Idaho Airport Beats the Clock with Cement Solution

By John Arroyo, Northwest Cement Producers Group

"Not only was FDR the fastest construction method, it cut costs over a million dollars when comparing all four possible pavement options."

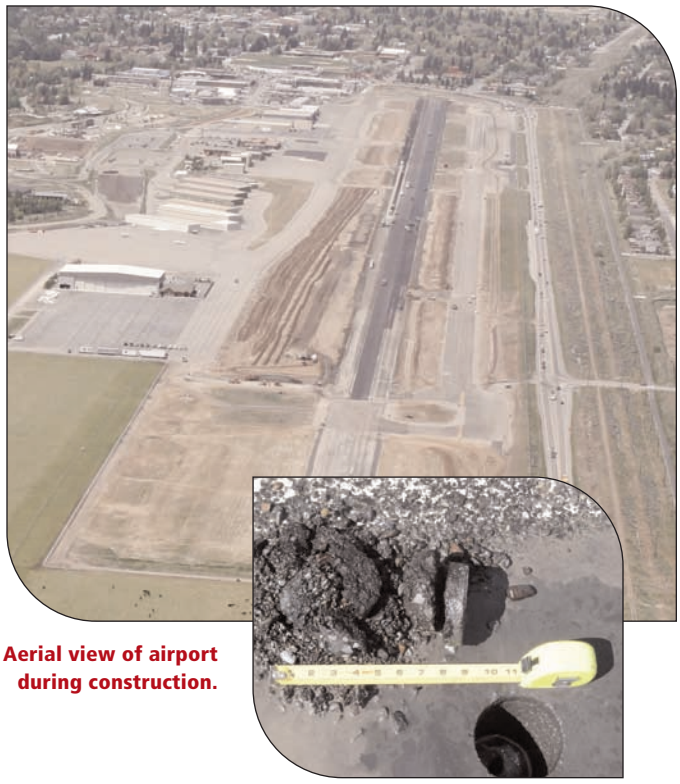
Dave Mitchell, Toothman-Orton Engineers

Central Idaho attracts a steady flow of visitors and new residents. The local airport in the town of Hailey, Idaho rebuilt their only runway in barely 30 days time. While some local airports shut down for twice as long, the Friedman Memorial Airport selected full-depth reclamation (FDR) with portland cement to meet a master plan objective and economically re-open for traffic in the shortest possible time span.

The year round recreational area contributes to Friedman Airport's needs to efficiently handle air traffic of all kinds. The airport anticipates traffic to grow 44% by 2022, the target date of their long-term master plan. To meet this need, there is a strong likelihood that within the next ten years a new airport will have to be built to replace the current one. This played a role in the decision not to consider a major runway reconstruction.

Background. Project analysis began in the spring of 2006, nearly a year before actual runway construction. Initially it was thought that simply milling off some old asphalt and then adding an overlay would suffice for several years until the airport master plan could be implemented with a new facility. However, a more thorough pavement analysis proved otherwise. When the first group of cores alerted the experts to potential problems with the underlying asphalt, the civil engineering firm of Toothman-Orton performed further investigation with assistance from geotechnical engineers at Terracon, Inc. Their studies confirmed that attention had to be given to the deteriorating underlying asphalt layers. The investigation uncovered significant asphalt deterioration after additional core samples were taken. Nineteen of the twenty-three cores cut from the existing runway indicated that the asphalt was in worse condition than expected. Even though the top layer of asphalt was in decent shape, the lower layers had been subjected to a deterioration called "asphalt stripping." Stripping is a common type of asphalt damage, caused when moisture and traffic loads cause the asphalt cement to separate (or "strip") away from the aggregate.

Time a factor. Airports such as the one in Hailey have to minimize closure time. Airfield Operations Chief Pete Kramer commented that their summer volume is busier than winter and that a long closure directly affects tourist, convention and conference traffic and the local economy. As a result a 30-day maximum construction time (runway shutdown) limit was set. That critical parameter guided the consulting engineers as they evaluated their options.



Aerial view of airport during construction.

Typical core shows deteriorated asphalt.

Pavement Design Options. Based upon airplane traffic and underlying soils, engineers at first calculated three different asphalt-based pavement options. A standard FAA design was considered along with two other pavement sections. When none of the first three could be constructed within a 30 day construction period, engineers approached the FAA and requested consideration for FDR. FDR with cement is a pavement rehabilitation process where a failed flexible pavement (surface and base) is pulverized, and then blended with cement and compacted. After curing, the cement-stabilized material forms a new base, which is then surfaced to create a long-life pavement structure.

