

Concrete Overlays for USA Airports



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Concrete Overlays

Airport Sponsors are asked to more with less

Budgets



Time

Airport Sponsor needs

- proactive, sustainable pavement Maintenance
- Longer lasting rehabilitation strategies
- Reasonable cost

Concrete overlays represent such strategies

HISTORICAL REVIEW

- Began in late forties and early fifties
- First used on Airports and Secondary Roads
- In mid-seventies acceptance grew
- By late eighties this was normal practice
- Then in early nineties Ultra-Thin Whitetopping
- Today concrete overlays are often used strategy



Concrete Overlays Long Life Rehab

- Overlays are not new



RUNWAY WHITETOPPING - IOWA

1971	Storm Lake -	5"	IDOT	1992	Spencer -	6"	FAA
1979	Centerville -	5"	IDOT	1993	Oelwein -	5"	IDOT
1982	Clarion -	5"	IDOT	1994	Spencer -	6"	FAA
1983	Waverly -	5"	IDOT	1994	Muscatine -	7"	FAA
1987	Corning -	5"	IDOT	1996	Hampton -	6"	IDOT
1988	Carroll -	5"	IDOT	1996	Clarinda -	5"	FAA
1991	Fort Madison -	5"	IDOT	1998	Oskaloosa -	6"	FAA
				2001	Jefferson -	5"	FAA
				2001	Greenfield -	5"	IDOT
				2001	Webster City-	6"	FAA

Benefits of Concrete Overlays

- Cost-effective solution
- Quick and convenient
- Easy to repair
- Durable rehabilitation tool
- Sustainability
 - Albedo
 - Longevity, and
 - Surface profile stability



CONCRETE AIRPORTS

for SAFETY



Pilots prefer concrete's visibility both day and night.

No ponding of water.

Better skid resistance in both wet and dry weather.

**Long term performance
= less construction**

THE ADVANTAGE OF CONCRETE APRONS & TAXIWAYS

- 📖 Concrete is resistant to deformation, rutting, “birdbaths”, etc.
- 📖 Concrete is not damaged by fuel spillage, oil drippings, or jet heat and blast.





