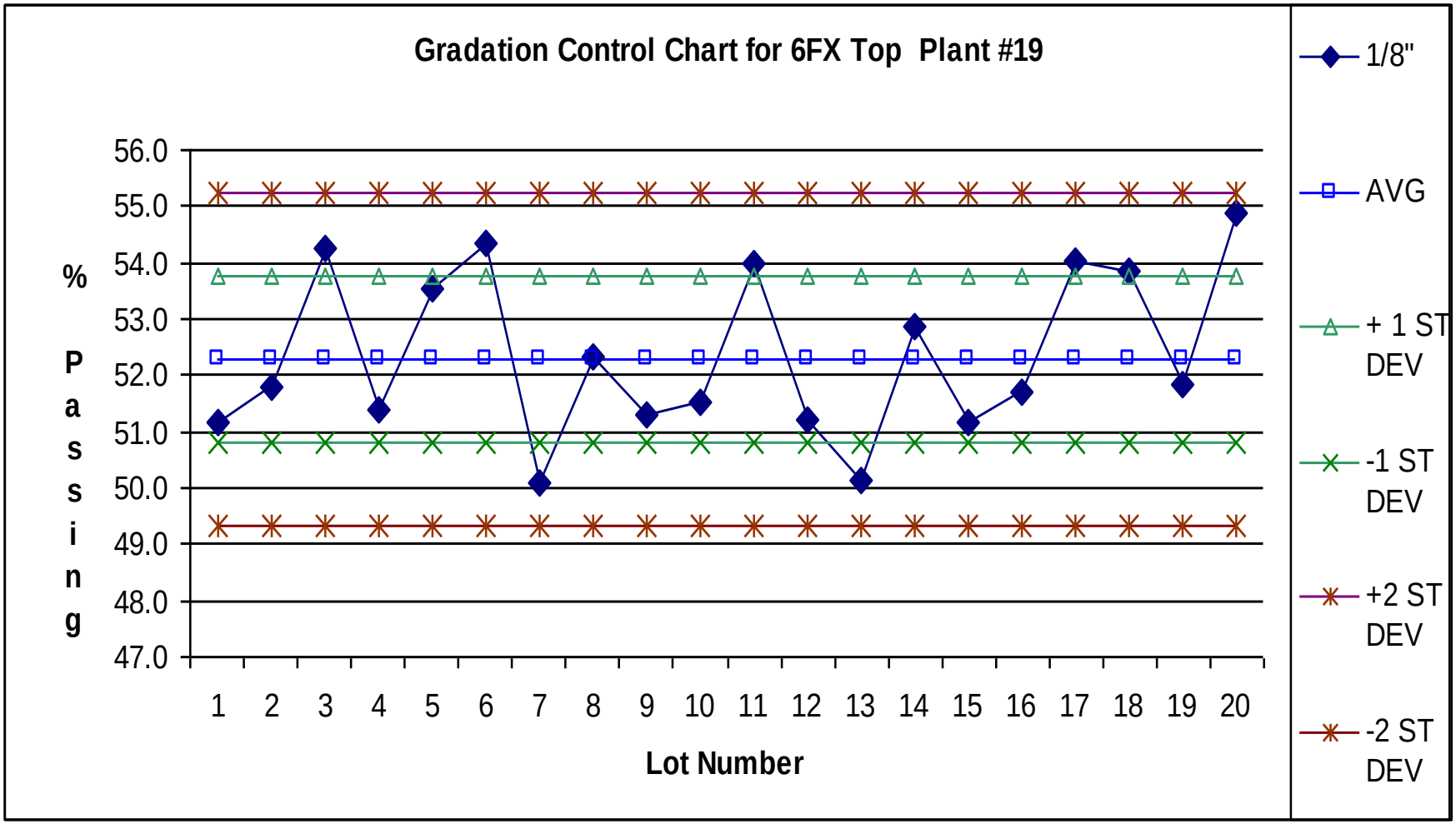
$$Q_l = \frac{\bar{x} - LSL}{s} \qquad Q_u = \frac{USL - \bar{x}}{s}$$

