TSB NEWSLETTER

TECHNICAL STANDARDS BRANCH VOLUME 6, ISSUE 1, May 2007

Welcome to the spring edition of the Alberta Infrastructure and Transportation (Inftra) Technical Standards Branch (TSB) Newsletter.

The newsletter is one of many vehicles used by TSB to keep you informed about branch activities. Hopefully, the articles fill in some of the gaps in the continual information exchange and technology transfer process.

Some of the articles in this edition may be technical in nature (but not "very" technical), current, and hopefully of sufficient length to keep you in the know with respect to recent trial projects, new materials, and advances in planning, design, construction, and maintenance techniques. The material in this newsletter is not designed to replace detailed reports produced at the end of trial projects, materials testing information, and branch research efforts.

TSB hopes that this newsletter keeps you up to speed and provides you with information to be able to locate detailed reports and names of people who you should feel free to contact for additional information.

So enjoy the articles.

Allan Kwan
Editor-In-Chief

Roger Skirrow
Ron Stoski
Leona Gardecki
Associate Editors

"Nothing happens
unless
YOU
make
it happen."

Peter Koestenbaum, Fast Company

IN THIS ISSUE

Long Term Pavement Performance Program

Ron Stoski
Geotechnical and Materials

Understanding "why" some pavements perform better than others is the key to building and maintaining cost-effective highways. That is why the Long Term Pavement Performance (LTPP) program was initiated in 1987, as part of the Strategic Highway Research Program (SHRP) to evaluate the in service performance of pavement test sections. One of the targets was long term performance improvement.

The LTPP program started with 2400 test sections in North America and was divided in three main categories: General Pavement Studies (GPS), Specific Pavement Studies (SPS), and Seasonal Monitoring Program (SMP).

This article focuses on experiments which dealt with the Rehabilitation of Asphalt Concrete Pavements (SPS-5) and the long term performance of asphalt concrete rehabilitation techniques. The SPS-5 experimental factors included: condition of pavement before overlay (structural and functional), loading conditions (including traffic and environment), and eight different rehabilitation treatment applications. The SPS-5 experiment for each highway consisted of nine test sections (152.5m each) subdivided as follows: four asphalt concrete pavement rehabilitation sections with milling prior to overlay, four sections without milling, and one control section left as is.

Each section had common numbers to identify section characteristics as outlined in Table 1.

Number	Description
501	Control (no treatment)
502	51 mm overlay, recycled mix
503	127 mm overlay, recycled mix
504	127 mm overlay, virgin mix
505	51 mm overlay, virgin mix
506	51 mm overlay, virgin mix, with milling
507	127 mm overlay, virgin mix, with milling
508	127 mm overlay, recycled mix, with milling
509	51 mm overlay, recycled mix, with milling

Table 1: General sections characteristics

As part of the experimental design, a control section to which treatments were not applied was marked out and left as is to use as a comparison with rehabilitated test sections. It was also specified that recycled mixtures contain 30% Recycled Asphalt Pavement (RAP) and that RAP material be material milled from the intensive surface preparation sections where 51 mm of the surface was milled off. Patching was also done where needed to rectify localized failures.

Besides the general data, more specific data related to the specific sections was added to the experiment in order to complete the LTPP database.

The US Federal Highways Department (FHWA) awarded five year contracts to regional consulting firms to monitor test sections and to collect data and inventory related to pavement performance: traffic, material testing, climate, maintenance, and rehabilitation. The data was also entered into the LTPP database.

This database enables people to extract data related to the SPS-5 experiment and to evaluate the performance of the pavement in each section, by comparing the time evolution of some indicators of rehabilitated sections with the control (not rehabilitated) section.

The general and specific database for the LTPP program is called DataPave and is available on line at http://www.ltpp-products.com/ . Data can be extracted to excel spreadsheets, analyzed, plotted, and processed using statistical programs. Moreover, the potential service life of pavements can be estimated based on available data and traffic projections.

General Data for Alberta SPS 5 Section

As an example, general geographic data for Alberta Highway 16:06, as extracted from LTPP DataPave, is in imperial units as shown in Table 2:

Data	Value	Observations
SHRP ID	0500	from 0501 to 0509
STATE CODE	81	Alberta
COLLECT DATE	1995	assigned to LTPP at 1/1/1990
FUNCTIONAL CLASS	1	Rural Principal Arterial – Interstate
LATITUDE DEG	53	
LATITUDE MIN	35	
LATITUDE SEC	18.6	
LONGITUDE DEG	116	
LONGITUDE MIN	1	
LONGITUDE SEC	9.5	
LOCATION INFO	3.5 km WEST OF JCT. HWY 32 (APPROX. 36 km EAST OF EDSON)	
ELEVATION	2900	Feet
MILEPOINT	38.6	
ROUTE NO	16	
SECTION LENGTH	500	Feet
DIRECTION TRAVEL	2	West Bound Truck Lane

Table 2 General geographic data - Alberta SPS-5 section

The history of LTPP in Alberta and some performance data for one Alberta Test Section is in the next article.

