

2007 WASHTO Subcommittee on Maintenance  
Alaska Scanning Tour

Proceedings

August 14-18, 2007



**2007 WASHTO Subcommittee on Maintenance  
Alaska Scanning Tour  
Proceedings Document  
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## 2007 WASHTO Subcommittee on Maintenance Alaska Scanning Tour

### Executive Summary

**Preface** – A number of NW states had been going on an annual “Rocky Mountain” maintenance scanning tour for a number of years. In a discussion about the tour at the WASHTO Maintenance Subcommittee meeting in Santa Fe, New Mexico in 2005, it was decided to form a pooled fund study and make it a WASHTO Maintenance Scan.

The First Annual WASHTO Maintenance Scan was held in Colorado in October, 2006. This is a proceedings report of the second annual Western Association of State Highway and Transportation Officials (WASHTO) Maintenance Subcommittee Scanning tour. Frank Richards, State Maintenance Engineer, Alaska Department of Transportation and Public Facilities, was so gracious to volunteer to host the second scanning tour in August, 2007. Alaska is an outstanding example of a true “Department of Transportation”. They have responsibility for most transportation modes, highways, ferries, airports, and ports across the state. They do not have rail.

They are responsible for;

5,603	center line miles of highways, paved and gravel
258	airports
11	vessels that transport people, supplies and vehicles
29	ports/harbors

August 15, 2007, 7:30 am

### Anchorage

**1. Welcome - Frank Richards**, Alaska DOT Frank welcomed everyone to Alaska and had everyone introduce themselves. See attendee list **(Appendix #1)**.

Frank gave a presentation on the state of Alaska and the Alaska DOT **(Appendix #2)**.

**2. Ocie Adams** – Ocie did a presentation on the Alaska Maintenance Management System. **(Appendix #3)**. They picked a Booze, Allen, Hamilton system.

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Vision – Create the most efficient and best maintained transportation system possible through sound maintenance management practices.

Mission – We will continually improve the quality of our states highways, airports and intermodal connections.

We will change our business practices to make the paperwork consistent and easier.

We will carry out this mission by providing leadership, expertise, resources and information.

Project Group

Frank Richards, Project Director

Clarke Milne, Northern Maintenance Engineer

Jack Fullerton, Central Region

Greg Patz, Southern Region

Deployment – Maintenance Yards use all means of computer connectivity including: LAN, WAN, Dialup, DSL, Cable Modem and Satellite.

The System includes Daily Work Reports, Activity Standards (37 measures), Performance Measures with the core of system being the budget and planning system.

- 3. Angela Parsons** - [angela.parsons@alaska.gov](mailto:angela.parsons@alaska.gov) Pavement Management System, Central Region Materials Group. Angela did a presentation on the Alaska Pavement Management System. (**Appendix #4**). They want to make it user friendly and beneficial to all managers. They are trying to map the information as cheap and user friendly as possible. In 2004 they developed pre-fabed PDF maps. From 2005 – 2007 they started using Google Earth, color coded for rutting, ride, Dynatest started collecting photo's and have tied photos into the Google earth mapping system. They will link the information to internal and external web sites. The goal is to use information to perform optimization routines.
- 4. Darryl Jordan**, Knik Arm Bridge and Toll Authority, talked about the proposed construction of a new bridge across the Knik Arm, (**Appendix #5**). Knik arm has a tidal range 39'. The bridge will be about 8180 ft, 6 lanes potential, initial construction 4 lanes striped for 2. They have about ¼ of the funding they need. Wilbur Smith says they can raise 1.5B over 30 years. It is 94 miles around the long way. He expect tolls to be \$3.00. 54% (254,000

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people) of the states population live in the area. There is very little land available to expand Anchorage anywhere except across Knik Arm. Almost all of the freight coming into Alaska comes through the Port of Anchorage.

**Anchorage to Copper Center** – The route selected by Alaska DOT took the group East and North out of Anchorage on the Glenn Highway toward Palmer. Jack Fullerton, the Region Maintenance Director for the Central Alaska Region moderated the first leg of the tour.

The Central region includes the Anchorage and areas West and the Aleutian Islands. The region has:

226 FTE

25 Maintenance Stations

4711 Lane Miles of roads

829 LM of runways

101 Airports

233 Bridges

Annual Budget \$42.9M

235 State buildings (AKDOT Operates and Maintains all state buildings)

Building budget - \$5.1M annual

AKDOT maintains the largest float plane harbor (in the world?) in Anchorage

**Glenn Highway** – The Glenn highway East and then North out of Anchorage is the busiest highway in the state with about 50,000 vehicles per day. Some of the maintenance issues are:

Snow and Ice – Up to 35% of their budget is spent on snow and ice. They mix up to 10% salt into their ice rock for workability issues.

