



UNIVERSITY OF SASKATCHEWAN

Saskatchewan Centre of  
Excellence for Transportation  
and Infrastructure

COLLEGE OF ENGINEERING  
ENGINEERING.USASK.CA/RESEARCH/SCETI

# Saskatchewan Centre of Excellence for Transportation and Infrastructure

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## 2015 Review and Operations Plan 2016

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FOR PUBLIC DISSEMINATION



UNIVERSITY OF SASKATCHEWAN

College of Engineering

DEPARTMENT OF CIVIL AND  
GEOLOGICAL ENGINEERING  
ENGINEERING.USASK.CA

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## Acronyms

SCETI	Saskatchewan Centre of Excellence for Transportation and Infrastructure
APEGS	Association of Professional Engineers and Geoscientists of Saskatchewan
SMHI	Saskatchewan Ministry of Highways and Infrastructure
COE	College of Engineering
U of S	University of Saskatchewan
U of R	University of Regina
C-TEP	Centre for Transportation Engineering and Planning (Alberta)

## Executive Summary

SCETI has made significant progress over the past 2 ½ years. It has broadened its reach to other post-secondary institutions in the province, and is regularly collaborating with similar institutions in Western Canada. It has full support of the private sector, with a core of over 250 professionals in the province, and another 200 in Canada and around the world that receive SCETI communications and participate in initiatives. In 2015 we planned, executed and managed 7 professional development courses, with over 600 attendees. These courses were:

1. Hydraulic Design (2)
2. Asphalt Operations (2)
3. Asphalt Institute Design and Management (2)
4. Joints and Seals at SHCA Annual Conference

A number of expressions of interest in applying for research funding were received, seven, of which five became official proposals. Two, the University Bridge Arch Rehab Modelling, and Road Salt Gradation, were approved. A large project, the bridge rehab has been so successful that presentations were made at both the Transportation Research Board IBTTA technical conference, and the Transportation Association of Canada annual conference. The estimated savings for Saskatoon at the rehab stage are over \$10 million, and over the remaining life of the bridge, some \$25 million. The project just received an extension of time and funding to mount an additional array of sensors for another 12 months.

One proposal was rejected as being not of sufficient interest to the province, and one is still awaiting a technical review, but is expected to be approved shortly. An extraordinary amount of SCETI time resources was spent on four iterations of the Large Animal Detection System (LADS) proposal, which is still ongoing. Following Highways intense interest, but unwillingness to provide basic contributions-in-kind, SGI agreed to fund half of the project. However, as the systems will sit on Highways rights-of-way, it insisted on a legal agreement regarding ownership, product lifecycle, and maintenance. Combined with the departure of the Principle Investigator, Dr. Peter Park, the proposal was in abeyance for some months. We now have a draft agreement with Highways and are awaiting another budget proposal from the PI reflecting the new agreement.

The short-term challenge for SCETI is to obtain sustained funding for the next 5 years. The initial \$3 million infusion from 2008 is forecast to run out at the end of calendar year 2018. Discussions are underway with the Ministry of Highways to supplement the remaining funds with an incremental investment of \$250,000/year for 4 years.

## SCETI Background

In May 2008, the Saskatchewan Ministry of Highways and Infrastructure and the University of Saskatchewan announced the establishment of a new transportation centre, with \$1 million in initial funding. A year later, they signed an agreement which provided the remainder of a total of \$3 million for the evolution of what was previously the University of Saskatchewan Transportation Research Centre (funded by Transport Canada and focused on collision analysis) into a new Saskatchewan Centre of Excellence for Transportation and Infrastructure.

SCETI was established as a strategic partnership between the Saskatchewan Ministry of Highways and Infrastructure, the University of Saskatchewan, and private industry involved in innovative transportation and infrastructure solutions. A broad Board of Advisors was formed to oversee the operations of the Centre of Excellence.

