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TSB Newsletter

Government of Alberta ■ Transportation

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Editor's Remarks

The December Newsletter contains articles on:

Safer Winter Highways Media Campaign
McGregor Dam Slope Re-Vegetation,
Bio-Engineering Work Shop,
Geo-Edmonton 08 and
Retention of Technical Expertise.

All of us in Technical Standards Branch look forward to working with all department employees and all stake holders in the New Year.

This newsletter also contains wishes for a safe and Happy Holiday Season.

May the coming year be
filled with good health,
prosperity, and peace
for you
and your friends and loved ones.

Editor-in-Chief

Moh Lali

Tricia Hurry *Roger Skirrow*
Bill Kenny *Ron Stoski*
Associate Editors

IN THIS ISSUE

Safer Winter Highways Media Campaign

Sharla Griffiths, P. Eng
Highway Operations

Alberta Transportation (AT) and the maintenance contractors (as part of the Alberta Roadbuilders and Heavy Construction Association (ARHCA)) launched the Safer Winter Highways Media Campaign in the winter of 2005/06. The 2008/09 winter marks the fourth year of the campaign. The budget for the first three years of the campaign was $200,000 each year (split 75% AT – 25% ARHCA). For 2008/09 the budget was increased 30% to help offset the cost of inflation. The same media consultants and branding were used each year which maximized funds through a continuity of players and themes.

The campaign has three key messages for the public:

Figure One: Campaign Message

1. **Careful Driving + 600 Plows = Safer Winter Highways**

2. **Drive according to road conditions and slow down.**

3. **Allow time and space** for snowplow operators to do their jobs.

The objectives of the campaign are to:

- raise awareness of winter highway maintenance activities and standards
- improve the public's understanding of challenges involved in winter highway maintenance in an effort to build reasonable expectations
- give motorists the tools they need to make safer winter driving decisions
- improve attitudes toward hundreds of Albertans responsible for winter highway maintenance by giving them a human face
- improve attitudes of drivers to drive responsibly and safely in winter conditions

This year, the key messages are being conveyed and the objectives are being met through a host of avenues.

First is the multimedia campaign: kick off at the Alberta Legislature Building with Minister Luke Ouellette (see Figure Two), billboards, radio public service announcements and interviews, web sites (AT and Alberta Motor Association/AMA), newspaper articles (information articles written by our media consultants and articles written by reporters who "ride along" in a plow truck during plowing operations), posters, note pads, fact sheets, and MLA tool kits.

Second is through *Show Off the Plow!* events hosted by media consultants, local AT representatives, ARHCA media relations, and local maintenance contractors. They are geared to Grade 2 students (who are learning about different jobs in their communities), Grade 10/11 students (new drivers), and community events (to show that snow plows and their operators provide a service to their communities similar to their local RMCP, paramedics, and fire fighters). Printed material is available for all events.

Third is through media training boot camps for AT and maintenance contractor staff. These sessions, hosted by our media consultants, educate field staff about campaign key messages and equip them to deal with media and to *Show off the Plows!* participants.

Figure Two: Alberta Transportation Minister Luke Ouellette in a snow plow at the Kick Off held at the Alberta Legislature on November 3, 2008

Information about the 2008/09 Safer Winter Highways Campaign can be found on the Alberta Transportation website: http://www.transportation.alberta.ca/3223.htm

or by contacting Sharla Griffiths
by email: sharla.griffiths@gov.ab.ca
or phone: 780 415 1057

McGregor Reservoir South Dam
West Slope Re-vegetation - Hwy 529

Fred Cheng
Geotechnical and Materials

Seamas Skelly and Charlie Murphy of Major Capital Projects and Fred Cheng of Technical Standards Branch presented this case history at the CPESC/ CLRA Erosion and Sediment Control Review Development Training Workshop in November 2008 in Calgary to an audience of environmentalists, regulators, Certified Professionals in Erosion and Sediment Control (CPESC), engineers, hydrologists, fish biologists, agrologists and land reclamation professionals.

Background:

Major rehabilitation work is being undertaken at the McGregor Reservoir South Dam, hydraulic structure and downstream channel. Excavation of the realigned channel was completed at the toe of the valley slope. As the excavation neared completion a major landslide occurred in the west valley slope above the channel. It was eventually determined that the landslide extended from below the channel excavation, upslope to near the crest of the valley wall. Debris was removed and the west slope shaped and reduced to a 3:1 slope.