$$TPWL = (LPWL + UPWL) - 100$$

Standard Deviation



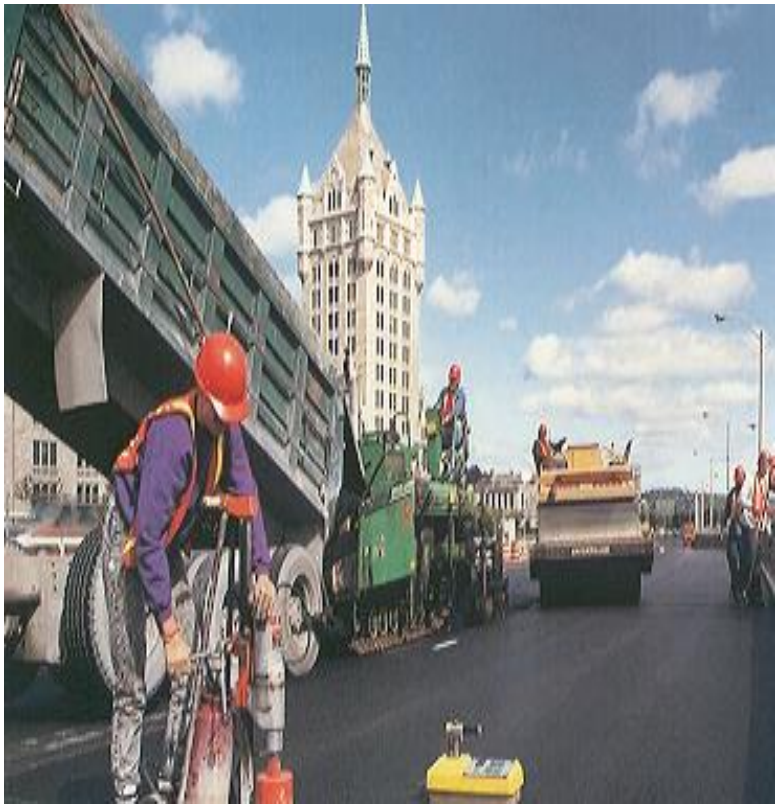
PWL- Consistency



P401 Success- Part #1
Development of Job Mix Formula (CONSISTENCY)

- Plant
  - Batch vs. Drum
  - Cold feed bins
  - Production capabilities
- Proportional balance of aggregates in JMF
- Aggregate properties
  - Aggregate Properties
    - Specific Gravity/Absorption
  - Aggregate Variability
  - Gradation
  - Segregation
- Volumetric Control in Production

JMF to Optimize Compaction



- Stability
  - Natural Sand- Rounded Particles can cause material to "walk" and become unstable under force of rollers
- Workability
  - Low / High #200
  - Excess Coarse Aggregate

Success #2- Production (Consistency)

- Trial batch and test mix through plant before project starts
- Stockpile Management
  - Monitor gradation and moisture
- Plant in optimum running condition
- Steady rate of production (eliminate starts/stops)
  - Scheduling?
  - Trucking- Logistics
- Minimize segregation with proper silo load-out
  - 3 drops
  - Do not load material below cone level
- Maintain temperature to target +/- 15 degrees maximum

Potential Pitfalls….

- Production Temperature
  - Batch Plant
  - Multiple Customers
- Dust Control
  - Mechanical Failure
  - Build-up of material in Hot Bin Fines

Plant QC Requirements

- Gradation and Asphalt Content
  - Twice/Lot
- Aggregate moisture
  - Once per lot
- Mix moisture
  - Once per lot
    - 0.5%

Temperatures

- Temperature 4X per lot
  - Dryer
  - Bitumen
  - Mixture at Plant
  - Mixture at Job Site

Monitor Trucks for Clean Bodies, Proper Release Agents and Tarped.