Rutting – They have a serious rutting problem because of studded tires and the softer asphalts that come from the Alaskan crude.

Hike and Bike Trail – AKDOT has constructed and maintains a hike and bike trail along the Glenn highway that is well used.

Along Edmonton Air Force Base, they have built one way moose gates to allow the moose to get off the highway right of way.

There is a truck weigh station N of Anchorage. Truckers that regularly use the Glenn highway can purchase a transponder that is detected by sensors before the station. If they have a good record, they can bypass the weigh station. There is a weigh in motion scale at the station.

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**Knik River bridge anti-icing system** -They have a bridge anti-icing system on the twin 1200 ft. Knik River Bridges. They have a 2500 gallon potassium acetate tank which has to be refilled three times over the winter. Average use is about 7500 gallons per winter at a cost of \$3.79 per gallon. The spray nozzles are in the deck and spray a light mist about 6 inches off the pavement. It is imperceptible to the traveling public and they track it down the bridge. It is very effective. Wayne Lupton explained how Colorado DOT had pretty much banned the use of potassium acetate on concrete structures due to ASR.

**Palmer Maintenance Site** - Toured the facilities; one item of interest was the 30,000 ton salt/sand pile. They are using 10% salt in the sand just to keep the pile from freezing. They are in the process of addressing environmental issues with the salted aggregate and will be developing some remediation plans in the future.

At the Palmer site we visited about what all types of work the maintenance crews perform. Alaska DOT does not own any lay down machines. All overlays are done by contractors.

The DOT employees that plow the roads and air strips are also certified for crash/fire/rescue at the airports.

From Palmer we drove over the Glenn Highway to the Cascade maintenance site for another tour. We drove over the Canyon Creek project that had excellent rock fall protection and retaining walls for supporting the highway.

The department is able to utilize federal funds for their maintenance work. The McCarthy Road project was a \$2 million M&O sponsored maintenance project utilizing federal funds.

They have a large amount of gravel roads and the EPA is giving them a hard time on dust issues. Some of the rural villages are out of compliance with their air quality. Wayne gave the superintendents some information on X-hesion. The main area that they would like to try is North of Fairbanks on the Dalton highway, 285 miles. The product needs to last for at least 1 year. They are currently using Calcium chloride, Permazine, a potato starch that comes in a 5 gallon bucket and EK-35, <http://earthcareconsultants.com/ek35msds.pdf> . They also have numerous dirt/gravel airports where they are using the same material.

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### MatSu Palmer District Station Issues

Winter aggregate – They use about 30,000 tons of ice rock in an average year. They primarily use aggregate because the anti-icing chemicals are not effective in extreme cold temperatures. They have found that when using them, black ice forms and causes many accidents. They would rather rely on plowing and aggregate to provide traction.

State forces are utilized for chip seals, crack sealing, ditch cleaning, guardrail repair, luminaries replacement.

They have about a \$21M program with state forces spending about \$3M and contract about \$18M on milling and overlays

They have an over height detection system made up of lights and horns that alert over height vehicles before a bridge that frequently gets hit. They have found it to be very effective. Even permitted loads that were supposed to detour around the bridge were forgetting to exit and were hitting the bridge. The alarm and light system wakes them up and reminds them to exit.

**Hicks Creek Rehabilitation project** – We toured the Hicks Creek Rehabilitation project. This is a project to rehabilitate a 5 mile section of the Glenn highway and widen it to 4 lanes with 8' shoulders. It included realignment in a few areas and in one area, included a 280' roadway cut. The project cost is \$26M. Some of the issues they have are the requirement to use bio-remediation for slope protection instead of rock riprap. The bio-remediation (The installation of plant material and vegetation) has not proven effective in stopping erosion along flooded embankments.

**N. Region** – At Mile post 118, we moved out of the Central Region and into the North Region. Mike Coffey moderated the next leg of our trip. A few statistics about the N. Region:

65% of the land area in Alaska (bigger than the state of Texas!)

25% of the population

60% of the state's lane miles - 8350 LM

70% of the state's NHS Routes

103 Airports

378 employees (80 seasonal, both summer and winter)



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386 state buildings to maintain.