Long Term Pavement Performance

- Alberta Contribution -

Ron Stoski
Geotechnical and Materials

In the early and mid 1990's Alberta contributed to the Long Term Pavement Performance experiment by constructing five General Pavement Studies (GPS) and three Specific Pavement Studies (SPS) test sections:

GPS 1	Highways	16:28 and 22x:04
GPS 2	Highways	1:04 and 21:14
GPS 6B	Highway	19:10
SPS 5	Highway	16:06
SPS 9	Highway	2:12 and 3:08

If you are driving to Jasper on Hwy 16:06, you will drive over one of two remaining key "SPS 5 survivors" in the western part of the LTPP program. You will drive over the SPS 5 sections as you bounce over nine 150 meter test sections in the west bound truck lane located about 2 minutes west of Junction Highway 32. Each section should be identified with white letters on a blue back-ground sign as shown in the right upper corner of Photo 1. A larger version of the road test sign is shown on Page 1.

Photo 1. Blue Background Sign on Shoulder – SHRP Road Test

A weigh in motion scale (WIM) on the Highway 16:06 test section will also record your vehicle speed, the exact time you crossed the scale, and the weight of each axle as traffic loading and weather conditions are important factors of the SPS experiment.

Your experienced eyes and your vehicle should be able to evaluate and confirm the good and bad performance trends of the nine SPS-5 test sections (even at 130 km/hr). You should be able to observe that some sections are performing very well after 17 years and some are falling apart. You may also notice that two sections were overlaid in 2006 because they reached the end of their service life.

Photo 2 below summarizes a typical good performer.

Photo 2 LTPP **Section 04**
127 mm overlay Hwy 16:06 June 2006

Photo 3 below shows why two poor performing test sections required a thin lift overlay in the fall of 2006.

Photo 3 LTPP **Section 02**
51 mm RACP overlay Hwy 16:06 June 2006

The Regional Contractor responsible for monitoring the Western part of the LTPP program which includes Alberta, British Columbia, Saskatchewan, Alaska, Hawaii, and other western states is Nichols Consulting Engineers Chtd. (NCE) from Reno, Nevada. NCE, as part of the Seasonal Monitoring Program, has gathered data from seven Alberta SHRP LTPP sites for more than 15 years.

Data from the seasonal monitoring program has already come up with valuable information regarding the impact of moisture and temperature variations on pavement performance. These performance trends are available and will be of use for pavement designers for many years.

Many of the LTPP sections including a few in Alberta have approached the end of their service life and are being closed out and will no longer be an active part of the season monitoring program.

Highway 16:06 SPS 5 Section Needed Repair

During the summer of 2004, Hwy 16:06 test sections were distress surveyed before they were spray patched, skin patched, and crack filled in an attempt to preserve the intent of the original experiment. Preservations were not successful as a 2005 field inspection and distress survey by NCE and Inftra confirmed what Edson regional staff knew: two Hwy 16:06 test sections need immediate help.

Telephone discussions between NCE and Inftra and the Edson Office confirmed that two of the desperate test sections need a thin lift overlay as soon as possible. Discussions with the region confirmed that a paving contract was to be awarded in the vicinity. Arrangements were made to include a thin lift overlay on the two test sections as part of the 2006 paving contract.

NCE and the FHWA decided to schedule extensive materials sampling and testing activities before the 2006 overlay. NCE reviewed 15 years of data and provided a manual that outlined materials sampling locations and defined testing requirements before the overlay.

During June 2006, NCE gathered the close out data and successfully completed the following work on the section:

- Distress Survey
- Dipstick readings
- Profile at 80 km/hour
- Sampling and Testing of Materials
- Dynamic Cone Penetrometre Readings
- Skid Resistance
- Photo log

EXH Engineering Services Ltd. was hired to carry out the coring and drilling operation. Both consultants, as a team, successfully obtained 70 cores of 102mm diameter, 18 cores of 305mm diameter, 800 kg of granular base course and 800 kg of sub grade under what would be described as typical mountain weather – showers, sun, rain, and more showers. All samples and materials were bagged, tagged, and hauled to Reno, Nevada by NCE.

