



Airport Runway Unbonded Concrete Overlay (PC/PC)

Project Report #11

Sibley, Iowa

November, 1992



Late in 1992, Sibley, Iowa made concrete paving history by being the first community in Iowa, and third in the nation, to construct an **unbonded** Portland cement concrete (PCC) overlay on their municipal airport runway. The Sibley Airport is classified by the Iowa Department of Transportation (Iowa DOT) as a "Locally Significant Airport" that provides basic utility service to the Osceola County area of northwest Iowa.

After 26 years of operation, the original 6 in. PCC slab which was built on compacted native soil without underdrains, began to exhibit coarse aggregate related D-cracking patterns at intersecting joints. However, little spalling had occurred and neither faulting nor curling was evident, but remedial planning commenced.

On the advice of their engineer, Ivan Doorenbos of DeWild-Grant-Reckert & Associates of Rock Rapids, the city selected a PCC unbonded overlay rehabilitation because of its superior life-cycle cost, durability, skid resistance and low maintenance qualities. The Sibley City Council and Administrator, Scott Pick, worked with Doorenbos to submit an application to the Iowa DOT which resulted in design concurrence and a funding allocation of 70% for

construction costs from the state FY-1992 aviation program. This concrete solution has given Sibley a modern 50 ft. x 3,000 ft. runway with turnarounds, taking advantage of the structural qualities of the old paving and using it as a base. Over 135 miles of unbonded concrete overlays have been successfully placed on Iowa county roads since 1973.

In July 1992 a local letting attracted three bids that ranged from \$291,947 to \$340,060. The engineer's estimate was \$300,000. A contract award was awarded to Carstensen Contracting, Pipestone, Minnesota for 18,875 SY of 5 in. PCC unbonded mainline overlay at \$13.75/SY, 485 SY of 6 in. PCC paving in the turnarounds at \$18.00/SY and 18,875 SY of sealcoat for a bond breaker at \$.50/SY. Work started September 15, 1992.

Sibley Concrete Products produced transit mixed concrete using five trucks to deliver 50 CY of Iowa DOT Class C concrete per hour. All materials were Iowa DOT approved, including washed gravel coarse aggregate. Although allowed, no fly ash was substituted for cement because of the late season construction period. Air content tested uniformly at $6\% \pm 1.5\%$ and slump ranged from 2.5 to 3 inches. Concrete test cylinder compressive strengths averaged 3,600 PSI at seven days and over 5,000 PSI at 28 days.

After filling minor D-crack spalling to prevent any keying action, Rohlin Construction Company placed the CRS-1 AC emulsion bond breaker at a rate of 0.15 gal. per SY of surface area, followed by a sand cover applied at 12 lbs. per SY. PCC paving began after a 72 hr. cure on the seal.

Carstensen Contracting divided the 50 ft. x 3,000 ft. project into six 25 ft. x 1,000 ft. areas. The southeast segment was placed first, using a GOMACO bridge deck finisher riding on steel rails. Inside the rails,

anchor bolted wooden forms were carefully shimmed for elevation control and to establish the desired riding quality. On the following day, the forms and finishing machine were repositioned to the adjoining segment where a keyway and tiebars assured proper connection between pours. By using this system for consecutive pours at three-day intervals, integrity of the unbonded overlay was guaranteed and days work joints were limited to two transverse locations. Because of the obviously superior riding quality achieved, an optional profilograph test requirement was waived.



A tied longitudinal joint was constructed at midpoint of each 25 ft. wide pour. Transverse joints were sawed at 12.5 ft. spacings. Square panels measuring 12.5 ft. x 12.5 ft. were created to prevent reflective cracking from the underlying original PCC runway. All control cuts were sawed D/3, not to exceed 30% approaching D/4. Texture was obtained by astro-grass drag. White pigmented curing compound was applied at the standard rate of 15 SY per gallon. The final concrete pours involved placing 5 in. unbonded overlays on the turnarounds at each end of the runway. An additional 8 in. thick and 6 ft. width was incorporated to make Sibley's new facility more functional for twin engine aircraft.

City Administrator Scott Pick is especially proud of the airport project and feels that the work performed by DeWild-Grant-Reckert & Associates, Carstensen Contracting and Sibley Concrete Products combined to produce an award-winning betterment for this community and the surrounding area.

Additional information on the project may be obtained by contacting:

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