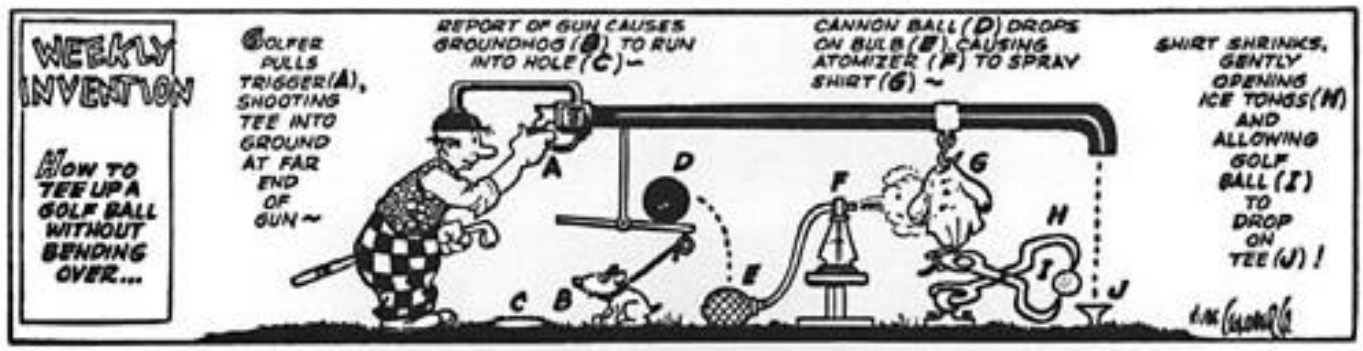
TSB NEWSLETTER

TECHNICAL STANDARDS BRANCH VOLUME 1, ISSUE 2, OCTOBER 2002

I hope you enjoyed our first issue of the TSB newsletter. The feedback we received was good. Keep it coming! There seems to be lots happening in the field of pavements and pavement materials these days - superpave, cold in place, PG ashphalts, AASHTO 2000 design guide, rubber asphalt, white topping etc. You will read in this issue about the rubber asphalt trial sections that the department conducted with some of the other agencies in the province, and in future articles, we will report on the sulphur extended asphalt being tried by the City of St. Albert, as well as the department's new pavement preservation strategy. To make sure that we are kept abreast of what's happening in the rest of the province, and to better co-ordinate our materials research programs, we have arranged to meet with representatives from the Cities of Calgary and Edmonton early next year, in what I hope will an annual "Collaborative Research Forum". The focus of the first forum will be pavements, and we'll keep you posted on what we learned, and what our future plans are, in the next issue of the newsletter. I will be reaching the end of my two-year stint with Technical Standards Branch (TSB) in a couple of months, so these will likely be the last introductory remarks I make in the newsletter. I've really enjoyed working in TSB over the last two years, and urge all of you to continue working with these folks, especially when you have problems. There is a wealth of knowledge here and believe me, they have solutions for (almost) everything!

Tim Hawnt
Editor-In-Chief



"Rube Goldberg is the (R) and (c) of Rube Goldberg Inc." [1]

IN THIS ISSUE

CONSTRUCTION RESEARCH INSTITUTE OF CANADA
Charles Lendzion

"If we knew what we were doing, it wouldn't be called research, would it?" Albert Einstein

The construction boom of the late 1970's revealed that there was an urgent need for better interactions between construction practitioners and researchers. But, it was not until 1997, through a generous private donation to the University of Alberta (UA) that the Construction Research Institute of Canada (CRIC) was born. CRIC's mandate is to act as a focal point and a catalyst for industry driven research that will provide immediate increases in productivity, efficiency and growth in all facets of the construction industry. CRIC works closely with the Construction Management group and the NSERC/Alberta Construction Industry Research Chair in Construction Engineering and Management at the UA. Under the day-to-day direction of Charles Lendzion, CRIC is managed by a Board of Directors drawn from the academia, industry, government and business (Allan Kwan currently represents Alberta Transportation on the Board).