40 maintenance stations

1335 pieces of major equipment

7 districts within region

\$60M annual budget

\$7M is spent on buildings

\$8-10M/yr FHWA PM projects

\$11M Work done by state employees

\$3-4M spent on "Deferred Maintenance Projects" (Special Maintenance Funds)

\$1.2M on Airport Surface Maintenance

35% of their state force budget is spent on snow and ice control in a typical year.

They have used about 20,000 gallons of mag chloride out of the Valdez maintenance station, but it is not very effective in the extreme cold temperatures.

They frequently get below 0°F in September and don't get above it until April. Some roads are closed to traffic over the winter. The Denali Highway is closed and takes up to three weeks to reopen in the spring.

They do a lot of erosion control in the North region. They have an extensive preventive maintenance program and form large state force crews:

- Reclaiming Crew

- Painting Crew

- Patching Crew.

The McCarthy Road was rehabilitated by state forces at a cost of \$2M.

### Challenges:

90°F+ in the summer, -80°F in the winter

Fairbanks – The third week in October to April is below 0°F.

Fuel cost up to \$8.00 in remote areas.

They do not operate their equipment below -30 degrees F.

Crushed surface rock can cost up to \$300.00/CY in remote areas

Travel to remote areas is costly, chartered flight may cost up to \$6000.

Perma Frost – There are three different kinds of perma frost. (Defined as ground that has remained frozen for over two years.) 85% of Alaska has perma frost.



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Cold Perma frost (Remains below 30 °F) Some roads are built over cold perma frost. It is very stable.

Thaw Stable Perma Frost (Rock or some other stable material that remains stable when it thaws)

Thaw unstable perma frost - Some perma frost thaws and creates major problems such as settlement when it thaws and heaving when it refreezes.  
Ice wedges – Water that gets in a vertical crack, and through cycles of freeze thaw creates a vertical ice wedge.

Ice Lenses – Horizontal layers of ice.

Four main problems with perma frost are Frost heaving, Frost boils, Thaw settlement, & Differential settlement. With the ground frozen there is no place for the water to go except to run off.



Over head delineators give better visibility for blowing snow areas.

### Copper Center to Valdez

**October, 2006 Flooding** – On October 10, 2006 an unusual weather formation forced some upper level moisture out of the Pacific Ocean into Alaska. This “Pineapple Express” produced over 5 inches of rain over a

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twenty-four hour period. The saturated ground couldn't handle the additional loading. The warm rain also melted a lot of the snow pack. Severe flooding resulted.

- Richardson Highway closed from Oct. 10 thru Oct. 20
- Daytime travel only from Oct. 20 thru Oct. 23
- Richardson Highway open for 24-Hour travel Oct. 23
- National Guard helped with security
  - Stations at either end of closed highway
  - Patrolled through closed section
- Keystone Canyon – 24 hour flaggers with pilot car until Nov. 16
- Night closure for abutment repairs
- Allowed Local Residents access

#### Rental Equipment to supplement State Equipment Fleet

- Excavators, Loaders, Side Dumps
- Rented from local contractors
  - Ahtna Construction \$47,000
  - Jim Cline Enterprises \$63,000
  - Regal Enterprises \$10,000

#### Maintenance & Operations Initial Tasks

- Re-establish Road Embankment
  - Initial task - Establish one lane public access
  - Lay Temporary Pavement before winter
  - Temporary Striping
- M&O Cost ~\$520,000

#### Emergency Relief Contractor Responsibilities

- Traffic Control – Both Richardson ER Projects
- River Re-Channelization – Tonsina River and Teikel River
- Re-Establish Drainage – Clear ditch lines and culverts of debris
- Temporary Repair of embankments and placement of Rip-Rap outside of the pavement surface.
- 

#### Tonsina River

- Re-Channelization
- Guide Bank
- Abutment Repair
- Repair Cost ~\$770,000

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### Small Creek / Teikel Bridge South

- Embankment eroded behind sheet piling
- Excavate and re-build approach embankment, replace Rip-Rap, and re-channelize Teikel River
- Combined cost for Small Creek and Teikel Bridge South
  - Great Northwest Inc.   \$200,000
  - M&O                           \$70,000

### Disaster Coordination - other infrastructure damage

- Alyeska Pipeline
  - Small Creek Dike Repair/Pipeline Pad Repairs
- Copper Valley Electric
  - Electrical locates and electric line repair
- GCI
  - Fiber-optic cable locates
  - Multiple cables severed during flood event
  