Photo 4 Sample Locations: 51 mm RACP Overlay SHRP Section 09 Hwy 16:06 June 2006

Photo 5 Coring 305mm diameter and Base Course Drill

The asphalt concrete pavement cores, base course, and sub grade soil will be tested and all data will be added to a materials data bank. The valuable information collected through forensic investigations will help to determine why each particular section performed as it did. The frame-work for conducting investigations is now complete.

Currently, LTPP Data is stored in the largest pavement performance data bank in the world. It is called the National Information Management System (NIMS) and data is statistically tested for accuracy before it is uploaded by the Regional Contractors to DataPave.

Most monitoring data is available on the internet on the latest edition of DataPave. http://www.ltpp-products.com Data can be extracted, analyzed, and used for improving pavement design technology and viability.

Chart 1 shows the progression of the International Roughness Index (IRI), as extracted from DataPave, for a thin lift and thick lift section of Hwy 16:06.

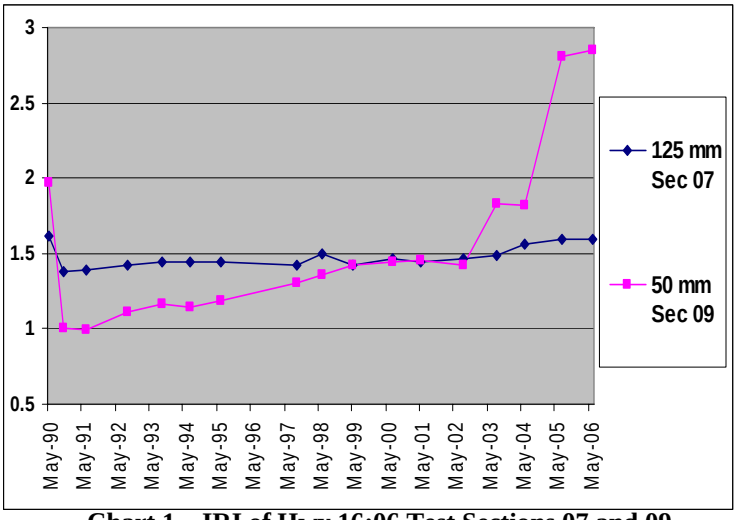


Chart 1 – IRI of Hwy 16:06 Test Sections 07 and 09

DataPave can also be used to come up with performance trends and charts for longitudinal cracking, fatigue cracking, transverse cracking, falling weight deflectometer readings, and pavement rutting.

Last, but not least, and as always and everywhere, funding is a major concern. Discussions between LTPP contactors and state and provincial coordinators are ongoing. At this stage, only high priority projects are scheduled for future monitoring as funding for data collection and pursuing investigations and analysis is limited. In many cases future monitoring will consist of close out sampling and testing.

For additional information please contact:
Ron Stoski
Phone: 780 415 1020
email: ron.stoski@gov.ab.ca

2007 Guideline for Routine Livestock Crossings

Corinna Mulyk
Highway Operations

In response to concerns that the existing permit process for handling livestock crossings of provincial highways was too cumbersome, the department has updated its guideline for these special events.

The guideline for livestock/trail drive and crossing special events now differentiates between routine livestock crossing events for the purposes of grazing, and events for fundraising, demonstrative, or other purposes.

To address concerns with the event permit process, the guideline for livestock/trail drives and crossings was amended to reduce the inconvenience of obtaining a permit for routine cattle crossings. Farmers may now obtain a single permit to cover multiple routine livestock crossing events at the same location(s) for up to 5 years. After 5 years, or anytime there is a change to the approved event conditions (i.e., change in crossing location, herd size, traffic control, etc.), a new permit must be obtained. When a permit application is received, the department will work with the individual applying to establish an appropriate traffic accommodation strategy for the event(s).

Requiring farmers to obtain only one permit for multiple events will make it more convenient and a less burdensome process for farmers to obtain special event permits for routine livestock movements, particularly since farmers do not need to specify the date and time of the event.

By continuing to require farmers to get the initial permit, the department can review the location and the farmer's proposed traffic accommodation/traffic control to ensure that they are adequate for the planned event(s). Through this review, the department can maintain control over events on the highways and uphold safety. In addition, showing that all of the required conditions were considered and followed by the herder lessens their liability exposure if injuries should occur as a result of the event.