We have done research projects for the department, most notably *"A Preliminary Study of Highway Construction Cost Estimating Practices in Alberta Transportation*", completed in October 2001. This was a study comparing the accuracy of cost estimating before and after outsourcing, and was done at the UA by Matthew Chan, a Master's candidate under the supervision of Dr. Aminah Robinson. Key members from Alberta Transportation supporting the project included Allan Kwan, Jim Harvey and Larry McDonald. The results of this study were of particular interest to the consulting engineering industry as they demonstrated that there were no significant differences in cost estimating practices or accuracy through the transition to the private sector.
Other research projects that are either completed or underway include:
"*GIS as a tool in Highway Construction*" - Concordia University/ Stantec
"*Construction Site Waste Recycling*" - University of Calgary/EllisDon
"*Field Rework – Its Causes and Impacts*" - University of Alberta/Syncrude
"*Change Orders in Construction*"- Concordia University
"*Human Factors in Productivity"* - University of Calgary/Graham/ Ledcor/EllisDon

CRIC publishes its research findings through many different media, including newsletters, web site (http://cric.civil.ualberta.ca/), technical manuals, workshops and an annual forum. Jointly hosted along with the NSERC Chair, the annual forum is a showcase for all the new construction management research initiated throughout the year as well as for updated information on past innovation. We are presently co-sponsoring the first Winter Construction Symposium (November 3-5, 2002 in Edmonton) with Economic Development Edmonton and others. A presentation on the *"Winter Canal Construction Experience in Southern Alberta"* will be made by Upali Hippola, Norman Weimer, Brian Soutar and John Ruttan of Alberta Transportation. If you are interested to attend this conference, please visit this site for more information: http://www.iwcse.com

Contact Charles Lendzion at 780-492-8183 or by clendzion@civil.ualberta.ca.

NSERC stands for Natural Sciences and Engineering Research Council of Canada

BUYING POWER FOR DEPARTMENT LIGHTING
Joe Mah

In 1995, the Alberta Government passed legislation to deregulate the electric and gas power industries in the Province of Alberta. This deregulation process has already begun and will be completed by the end of December 2003.

What is power deregulation? Electrical power business consumers pay three charges: (1) power generation, (2) transmission and distribution, and (3) electrical power supply. Under the previous system, the same Power Company such as TransAlta (TAU) provided all three. Under deregulation, the rates for power transmission and distribution continue to be regulated by the Alberta Energy Utility Board (AEUB); whereas power generation and electric power supply are deregulated. The goal of deregulation is to create competition and offer consumers with choices and lower rates.

Power companies buy "wholesale" power from the provincial power pool or directly from the power generating companies. Then they sell it to consumers (like Alberta Transportation) at marked-up prices.

Consumers will now have the choice to shop around for cheaper rates.

Deregulation prohibits companies that supply electrical power from being involved in the power generation, transmission and distribution business. This avoids a conflict of interest.

In response to this new legislation, the power companies, such as ATCO Electric (AE) and TransAlta Utilities (TAU) have had to reorganize and re-engineer their business process to comply with the regulation. TAU is only interested in keeping its non-regulated power generation business. Subsequently, TAU sold its power supply, transmission and distribution business to Utilicorp Network of Canada (UNCA). UNCA has retained the transmission and distribution business but sold its electric power supply business to EPCOR. ATCO Electric had split their Corporation into different companies: ATCO Power and ATCO Electric. Enmax of Calgary had split into Enmax Power and Enmax Energy.

There is no change for the power transmission and distribution business under the deregulation. UNCA and ATCO Electric have been and remain as the department's two transmission and distribution providers. The franchise areas are: (1) UNCA - southern and central Alberta, and (2) ATCO Electric - northern and eastern of Alberta. The rates charged to the department have been and remain to be regulated by the AEUB. The transmission and distribution providers are not allowed to cross into other franchise areas to do business. However, the power energy providers have no restriction of boundaries and are allowed to sell power anywhere in Alberta.

The ownership of Alberta Transportation highway lights has been a contentious issue for the department as well as for the power companies. Fortunately under the new regulation, the consumers are ultimately responsible for finding their own power provider regardless of who owns the lights. This allows the department to avoid the ownership issue with the power companies and concentrate on shopping for cheaper power prices.