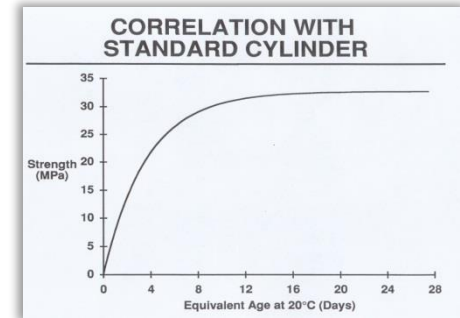
3-Year old Reconstruction

3-Year old Asphalt overlay
Reflective cracks

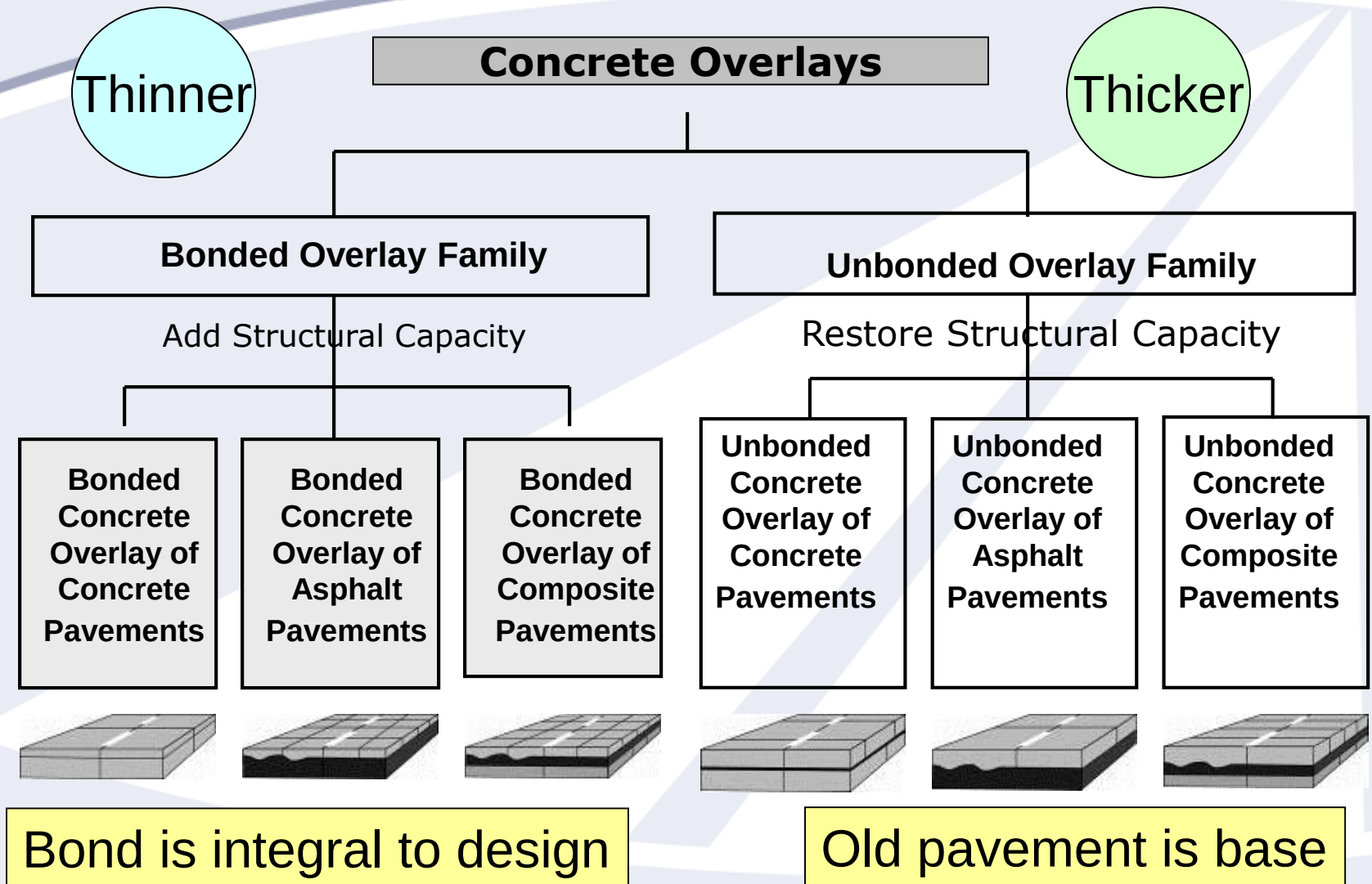


Benefits of Concrete Overlays

- No need to remove existing pavement
- Few pre-overlay repairs
- Placed using normal construction practices
- Accelerated construction practices can be used
- Can be open to traffic quickly