For additional information please contact:
Corinna Mulyk
Phone: 780 415 9961
email: Corinna.Mulyk@gov.ab.ca

Value of Co-op Engineering

Titilope Sonuga

2006/07 Work Experience

My father worked as a civil engineer for many years, so growing up I had the opportunity to go with him to work on many occasions, and this sparked my interest in being an engineer. Though I had no idea what went into building a bridge or designing a road, it was definitely something I wanted to be a part of. My strengths have always been in the sciences, so upon graduation from high school, I decided to take a year of sciences before going into the civil engineering department for my second year.

Enrolling in the coop program was an obvious choice for me. I knew that it would be important for me to gain engineering experience while getting my education in order to ease my transition into the industry. I am a very visual learner, so I knew that gaining experience would also aid my learning at school. My main interest has been to work in transportation engineering, particularly the roadways aspect. I have had this in the back of my mind when selecting coop jobs, to ensure that the experience I gain can be directly applied to my future career.

The coop program gives you the opportunity to work directly in your field of interest. As a student you get the rare opportunity of a preview into the work force before you graduate. I have been able to directly apply some of the things I learned on my work terms to various classes at school. Having experience has allowed me to view problem solving in a more practical way, and this has definitely impacted my education positively.

I have learned so much from all the engineers that I have had the pleasure of working with all the way down to laborers working out in the field. Having the opportunity to work in several different work environments has allowed me to come in contact with a lot of great people and decide what area I would like to work in when I graduate. I can safely say that the most valuable learning experiences that I have had in four years of engineering education, has come from my coop work terms.

Value of Co-op Engineering

Megan Mallet-Paret

2006/07 Work Experience

Being that I was good at math and the physical sciences in high school, engineering seemed like the most obvious choice for a university program. I come from a family of electrical and mechanical engineers, and therefore I generally knew what to expect from the program, but it took me until the end of first year engineering to decide which discipline of engineering I wanted to pursue. I chose civil engineering, not because I knew I loved it, but simple by the process of elimination. I disliked electricity, chemistry, and anything involving gears. I wanted a job where I would work with a variety of people and I could live in an urban area. This made civil engineering the most logical choice.

I chose civil co-op because the co-op department makes it easy for students to be integrated into the engineering field and helps reduce the financial burden of completing the engineering degree. Through the co-op program, I have become more familiar with construction techniques, piling, surveying, landslides, erosion and many other areas that have prepared me to be an engineer. It has made me aware of various types of working environments, employers, and engineering positions that I would never have been aware of otherwise. I have made dozens of professional connections during my work and have been familiarized with many ethical issues facing engineers.

Since the engineering program at the University of Alberta is extremely theoretical, having working knowledge of the principals we are learning about makes visualizing problems much easier. The co-op program has helped me gain some of this working knowledge, and has thus helped improved my understanding of the in class work and it's applications to the real world. As a result of co-op, I can use and retain more of the information I learn in school. The Civil Engineering co-op has therefore prepared me to be a well rounded engineer with a realistic understanding of the engineering field.

Technology Transfer //\\ Technical Training T4

Ron Stoski - Geotechnical and Materials

Technical training and upgrading has been identified as an important way to improve job skills and to keep to date in our fields. The following training courses are being set up for the first part of the fiscal year.

TSB Training Courses ……..Calendar of Events
April 2007 ……. December 2007

BIM Class B Bridge Inspection Course - Edmonton
April 23 - 27 and September 10 - 15, 2007
BIM Field Training Course–Edmonton-October 2-4, 2007

Introduction to Bridges Seminar (MCI's, FST'S)
May - June 2007
Highway Geometric Design May - June 2007
Regional Level AVLS – RWIS
September – October 2007
Roadside Design Course
Network Expansion Support System (NESS)
Access Management Guidelines Training (CEA)
Access Management Guidelines Training (for Construction and Operations)
Traffic Impact Assessment Training and Prequalification
Environmental Impact Assessments
Access Management Training (Calgary)
Streambank and Hillside Bioengineering Workshop (Fort MacLeod)

Summary of 2006/07 Technical Training

The following courses were delivered by TSB ***during the 2006/07 fiscal year:***

Bridge Section
BIM Class B Bridge Inspection Course - Edmonton - April 24 to 28, 2006
Bridge Planning GIS Tool Seminar - Edmonton - May 12, 2006
Bridge Planning GIS Tool Seminar - Calgary - May 17, 2006
BIM Class A Bridge Inspection Course - Edmonton - June 5 to 9, 2006
BIM Class B Bridge Inspection Course - Edmonton - September 11 to 15, 2006
BIM Field Training Program - Edmonton - October 11 to 13, 2006

EIM Livelink Engineering Drawings Hands-On Training for Regional Staff - Barrhead, Peace River, Lethbridge, Grande Prairie, and Red Deer - February/March 2007