- Other Issues
  - Tonsina Bridge Damage limited oversize hauls
  - High Mobilization Costs – Remote / Emergency
  - Survey for As-Built drawings for future repairs
- Damage Sites
  - 33 Damaged Sites
  - 15 Contractors
  - Richardson Highway MP 40 – 80 Total Repair Cost
    - M&O                           \$520,000
    - Great Northwest \$3,300,000
  
- Keystone Canyon – Temporary Repair
  - Repair Embankment
  - Repair Rip-Rap
  - Repair Guardrail
  - Temporary Pavement
- Remove Rockslides
- Establish Drainage
  - Clean Ditches
  - Repair Culverts
  - Remove Debris from under Bridges
- Repair Road Embankment
  - Repair Cost: \$1,700,000

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### Flooding Summary

- Richardson Highway MP 0 – MP 40
  - Harris Sand & Gravel: \$2,300,000
- Richardson Highway MP 40 – MP 80
  - Great Northwest Inc.: \$3,300,000
- Edgerton Highway and McCarthy Road
  - Great Northwest Inc.: \$150,000
  - Exclusive Paving Inc.: \$190,000
  - Rowcon Services: \$100,000
  - M&O: \$90,000
- Richardson Highway MP 0 – MP 80
  - M&O: \$520,000
- Copper River Highway
  - M&O \$60,000
  - All Contractors \$770,000
- Other Costs: Stock Requests - Contracts, Materials, Lodging, ect.
  - \$1,000,000
- Northern Region Flood Temporary Repair Cost: ~\$8,400,000
  - Plus 15% Construction Engineering ~\$600,000
- Total Northern Region Flood Cost
  - \$9,000,000
- ▶ The DOT has not been totally reimbursed by FEMA. The EPA is holding up some of the permits and FEMA will not reimburse until all permits are in place. The EPA did not agree with the permits issued by the US Army Corps of Engineers. They have a flood event from October, 2006 that is still not repaired because the EPA will not let them use rip-rap.
- ▶ The DOT was patching sections of highway in November at 0 degrees with it snowing and most of the patches are still holding up.
- ▶ Lessons learned;
  - No stock piled materials, i.e. culverts
  - Communications with everyone involved
  - No portable bridges
  - Very long turn around time on materials

**Alaska Pipeline** – One of the most incredible engineering feats in the world, the Alaska Pipeline was discussed and inspected.

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- The Trans-Alaska Pipeline System was designed and constructed to move oil from the North Slope of Alaska to the northern most ice- free port- Valdez, Alaska.
- Length: 800 miles.
- Diameter: 48 inches.
- The pipeline crosses three mountain ranges and over 800 rivers and streams.
- Cost to build: \$8 billion in 1977, largest privately funded construction project at that time.
- Construction began on March 27, 1975 and was completed on May 31, 1977.
- First oil through the pipeline on June 20, 1977.
- Where thaw-stable soils are present, the pipeline is buried in the conventional manner. In areas of thaw-unstable soils, and where heat from the oil in the pipeline might cause thawing and consequent loss of soil foundation stability, the pipeline is insulated and elevated above ground by means of a unique support system.
  - Above-ground — 420 mi.
  - Conventional below-ground — 376 mi.
  - Refrigerated below-ground — 4 mi.
- *Above-ground* — Specially designed vertical supports were placed in drilled holes or driven into the ground. In warm permafrost and other areas where heat might cause undesirable thawing, the supports contain two each, 2-inch pipes called "heat pipes," containing anhydrous ammonia, which vaporizes below ground, rises and condenses above-ground, removing ground heat whenever the ground temperature exceeds the temperature of the air. Heat is transferred through the walls of the heat pipes to aluminum radiators atop the pipes.

### **Avalanche Control**

Thompson Pass – One of the stops along the route was at the Thompson Pass Maintenance Station. Thompson Pass along the Richardson Highway has an annual snowfall of 46 feet! There are literally hundreds of avalanche paths along the Richardson Highway between Thompson Pass and Valdez.

Alaska DOT at Thompson Pass has the following equipment:  
2 Oshkosh Blowers ( one with a GPS heads up display)

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2 Mack Plow Trucks (one with a GPS heads up display)

2 Graders

2 Loaders

Thompson Pass has a bunk house for employees in the winter.