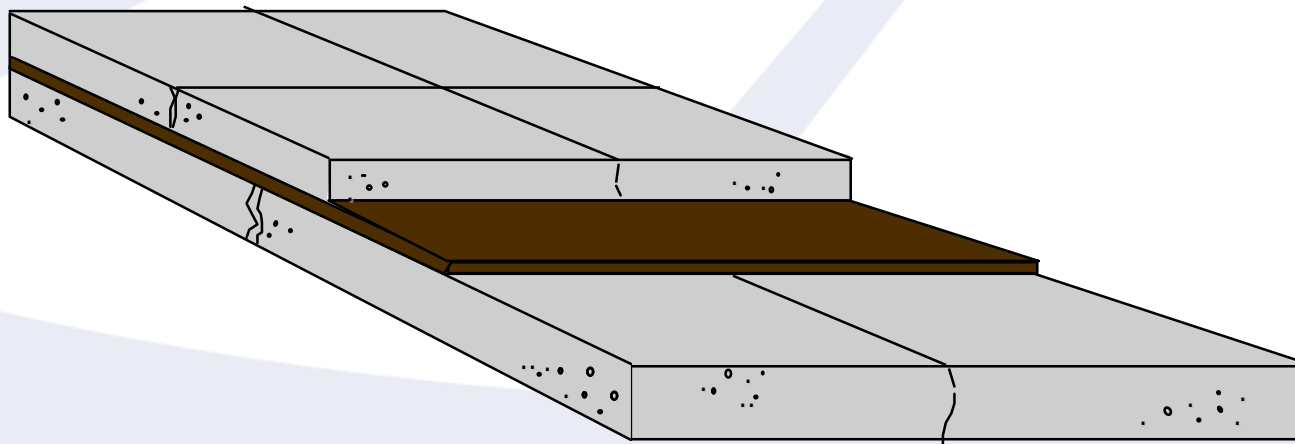


Family of Concrete Overlays

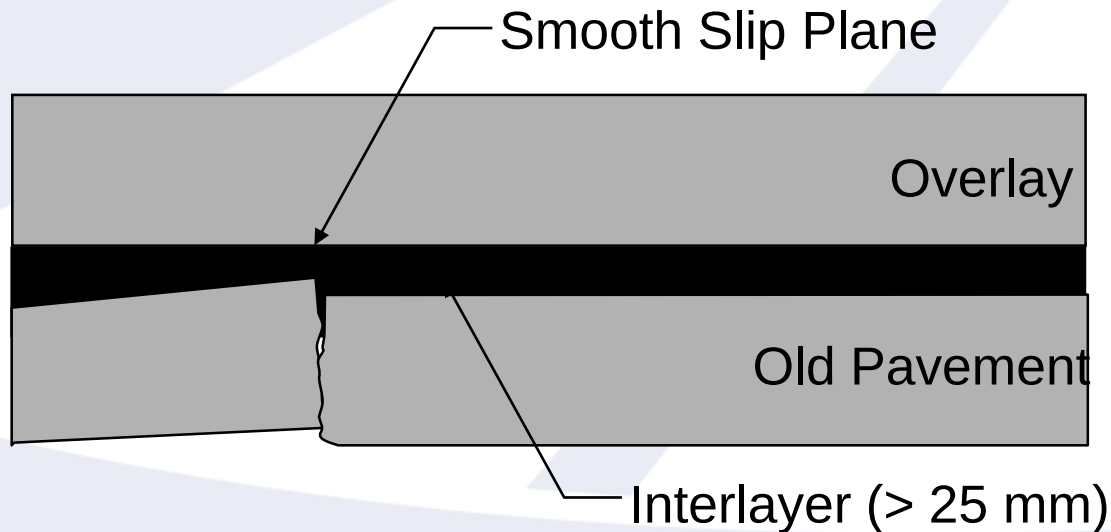
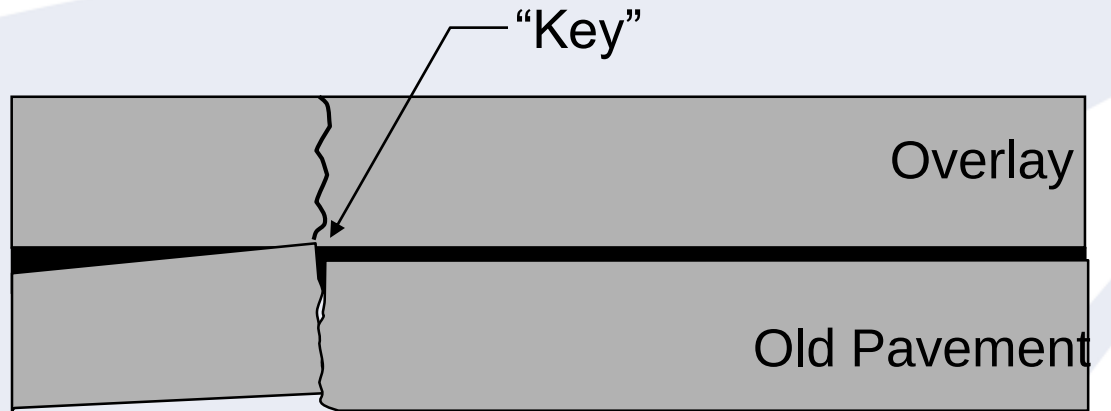