Environmental Section - Environmental training for water management staff and consultants
EMS Training for regional staff and consultants
Workshop on ECO Plan revision at Tri-Party conference
Best Management Practices for salt management
ECO Plan framework training (Calgary and Edmonton, Tri-party sessions)

Geotechnical and Material Section
Bio-engineering and Bio-technical Streambank and Stabilization Techniques Workshop: One classroom day Hinton Training Centre and two field days Sept. 2006
Erosion and Sediment Control Regional Workshops (4 one day workshops)
Coordination and Delivery of Training

Highway Operations - RWIS - September 2006

Lethbridge	Okotoks	Hanna Red Deer
Edmonton	Edson	Vermillion
Athabasca	Peace River	Grande Prairie

Highway and Roadside Planning

Air Quality Management	November 30, 2006
Roundabout Design Workshop	November 15-17, 2006
Access Management Course:	January 30, 2007
	January 31, 2007

Surfacing and Aggregates Section
Pavement Preservation – Edmonton - April 2006
Project Management for Grading Base Paving Projects (with C-TEP)
Pavement Design Construction Management for Project Administrators – Feb 26–Mar 01

Computer Related
Network Expansion Support System **(NESS)**

Peace River	Barrhead	Red Deer	
Lethbridge	AMEC staff	Calgary	January 2007
Twin Atria	February 2007		

Technical training course calendars are updated and posted under Technical Resources, Technology Transfer, Courses Seminars and Events:

For additional information and/or if you have suggestions please contact:

Ron Stoski
Phone: 780 415 1020
email: ron.stoski@gov.ab.ca

Center for Transportation Engineering and Planning

Roger Skirrow and Ron Stoski

The Center for Transportation Engineering and Planning (C-TEP) has recruited Neil Little as Executive Director.

Neil has worked with Roger Skirrow (Alberta Inftra) to set up and offer the following courses:

Bridge Construction Inspection
March 26-28, 2007 Calgary
Project Management for Grading, Base & Paving Projects
April 2 - 4, 2007 Edmonton
Status of the SuperPave System
April 12, 2007 Sheraton Cavalier Hotel, Calgary
Acoustics Seminar
April 23 - 24, 2007 Calgary
April 30 - May 1 Edmonton

C-TEP will be setting up additional training courses and seminars and reoffering the above as needs are identified.

For additional information please go to the C-TEP website at http://www.c-tep.com/
or phone:

Roger Skirrow at 780 427 5578
or Ron Stoski at 780 415 1020

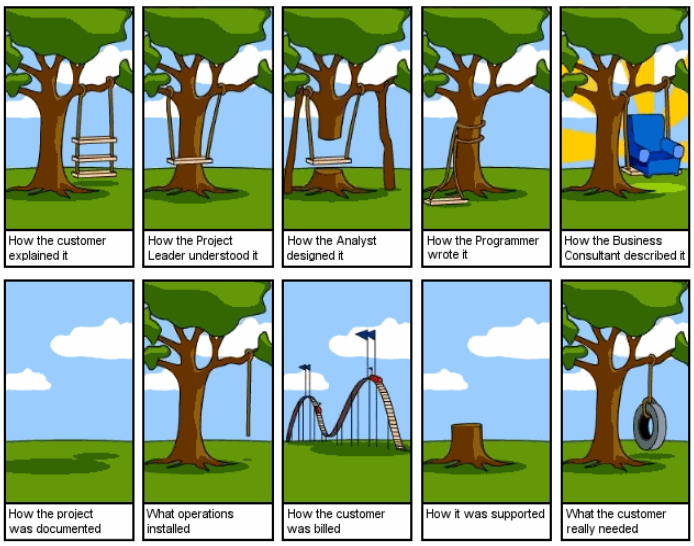
ToDay ouR VaLue AdDeD is in
lEARNing and
pLaNning

"Even in …engineering,
about 15% of one's …
success
is due to one's technical knowledge
and about ***85%***
is due to skill in human engineering,
to personality, and the ability to
… (_____) …people."

-Dale Carnegie-

Technical Reflections

- Innovation and Engineering -



- Self Study Projects -

----SAFETY ----
YOU
Can Make It
Happen

Previous editions can be viewed at TSB newsletters

If you would like to forward an article for publication in this newsletter or have something to share please contact:

Leona Gardecki	**(780) 415 1006**
Roger Skirrow	**(780) 427 5578**
Ron Stoski or	**(780) 415 1020**
Allan Kwan	**(780) 427 8990**