The Valdez Station has Blowers, Plow Trucks,

Loaders, Bulldozer,

Grader

(plus Airport Equipment)

The GPS heads up display was installed by a research group from the University of Minnesota. <http://www.its.umn.edu/ProgramsLabs/IntelligentVehicles/>

The contact is; Craig Shankwitz, 612-625-0323, 612-508-1434 (cell), 612- 625-8884 (fax), shank004@umn.edu

Hundreds of avalanches occur each winter on the paths threatening the highway. On average about two dozen block the road. There are historical reports of miles of road buried. Damage includes snow poles thrown hundreds of yards at School bus. Last January one avalanche buried 1560' an average of 10' deep (x 40' wide road = 7,000 ten yard dump truck loads).

### **Valdez**

A break in the scan in Valdez provided for an opportunity to go white water rafting or salmon fishing. Several people went on the raft tour, but the majority went silver salmon fishing. The Alaska DOT had employees in the Valdez area volunteer their boats to take the group fishing. The silver salmon were biting and many people got to ship home salmon. See the appendix for photographs.

### **Valdez to Anchorage**

#### **Alaska Marine Highway Ferry**

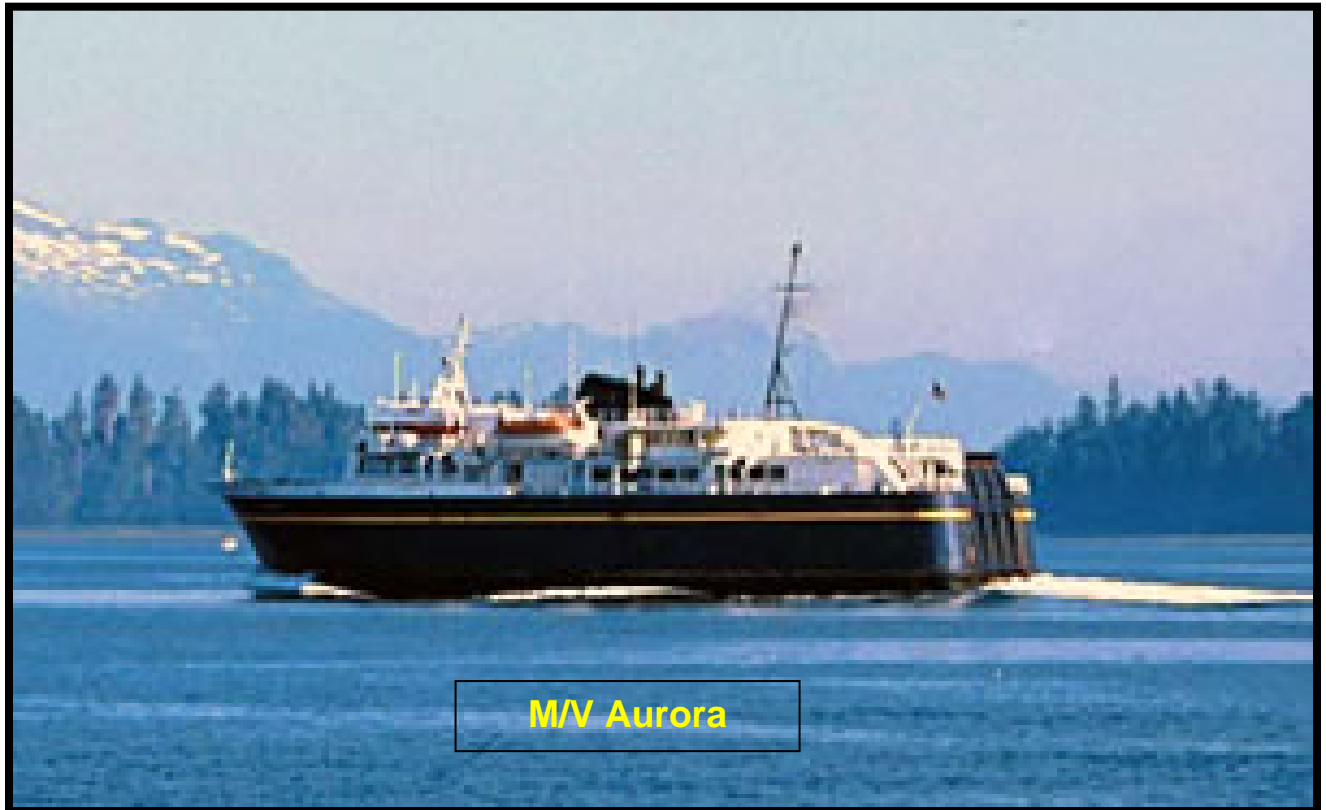
From Valdez, the bus was loaded on the Alaska Marine Highway Ferry "Aurora". The group toured the "bridge" and learned all about the boat and it's operation. The Aurora was built by Peterson Shipbuilders in Sturgeon Bay, Wisconsin, and began service in 1977. The Aurora is 235 feet long, and can transport 300 passengers and 34 vehicles (20' lengths) at a service speed of 14.5 knots. The ship has several vehicular decks, the main deck, the solarium and the bridge. Tours of the engine room were also provided to



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those who wanted it. The trip, from Valdez to Whittier, was about 5 hours in length and provided incredible views of wildlife, mountains and glaciers.



