A Framework for Conducting Sustainable Transportation Assessments for Neighbourhoods

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Abstract

Traffic calming, techniques used to slow or reduce the volume of motor traffic on local streets, has met with challenges in recent years. Two issues have become evident and increasingly recurring: the process is seen as reactive, and often creates divisions among neighbours, with many typical solutions (traffic circles, speed humps, closures, etc.) deeply unpopular; and second, the roots of the neighbourhood concerns quite often reveal underlying structural problems, such as a lack of connectivity and pedestrian facilities, and personal security concerns – solutions for which are typically outside the scope of the traditional toolbox of traffic calming measures.

The Alberta-based Centre for Transportation Engineering and Planning in partnership with Strathcona County, Alberta, retained Opus International Consultants (Canada) Limited (Opus) to prepare a framework for conducting Sustainable Transportation Assessments for Neighbourhoods (STAN). Where the traditional traffic calming process often uses physical measures to slow or redirect vehicles on neighbourhood streets, with potential benefits for pedestrians and cyclists, STAN reverse this process: through a more thorough diagnosis of underlying traffic issues in a neighbourhood, the STAN framework forwards solutions which improve conditions for pedestrians and cyclists, with the resulting mitigations helping to slow and reduce short-cutting traffic where necessary. By providing for sustainable travel modes and encouraging sharing of the roadway, STAN improve the overall health and mobility of the neighbourhood without dramatically (and unrealistically) impeding auto users.

At its core, the STAN framework is a straightforward process. The underlying contributing factors of a particular traffic issue are determined by the collection and analysis of traffic and active transportation data, consultation with the public, and a site visit where appropriate. Depending on these factors, the framework presents a range of solutions is provided whereby the impact to traffic by means of physical measures is limited. For instance, where an area is determined to be lacking in appropriate pedestrian facilities (i.e. sidewalks, crossings, etc.), where pedestrian exposure to vehicles is resulting in safety-related complaints, the framework forwards the additions of or improvements to these facilities as opposed to traditional physical traffic calming devices, such as speed humps, to slow motorists.

In developing the framework, Opus conducted stakeholder interviews with several agencies in Alberta as well as internationally, and reviewed literature on innovative and leading practices for including sustainable and multi-modal enhancements into new developments. The real-world applicability of the framework was tested and refined through a workshop with staff at Strathcona County, Alberta, where it was used to evaluate a recently traffic calmed neighbourhood. The framework was seen to recommend viable solutions (with many implemented by the county), as well as identifying potential policy gaps with which failure to implement may ultimately lead to a repeated study of the area.

i. Background

Traffic calming, broadly defined as techniques used to slow and/or reduce motor traffic on local streets, has evolved dramatically from a grassroots movement born in late 1960s Europe. The Transportation Association of Canada (TAC) published Canada's founding document on the practice in 1998, the *Canadian Guide to Neighbourhood Traffic Calming* and the traffic calming process is now typically integrated into transportation policies in many North American municipalities.

Typically**,** traffic calming initiatives apply the installation of physical measures, such as speed cushions or speed humps, to slow the speed and control the volume of traffic in order to improve safety on local streets. However, vertical deflection measures such as speed humps and raised crosswalks, and obstruction measures such as diverters and road closures, while often effective in reducing traffic volumes on local and neighbourhood collector roads, have been met with challenges in recent years. Two issues have become evident and increasingly frequent:

1. Too often the traffic calming process creates divisions between neighbours. The typical toolbox of solutions (traffic circles, speed humps, road closures, etc.) is seen to be generally reactive, and many devices remain deeply unpopular.

2. The roots of the neighbourhood concerns quite often reveal underlying problems such as lack of connectivity, lack of pedestrian facilities, and personal security concerns; the solutions for which are outside the scope of the traditional toolbox of traffic calming measures.