The electric power supply providers for Alberta Transportation's highway lighting system up until April 2002 were: (1) EPCOR - southern and central Alberta, (2) ATCO Energy - northern and eastern Alberta, and (3) Enmax Energy of Calgary - Deer Foot Trail in Calgary. Under the regulation, companies selling power energy are responsible for collecting all charges and forwarding them to the consumers for payment.

In February, 2002, the department put out a request for proposal to supply electrical power for all highway lights. The timing was perfect for the department, as the power rates were substantially lower than last years since the economy was slow and the demand of power was low. This created an opportunity for the department to capture a reasonably low power rate. The contract was awarded to Enmax Energy of Calgary in March, 2002. The department locked in a five-year contract with a fixed rate of 4.87 cents per kilowatt hour (kWh) commencing May 1, 2002 and ending April 30, 2007. Enmax now is the sole power provider for all Alberta Transportation streetlights, traffic lights, beacons, etc. The difference from the current rate is 2.5 cent increase per kWh. The department's annual power consumption is about 20.0 million kWh. The net saving is in the order of $500 thousand as compared with the current market rate. The department had also managed to negotiate an additional 25% more power at the same rate to account for future projects.

HWY. 2 INTELLIGENT TRANSPORTATION SYSTEM PROJECT UPDATE

Allan Lo

Alberta Transportation along with Transport Canada, is co-sponsoring an Intelligent Transportation System (ITS) "blueprint" study for one of the province's busiest portion of rural and urban highway – Highway 2 between Edmonton and Calgary. The study will focus on the 260 km rural four-lane divided freeway plus the urban freeway sections within Calgary (50 km of Deerfoot Trail) and Edmonton (25 km of Anthony Henday Drive, including portions not built). Aside from serving the many intra-provincial trips between the communities along the corridor, Hwy 2 also makes up a significant portion of the CANAMEX (CANada, AMErica, MEXico) North South Trade Corridor that links the province to the US and Mexico. Traffic volumes vary significantly from 120 000 to 200 000 vehicles per day on parts of Deerfoot Trail to less than 30 000 vehicles per day along the less congested rural portions.

It will be a unique Canadian study due to the corridor's length and the many potential rural and urban ITS solutions that will be addressed: Advanced Traveller

Information Systems (ATIS), Advanced Traffic Management Systems (ATMS), Road Weather Information Systems (RWIS), Critical Incident Detection Systems, and Smart Work Zones. In addition, the study will include site-specific determinations of the 70 proposed RWIS stations along our National Highway System, which will constitute Alberta's contributions to the RWIS System for Canada.

The impetus behind the study started with Alberta Transportation's ITS Strategic Plan in 2000 when we identified Hwy 2 as a key test bed corridor for future ITS deployment. After months of internal discussion and the confirmed co-sponsorship of Transport Canada, the call-for-proposal was made in May 2002 and the consultant team led by Delcan (Ontario) was selected in June. The team includes Infrastructure Systems Limited of Edmonton, Earth Tech Canada, Mark Pinet & Associates Limited from Ottawa, and Western Ergonomics Inc. of Calgary. The study is expected to be complete by April 2003 with the major deliverable to be a set of functional plans and drawings including technical specifications for some critical ITS components.

The objectives of the study are to:

- Enhance traffic safety and operations along the Highway 2 corridor;
- Mitigate congestion on the heaviest travelled portions;
- Enhance winter maintenance; and
- Integrate and coordinate our ITS plans with the stakeholders' plans.

A web site containing more detailed information on the project will soon be available. The Hwy 2 study can be found here:
http://www.trans.gov.ab.ca/Content/doctype255/production/itsint01.htm

ALBERTA TRANSPORTATION PRODUCTS LIST
Joe Filice

In 2002, the *Alberta Transportation Products List* (ATPL) was officially adopted, replacing the previous *Recognized Products List and the Approved Products List*.

The ATPL identifies various products that may be used on Alberta Transportation highway/bridge construction and maintenance contracts. This new list is a result of establishment of the New Products Evaluation Committee (NPEC) in 2001, consisting of technical referees, a representative from each of the major process committees (MPMG, CPMG and BMG) and other Twin Atria staff. Technical referees are the department's resource personnel with appropriate expertise in the areas of concern. The NPEC meets every second month to review recommendations made by the technical referees on the product information submitted by vendors and accepts or rejects the product for inclusion on the ATPL .

