

Appendix 2 – Best Practices Review



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Memorandum

To/Attention	Project File	Date	October 3, 2017
From	Don Drackley	Project No	111131
cc			
Subject	Best Practices Review: One to Two-Way Street Conversion Sault Ste. Marie Downtown Traffic Study		

Summary

The questions of whether and how to convert downtown Sault Ste. Marie one-way streets to two-way is an important decision by the City. This decision can be aided by considering similar decisions in other cities. IBI Group staff have been involved in a number of downtown one-way street conversion investigations and projects (Kitchener, Cambridge, London, Hamilton, Sarnia, Kingston). We have also conducted a literature search of conversion examples from other cities, mainly in the USA. Common findings from this peer review include:

- Conversions were implemented or planned in response to core area revitalization objectives;
- Conversions most commonly involved signal and signage adjustments, as well as capital works within the street right-of-way;
- Some staff concerns about resulting traffic changes were noted, but in each case, the traffic level of service remained at acceptable levels (i.e. no congestion);
- In each case, the public eventually accepted the conversion with minimal problems;
- In each case, response from the business community was positive (more business exposure and accessibility); and
- No economic analysis of business conditions before and after a conversion has been noted.

Recommended / Implemented Conversion Examples

Hamilton, Ontario

Growing traffic concerns in Hamilton pushed the City to consider one-way street operations. In 1956/57 the City had gone forward with converting a large portion of its downtown streets network to one-way operation. From the late 1950s and 1960s, expansion of the one-way street network continued despite growing dissatisfaction, particularly from business owners in the downtown who experienced an observed steep decline in business as a result of the system.

During the 1990s to the present, the City investigated further methods of revitalizing the downtown's prosperity and livability. Reverting roadways to two-way traffic operation was considered for further investigation to accomplish the downtown's transformation. Since 2001, several roads, or portions thereof have since been converted to two-way traffic operation, including James Street and John Street shown in the following photos, plus four other one-way streets as recently as June 2013.