Due to these unaddressed issues, some neighbourhoods have had to revisit their traffic calming plans on multiple occasions and the process has been drawn out, resulting in frustrations that have sometimes led residents to take matters into their own hands. At the same time, Canadian municipalities are increasingly embracing the tenets of sustainability with respect to transportation, by planning for and accommodating sustainable travel modes (i.e. pedestrians, cyclists, skateboards, etc). While traditional physical traffic calming measures can be effective in reducing speeding or cut-through traffic in neighbourhoods, and can accordingly improve safety conditions for these alternative travel modes, they do not typically improve the infrastructure designed primarily for them.

ii. Study Process

In recognition of Alberta municipalities requiring strategies to deal with these issues, the Centre for Transportation Engineering & Planning (C-TEP), with support from Strathcona County, retained Opus International Consultants (Opus) to establish a framework for a new, less controversial way of looking at, and expanding transportation choices at the neighbourhood. The resulting framework is called Sustainable Transportation Assessments for Neighbourhoods, or STAN. In developing this framework, Opus envisaged and completed the study as four major tasks:

1) Confirm Current Issues in Alberta Neighbourhoods

2) Conduct a Literature and Best Practices Review

3) Develop the Framework

4) Test and Finalize the Framework

iii. Current Issues in Alberta Neighbourhoods

Stakeholder interviews were conducted with engineering and planning departments at Strathcona County, and the Cities of Edmonton, Calgary and Lethbridge, to better understand the issues surrounding current traffic calming procedures. The stakeholder interviews enabled the study team to better understand the current issues municipalities were experiencing with traffic calming, and provided an excellent insight into some of the innovative approaches already taking place in Alberta.

It was made clear that each neighbourhood throughout Alberta has distinctive characteristics and should have unique solutions. These solutions are not always available in the *Canadian Guide to Neighbourhood Traffic Calming (TAC, 1998)*. Each municipality stressed that implementing traffic calming devices is difficult technically, politically and financially. Accordingly, alternative solutions that are less of a drain on resources are desired.

Each municipality valued efficient and effective public participation throughout the traffic calming process. The success of a traffic calming project is generally measured by successfully reducing vehicle speeds and vehicle volumes and through positive feedback.

It was stressed that an understanding of underlying factors contributing to traffic issues was required to adequately address the respective issues. Not all traffic-calming-related complaints were directly aimed at speeding or cut-through volumes. Opus used examples from the municipalities' traffic calming experiences, along with traffic calming studies Opus has completed and factors revealed in the literature review (discussed in the following section) to develop a list of common underlying factors relating to these complaints. These factors formed the basis of the second phase of STAN, and are given a brief overview in the following sections.

The consultative process revealed a need and desire on behalf of the participating municipalities for a review process aimed directly at providing solutions to improve conditions for pedestrians and cyclists, with an indirect benefit of helping to slow vehicle speeds and reduce short-cutting traffic. Ideally, this process would potentially eliminate the need for a traditional traffic calming study, and associated physical traffic calming measures.

iv. Emerging Practices in Sustainable Neighbourhoods

In developing the STAN framework, a literature review was conducted on leading innovative and sustainable practices in traffic calming and neighbourhood design. The review confirmed an awareness that traffic calming projects not only have the ability to provide traffic solutions, but they also have the potential to create safer, more attractive streets through landscape architecture and place making. Nearly all traffic calming devices and initiatives promote green travel options, at least indirectly. Increasing the number of pedestrians and bicyclists has been shown to both slow traffic and reduce

congestion. Accordingly, where there are active modes present, the need to install physical traffic calming devices may be redundant. Bicycle lanes and the implementation of *Safe Routes to School* programs, for example, are widely adopted to achieve such goals.

Building on the experiences and lessons from the initial wave of traffic calming, and embracing the contemporary return towards encouraging a range of travel modes, a so-called second generation of measures has emerged, with its roots again in Europe. While this movement acknowledges the efficacy of traditional physical calming devices in lower vehicle speeds, their reactive nature typically fails to address underlying issues of the driving environment. Experience shows that the best slow traffic environments are ones where physical speed management devices are not needed. Rather, tools such as *naked streets* (the complete removal of traffic signals and control signs) and *mental speed bumps* (social activity in the street) limit forward visibility and create an environment which instinctually lowers speeds. These visual changes to roads have been linked to more attentive driving, reduced speeds, reduced crashes, and greater tendency to yield to pedestrians.