The ATPL can be accessed through the web at http://www.trans.gov.ab.ca/Content/doctype253/production/PRODUCTINDEX.pdf.

There are essentially two possible streams for any new product considerations in the ATPL process. Products that fall under the **Approved Products** category (Bridge Concrete Sealers, Bridge Coating Systems, Non-Shrink Grout, Portland and Cement Concrete Patching Products and Traffic Paint Formulations) must meet all the required standards and specified testing for the products to be accepted. All other new products *not* on the **Approved Products** listing must go through a staged trial process whereby the products usually begin as **Potential Products** before being used as **Trial Products** which after a period of testing, may be accepted as **Proven Products**. Time is also a consideration during the entire process, as products may become obsolete or outdated which is why there is a maximum three-year window for a Potential Product to move up to Trial Product status before it is de-listed. For department projects, Approved and Proven Products may be used without NPEC consultation whereas Potential and Trial Products will require approval prior to their use.

The new process is explained in
http://www.trans.gov.ab.ca/Content/doctype253/production/Process.pdf

Here is a capsule review of the process:

- The proponent (usually the manufacturer or supplier) will initiate the process by submitting a form for evaluation, along with all the necessary documentation on test or performance data, standards conformance and other relevant information. The Products Submission Form can be found at http://www.trans.gov.ab.ca/Content/doctype253/production/psm1.htm.

- The new product submission is sent to the appropriate technical referees for assessment. The referees will determine if the new product belongs to the Approved listing, or must go through the Proven process and whether or not the product should start at the Potential or Trial stage. The referees may also reject the product based on the documentation submitted and/or other sources of information. Performance criteria and the time period needed for trials will also be determined by the referees.

- The NPEC reviews the referees' input and has the final say regarding the recommendations. An annual review is also carried out by the committee to ensure each product's status is updated, and to remove any products deemed obsolete, not-in-use, or which no longer meet current standards.

- Products that are rejected or removed may not be resubmitted before a minimum two-year moratorium period has elapsed.

Questions concerning the product's latest status or for approval of new products' use on trial projects may be directed to Mr. Terry Willis, P. Eng., Director of Materials and Technical Services at (780) 427-7761 or by fax (780) 422-5426 or by email terry.willis@gov.ab.ca.

MPMG – Maintenance Process Management Group
CPMG – Construction Process Management Group
BMG – Bridge Management Group

GEOTECHNICAL CONSTRAINTS AFFECTING THE ANTHONY HENDAY DRIVE PROJECT

Roger Skirrow

Most people are aware of the department's ongoing construction work to complete the Anthony Henday Drive (AHD) in Edmonton (for more background, visit http://www.trans.gov.ab.ca/CM/Source/Views/Construction/AHD.asp?cn=72). What some people may not be aware of are the many complex and expensive technical challenges that confront the consultants and department staffs. Some of these challenges concern urban designs for noise attenuation and drainage, utility crossings, major bridge designs, and geotechnical hazards.

There are major geotechnical hazards encountered along the AHD and significant design modifications were implemented to mitigate the hazards. Similar to geotechnical issues experienced elsewhere, major river and stream crossings represent the bulk of the obstacles; in this case, they are the North Saskatchewan River (NSR), the Whitemud Creek, the Wedgewood Creek, and the Blackmud Creek. The NSR and the Whitemud crossings will be used to illustrate these difficulties.

NORTH SASKATCHEWAN RIVER CROSSING
West side issues:
The AHD alignment crosses along one edge of an ancient landslide that affects the entire 100 m high valley slope. Investigations determined that the slope is at present only marginally stable (Factor of Safety or FS ~ 1.0). Placement of the 10 m high bridge approach fills will reduce the FS below 1.0. An extensive drilling program found deep-seated weak bedrock layers, confirming the worst case scenario. A complicating factor is that the anticipated direction of slide movement is oriented at 45° to the road alignment, which would result in a combination of compressive and shearing forces acting on the bridge structure.

