



Unbonded PC Concrete Overlay

Project Report #24

Denison Municipal Airport, Runway 12/30

October, 1997

After providing 35 years of expanded service for the flying public at Denison, Iowa, rehabilitation of Runway 12/30 during 1997 was completed. The existing 75 ft. wide by 5,000 ft. long portland cement concrete facility was initially paved 2,600 ft. in length in 1960. A 1,500 ft. extension was constructed in 1968 and further lengthening totaling 900 ft. was added in 1989. However, in recent years evidence of D-line cracking resulting from use of local limestone coarse aggregates required an annually increasing amount of full-depth repair.

Following their July 30, 1997 letting the Denison Airport Commission and Federal Aviation Administration concurred in a contract award to the Fred Carlson Co., Inc. of Decorah, Iowa for \$762,490. This preservation concept carried an October 31 completion date and stipulated that Runway 12/30 could not be closed more than four calendar weeks, or be subject to \$800 daily liquidated damages penalty for late opening.



To correct this condition a remedial design prepared by Sundquist Engineering, P.C. called for installation of 8,010 l.f. of 4 in. PVC pipe underdrain, the application of a 1 in. ACC/Type B De-bonding layer and the placing of a 6 in., PC concrete unbonded overlay pavement totaling 36,500 SY. This surface area covered 4,050 ft. of the mainline, provided for a 150 ft. transition to the existing 800 ft. on approach Runway 30 that would be used as constructed, and allowed for transitions at abutting taxiways.

To meet this production schedule, Carlson closed the airport on October 1 to perform preliminary repairs and specified removals, while stockpiling aggregates and materials essential for the new construction. On October 3-4 their subcontractor, Western Engineering, placed the 1 in. Type B ACC De-Bonding layer over the full width and length that would be overlaid with PC concrete. On October 7, the outer 25 ft. south lane was poured and followed by paving the outer 25 ft. north lane the next day.

When tests showed that both initial pours met FAA required 400 psi 3rd point loading flexural strength at 5 days, Carlson proceeded to pave the center 25 ft. pass. Their Rex Town & Country slipform paver was locked-to-grade and rode on longitudinal padding to avoid track damage to the previous pours.



Ash Grove Type 1P cement in combination with Class 3i coarse aggregate from Martin Marietta/Fort Dodge and sand from Dusek/Wall Lake, plus 5% fly ash, produced a consistent C-3 W/R 7 CY drum mixed batch at Carlson's on-site Rex Model-S plant. FAA 501 standard specifications for 1.5 in. slump and 6% entrained air produced excellent quality concrete. Proper surface texture was achieved by burlap drag and 3/4 in. transverse tines, followed by application of white pigmented curing compound. Expansion joints utilized pre-formed basket

assemblies consisting of 3/4 in. x 18 in. dowels on 12 in. centers at specified locations near the main taxiway connection near the midpoint of the runway. Wire mesh 6 in. x 6 in. reinforcement was used in irregular shaped transition areas. To prevent the appearance of any random reflective cracks in the new pavement surface, the project consultant, Sundquist Engineering, P.C., took care to locate all contraction joints vertically above those in the old concrete slab. Contraction joints sawed T/4 by 3/8 in. wide called for backer rod and hot pour ASTM-1751/1752 joint filler. Epoxy coated #4 x 20 in. deformed tie bars at 36 in. spacing were used in longitudinal joints at the center of each 25 ft. lane. 3/4 in. x 18 in. dowels on 12 in. centers were drilled and epoxy glued into the inside edge of each outer slab prior to paving the center lane. Profilograph traces showed excellent riding qualities well within specification requirements.

On October 22, following completion of the 4 in. diameter pipe underdrain system involving porous backfill surrounded by geotextile engineering fabric and completion of earth shouldering, Runway 12/30 at the Denison Municipal Airport was reopened to full aircraft traffic service. Permanent seeding and pavement markings will be completed next spring.

Additional information may be obtained by contacting:

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