Unbonded Overlay

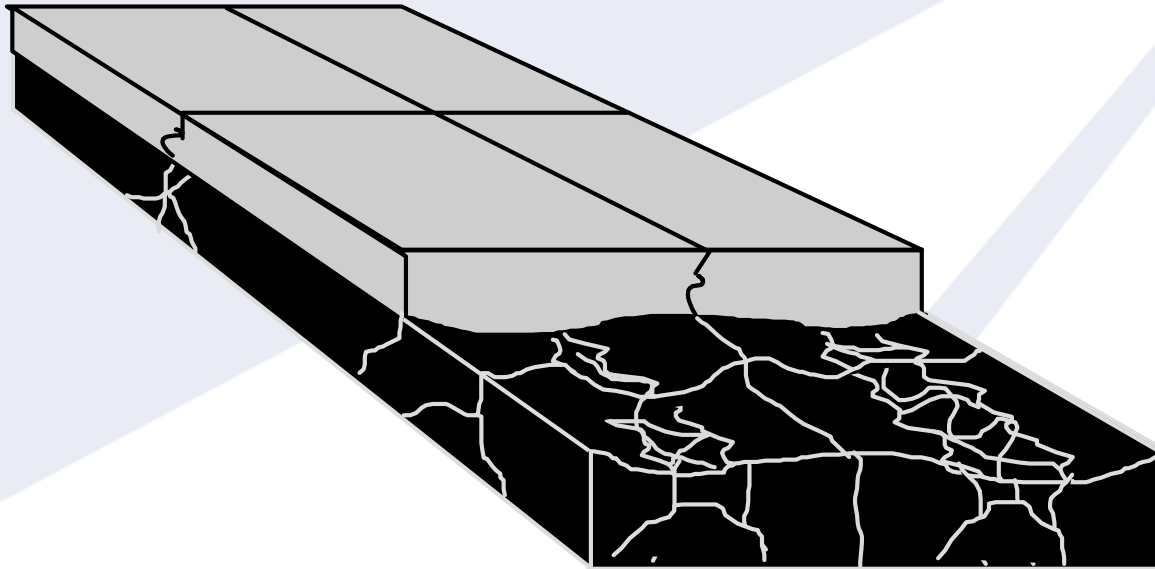
- Consists of thick concrete layer on top of an existing concrete pavement
- Uses a “separation interlayer” to separate new overlay and existing concrete