West side mitigations:
A four-fold approach, costing about $2.6 million in total, will be taken to protect the bridge structure:

- A large berm will be placed along the toe of the valley slope to provide a buttress against large-scale valley wall instabilities. The volume of the berm will be about 250,000 cu.m.

- A 150-m long line of cast-in-place concrete piles, 1.2 to 1.5 m in diameter will be installed to about 20 m depth. The piles will enhance the stability of the slope in the area of the headslope fill.
- Significant regrading of the entire valley slope will be done to improve drainage off the slope and reduce soil loading at the crest of the valley slope.
- The bridge abutment was modified to accommodate significant lateral and transverse abutment seat movements.

East side issues:
The design called for about 18 m of fill to be placed onto a broad river terrace. The silts and clays that make up the upper 10 m of terrace deposits have poor shear strength, drainage and settlement characteristics. Additionally, local Edmonton experience suggested that the bedrock underlying the soft terrace deposits might be pre-sheared due to glacial drag & valley rebound processes. It is considered a strong possibility that the high fill will develop shallow and deep-seated instability with failure surfaces projecting through the terrace deposits, and also through the deeper pre-sheared bedrock materials.

East side mitigations:
Due to the uncertainties associated with soil characterization at this site and the inability to gather good bedrock samples, a full-scale 18 m high instrumented test fill was constructed at the site. Pore pressure, slope indicator and settlement data was gathered and used to optimize the approach fill design. The test fill will eventually become a part of the bridge approach fill. At an estimated cost of $1,3 million the east side approach fill will be completed in a staged construction manner. A 170-m long line of cast-in-place concrete piles, 1.2 to 1.5 m in diameter will be installed to about 20 m. Both the west and east side pile walls were designed using state-of-the-art computer modeling techniques and will be instrumented to provide data to assist in future pile wall designs and will serve in a long-term performance monitoring capacity.

WHITEMUD CREEK CROSSING
Issues:
The AHD alignment crosses the Whitemud Creek at an historic coal mining location. Much of the valley bottom was part of an open-pit coal mine that was abandoned and infilled with a non-homogeneous random mix of mine tailings, overburden spoils and miscellaneous materials. A small portion of the proposed 20 m high embankment fill will extend over this poor load bearing material. The primary concern is the stability of the high embankment fill due to possible settlement and subsidence of mine shafts, rooms and adits. An additional concern is the downdrag effect by the fill on the proposed arch culvert structure.

Mitigations:
An extensive and thorough review of the mine records was performed to delineate the boundaries of the old mine workings. Drilling investigations were then taken to confirm the research findings and to develop appropriate mitigative designs. Estimated at $1.2 million, the mitigation measures developed for the Whitemud crossing consist of:

- Installation of wick drains at 1 to 1.4 m spacing to depths of 6 to 13 m, tied into an extensive granular drainage blanket. The foundation drainage system will accelerate consolidation, and hence strengthening, of the soft foundation soils.
- Installation of 0.6 m diameter stone columns at 1 m spacing to 11 m depth. The columns will strengthen the foundation soil shear resistance within a vulnerable corner of the site where wick drains were not considered sufficient.
- Staged construction aided by geotechnical instrumentation to monitor pore-pressures during construction.
- Vulnerable steeper segments of the embankment slope will be reinforced with geogrid layers. Steep embankment slopes were required to accommodate the creek realignment.
- Placement of two layers of low-friction polyethylene between the concrete arch structure and the surrounding earth fill. The theory is that the low-friction layers will reduce the downdrag, and hence the vertical loading, imposed on the culvert by the settlement of the surrounding fill materials.
- The arch structure will be supported on 34 m long, 1.5 m diameter cast-in-place piles that will be extend 23 m into competent bedrock materials below the surface mine infill deposits.
- Realignment of the creek onto the previously mined out area was also required to accommodate the culvert design.

If you would like more detailed information please contact Roger Skirrow @ 780-427-5578.