### Whittier Tunnel

Fifty miles southeast of Anchorage near Portage Glacier, the Whittier Tunnel connects the port city of Whittier on Prince William Sound to the Seward Highway and Southcentral Alaska. It opened to vehicle traffic on June 7, 2000 after extensive conversion by the Alaska DOT from a World War II railroad tunnel.

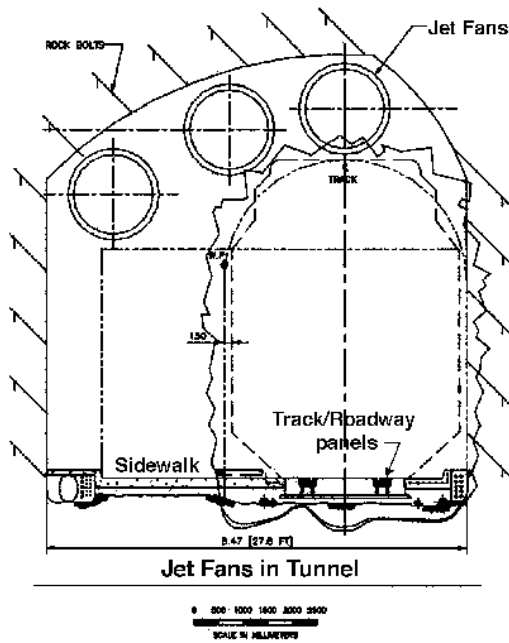
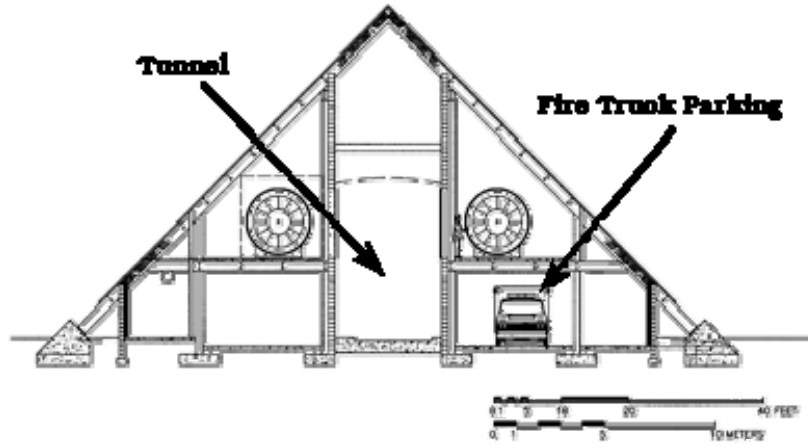
#### **Facts:**

- Longest highway tunnel in North America (13,300' or 2.5 miles).
- Longest combined rail and highway use tunnel in North America.
- One direction of traffic on the hour, the other direction on the half hour with train traffic in-between.
- 120 trains per week in the summer and 30 in the winter
- First U.S. tunnel with jet turbine and portal fan ventilation.
- First computerized regulation of both rail and highway traffic.
- First tunnel designed for -40° F. and 150 mph winds.
- Portal buildings designed to withstand avalanches



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- 8 safe houses for emergencies
- Toll prices range from \$12 to \$300.
- Maintenance & Operations is contracted out



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<b>2007 WASHTO Maintenance Scanning Tour Attendees, Alaska</b>					
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13	Hendrix, Lonnie	Arizona DOT	State Maintenance Engineer	(602)712-7972	<a href="mailto:lhendrix@azdot.gov">lhendrix@azdot.gov</a>
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21	Shultz, Ken	Wyoming DOT	State Maintenance Engineer	(307)777-4458	<a href="mailto:ken.shultz@dot.state.wy.us">ken.shultz@dot.state.wy.us</a>
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24	Webb, Zane	Texas DOT	Director, Maintenance Division	(512)416-3034	<a href="mailto:zwebb@dot.state.tx.us">zwebb@dot.state.tx.us</a>

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