It was determined that further slope movement might jeopardize the South Dam and new hydraulic structure. Protection of the exposed slope to prevent erosion and limit water infiltration into the slide area was a site priority. A series of trials was undertaken to determine the best course of action to re-vegetate the slope, given the scarcity of topsoil, arid and windy site conditions.

After slope grading in the fall of 2005, compost blanket, compost sock berm and hydroseeding were used on two trial plots on the slope to encourage re-vegetation. The compost blanket plot showed very good growth the following year.

In 2006, Major Capital Projects, Environmental Management Services, and the Technical Standards Branch, Geotechnical and Materials Section conducted a joint study of the performance of various erosion control products and seed mixes. Three plots were added to the 2005 plots. New materials such as SiltStop, Flexterra FGM mulch and AgriBoost were used on the new plots. A summary description of each of these test products is provided below:

- Hydro-seeding: hydraulically applied cellulous mulch that incorporates fertilizer and seeds. Hydroseeding was applied on north plot in 2005 and buffer plots in fall 2006.
- SiltStop: anionic polyacrylamide polymer (PAM) that when in contact with moisture binds silt together to prevent erosion and promote germination of seeds. Applied in fall 2006.
- Flexterra: hydraulically applied bonded fiber matrix that forms an intimate bond with the bare surface. Once dried, it reduces evapo-transpiration, traps heat, moisture and nutrients, and provides a good micro-environment for seed germination. Its bonded surface reduces raindrop and runoff erosion. Applied in fall 2006.
- Compost: composted wood waste by-product. It prevents surface erosion and provides nutrients for vegetative growth. Both compost blanket and berms were applied in 2005 but re-applied in failed spots in spring 2006. Also applied extensively in fall 2008.
- Agri-Boost: chopped up and pelletized alfalfa. It is surface broadcast and lightly tilled into the soil to provide natural nutrients for seed growth. Applied in fall 2006.

Challenges:

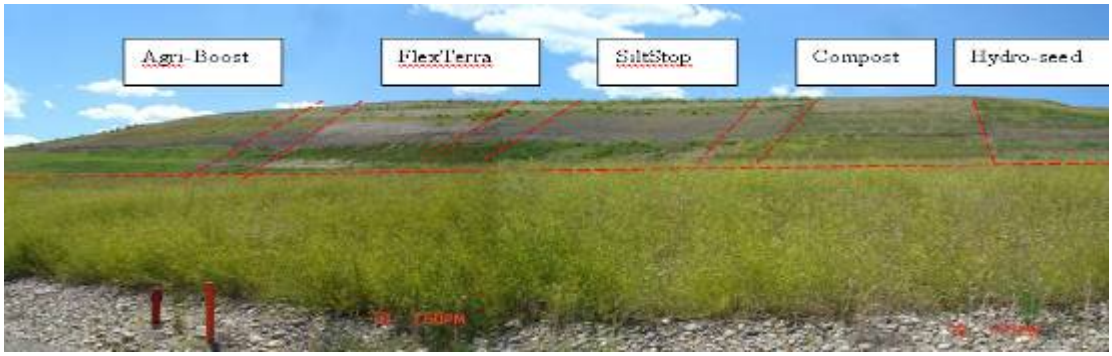
The project site posed a number of challenges to re-vegetation. Firstly, the slope material is predominately erodible silty clay, with sand and coal lenses. The slope trimming exposed a 2m wide wet coal layer at mid-slope and a gravel layer at the top of slope. Secondly, some soils were alkaline; soil pH ranged from 6.9 to 11.2. Thirdly, the site is situated in a windy part of Alberta; wind can blow away soil, as well as result in high evapo-transpiration losses. A special alkali tolerant native seed mix was designed for this site.

2007 Evaluation:

A site inspection was conducted in summer 2007. In general, the slope was stable. There were minor erosion gullies or rills formed below the coal layer at the lower slope of the SiltStop, Flexterra and Hydro-seed plots. Some siltation occurred in the channel due to minor gully erosion during rainy periods. In general seepage at the coal seam, among other contributors, appeared to help vegetative growth in the Agri-Boost and compost plots. It was also believed that frequent strong wind played a role in transporting seeds from surrounding plots. It was difficult to get the coal and gravel seams to vegetate.

The compost plot flourished the best although it had gone through two growing seasons and had been patched in spring 2006. Among the three plots treated in fall 2006 (Agri-Boost, Flexterra and SiltStop)

Photo 1



Agri-Boost seemed to flourish best, while Flexterra caught the slowest. The Flexterra BFM shell was still visible and intact at bare spots. Tilling of the Agri-Boost into the soil appeared to provide a good mix of soil and nutrients.