HIGHWAY TRAFFIC NOISE
Jim Der

For urban highway planners, traffic noise represents one of the more emotional and challenging issues to deal with the general public because it is an issue that can easily be misunderstood. Alberta Transportation has been somewhat shielded from the noise debate in the past because many highways are located predominately in rural settings. However, as the department takes on more urban roads (Anthony Henday Drive and Deerfoot Trail for instance), the noise issue has come to the forefront.

Traffic noise is a complex phenomenon to understand. It includes tire hiss, exhaust rumble, transmission whine and engine roar - all distinguished by their unique "pitch" characteristic. Moreover, these noise components are always changing in intensity; they fluctuate up and down depending if the vehicle travels toward or away from the observer, or as gears shift up and down. Additionally, traffic noise will change throughout the day, and has varying degrees of impact upon our everyday activities.

Scientists and engineers measure noise in terms of a simple mathematical unit called decibel (dBA). The first part, dB, indicates the noise intensity level (louder ⇔ higher dB value), and A is the weighting scale for the pitch component. The essence of the unit is an attempt to quantify how humans hear and respond to noise.

A one-decibel change in noise is about the smallest change we can detect under ideal laboratory conditions. Outside the laboratory, a change of approximately three decibels is just discernable without using a meter. Generally a change of at least five decibels is required to cause significant change in the noise level in a community. A ten-decibel change is large and is generally regarded as a two-to-one change in loudness, independent of the initial noise level. In other words a jump from 40 to 50 decibels will sound like doubling the loudness, as will a jump from 70 to 80 decibels. The following table outlines typical noise levels generated by various machines at various distances.

To relate noise levels to traffic volumes, a three-decibel increase would require a doubling of traffic volumes. For example, if the noise level to an observer is 50 dBA for 5,000 vehicles per day (vpd) at a distance of 200 m, the traffic volume would have to increase to 10,000 vpd in order to the increase level to 53 dBA. Another way for the noise level to increase to 53 dBA is if the distance to the observer is reduced by one half to 100 m. These values have obvious planning implications when we design new highway corridors, upgrade existing roads or if new land developments are permitted adjacent to existing highways.

For transportation and other uses, another unit is needed to describe noise over a time period and to condense the many characteristics of noise into a manageable form. Noise levels are firstly condensed into a basic unit for each incident, read directly into a sound level meter, then all readings are condensed into an hourly unit and finally the hourly units are condensed into a daily unit. The noise is then expressed in a unit call $Leq_{(24)}$, which is the average of the noise energy during a 24 hour period. Combining the first and the second part, "dBA $Leq_{(24)}$" becomes the de facto standard expression in many transportation noise studies.

Alberta Transportation has recently developed draft guidelines for the conditions needed to trigger the implementation of noise attenuation devices (noise berms or walls) through urban areas. The guideline states that Alberta Transportation will use a noise level of 65 dBA $Leq_{(24)}$ measured two metres inside the property line as a threshold to consider noise mitigation measures. Although we have not built any attenuating berms or walls, we have cost shared the construction of noise walls within some cities. Over time, it is anticipated that the department will adopt these guidelines into a formal policy.

Noise mitigation measures are very expensive. For example a linear metre of a five-metre high wall will cost about the same as it is to construct a linear metre of two-lane highway (typically about $700/m). It then becomes a great balancing act to juggle the capital road-building budget needs with the noise berm construction needs.

TYPICAL NOISE LEVELS

DBA L_{eq}*	Fluctuating Noises
120	Rock Band
110	
100	Inside Subway Train (New York City)
90	
	Noisy Urban Daytime
80	Shouting at 1m (3 ft)
70	
	Normal Speech at 1m (3 ft)
60	Quiet Urban Daytime
50	Quiet Urban Nighttime
40	
	Quiet Rural Nighttime
30	
20	
10	
0	

DBA	Non-Fluctuating Noises*
120	
110	Jet Aircraft at 300m (1000 ft)
100	Full Throttle Diesel Truck at 6m (20 ft)
90	Full Throttle Diesel Truck at 15m (50 ft)
	Freeway Diesel Truck at 15m (50 ft), 95 km/h (60 mph)
80	Medium Truck at 6m (20 ft), 50 km/h (30 mph)
	Food Blender at 1m (3 ft)
70	Auto at 6 m (20 ft), 50 km/h (30 mph)
	Dishwasher at 1m (3 ft)
60	Auto at 6m (20 ft), 25 km/h (15 mph)
	Airconditioner (indoors) at 1.5m (5 ft)
50	Dishwasher (next room)
40	Refrigerator at 1m (3 ft)
30	Quiet Rural Bedroom at Night
	Concert Hall Background
20	
	Broadcasting Studio
10	
	Threshold of Hearing
0	