In December of 2012 a lengthy strategic review of the Centre was completed, following a series of stakeholder meetings and focus groups. A decision was made to engage a fulltime Managing Director to optimize SCETI's outputs. Simultaneously, SCETI was relocated from the old Research Centre's Animal Sciences Building site to the External Collaboration Centre in the College of Engineering, enhancing the College's relationships with the private sector. The Centre includes SCETI, the Associate Dean (Research), Tri-Council Administration and Research Coordinator, College Advancement Group and the Engineering Technology Transfer Office.

The Managing Director redesigned the governance structure of SCETI, its operational framework, and reinvigorated its partnerships with the private sector and the Ministry of Highways and Infrastructure. In the short term, future funding sources needed to be developed, synergistic and strategic partnerships with other similar organizations explored, and a structure put in place to offer courses and training to professionals across the province. Longer term objectives include developing a sustainable financing model and ensuring that SCETI was more responsive to the needs of the government, academic and private sector stakeholders.

Stakeholders felt that SCETI could make its most valuable contributions in the following areas:

1. Asset management and life cycle cost analysis
2. Integrated traffic, infrastructure and utility planning and financing
3. Bridges, for which the province has over 2000
4. Climate change impacts and harsh climate engineering
5. New partnerships enhancing university capabilities and stimulating HQP
6. Professional development

## SCETI Mandate and Mission

The primary mandate of SCETI is to provide world class transportation and infrastructure solutions for:

- a. meeting rapidly-expanding needs of Canada's second fastest growing province
- b. increased commodity and manufactured goods shipments
- c. growing urbanization in the province, and
- d. aging infrastructure and effective asset management

To achieve this, SCETI:

- Fosters world class research, which develops and deploys more efficient transport infrastructure, engineering design and construction techniques that directly support Saskatchewan's rapid growth
- Improves transport and infrastructure asset management systems, recognizing sustainability
- Supports private sector innovation and research, generating economic growth and export potential
- Provides world class training to develop highly qualified practitioners

## SCETI Operations Review 2015

Seven formal expressions of interest in applying for SCETI funding were received in 2015, and another 15 formal discussions were held which did not lead to written submissions. Of the seven, five became formal proposals. These were:

1. University Bridge Arch Rehab
2. Large Animal Detection System
3. Road Salt Gradation (Mehran, UofR)
4. Cone Penetrometer Technologies (Ellwood, UofS)
5. Historical Rebar Assessments (Feldman, UofS)

The bridge rehab modelling went beyond expectations and has been presented at both TAC and the TRB (IBTTA). The province of Manitoba has expressed interest in proposals to evaluate three of its bridges, and discussions continue. An extension was approved for the project, with additional modelling and sensors, in February, 2016.

LADS remains on the books but has been extraordinarily difficult to get off the ground due to complexities at Highways. It was first proposed in 2014. Peter Park's departure

for York notwithstanding, it has taken almost 2 years to come to a simple understanding between Highways, SGI and SCETI regarding funding for the project and ownership of the system itself (the university cannot own the system and Highways can, but has been very reluctant). We are now at the point of an agreed legal framework with Highways regarding its ownership and contributions, and are awaiting another revised proposal from the PI.

The Road Salt Gradation project was well-received by the provincial government and a Phase II has been proposed by the research team that would see actual road conditions simulated at the Integrated Road Research Facility in Edmonton. This would enable actual empirical research on optimal salt blends, coarseness and laydown techniques. This in turn would lead to potential savings in winter road operations in the province.

The penetrometer proposal was well-written, but as proposed was of no interest to Highways given that it involved an end use, bridge piles on stable soil, that has no application. The PI was unable to modify it to meet the needs of the province.

The historic rebar assessment proposal is a very specific niche area with very few experts in Canada. While SCETI agreed that, if it involved a fresh look at ASTM specs and possible changes, it met the test of innovation and practicality, finding external reviewers has been a daunting challenge. A colleague of Dr. Feldman was sought (Ecole Polytechnique) and agreed, but has not yet seen fit to review the project after numerous reminders and conversations. The proposal has now been sent to UNB where another expert has agreed to perform a review.