The hydro-seeded plots (north plot and buffer plots) also had fair growth. Minor erosion gullies formed at the bottom of the slope. Small amounts of silt were washed into the channel below.

Photo 1 above shows relative performance of plots.

Field observations are summarized in Table 1 below.

Soil Type	**Agri-Boost**	**Flex-terra FGM**	**Silt Stop**	**Com post**	**Hydro -seed**	Surface Distance from top
Gravel (sporadic grass catch)						-2m
Sand silty clay till	Very good grass catch	Some grass catch; rills	Good grass catch	Very good grass catch	Good grass catch	-38m
Coal and Seepage (no grass catch)						-40m
Sandy silty clay till	Very good grass catch	Bare patches	Fair grass catch	Very good grass catch	Some grass catch	-65m
		Very good catch	Small gullies/ rill erosion		Small gullies/ rills	-83m

Table 1

Table 2 below shows relative costs.

Product	**Date Applied**	**Area (m^2)**	**Cost**	**Unit Cost**
Compost blanket	Nov 2005	2,500	$11,500	$4.6/$m^2$
Compost berms	Nov 2005		$1,128	$10/m
Flexterra FGM	Oct 2006	3,000	$4,950	$1.65/$m^2$
Silt Stop	Oct 2006	3,000	$3,811	$1.27/$m^2$
Agri-Boost	Oct 2006	3,000	$6,400	$2.13/$m^2$
Hydroseeding (north plot and buffer strips)	Oct 2006	5,750	$1,930	$0.34/$m^2$
Compost blanket	Nov 2008	-	-	$6.5/$m^2$
Compost berms	Nov 2008	-	-	$15/m

Table 2

2008 Re-vegetation:

In late summer 2008 the Project Review Board recommended re-vegetation of the entire slope, including the gravel and coal seams. Compost was chosen as the growth medium. All bare areas were topped with 50 mm of compost. Several strips of compost sock berm were placed across high slope. The 2m wide gravel and coal seams were sub-excavated to a depth of 300mm and backfilled with topsoil.

A lockdown netting was placed on the topsoil and anchored on the top and bottom edges with compost sock berms. Compost was again sprayed on top of the topsoil/netting in November 2008. The performance of the products will be monitored in 2009.

Erosion rills and gullies are formed on slope (2006)

Plush green compost plot – on far right (2006)

SiltStop, Hydro-seed, Flexterra, Agri-Boost (2006)

Completed compost berm and blanket (Nov 2008)

Slope before complete re-vegetation (2008)

Completed compost berm and blanket (Nov 2008)

Recommendation:

On the whole, the ESC products worked well on the slope although some products performed better than others. Monitoring the effectiveness of the ESC measures during and/or after heavy rainfall and snow melt, and windy periods is recommended. Seed cover, vigor and density of growth should also be monitored.

Some patch-up work with fertilizer and seed may be needed next year if bare spots appear or rill erosion persists.

Acknowledgement:

Thank you to staff support from Major Capital Projects, Environmental Management Services and Geotechnical and Material Section of Technical Standards Branch.

If you have questions or comments regarding this article please contact:

Fred Cheng:
by email: Fred.cheng@gov.ab.ca
or phone: 780-415-1039

Bio-Engineering Work Shop

Neil Kjelland
Geotechnical and Materials

Alberta Transportation and the Centre for Transportation Engineering and Planning (C-TEP) sponsored the 3rd Bio-Engineering Workshop. The workshop was organized to familiarize participants to environmentally friendly "green" methods of remediating slope and stream bank erosion by combining mechanical and biological elements into slope stabilization and erosion protection measures.

The classroom portion of the work shop was held in Calgary on November 4th while the two day practical portion was held on November 5th and 6th at Willow Creek (Highway 2:08 north of Fort McLeod, AB). The Willow Creek site has been monitored by Alberta Transportation since 2001 under the Regional Geo-hazard Monitoring Program, due to the potential for ongoing retrogressive landslides along the outside bend of the creek which over time could impact Highway 2.

The causes of the landslides at Willow Creek include a combination of river bank erosion along the outside bend of Willow Creek and internal slope seepage and soil erosion along the slope. The bank erosion resulted in unstable slopes dangerously close to encroaching on Highway 2.