* Moving source noise levels are for the closest points of approach

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ASPHALT RUBBER PAVEMENT
Marta Juhasz

In July, trial sections of asphalt rubber pavement (ARP) were constructed on Hwy 630:02, and in Edmonton, Calgary, and Strathcona County.

This was not Alberta Transportation's first rubber ACP project. In the 80s the "dry" process (rubber and aggregate combined prior to addition of asphalt) was used on Highway 47 and rubberized seal coats were tried. Performance did not meet expectations.

Why try again? In the last ten years, new technology has been developed, some success has been achieved in Arizona and California, and the patent on the "wet" process (crumb rubber melted into hot asphalt prior to mixing with aggregate) expired.

An American contractor with experience in asphalt rubber production was retained to blend the crumb rubber and asphalt cement at the mix plant. E Construction completed Edmonton area projects while the City of Calgary used their own crews.

The Hwy 630 trial was an 80 mm ARP overlay from km 27.6 to 28.1 and a 40 mm overlay from km 28.1 to 28.6. The ARP mix design called for a **9.8 %** binder content**.** The binder consisted of 20% 2 mm-crumb rubber and 80% asphalt cement. The coarse gap-graded aggregate

had 75% passing the 10 mm and 15% passing 2.5 mm sieve. Conventional Type 5 ACP control sections with an asphalt content of about 5.5% were constructed from km 26.6 to 27.6.

Construction went smoothly despite a lot of smoke due to high mixing (165°C) and lay down (145°C) temperatures. Wet (limewater) steel drum rollers compacted the mix at 120°C. The pavement was sprayed with limewater prior to traffic to prevent car tires from sticking to and marking the surface.

The higher asphalt content and crumb rubber significantly increases the cost of rubber ACP: therefore, it will be imperative to quantify benefits and review life cycle costs. Over the next several years, Alberta Transportation, the University of Alberta and Arizona State will monitor, analyze, evaluate, and compare the performance and cost effectiveness of ARP to conventional ACP.

The expected benefits of ARP are a quieter ride, improved rutting resistance, and less cracking in pavements. While some characteristics have been clearly demonstrated in the US, time will tell whether they are applicable to Alberta's environment.

This trial culminated two years of planning by the Tire Recycling Manufacturer's Association, Alberta Road Builders & Heavy Construction Association, Cities of Edmonton and Calgary, Strathcona County, and the Department. EBA Engineering provided technical support. For more information, please contact Marta Juhasz @ 780 415 0691.

QUIRKS AND GLITCHES

Hey, have you heard about the one where a doctor, an engineer (civil no less) and an IT manager arguing about who has the claim to the oldest profession in the world?

The doctor pointed out that "In the Bible, it says God created Eve by removing a rib from Adam. Clearly, this represented the first surgery ever performed on a human being and my profession is the oldest in the world."

"Ah…but," the excited civil engineer pounced on the argument, "the Bible also states that God created order of heavens and Earth from out of chaos, well before Adam and Eve's time. This is irrefutably the first engineering application known to man. Therefore, my dear colleague, your surmise is inaccurate and my profession should be considered the oldest."

Just then, the IT manager looked smugly at both his friends, folding his arms and leaning back on the chair, said, "Now, *who* do you think created that chaos in the first place?"

Know any good (and clean) jokes about engineers, technology and/or transportation in general, or, have interesting and unusual pictures that would be appropriate here, we love to hear from you!

Possible upcoming articles next issue:

- Waterborne Paints on Trial
- High Resolution Magnetic Imaging for Prospecting Experiment
- Wildlife Countermeasures

If you have an interesting technical article or know of an interesting project that you like to share, we will be happy to hear about your ideas and newsletter-related comments.

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