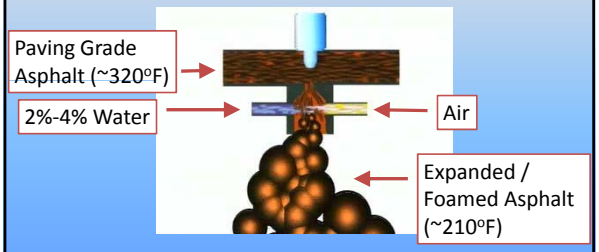

## A Quick Refresher
## What is "Foamed Asphalt"?

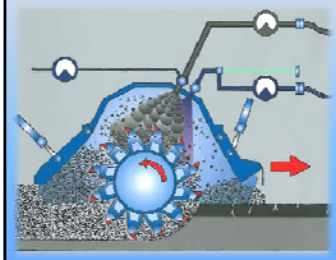
**Cold Water + Hot Asphalt**




## Benefits of Foamed Asphalt Stabilization

- **Increased section strength (improves base strengths 2.5-3X)**
- **Eliminates seasonal thaw weakening within the base layer**
- **Maintains a flexible section**
- **Fast tracks the construction process by reducing the need to remove and replace material**

## Stabilizing With Foamed AC



**Two Techniques**

- **In-place (in situ)**
- **In-plant at an off-site recycling mixing plant**

## Foamed Asphalt Use In AK

- **First used in the early 2000's in Homer**
- **In situ stabilization has been utilized on over a dozen projects to date**
- **Kodiak Airport Project is the first to utilize an off-site recycling plant for the foamed AC stabilization process and the first to stabilize 100% RAP mixture**

## Typical Foaming Train (in situ)

## Typical PCC Distributor (in situ)

## Typical Compaction (in situ)

## Back Story

**R/Ws 7-25 and 11-29**

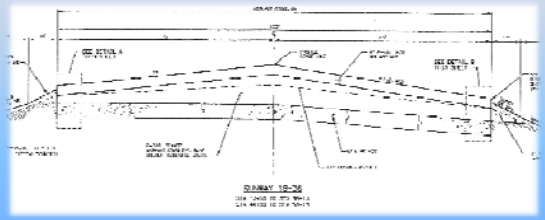
- Have been improved through the Airport Improvements Program (AIP) over the last few decades

## Back Story

### R/W 18-36

- Constructed during WWII
- R/W 18-36 has not seen the same level of improvements as R/W's 7-25 and 11-29
- The Coast Guard resurfaced R/W 18-36 around 1993

## R/W 18-36 Existing Conditions



## Back Story

### R/W 18-36 (bones)

- 1940's - Originally as 6-8 inch PCC reinforced slab
- w/ Uniform sheet flow drainage to the east
- Later (?) overlayed with HMA
  - Crown section installed by placing up to 12 inches HMA at centerline
- 1993 - Coast Guard resurfaced the runway with mill and fill job that placed 4 inches of new HMA
  - Delamination between layers a serious problem during construction (had to remove down to PCC in many areas)

## Back Story

**Fast Forward approx. 10 yrs. (2003'ish)**

- Raveling of Longitudinal joints was big issue
- Despite crack sealing efforts, joints continue to come apart over the next 5 yrs.
- Until Maintenance crews are trying to maintain this…

## Back Story

Integrity · Excellence · Respect

## Back Story

**Approx. 15 yrs. After Construction**

- Fall 2009 – Runway finally closed due to uncontrollable raveling
- (late) Fall 2009 – Maintenance applies new liquid pot hole filler as an emergency fix to keep the runway open through the winter. Result???