The STAN framework accordingly attempts to reconcile the difficulties experienced with implementing and sustaining effective physical traffic calming measures by forwarding less invasive contemporary practices that are appropriate for application in the Albertan (and Canadian) environment.

v. The STAN Framework

Where the traditional traffic calming process often uses physical measures to slow or redirect vehicles on neighbourhood streets, potentially improving conditions for pedestrians and cyclists, STAN reverse this process. Through a more thorough diagnosis of underlying traffic issues in a neighbourhood, the STAN framework provides solutions which directly improve conditions for pedestrians and cyclists, with the resulting mitigations helping to slow and reduce short-cutting traffic where necessary. By providing for sustainable travel modes and encouraging sharing of the roadway, STAN improve the overall health and mobility of the neighbourhood without dramatically (and unrealistically) impeding motorists.

At its core, the STAN framework is a straightforward process. The underlying contributing factors of a particular traffic issue are determined by the collection and review of traffic and active transportation data, consultation with the public, and a site visit where appropriate. Depending on these factors, a range of solutions is provided whereby the impact to traffic by means of physical measures is limited. In some cases, for example, where speeding on a local road is confirmed by data to be mostly the result of unwanted pass-by traffic, proceeding with a traditional traffic calming process may be warranted. FIGURE I illustrates the components and stages of the STAN framework.

The effective use of the STAN framework requires that several policies and practices promoting healthy, vibrant neighbourhoods that provide a variety of transportation options be in place and actively pursued. Mandatory policies and practices include a road classification scheme, appropriately designated school and playground zones, and regular arterial and collector road reviews. Additionally, safe routes to schools/traffic management plan for pick-up and drop-off, multi-modal plans and active transportation policies such as those promoted in *Promoting Sustainable Transportation through Site Design (ITE, 2004)*, are also strongly recommended.