Unbonded – Separation Interlayer



Unbonded – Whitetopping



Existing Asphalt

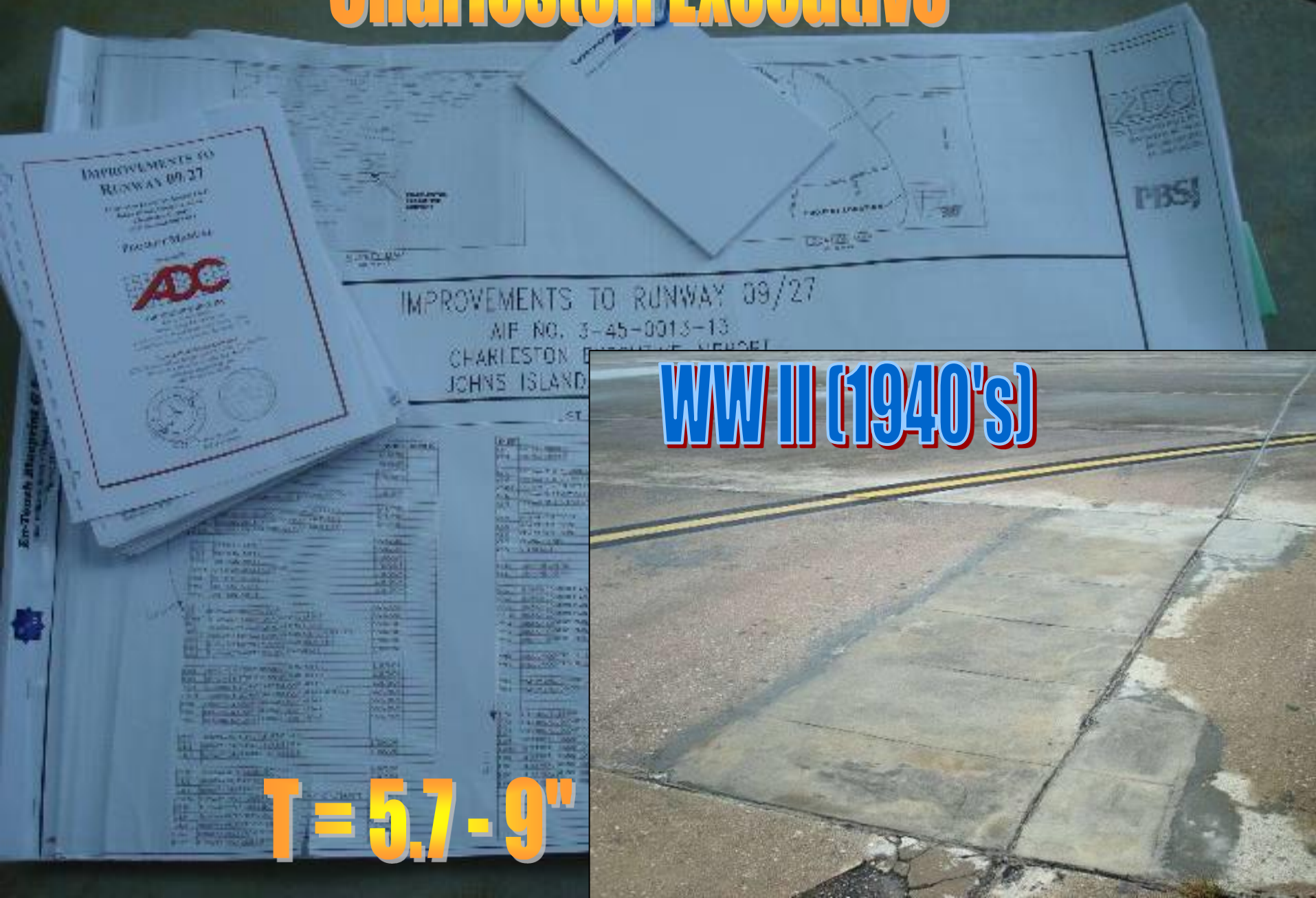




Recent Overlay Projects

Airport Name	Bid Date	Type	PCCP SY & Depth	Price per SY
Williamsburg Co (SC) - apron	June 2004	WT = Unbonded over asphalt	7000 (5-inch)	\$41.96 (Bid SY/CY)
Cobb County (GA) - runway	Apr 2008	WT	70,881 (7-inch)	\$29.39
Lancaster County (SC) - runway	Apr 2009	WT	66,870 (6.5-inch)	\$22.75
Charleston (SC) Executive - runway	June 2009	Unbonded over PCCP	59,700 (11-inch)	\$39.45
Berkeley County (SC) - runway	June 2010	WT	36,260 (9-inch)	\$32.90
Augusta (GA) Regional - runway	Sept 2010	WT	141,308 (14-inch)	\$37.84

Charleston Executive



350' Extension

Batch Plant On-Site

Crushing Operation – Base Material

WW II Era PCCP

RW Width reduced to 100'

Asphalt Sep Layer



Quotes from Open House

- A Concrete Overlay kept us “out of the subgrade” vs. reconstruction option.
- A Concrete Overlay raised our pavement elevation out of the high water table
- Inch per Inch concrete was less expensive than the asphalt leveling (separation) layer
- Our original PCCP surface lasted 60+ years, no reason why this surface cannot last another 60 years!

