DM&E faces drainage challenges on $1.4-billion coal line project

Alaska’s Whittier tunnel expands for joint road/rail use

Spring frogs enter third generation
Alaska tunnel gets millennial makeover

by Monica Black, assistant editor

Tunnel work is always a major project and a major headache. But if your tunnel work is going forward in Alaska's harsh Winter climate, and you've got to keep trains running while getting that tunnel ready to handle highway traffic for the first time, you have the makings of an uncommon challenge.

The Whittier Access Project through the Anton Anderson Memorial Tunnel has been under way in Whittier, Alaska, since June 1, 1998. The $57.3-million project, funded by the Federal Highway Administration and the State of Alaska, will expand and improve a railroad tunnel that has been the only link, other than barge, between the town of Whittier and the rest of the world since it first opened in 1942. The tunnel, and hence Whittier, will now be accessible for the first time to automobiles.

A short history

Because Whittier (pop. 250) depends so heavily upon rail service, the Alaska Railroad has had to maintain operations throughout the work on the tunnel, and construction has had to take place within the windows afforded by the railroad's schedule.

Built by the U.S. Army Corps of Engineers during World War II, the Anton Anderson Tunnel connects Portage, Alaska, and the port town of Whittier through Bear Valley. Two tunnels and 15 miles of track were constructed at that time to form a connection with the Alaska Railroad mainline.

Creating better access to Whittier, located on pristine Prince William Sound, has been under discussion since the 1950s. Various groups from tourist authorities to trucking companies, have lobbied over time to see something on the order of this project take place.

Finally in 1993, when financial feasibility and a workable and affordable design were found to coincide, the Alaska Department of Transportation and Public Facilities awarded the consulting firm HDR Engineering, Inc., the Whittier Access Project Location Study Report and Environmental Impact Statement.

HDR is providing project oversight and services for the design/build project development process. They developed design criteria, performance specifications, selection criteria and documents, assisted in choosing a contracting company, assist with the analysis of design reviews and have been mainly responsible for quality assurance throughout the work.

The work proceeds

The AAM Tunnel is being expanded both vertically for double-stack traffic and laterally to allow for the creation of emergency turn-out areas for automobiles and for spaces in which eight "safehouses," or fire-proof rooms, are being constructed. These will supply safe haven to travelers in the event of a tunnel fire.

Additionally, modifications are being made to provide tunnel ground support and water control measures, a tunnel traffic control and vehicle detection system, a driver information system, fire detection systems and an emergency response apparatus. A new railroad signal system is also being installed through the tunnel area.
The Whittier Access Project is only the second design/build transportation project in the State of Alaska, and it is the first design/build highway tunnel job in the United States. When completed, the tunnel will be the longest highway tunnel in North America. Though a grade surface like the one in the AAM Tunnel is not unique, it will be absolutely one-of-a-kind insofar as it’s being used in a tunnel.

All of this has required expert planning and a highly-cooperative relationship between DOT, HDR, the Alaska Railroad and Kiewit Construction Co., the contractor responsible for the design and the building expertise the project has demanded. Kiewit moved its offices and equipment on to the site and relocated a power cable that feeds Whittier to a small utility tunnel adjacent to the Anton Anderson Tunnel.

Staying interconnected
The interconnectedness of the component players is vital to this project. As Paul Witt, HDR’s project manager for the Whittier tunnel, explained, “Working for the State of Alaska, HDR did a preliminary design for the project and in doing that, wrote performance specs for things like lighting and ventilation. HDR provided the concept for how the project might proceed. This gave the various bidders a level playing field in that it gave them an idea of what to bid on. HDR then assisted the DOT in evaluating bids.

“The contract was awarded on the basis of a complicated formula that allowed for an assessment of value,” Witt went on to say. Some proposals were four inches thick. These submissions took the preliminary concept to another level and got very specific about what they were going to be providing, who their designers were, what they were designing.”

For each component segment of the construction process, Witt continued, “Kiewit submits a portion of a design to the DOT here at the project office with plans and specs for what they want to do. Then DOT gives those to HDR for our reviewers to take a look at. DOT’s own engineers look at it, and we also give them to the Forest Service and the Alaska Railroad. All of these parties send comments back for HDR to filter through. Then DOT has final approval of comments on the designs.”

DON’T LET A TUNNEL STOP YOUR TRAIN COMMUNICATIONS...

- Seamless Dispatch Radio Coverage
- Continuous EOT/HOT Through Any Tunnel
- Distributed Power Operation
- Dispatch, Trains, MOW Communications
- No Radio Dead Spots
- VHF and UHF Compatible

Tunnel Radio Of America
33868 SE Eastgate Circle
Corvallis, Or 97333
Phone: 541-758-5637
Fax: 541-758-1417
Internet: www.tunnelradio.com

E-mail: info@tunnelradio.com

Tehachapi California, UPRR 1998
Over 100 miles in operation across North America
15 rail tunnel systems installed in 1998

The new Track Safety Standards Calculator is a must for anyone that works on track. It includes the latest revisions to the DOT Federal Railroad Administration’s Track Safety Standards Part 213, which went into effect on September 21, 1998. Covers Classes of Track 1-5.

This easy to use tool will assist track personnel in determining:
- Distance for rail joint location;
- Allowable gage;
- Number of bolts per rail;
- Alignment of curves;
- Passenger speed;
- Plus much more...