SCETI spends significant time explaining its function to interested parties. Academically, there has been a tendency to see SCETI as a methodology to fund grad students, in spite of the clear and abundant mandate of materials available on innovation and practical application to provincial needs. We will continue to enhance the clarity of our objectives and mandate as needed. From the private sector standpoint, we have spent considerable time explaining that SCETI is not a funding mechanism to assist in enterprises wishing to sell their products to Highways, or outside the province, and that true innovation needs to be part of a proposal. We saw fewer of these in 2015 and hope to see even fewer going forward.

Professional development consumed a significant amount of SCETI resources in 2015 and the program was highly successful. Each course brought in global experts in their respective fields to deliver the courses, and contracts for service were required for each. Collaboration with Highways was necessary for both subject matter and in-house attendees and on average each course saw 30-40% of the attendees from government. The courses were (attendees in brackets):

1. Hydraulic Design Regina (46) and Saskatoon (48). Limited by instructor request

2. Asphalt Operations Regina (76) and Saskatoon (90)
3. Asphalt Institute Saskatoon (75)
4. Tack Coat and Joints at SHCA Conference Regina (210)

Net surpluses for the courses were some \$50,000 after expenses.

SCETI continued to act as the public face of transportation and infrastructure for the university in 2015, with no less than 4 print articles and 8 television interviews conducted. We spoke at a number of conferences in Canada and coordinated 5 sectoral stakeholder meetings, including town halls and the SCETI Advisory Board. SCETI provided formal input into the City of Saskatoon's Twenty Year Growth Plan. We are chairing a new provincial intelligent transportation working group (a committee by any other name) and its first meetings will be in April/May.

We also funded the 2015 Capstone Team to the CSCE annual meeting in Regina, and are now the key funder for the CE990 Course, renamed the SCETI Graduate Student Research Conference. We will again fund Capstone for 2016 in London, Ontario.

## SCETI Operations 2016 and Onward

The post-2013 operational framework for SCETI is aligned with similar research and funding organizations both nationally and internationally. A transparent and flexible proposal template is available to all prospective applicants. Guidelines for the review of applications are available to both applicants and reviewers. Proposals themselves are reviewed by a flexibly-structured panel including non-participating academic and external experts from around the country. Projects under a threshold of \$50,000 are reviewed by SCETI and one selected reviewer, while those over \$50,000 involve a panel of up to four.

SCETI was originally provided with a total of \$3 million by the Ministry of Highways and Infrastructure. The College of Engineering does not provide matching funding of any sort, and SCETI is considered a "Type A" Research Centre at the university.

Type A centres are described as follows:

*"Type A centres are those that are organizationally part of one college, and report to a dean, and do not involve substantial resources. These centres involve activities that complement and enhance primarily the work of one college, but can involve multi-disciplinary and multi-faculty work. The activities must be congruent with approved college plans. Responsibility for funding rests with the college"*

The original \$3 million grant from Highways covered all research project, administrative and staff expenses for SCETI. As of December 31, 2015, SCETI had \$1,003,000 left in



its two operating funds, one which accounts for revenues/costs associated with course development and delivery (this fund is profitable), and the larger fund which finances research and the operations of SCETI. To 29 February, 2016 it is \$976,000 (below).

## Operations

SCETI has reviewed over two dozen proposals since 2013, and funded five. It has planned and executed eight professional development courses in that time period, each of which netted a surplus after expenses (excluding staff time, but including travel). Over 800 engineers and practitioners received training in the past 3 years in critical areas of importance to industry and government.

SCETI has also broadened its reach within, and external to, the university environment. It now collaborates with academic staff in the organization and execution of the CE990 Graduate Course, previously known as “Grad Student Seminars”. The course is now known as the SCETI Graduate Research Conference, and external partners (both companies and government) are now being specifically invited to hear the presentations of the grad students. Going into the future this will be used as a recruitment tool for employers in the province. SCETI is funding the conference, and for 2017 will be soliciting sponsorships and exhibits.