## Back Story

### Approx. 15 yrs. After Construction (cont)

- Summer 2010 - Reapplication of pot hole filler (under better conditions) has better results
- Summer 2011 - "Successful" application begins to pull free as the asphalt it's adhered to separates from the rest of the mat

## A New Twist on a Proven Stabilization Technique at Kodiak Airport

### Kodiak Airport Improvements 2011 Project Objectives

- Resurface R/W 18-36, R/W 07-25 and T/W Bravo
- Install new lighting for both R/Ws and T/W
- And reconstruct terminal parking and airport access road

## Pavement Design Objectives

- Design a pavement that meets FAA requirements
  - Stabilized base (required for aircraft +100K lbs)
  - Install minimum cross slope of 1%
- Determine the most beneficial use of PCC layer
- Remove old, poorly bonded pavement layers
- Maximize the reuse of Reclaimed Asphalt Pavement (RAP) that will be produced
- Do all of this COST EFFECTIVELY!

## Considered Approaches

### In Place Rubbelization of PCC Pavement

Advantages

- Allows the use of aggregate (RAP) to build the new crown section
- Eliminates potential of reflective cracking above intact control joints

Disadvantage

- Strength loss as result of reducing the PCC layer to a crushed aggregate

## Considered Approaches

### Foam Stabilization of Existing RAP

Advantages

- Provides a stabilized base as required by FAA for pavements serving +100K lb aircraft
- Being flexible it should reduce the potential of reflective cracking above intact control joints
- Reuses project produced RAP
- Leaves the PCC intact (big strength benefit)

## Considered Approaches

**Foam Stabilization of Existing RAP**

Disadvantages

- The Department has not used a foamed stabilized layer made of 100% RAP (not many have)
- Project doesn't lend its self to in-place stabilization
- Requires a finer RAP gradation that may be difficult to obtain given history of delamination (extra processing at extra cost)

## Foam Stabilization of RAP was Selected

To mitigate risk the Department required the use of central mixing plant. Why?

- Variable pavement depths would complicate in-placing mixing
- Most Importantly – A plant provides accurate proportioning and a homogeneous mixture

## Contract Provisions

- Created Item P-310 Foamed Asphalt Stabilized Base Course (FASBC)
- FASBC paid for by the SY
- FASBC layer was to be built 1-2 inches above finished grade then milled to finished grade
- Finer RAP gradation than typically used (-1")
- Maximum FASBC lift thickness of 8 inches

## Contract Provisions

- Technical Representative had to be onsite longer than typically required
- Target density was established by roller pattern
- FASBC had to achieve 85% of the Dry Indirect Tensile Strength (ITS) established in the mix design
- Contractor performs ITS testing
  - Lots were 24,000 SY and consisted of 6 - sublots
  - Three biscuits are tested and averaged per sublot

## FASBC Mix Design

| Mix Design Requirements and Properties | |
|---|---|
| Asphalt Type | PG 52-28 |
| Asphalt Cement, % | 1.5-2.0 |
| Portland Cement, % | 1.0 |
| Asphalt Foaming Temp, °F | 340 |
| Optimum % Water | 3.0 |
| Target Indirect Tensile Strength, psi | 51 |
| Unit Weight, lb/cu. ft | Approx . 131 |

## Aggregate / RAP Properties

| Gradation Requirements | |
|---|---|
| Sieve Designation (sq. in) | Percentage Passing |
| 1-1/2 | 100 |
| 1 | 90-100 |

## NOW.. To Make That… Into This

## Milling

## Milling

## Milling

## Milling Finished Product

## Wirtgen KMA 220 Mobile Plant

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## Cement Hopper

## Mixing Chamber

## Control Center

## Placing the Foamed RAP

## Compaction with Smooth Drum and Pneumatic

## Vibratory Pad Foot Roller

## Initial Pass

## Intermediate Pass

## Pad Foot Final Pass W/ Steel Drum Finish Rolling

## Compacted Surface (1-2 in. higher than finished grade)

## Checking Relative Density After Final Rolling

## Milling to Finished Grade

## Milling to Finished Grade

## Delamination Between FASBC Layers

## READY TO PAVE

## AND… PAVING

## Summary

**ITS and relative density testing, to date, of the Foamed Asphalt Stabilized Base Course (FASBC) indicates we are getting the specified compaction, and then some. Results are often higher than required by contract.**

**What we learned is the importance of the Department Staff (Construction and Design) working with the Contractor to modify specified methods for this new technique in order to provide the best finished product.**