Photo 1: Retrogressive landslides at Willow Creek prior to remedial bioengineering measures, view looking South (June, 2008)

To combat these issues, the following bio-engineering principles were employed:

- LPSTP/Vanes - Longitudinal Peaked Stone Toe Protection with Vanes (both constructed using self-launching stone) – the bank of the creek along the outside bend was lined with rock to protect against the erosive forces. In addition, vanes extended into the creek which will move the stream (and maximum erosive potential) away from the stream bank. Self launching rock was used to avoid high siltation effects of conventional in-stream works that are detrimental to aquatic habitat.

- Live Siltation – willows were planted immediately adjacent to the LPSTP along the edge of the creek to promote the growth of vegetation. The vegetation along the stream bed is important for providing cover for aquatic habitat, as well as for inhibiting silt from entering the stream from surface erosion. During high flow the live siltation will act to slow the current and lessen the erosive potential of the flow above the LPSTP elevation.

- Slope Flattening – due to the previous slide activity, several precariously steep sections of slope existed. Equipment was used to cut and shape these slopes to an overall flatter angle to reduce the potential for the upper slope to reactivate.

- Live Brush Layering – woody cuttings were layered with successive soil lifts at the lower portion of the flattened slope to provide enhanced stability, improved soil drainage, superior erosion control, and additional vegetation to the slope.

- Coconut Fibre Rolls – masses of coconut husk fibres shaped into cylindrical rolls were installed along the upper slope to slow overland water flow and reduce surface erosion. Live stakes were used to keep these rolls in place with the added benefit of increasing vegetation along the slope.

- Turf Reinforcement Mats were installed to protect the surface soils at locations where highly erosive forces are expected.

With the exception of equipment operations, the 40 workshop attendees representing government agencies, consulting firms, and construction companies were integral to the application of the above techniques. The four photographs describe the problem and some of the solutions.

On hand to lead the classroom and field activities was John McCullah, a watershed geologist and Certified Professional in Erosion and Sediment Control (CPESC) from Sacramento, California. John is a part-time Watershed Restoration Practices instructor at Shasta College and Executive Director for Sacramento Watersheds Action Group (SWAG), a non-profit, community-based watershed restoration organization.

John also published several manuals on designs and best practices pertaining to erosion control. John also lead two previous Bio-Engineering courses held along the Pembina River by Hinton.

Photo 2: Landslide and river training bioengineering remedial measures implemented at the site, view looking South (November, 2008)

Photo 3: Workshop participants placing willow stakes for brush layering (November, 2008)

Photo 4: Workshop participants securing coconut fibre rolls on slope (November, 2008)

The bio-engineering techniques at Willow Creek will be monitored by Alberta Transportation to determine the ongoing effectiveness of the remedial measures.

In addition to stabilizing the slope and preventing further regression of the landslide towards Highway 2, the third bio-engineering workshop further familiarized practitioners and regulators in Alberta with environmentally friendly options for erosion and slope stability remediation

For more information please contact:

Neil Kjelland
By email at: neil.kjelland@gov.ab.ca
Phone: 780 415 1028

GeoEdmonton'08
61st Canadian Geotechnical Conference and 9th Joint Groundwater Conference

Rocky Wang
Geotechnical and Materials Section

More than 625 people took in the Annual Conference of the Canadian Geotechnical Society held at the Westin Hotel in Edmonton September 21-24, 2008. Roger Skirrow, Director of Geotechnical and Materials Section, TSB co-chaired the conference with Derek Martin of the University of Alberta.

The conference theme "A Heritage of Innovation" was reflected in the presentations, discussion of research developments, and advancements of practical engineering. Posters and special acknowledgements were made to recognize Edmonton area geotechnical and hydrogeological innovators. These posters will be reprinted, framed, and hung at the University of Alberta. One of the innovators, Dr. Norbert Morgenstern delivered the conference keynote R.M. Hardy Lecture on "Risk and Reward: Geotechnical Engineering and the Alberta Oil Sands" to a packed plenary session.

Professional geotechnical and hydrogeological knowledge was shared through a well-organized schedule. Technical sessions consisted of 300 papers and presentations on a wide range of geotechnical and hydrogeological topics. Of note, Rocky Wang presented a paper titled "Slipline solutions by spreadsheet" which dealt with spreadsheet implemented numerical methods to solve slope stability problems. Roger Skirrow presented a paper titled "Cost-benefit analysis for selection of pile tests" which dealt with practical cost-benefit considerations for pile capacity testing.