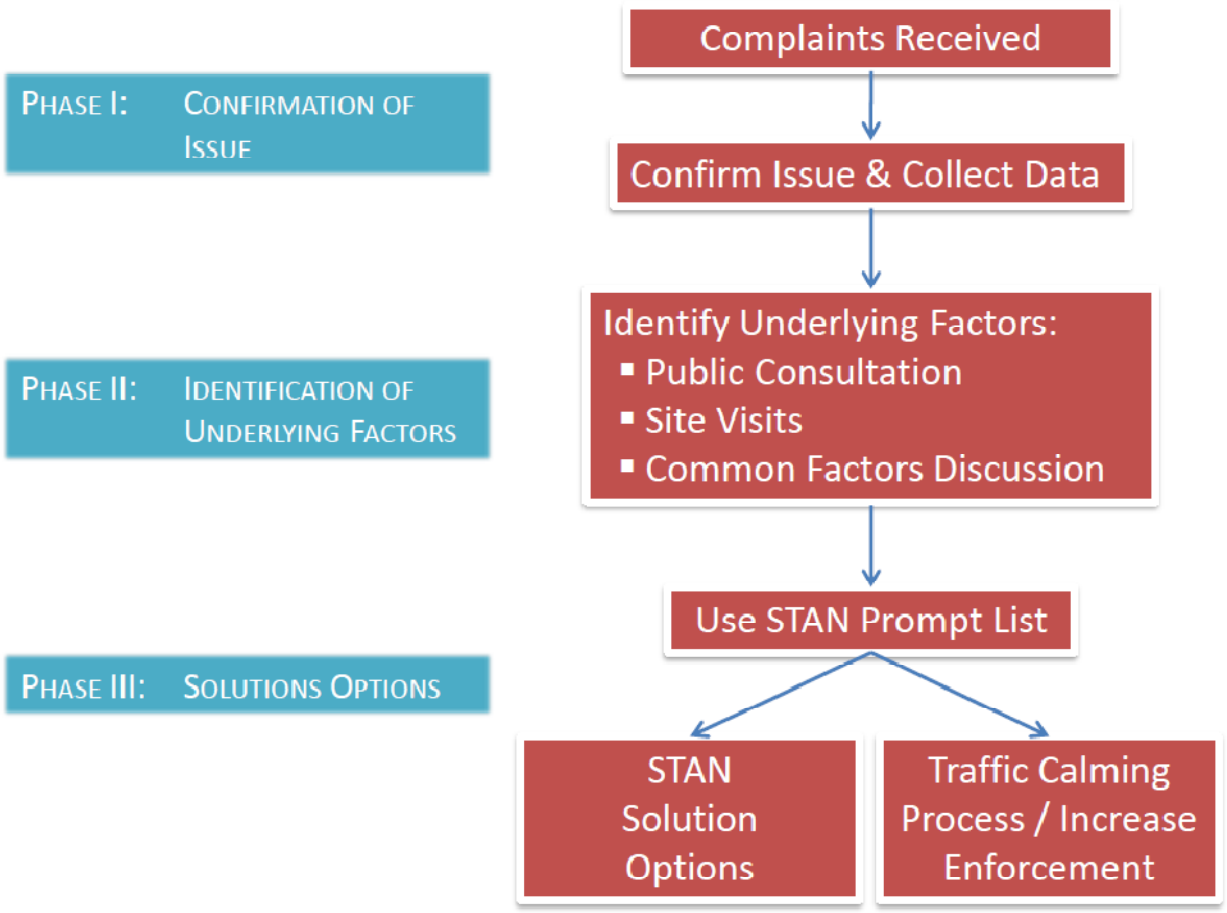

FIGURE I STAN FRAMEWORK

Phase I: Confirmation of Issue

The initial phase of the STAN framework is similar to a traditional traffic calming study. Requests for traffic calming are typically received in writing and must contain sufficient information outlining the perceived problems or issues for due consideration.

Traffic data should then be collected at identified locations to confirm the stated complaints. Proper data collection helps to confirm whether a reported traffic issue is either valid or perceived. In addition, it would also be helpful to conduct pedestrian and cyclist counts to not only confirm the existing issue but to compare before-and-after results. The *Canadian Guide to Neighbourhood Traffic Calming (TAC, 1998)* provides a detailed methodology for the collection of data and should be consulted in lieu of an existing policy.

Phase II: Identification of Underlying Factors

When investigated in detail, the roots of neighbourhood concerns – whether speeding traffic, high volumes on local roads, or other typical traffic calming process generators – quite often reveal underlying problems such as a lack of connectivity, lack of pedestrian facilities, and personal security

concerns. The solutions for these are typically outside the scope of the traditional toolbox of traffic calming measures.

After the traffic issue has been identified and quantitatively measured, the second phase of the STAN framework aims at the identification of its underlying cause(s). Opus used its firsthand experience conducting numerous traffic calming studies for municipalities throughout British Columbia, as well as findings from the literature review and stakeholder consultation to help develop a comprehensive list of common underlying factors behind resident concerns. In addition to the traffic data collected in the first phase, two additional strategies help determine the contributing factors: consultation with the public and conducting a site visit to the problematic location.

Five of the most common factors identified in the STAN framework as contributing to concerns and situations of excess vehicle speeds and volume in neighbourhoods are outlined here.

Lack of Pedestrian Facilities and Crossing – Complaints stemming from residents of a neighbourhood are often directly related to a lack of appropriate pedestrian facilities in the area. For instance, while speeding on a local road could be presented as an issue (and potentially confirmed by data) it may be due to an absence of sidewalks that pedestrians are forced to walk on the edge of roads. The resulting proximity and exposure to passing vehicles leads to a heightened perception of speeding. Fearing for their safety, pedestrians may resort to using automobiles, adding further volume to the road network.