Similarly, SCETI is providing funding for the development of HQP. It is subsidizing the UofS Capstone Design team to travel to and present at the annual conference of the Canadian Society of Civil Engineers. This year the meeting will be held in London, Ontario, and the subsidy provides the ability for the university’s team to actually go and compete against other teams from across Canada.

## Funding

SCETI planned in 2015 to work with the government of Saskatchewan towards another infusion of funds for the medium term and the response was very positive. However, the looming election effectively stalled any formal discussions until post-election, as Highways staff are not permitted to attend events, discuss funds, or receive requests prior to the election. Similarly, courses that were to be planned and executed in the February-April time frame have all been put in abeyance until the election is complete. This will affect course attendance, as we anticipate fewer attendees once construction crews and engineering firms are out on their projects for the summer.



## SCETI Operational Cash Flow (at Feb 29, 2016)

### Cash Position

Opening funds (at 1 Oct, 2015 operating & course revenue).....	1,122,984.16
Revenues (Prof Development Courses 1 Oct, 2015 to 29 Feb, 2016).....	0.00
Total gross funds available.....	1,122,984.16
Research Expenses (projects committed 1 Oct, 2015 to 29 Feb, 2016).....	0.00
Prof Development Course Expenses (1 Oct, 2015 to 29 Feb, 2016).....	0.00
Operating Costs (expenses 1 Oct, 2015 to 29 Feb, 2016).....	146,416.52
<b>Total Net Funds (at 29 Feb, 2016) .....</b>	<b>\$976,567.64</b>

### Research Projects (commitments to Feb 29, 2016)

Internal (SCETI) funds committed:

University Bridge Project – 2 <sup>nd</sup> Installment (Dr. Moh Boulfiza, UofS) .	34,320
Total SCETI funds committed.....	34,320
<b>Total research funded.....</b>	<b>\$34,320.00</b>

### Administration Position (Monthly Burn Rate)

Staff (salaries and benefits) .....	22,386.86
Telephone and Fax .....	130.00
Supplies .....	150.00
<b>Total Fixed Monthly Expenses .....</b>	<b>\$22,666.86</b>

## SCETI Budget Forecast and Operational Plan

The monthly burn rate at current staffing levels is just under \$23,000. With \$1 million remaining, current financing covers another 2 years of research funding of \$200,000 annually, or total research project expenditures annually of some \$400,000 at 50% funding contributions.

At current resource levels SCETI foresees undertaking the following initiatives in 2016:

1. 8-10 proposals accepted and reviewed, of which 2-4 proposals funded and managed

2. 4-6 technical courses and training sessions initiated, managed and evaluated by SCETI, all of which eligible for professional development credits with the Engineering Institute. These courses have already been defined and await Ministry approval and partnership:
  - a. Geometric Design
  - b. Work Zone Safety
  - c. Contract Management
  - d. Project Management
  - e. Intelligent Transportation Technologies
3. 5 other external initiatives advancing transportation in the province, such as the provincial intelligent transportation working group

Should the Ministry of Highways and Infrastructure not be interested in providing further systemic funding to SCETI, it will be a significant challenge to find adequate funding from other sources, given that SCETI's mandate is provincial. In that case, by the end of the university fiscal year 2017-18 (April 30, 2019), it is probable that SCETI will be sunset after 10 years of operations.

## Performance Indicators

SCETI's performance can be readily measured, going forward, by the following key performance indicators:

1. Number of research and development proposals received
2. Number of research and development proposals approved and funded
3. Number of research and development projects brought to completion
4. Technology and/or intellectual property developed and used on a commercial basis following completion of project
5. Number of courses offered in the province and/or jointly with other institutions in Western Canada
6. Number of professionals trained on an annual basis