Also of interest were four Special Technical Sessions:

- Geotechnical Education for Modern Practice;
- Staff Retention and Motivation;
- P3 experience, and
- Urban Geohazard Risk Management – Bridging Vision and Tradition.

In addition to the technical presentations and plenary lectures, many people took part in one of three full-day technical tours:

- Travel through Time: A Day on the North Saskatchewan River, (raft trip with the Alberta Geological Survey)
- Manifestations of regional groundwater flow-systems in and around Edmonton, and
- Fort McMurray and the Syncrude Oil Sands.

Four full day lecture courses were also well attended:

- Applied Multidisciplinary Remote Sensing and Terrain Analysis for Engineers, Geoscientists and Environmental Scientists,
- Design, Analysis, Performance and Specification of Geosynthetic Reinforced Soil Walls,
- Ground Improvement, and
- Advances in Probabilistic Slope Stability Analysis and Coupled Climatic 1D/2D/3D Finite Element Seepage Modeling.

The conference implemented a number of innovations, including:

- A dedicated poster session combined with hands-on "wall-breaking" contest, won by the University of Manitoba.
- A heavy equipment show with several drilling rigs and a soil nail launcher parked in front of the Winspear Centre.
- A Gala Awards Night to replace a traditional morning awards program. Of note, Roger Skirrow received the A.G. Stermac award for long-time service to the geotechnical society.

Tricia Hurry, administrative assistant with Geotechnical and Materials Section, TSB ably chaperoned delegates' partners to various local venues.

The conference provided ample opportunity for peers and colleagues to discuss case histories, advances in research, new software and instrumentation development. Over 40 exhibitors showcased the latest in geotechnical and hydrogeological wares.

Although many of the fundamental theories of geotechnical engineering have not greatly changed in the past 50 years, new instrumentation technologies and software are rapidly advancing. A firm grounding in the fundamentals of geotechnical engineering carries as much value today as it did when our innovators were starting their distinguished careers.

A CD of the proceedings is available from the Geotechnical & Materials Section, TSB.

For more information please contact:

Rocky Wang by
Email: rocky.wang@gov.ab.ca
or Phone : 780 415 1027

Retention of Technical Expertise In-House Model

Bill Kenny and Ron Stoski
Design, Project Management and Training

A "Retention of Technical Expertise" framework was developed and approved in 2008 by a departmental executive task group consisting of Allan Kwan, Gordon Zack, and Stu Becker.

The task group reviewed many options for creating career paths for technical employees and decided on the In-House Project Team model as a way to provide developmental opportunities for technical employees to ensure that the department objective of knowledgeable owner status is maintained. The task group felt that department's technical junior employees needed the "hands-on" experience. This would enable the employees to learn about field conditions before they moved into more senior positions. This initiative will provide practical, meaningful and project based knowledge to staff which will be of value in the future.

The in-house model is designed to allow all staff to keep current in technical areas by providing hands on developmental experience in functional planning, designing, tendering, and project managing the construction on the highway network.

In-house teams will consist of junior and senior employees from Technical Standards Branch (TSB) and Regional Offices. Junior staff will learn by doing and gain practical experience by "building" highway projects. Junior staff will also learn to deal with "what works in the real world" and learn to identify standards or practices that require changing or improvement. During the learning process learners will be actively mentored by senior staff. Senior staff will benefit from the program as it will enable them to maintain technical expertise and assure familiarization with new codes, guidelines and specifications.

The framework developed by the task group also identified three key strategies for retaining expertise:

1. Provide / expand formal professional development and training in identified technical subject areas.

2. Use "in-house engineering" to plan for, design and undertake highway engineering projects and to supplement engineering by external consultants.

3. Assign department engineering staff to engineering consultant's offices and construction projects to enhance field expertise.

Strategy 1: Expand Formal Training Program

Objective: Identify, prioritize and facilitate delivery of key learning requirements.

Background: An assessment of formal training needs was done by business unit leaders over the last four years. Business unit leaders include TSB section directors and regional construction, bridge, operations, and infrastructure managers.

Subsequently training programs were developed in-house and by external resources to meet immediate needs. Practical delivery methods were developed using a combination of in-house delivery and delivery through external organizations such as C-TEP and coordination with organizations such as CEA member companies and municipal highway authorities.

Many technical courses and workshops related to highway engineering, bridge engineering, highway safety and general interest to highway engineering staff throughout the province were also hosted by Alberta Transportation, C-TEP and other organizations and made available to the engineering community.