TCAL......Track Safety Standards Calculator..............$6.00
Only $5.50 for orders of 50 or more!

1-800-228-9670

The Railway Educational Bureau
1809 Capitol Avenue • Omaha, Nebraska 68102
Fax: 402-346-1783
Email: sbrown@radis.net
8 a.m. to 5 p.m. C.S.T., Monday thru Friday

Company invoicing is welcome, shipping will be added. Pre-payment, please add $2.00 1st item; $ .50 each additional, for ground delivery in US; Call for Air Rate shipping to Canada. All other countries, pre-payment is required. Nebraska residents add 6% sales tax. Please FAX your order. Fax: 402-346-1783. Allow 21 days for delivery. Appropriate Air Rate charges will be added. US funds only.
Essentially, the floor of the tunnel will resemble a 2.6-mile-long grade crossing, with track embedded in the highway section. As such, the Whittier tunnel will be the longest dual-use rail/highway tunnel in the world.

Oldcastle StarTrack panels, cast by Utility Vault Co., are being laid the length of the track. The existing 115-pound rail in 400-foot sticks will be re-used and welded into continuously welded rail. Pandrol clips will hold the rail in place.

It was necessary before beginning rock blasting to survey the existing tunnel profile and its relationship to the needed clearance envelope. To accomplish this, Kiewit used Amberg Profiler instrumentation and software. The Profiler was set up at predetermined, 82-foot increments through the length of the tunnel. From these points it shot a laser in a radius, enabling engineers to collect measurements and determine where the rock was. The information thus gathered was then downloaded to a PC to produce a graphic representation of the tunnel’s interior, making it possible to learn at what alignment the new road/railroad should be placed to minimize excavation for train clearance.

An Atlas Copco Berema H-177 two-boom hydraulic drill jumbo mounted on high-rail gear was then used to drill holes for blasting. The tunnel structure has been judged sound so that only portions of it will require lining. Much of the tunnel will have a wire-mesh membrane to capture any small, loose debris that works itself loose over time.

Witt summarized the massive scope of the work and the many people who are working in cooperation to get this tunnel to the state they all envision by the opening in May 2000. “Because this is such a diverse project, we’ve got Kiewit’s tunneling division, building division, highway division, rail division and electrical division all working on this. They’re designing details as they build them, which is really interesting. This has been a really well-partnered job.”

**Challenges met**

Cooperation is the name of the game for other reasons too. “Dealing with the community, and knowing this is their only access to the world, you’re really limited to how much time you can take that tunnel out,” said Mike Copack, project manager for Kiewit. “We replaced the actual rail, took out the ties, dug the ballast out down to rock and brought in a new road base capped with precast concrete panels. The railroad gives us what are called extended windows, from four-to-six days long. We’re allowed to shut the track down, and we work round-the-clock. The biggest challenge for us has been having to construct this thing while maintaining live rail.”

In the Winter months, the train through the tunnel runs on Tuesdays, Fridays, Saturdays and Sundays, throughout the day. And then there have been the additional, unscheduled trains to consider as well.

“In the Summer,” said Copack, “the trains run all day, every day, so we’re restricted to nine hours at night in which to work.”

Naturally, too, the Alaskan climate made matters more difficult. “Bears Valley is a box canyon, so you get unusual weather patterns,” said Copack. “We get winds up to 100 miles per hour, that can come from any direction. We’ve also gotten 30 feet of snow this Winter. We’ve done most of our work in the Winter months, in temperatures of -40 degrees, with a wind-chill of 80-90 below.”

**Dealing with water**

There was also the sticky problem of water in the tunnel, always a matter of great concern in this sort of work. Of course, in Alaska in Winter, that water is actually ice, and it’s up to three feet thick. Mike Copack explained that workmen “spend a considerable amount of time dealing with ice. We have to keep chipping it back and heating it up to maintain clearance for train traffic. We have seven one-million-BTU heaters that blow hot air in, which warms the tunnel to some extent. But you have to keep opening the doors to keep the air quality acceptable. We’ve had ice 4,000 feet inside the tunnel.

There are over 10 miles of drainage pipe in the tunnel, organized into a two-phase system. Under-drains, made out of four-inch, double-walled, perforated HDPE pipe, are located below the structural material and comprise the sub-drain system.

This network of pipe is held in place with pea gravel and a filter fabric. Water that flows into these pipes will be pumped up to larger pipes which drain the roadway gravitationally. The tunnel will also be partially lined, only at the portals, and behind that lining there will be drainage directed into the larger pipes to be moved out of the tunnel.”

“The lined portions of the tunnel are called ice-control sections,” said Jeff Brown, State of Alaska project engineer for the AAM job. “There are insulated panels that will go into areas where there is water infiltration near the tunnel’s portals. The portals lend themselves to pretty severe icing during the Winter. We hope that the insulated panels will keep the water liquid and introduce it into the drainage system.”

Getting materials barged in through the notoriously mercurial Winter waters of the Gulf of Alaska has also not been easy. But according to Copack, “Getting materials in is the least of our worries. Maintaining rail service throughout the work has been our big concern. Getting what we need requires careful planning by both Kiewit and the Alaska Railroad.”

After opening day in May 2000, Kiewit will operate the tunnel for two years as contracted. Alaska DOT&PF believes that this tunnel, when completed, will provide greater convenience, lower costs to users and improved safety to future travelers, all while providing another gateway to one of Alaska’s most magnificent recreational areas.