Williamsburg Co Apron Whitetopping

Asphalt PCI = 53/16

Project Details / 2004

Two Alternatives

Volatile Material Cost

Alternate Bids Accepted

Contractor	Alternative Bid Amount (\$)	
	Asphalt	Concrete
A	\$474,770	\$421,625
B	\$482,725	-
C	-	\$454,510
D	-	\$521,521

Cobb Co - McCollum Field



7-in Whitetopping

@ 29.39 / SY

Lancaster County Whitetopping

May 25, 2010



Berkeley County Whitetopping March, 2011

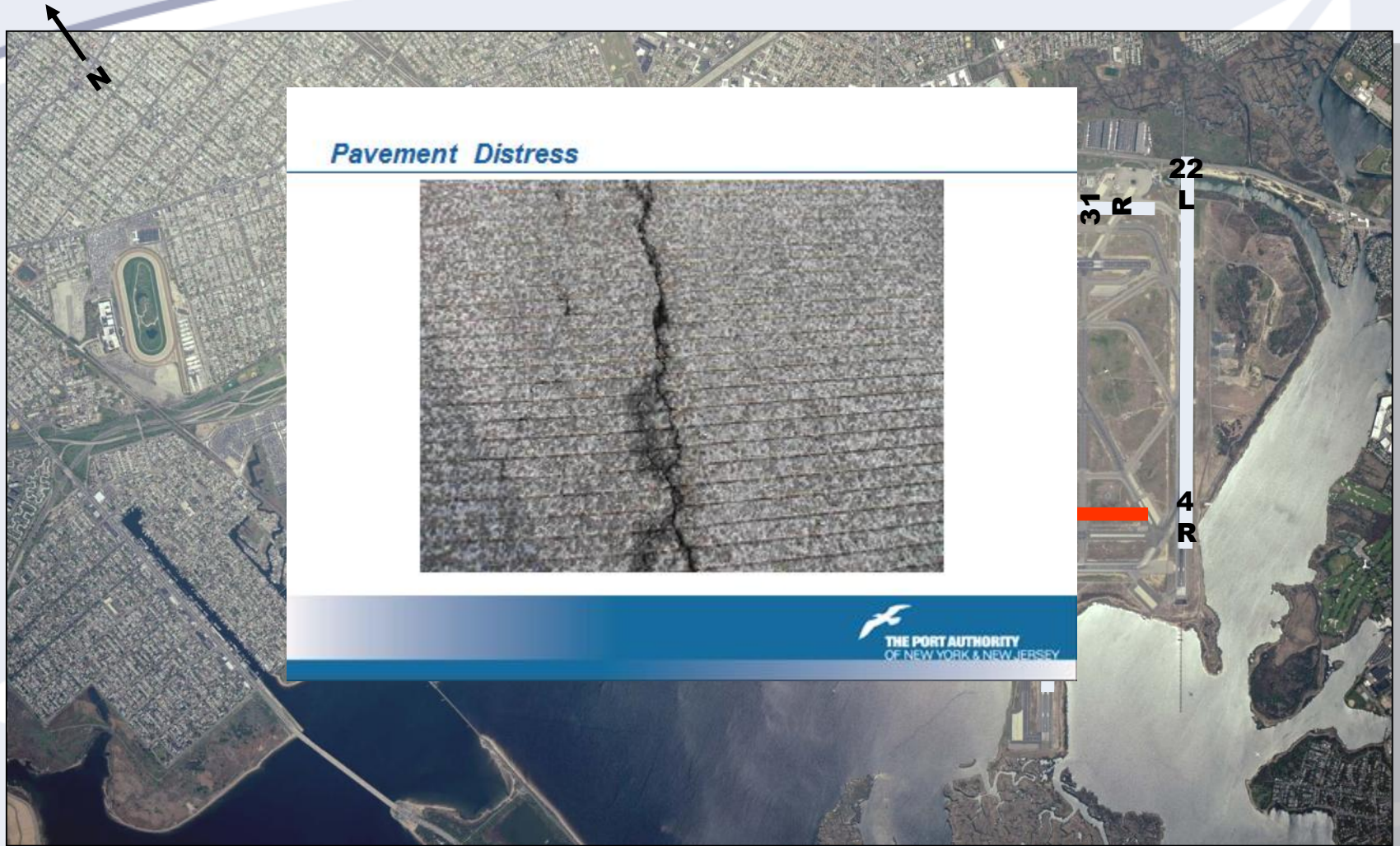


John F. Kennedy International Airport



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Airport



Two Alternatives Developed

❖ Project Scope Includes:

- *Widen Runway to 200 feet for the A-380*
- *Additional Taxiway Entrances and Exits*
- *New Drainage System*
- *Regrading of Safety Areas*
- *New Electrical Infrastructure*
- *Existing Taxiways Widening*
- *Concrete and Asphalt Overlay Alternatives Developed.*



Alternative Analysis - Asphalt

- INITIAL CONSTRUCTION

- 9" ASPHALT OVERLAY, CONCRETE ENDS, WIDEND

- REHABILITATION – YEAR 8

- 3"RW & TW MILL & OVERLAY

- REHABILITATION – YEAR 16

- 6"RW & TW MILL & OVERLAY

- REHABILITATION – YEAR 24

- 3"RW & TW MILL & OVERLAY

- REHABILITATION – YEAR 32

- 6"RW & TW MILL & OVERLAY

Alternative Analysis- Concrete

INITIAL CONSTRUCTION

18" CONCRETE

MAINTENANCE – YEAR 8

TW MILL & OVERLAY & CONCRETE REPAIR CONCRETE

MAINTENANCE – YEAR 16

TW MILL & OVERLAY & CONCRETE REPAIR CONCRETE

MAINTENANCE – YEAR 24

TW MILL & OVERLAY & CONCRETE REPAIR CONCRETE

MAINTENANCE – YEAR 32

TW MILL & OVERLAY & CONCRETE REPAIR CONCRETE

Life Cycle Cost Comparison

Initial Construction Cost:

Portland Cement Concrete costs approximately 3% More than Asphalt

Life Cycle Cost:

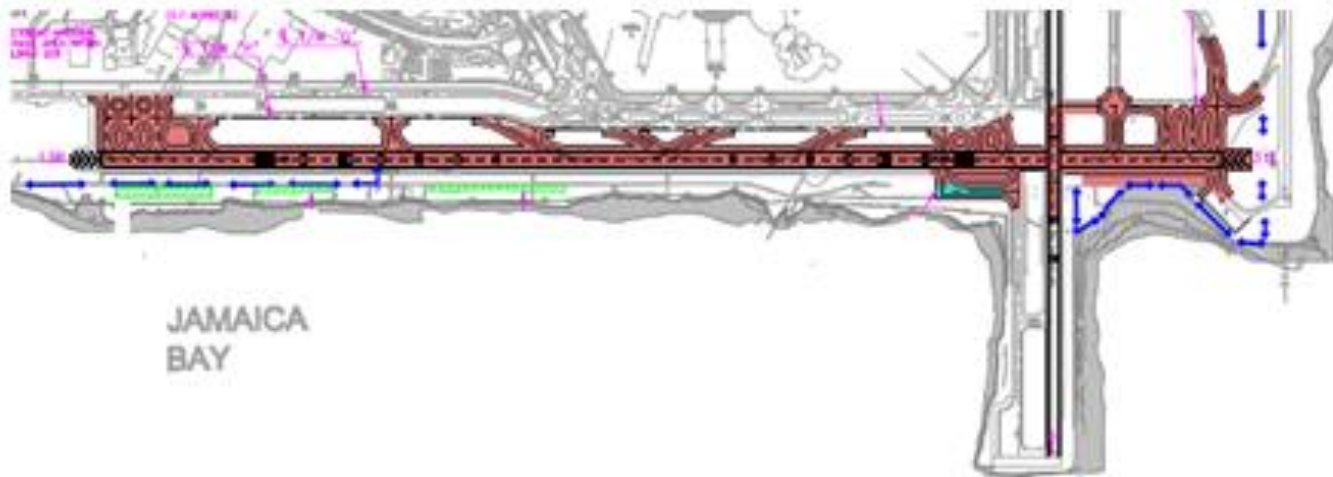
Portland Cement Concrete costs approximately 36% Less than Asphalt

The concrete alternative was \$154 million cheaper than asphalt over the 40 year life of the pavement.