Wide Cross Sections – Over-designed road facilities are a common underlying factor in cases of speeding on neighbourhood streets. Many postwar North American neighbourhoods were designed to provide maximum efficiency for the automobile. Consequently, many residential roads have unnecessarily wide lanes, providing motorists with an unrealistic sense of safety at higher vehicle speeds.

Wide Corners – Large radius intersection corners permit motorists to turn at higher speeds than corners with smaller radii. Similar to the wide road cross-sections of many postwar neighbourhoods, wide street corners are commonly found in older neighbourhoods. As motorists realize they can (perceivably) safely navigate the corner at higher speeds, the roadway becomes less safe for pedestrians and cyclists.

Inappropriate Speed Limits – Studies have shown that in cases where the speed limit of a road was lowered without accompanying changes in the surrounding environment, and the perception of regular enforcement, motorists will generally continue drive at the speed at which they feel comfortable. Effective speed limits are typically context sensitive.

Issues on Surrounding Roads –In cases where the operating conditions of collector roads and arterial roads that surround a neighbourhood are operating poorly, local residents may be subject to increased traffic volumes resulting from short-cutting motorists. It is important to differentiate these instances with one-time or occasionally repeating special events, which can also lead to traffic rerouting.

Phase III: Solution Options

The third and final phase of the STAN framework determines potential mitigation measures from the underlying factors surrounding the traffic issue identified in the second phase, whether related to speeding or cut-through traffic. In cases where traffic and anecdotal data confirm the presence of a speeding or cut-through traffic issue, a traditional traffic calming process or additional enforcement may

ultimately be recommended. However, by focusing on improving conditions for pedestrians and cyclists, there may be locations where neighbourhoods can tolerate some traffic issues, provided there is a safe place for all travel modes to efficiently move about.

The STAN framework presents a prompt list, shown in FIGURE II, with several questions regarding underlying factors associated with the traffic issue investigated and confirmed over the two previous phases. Each question should be answered either as *yes* or *no*. Where any neighbourhood achieves four or more *yes* answers, it will be a candidate for greater enforcement or a traditional traffic calming process, potentially leading to the implementation of physical traffic measures. For each questions answered *no*, the framework presents a series of potential mitigation measures aimed at improving facilities for non-motorized road users.

For instance, in situations where pedestrian facilities are not provided (i.e. the first question on the prompt list is answered no), the following mitigations are recommended under the STAN framework:

- Implementing sidewalks or other pedestrian facilities on key corridors (where key corridors may be defined as routes fronting schools, safe routes to school, routes fronting and linking pedestrian generators, etc.)
- Providing pedestrian links (pathways)
- Initiating a *Safe Routes to School* process (if not initiated as a recommended prerequisite)
- Improving the design of existing pedestrian facilities (i.e. provide curb and gutter, incorporate boulevards, etc.)