FDR with cement is a common practice among county road maintenance departments and state transportation departments. The method is commonly used by members of the Idaho Association of Highway Districts

as well as by the Idaho Transportation Department (ITD) which has performed hundreds of miles of FDR with cement. The process has different names in different states. In Idaho the term is CRABS, which stands for cement recycled asphalt base stabilization. Whatever the term, the end result is the same—a strong, durable, pavement base. FDR is environmentally friendly since it reuses materials on site, eliminating the need to haul the material to a landfill.

Once FAA agreed to consider FDR, an additional pavement option was developed with input from Terracon. The four possibilities (three ordinary asphalt and one FDR) were:

Standard FAA	Alternate #1	Alternate #2	Alternate #3
15" #P154 subbase	None	None	None
6" #P209 crushed stone base	14" P209 crushed stone base	None	12" FDR with cement
4" #P401 asphalt	4" P401 asphalt	14.5" P401 asphalt	6" P401 asphalt
25" total section	**18" total section**	**14.5" total section**	**18" total section**

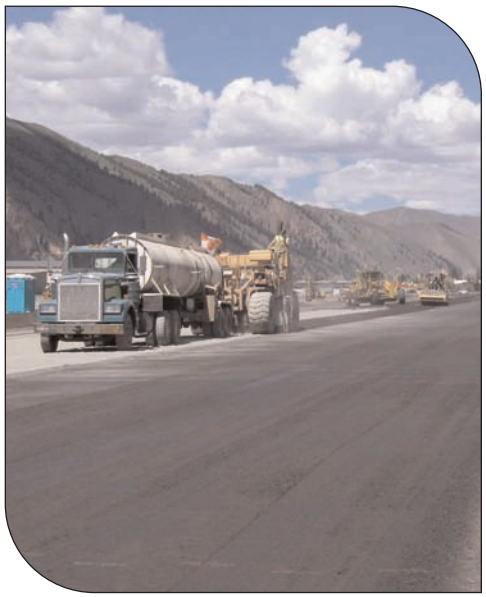
The standard FAA option and alternatives #1 and #2 required roughly 45-50 days of runway downtime, outside the established 30-day time frame. Dave Mitchell, Toothman-Orton Engineers, said that "they had to find a way to perform the necessary work and get it done within the 30 days." FDR was the only option that would meet the required schedule cutting 18 work days off the schedules of the other pavement options. FDR allowed them to attain the 30-day goal in a sustainable fashion, as it recycles resources already in use and also according to Mitchell, "eliminated probably 4,000 truck trips that would have been a huge impact on the community."

Cost. The big surprise, says Mitchell, was that their estimate indicated FDR would "cut their costs over a million dollars when comparing all four possible pavement options." Once the FDR alternative received FAA approval (federal airport funding was involved) and approval from the five member airport commission, the project went to bid in early 2007.

Construction. Low bidder Western Construction, Inc. from Boise began work immediately after the runway was closed on April 23. Western selected Valentine Surfacing from Vancouver, Washington to perform the actual FDR work on 73,440 square yards of runway. Chuck Valentine, president, recounted that his crew took "five days to grind and five days to mix". A nominal 2% of portland cement was used at the start and was increased to 2.3% as construction proceeded to adjust for changes in soil moisture.

Precision Surveying and GPS Technology. The FAA required a tight +/- .02 foot pavement surface precision on the finalized pavement. As a result the engineer specified a "robotic total station" using ITD specs as a guide. Western's Jack Snyder commented that "we can build a better product without stakes" as he refers to the application of electronic grade control.

End Result. The project was successfully completed within the required 30 days. As a result, Airport Operations Chief Pete Kramer now recommends the FDR with cement process to other airport operators who want to minimize their runway reconstruction closure times to bare minimums. Western's Snyder says that the successful completion depended on "the right technology and an experienced team of professionals working together."



Mixing cement into the failed asphalt base.

Grader with GPS technology.

PCA
Portland Cement Association
5420 Old Orchard Road
Skokie, Illinois 60077-1083
847.966.6200 Fax 847.966.9781
www.cement.org

An organization of cement companies to improve and extend the uses of portland cement and concrete through market development, engineering, research, education, and public affairs work.