The department also provides learning opportunities by sending employees to conferences and seminars when opportunities for specialized learning are available.

The Action Plan

Revisit the current training program with business unit leaders by June 1st. Based on their input, together with additional input from stakeholders and providers of training, devise an overall training strategy for the division by September 1st of each year.

Source required external training resources.

Co-ordinate delivery of formal training programs with CEA, C-TEP, ITE, universities, technical colleges, Alberta government trainers, and department staff.

Experience with technical training programs undertaken by the department has shown that formal training is of limited value unless trainees can apply new knowledge immediately on projects. Consequently implementation of Strategies 2 and 3 is expected to improve effectiveness when combined with formal training specific to the tasks that are undertaken. This includes training in the use of design and drafting tools (use of software) as well as non-technical training intended to improve "people skills" that are beneficial in the project management of highways and bridges.

Strategy 2: Use in-house "engineering and related" forces to deliver projects.

Objective: To enhance expertise of in-house "engineering and related" staff by undertaking projects using integrated teams of junior and senior staff from existing sections of TSB and regional offices. Projects are to be delivered on time, within budget and with appropriate project management, quality engineering and technical standards

Actions: Identify projects at the 5 to 10 year program development stage by TSB business unit leaders and regions in consultation with project directors and staff. Identified projects are sent to Director PMT to obtain approval in principle. The business unit leader proposing a project should identify key staff members plus supporting staff and roles.

Strategy 3: Placement of department "engineering and related" staff in offices and on consultant construction projects to enhance field expertise.

Objective: Enhance the level of "engineering and related" expertise of department staff by placement of select staff to work in areas where knowledge gaps exist. This may include design, planning and project management. This strategy is primarily intended for staff with limited experience in the project management of construction projects and where this type of experience is expected to be useful for their professional growth.

Actions: Business unit leaders in consultation with staff will identify employees interested in obtaining experience working with consultants. Business unit leaders suggest staff placements to Director of Project Management and Training to enable central record keeping and funding approval.

Depending on the urgency of the training need and availability of suitable consultant projects and willing consulting companies, the employee may be placed in a consulting company for current work. On completion of assignment on a consulting team the participating employee would document experience, cost, duration, and key learning points.

Current Activities

The following activities are currently taking place: Procurement of design earthwork software and training for people responsible for designing and drafting along with project management software to track progress. The InRoads software package from Bentley Systems is being installed on the department's network servers so that access can be provided to those that need it. InRoads software requires knowledge of MicroStation

Terms of reference and project plan shells are being set up for in-house "engineering and related" work and for procurement of engineering and technical services for activities that will not be done in-house (surveying, soil testing etc). They will be available to project directors shortly to ensure consistent and comprehensive plans are prepared.

Communication:

The communication strategies are:

- TSB Newsletter to department staff.
- Direct email to engineering and technical staff in Transportation and Civil Engineering Division.
- Ongoing brown bag lunches.
- Updates to CEA and ARHCA through meetings of the Tri-Party Operations committee.

The intent is to keep the CEA and ARHCA informed about the number and types of projects where in-house engineering is to be used. The amount of design engineering completed within the Department is not expected to significantly affect amounts of engineering work assigned to the consulting industry.

Summary

The concept of a knowledgeable owner is a benefit to industry: all partners and stakeholders work as a knowledgeable team to achieve the common goal to ensure a safe and sustainable transportation infrastructure.

Bill Kenny, Director of Project Management and Training (PMT) as of October 2008, was assigned the following responsibilities:

- Project sponsor for in-house transportation projects including project and delivery management.
- Coordinator of technical support services (survey, drafting, etc.).
- Coordinator of design and project IT software and tools and for ensuring software is compatible with existing department systems.
- Coordinator of division's technical training program.
- Reporter of results achieved to the Divisional Executive Committee

To obtain more information about this program and/or to partake in this program please contact:

Bill Kenny at
Email: bill.kenny@gov.ab.ca
Phone: 780 415 1048

or Ron Stoski at
Email: ron.stoski@gov.ab..ca
Phone: 780 415 1020

One must learn by doing the thing,
for though you think you know it,
you have no certainty until you try.

Aristotle

Previous TSB newsletters can be viewed at:
www.transportation.alberta.ca/1881.htm

If you would like to publish an article or
to comment on the newsletter please contact:

Bill Kenny	**780 415 1048**
or Ron Stoski	**780 415 1020**
or Roger Skirrow	**780 427 5578**
or Moh Lali	**780 415 1083**