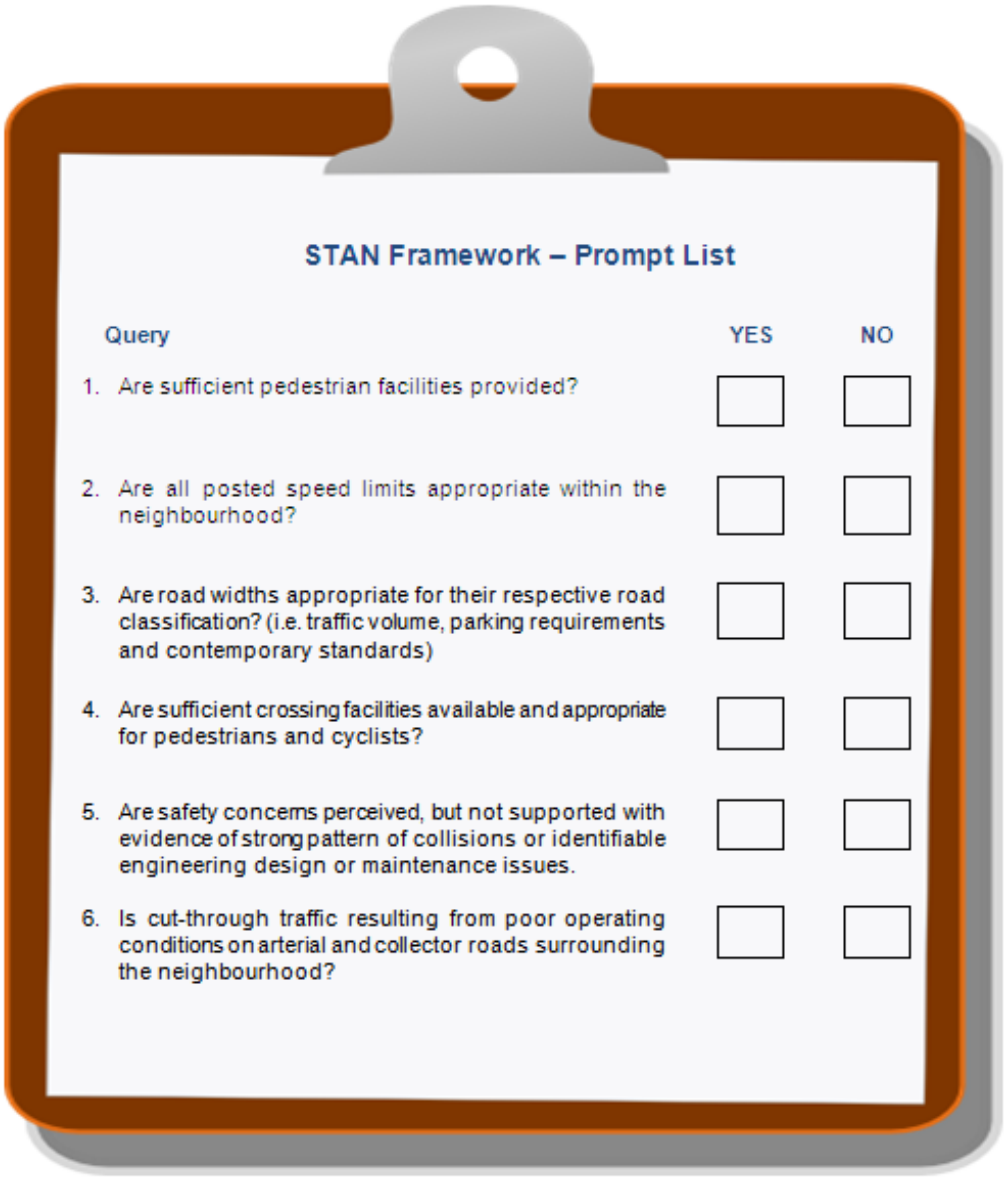

FIGURE II STAN FRAMEWORK PROMPT LIST

vi. Testing the Framework

To further refine the STAN framework, the project team worked with staff at Strathcona County, Alberta to examine an existing recently traffic calmed area. The framework was used to determine the suitability and robustness of its recommended solutions as compared to those resulting from the traffic calming process.

The area selected for review was the County's Mills Haven neighbourhood. Main Boulevard is a collector road in the neighbourhood, situated approximately 10 kilometres east of the City of Edmonton. The roadway traverses a 1970s era subdivision, and is largely fronted by single family homes. Three schools are also located on the street, as well as commercial nodes at each end of the study corridor (where it

meets arterial roads). In response to concerns with the condition of the road's asphalt surface, high traffic volumes, vehicle speeds and pedestrian safety concerns, a traffic calming process was initiated.

STAN Phase I – Confirmation of Issue

In line with STAN recommendations, data was collected to help confirm traffic issues in the Mills Haven neighbourhood. A license plate survey revealed approximately 15 percent of traffic was short cutting through the neighbourhood, slightly higher than would be expected for a collector road. Several speed surveys were also undertaken, however no significant issues were revealed.

It was noted that the county did not have a Safe Routes to School program in place, a recommended pre-requisite STAN policy. Strathcona County is also in the process of finalizing a review of its school and playground zones and areas, which is another recommended pre-requisite.