Monitor Assurance Testing

- Partnership
- Consistency
- Sampling
- Calibration
- Test Standards

Minimize the damage and close-out days production

1st test	Time	Air Voids	Air Voids
5-a	7:00 AM	2.1	2.1
5-b	9:00 AM	1.8	1.8
5-c	11:00 AM	5.1	2
Average		3	1.96667
Std dev		1.82483	0.15275
Ql		0.548	-0.21822
Qu		1.09599	19.8578
PWL		66	44
Payment		80.4	Remove

P401 Success #3 Construction –(Consistency)

- Paver set up
  - Width- ABOE
  - Electronic Grade Control
- Paving Speed
  - Logistics Trucking
- Rolling Pattern
- Sufficient material at joints
- Use of MTV?
- Where is the dam water truck?

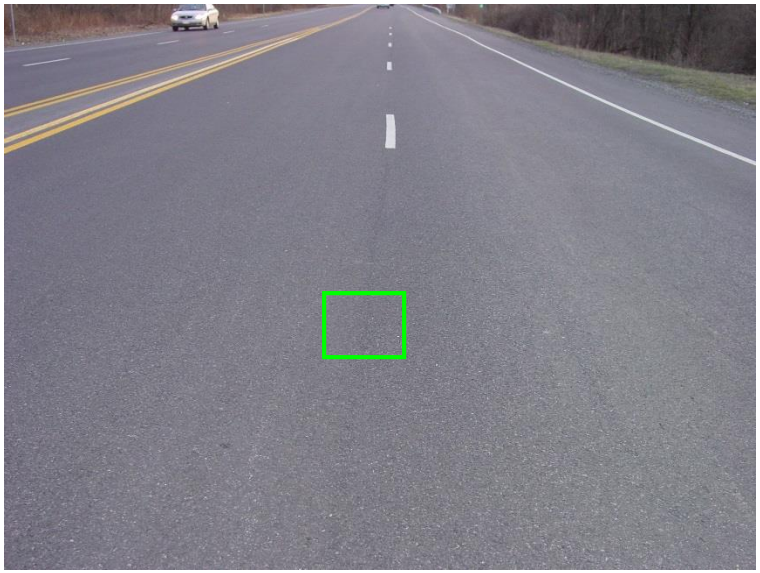
Communication

- Game Plan
  - Production goal
  - Dedicated Plant ?
- Density- Target 100% of Gmb to ensure Joint Density
- Constant monitoring
  - Continious communication of data from Plant lab to field personnel
  - Nuke gauge technician
  - Roller operators
  - Paving foreman
  - Project manager

Width Requirements- ABOE

Rolling in Echelon

Good Joints



Sufficient Material + Mat Density @ 99% Gmb = 100PWL on Joints

Core #4

Misc. Tips- Pre-Pave Meeting

- Contractor
- Producer
- Owner
- Consultant engineer
- Assurance Testing Laboratory

Construct Test Strip

- Minimum 300 ft. long x 20 ft. wide
  - Large projects should be 50% above minimum
  - Engineer can waive for jobs < 3000 tons
- 2 passes- cold joint that is cut back
- 3 Samples
- 2 opportunities for payment/progress
- Minimum 90% PWL
  - Stability, Flow, Air Voids, Mat Density, Joint Density

Success!! Albany County Airport, NY, Runway 10-28

NAPA Ray Brown Airport Award

- The Ray Brown Airport Pavement Award is given to the highest-rated Quality in Construction - Airport Pavement .
- The award is named after Ray Brown, who was the Director of the National Center for Asphalt Technology from 1991 until his retirement in 2007.
- Under his leadership, NCAT became the preeminent organization for asphalt pavement research.

Duval Asphalt, Jacksonville, FL Runway 5-23, Craig Municipal Airport

- Stockpile Management
- Pre-test mix
- Control mix segregation
- Control temperature
- Steady production
- Constant communication between Plant and Field staff

2011 Ray Brown NAPA Award Winner

- TJ Young (Production Manager) and Chris Wright (Project Manager)
- "*We put a core rig right on the job that can run complete core tests for immediate feedback to the paving crew and for correlation to non-destruct density gauges. We feel this is a key strategy*"

Common Themes with "Problem" Projects

- Non- VI supply
  - Paving Contractor unfamiliar with specifications and potential impact of decisions
  - Often supplier is not included in project level discussions and Contractor has the only relationship on the project
  - Inexperienced
- Batch Plants
- P401 on smaller projects

Thank you!

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