Notes: * 40-year Design life of the Project, 8-year Maintenance and Rehabilitation cycle, Discount Rate 3.5%.

User delay costs not included since airlines reschedule flights during construction periods.

Final Project Design

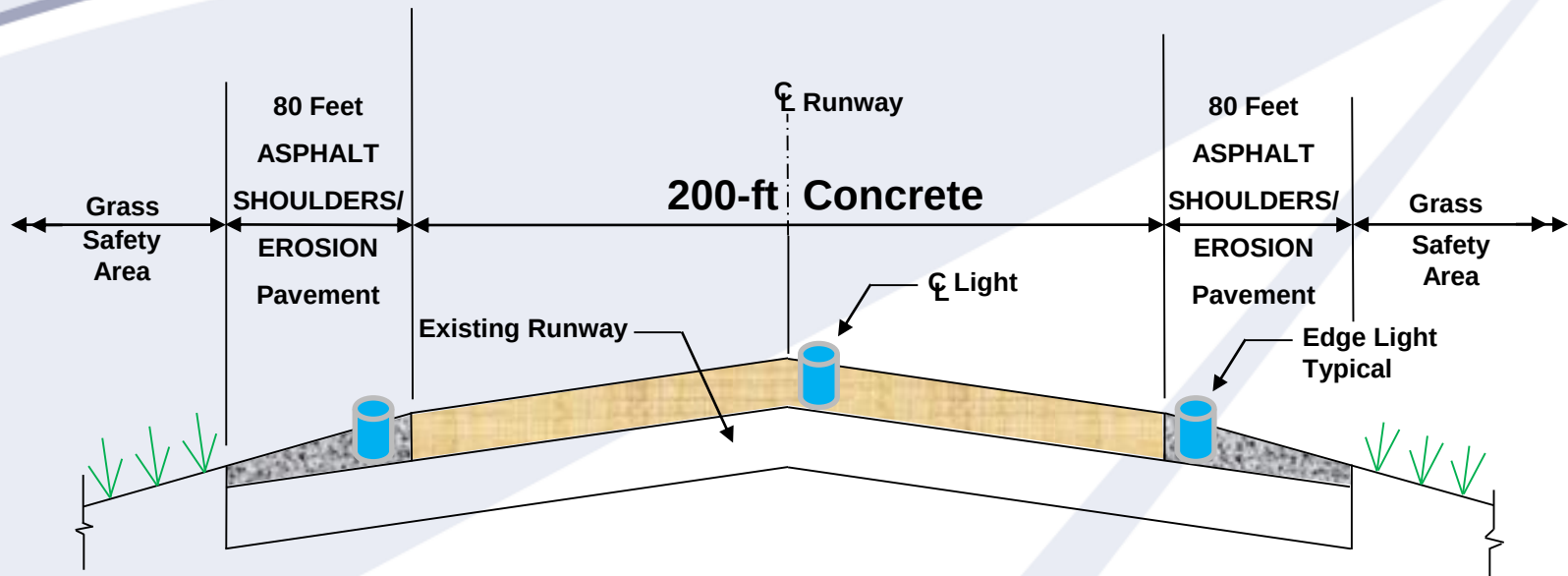


120 Days - Paved over 12,000 feet



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Runway Cross Section



Concrete Runway Typical Section

Construction Progress- Slipform Paving



Runway 4L-22R



Major Construction Quantities

- AC = 450,000 Tons
- PCC = 220,000 CY
- Astroturf = 7 acres
- Grass = 118 acres
- Electrical Ductbank = 25 miles
- Storm Drainage Piping = 12 miles
- Infiltration Trench = 3 miles
- Airfield Lighting Cable = 13 miles
- All Cable = 170 miles
- Airfield Lighting Fixtures = 2700 each

A million dollars a day in construction!

Slipform Paving



Contraction Joint



THANK YOU



Questions & Comments

THANK YOU!

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