STAN Phase II – Identification of Underlying Factors

The discussion of underlying factors in STAN was reviewed. In general, Strathcona County was effective in determining underlying issues behind resident complaints through a comprehensive public consultation process. A lack of adequate pedestrian facilities was revealed. The existing 0.95m wide monolithic sidewalk was seen as narrow and (with the adjacent roll-over curb) exposed to traffic on Main Boulevard. While residents complained of speeding, county staff felt this perception was in part due to the proximity of pedestrians to traffic.

The relatively wide cross-section of the road was also identified as contributing to elevated (though not excessive) vehicle speeds. Traffic operations on surrounding arterial roads were not felt to contribute to excessive cut-through traffic on the study corridor. Both of the issues would have been uncovered by the STAN framework.

STAN Phase III – Solution Options

The STAN prompt list shown in FIGURE II was used to compare solution options put forward by the framework and those implemented in the Mills Haven neighbourhood. In most cases the framework recommended solutions that were implemented as part of the Main Boulevard traffic calming process. For instance, improved pedestrian facilities (i.e. wider sidewalk, physical separation from roadway, shorter crossings) and a narrowing of the overall road width were both implemented by the County.

The STAN framework also suggested several potential mitigations not adopted by the county. The addition of painted on-street bike lanes to Main Boulevard was not considered viable, as the county does not currently have any on-street bike lanes, or a bicycle master plan. The County is considering undertaking a Safe Routes to School study – another STAN recommendation – with the county acknowledging that residents are still expressing some concern over the safe access of schools throughout the region.

Discussion

It was acknowledged that the Mills Haven traffic calming experience was positive, with residents generally approving of the process and resulting solutions. The STAN framework was seen as effective in both recommending viable solutions (with many implemented by the county), and identifying potential policy gaps, which may ultimately lead to the study corridor being revisited. Through discussion with the County, it was also determined that the framework process could be considered when planning for and implementing new neighbourhoods. Minor changes to the framework were made to accommodate this.

vii. Conclusions and Next Steps

To maximize the value of the STAN framework, Opus recommended that C-TEP consider the following actions at the conclusion of this study:

Circulate and Promote Study Deliverables to Municipalities and Road Agencies

The benefits of the new knowledge provided by this study would be realized through the sharing of the report deliverables to municipalities, road agencies and within the industry in general. This would include posting it to C-TEP's website. Online availability would be a particularly valuable and practical tool to an international community looking at innovative ways to provide their communities with sustainable transportation solutions. To properly describe the framework, training could be arranged for municipality staff, road agencies and other stakeholders in the industry.

Adapt the Framework to Current Policies and Standards

The STAN framework was developed using language appropriate for municipal policies and could readily be adopted by any municipality. The framework is designed to address the unique characteristics of any neighbourhood and can be tailored to meet the specific needs of any community. Municipal road agencies should be encouraged to review the framework for compatibility with their own practices. Existing policies could refer to the STAN framework as supplementary guidance, or could be adopted in whole or in part into existing practices.

References

N/A – All Figures are original to the manuscript

Tables

N/A

Figures

N/A

SPEAKER'S BIOGRAPHICAL NOTES

2011 TAC Annual Conference
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Name (no initials please): Gregory Ablett, EIT and Jason Bell, EIT

Paper Title: A Framework for Conducting Sustainable Transportation Assessments for Neighbourhoods

Session: Effective Methods for Identification of Potential sites for Road Improvements

Biographical Notes:

Greg is a Transportation Engineer in Opus' Vancouver office. A graduate of the University of Western Ontario, Greg has recently assisted in developing a comprehensive traffic safety engineering guide for accommodating older road users for use by public agencies, and a guide to collision reduction methods for Alberta Transportation.

Jason is a Transportation Engineer in Opus' Calgary office. A graduate of the University of Calgary, Jason is also involved in the safety review of Alberta Transportation's guidelines for Human Powered Trails in Highway-Right-of-Ways.

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