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BEFORE



TODAY

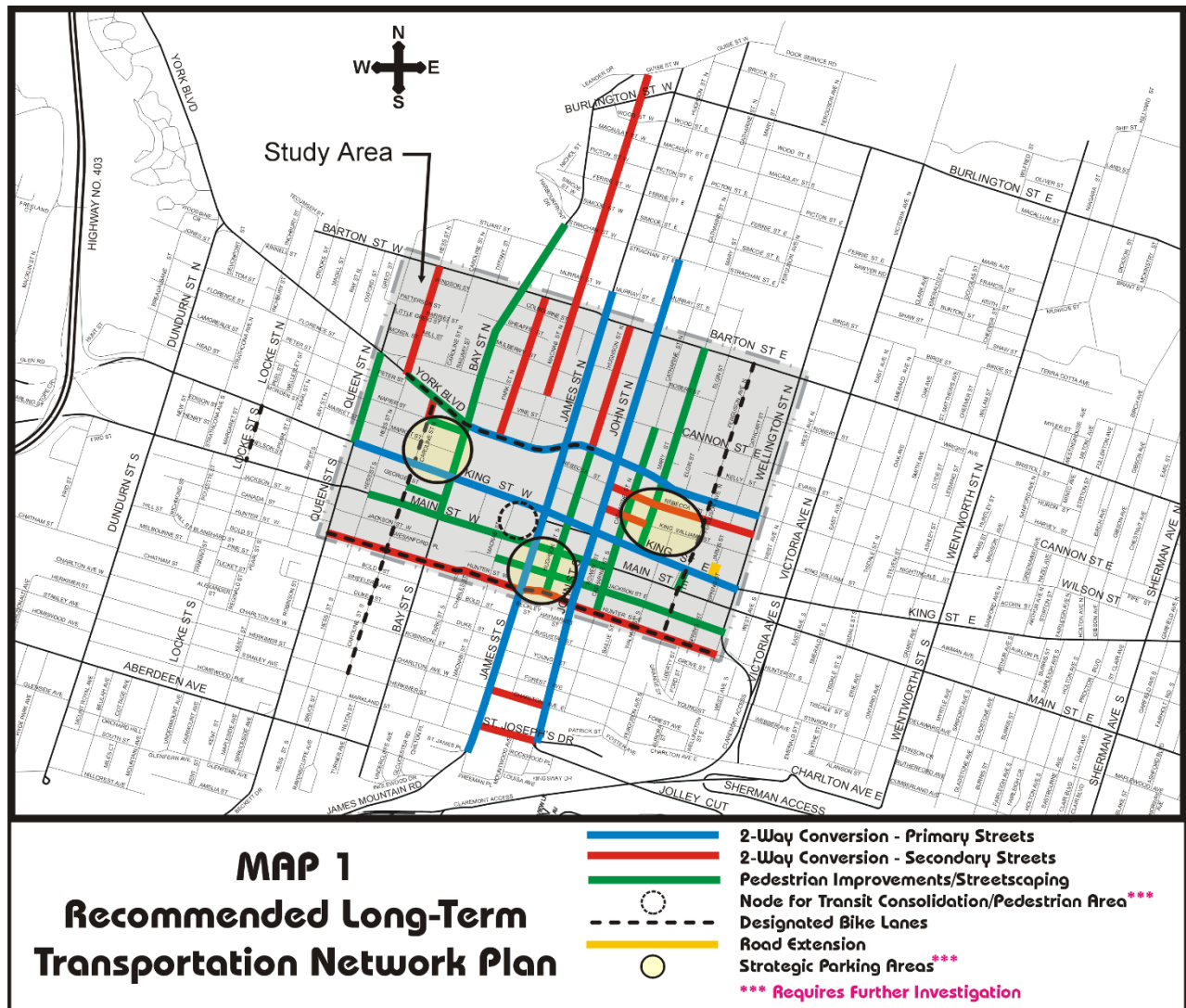


The impetus for these conversions was the City's Downtown Transportation Master Plan prepared in 2001. One recommendation of the Master Plan was to convert a number of downtown streets from one-way to two-way operation as shown in the next graphic.

The first phase of the one-way to two-way conversions was completed in Fall 2002 involving relatively short sections, and seen as a means of testing the impacts of one-way to two-way conversion prior to widespread implementation. To support this test, the City undertook both traffic volume and travel time delay studies before and after the conversion. The Hamilton Street Railway, the local transit authority, also maintained records of bus travel times before and after conversion.

The James Street and John Street conversion has had the effect of slowing travel speeds and increasing travel times by up to 50% depending on the section and direction of travel. In general, there has been a very positive response from the business and residential community despite increased travel times.

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As shown in the following table, the primary advantage of one-way streets is improved traffic capacity.ⁱ It has been estimated that a pair of one-way streets can accommodate as much as 50 percent more volume than two parallel two-way streetsⁱⁱ. One-way streets also have considerably fewer conflict points than two-way streets because opposing left turns are eliminated. It has been shown that total accidents can be reduced by 10-50 percent when two-way streets are converted to one-way operationⁱⁱⁱ.

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General Characteristics of One and Two-Way Streets

Factor	One-way Streets	Two-way Streets
Traffic Movement	Signal systems can be designed to optimize traffic progression thereby increasing capacity	Less throughput capacity, but increased routing options may reduce overall travel distance required
Safety	Fewer conflicts at intersections	Increased conflict points, but generally slower traffic speeds
Loading and Parking	On two lanes streets, loading and parking can occur without completely blocking traffic	A minimum of two lanes are required for traffic movement, which may reduce parking and loading opportunities
Air Pollution	Smoother traffic progression results in less emissions per vehicle-kilometre	Improved pedestrian environment, reduced traffic speeds, and more accessible transit may promote use of modes other than cars, thereby reducing overall emissions
Pedestrian Environment	Higher traffic speeds can be deterrent for pedestrians	Lower traffic speeds are not as intimidating for pedestrians
Cycling	High traffic speeds can deter cyclists; indirect routing may promote riding in wrong direction on one-way streets.	More direct routings minimize cycling distances
Transit	Transit users must board at different location than where they exit.	Transit users board and alight at same location; slower traffic speeds may also reduce bus speeds.
User Understanding	Can be difficult for drivers unfamiliar with street system	Universally understandable

While the reduction in conflicts reduces collision potential, the benefits may be offset somewhat by higher travel speeds on one-way streets and therefore more severe collisions. From a pedestrian safety perspective, the impacts of one-way streets are mixed. One-way streets are easier to cross at mid-block locations because pedestrians only have to look in one direction, and can usually cross through traffic gaps of significant size. However, at intersections, drivers crossing one-way streets tend to look only in the direction of on-coming traffic and may not see pedestrians crossing in the opposite direction.

Compared to one-way streets, two-way streets generally exhibit slower traffic speeds and as a result are viewed as more pedestrian friendly, particularly to pedestrians on parallel sidewalks. Two-way streets also provide more direct routing than one-way streets and can therefore reduce “out-of-direction” travel. Research has shown that compared to a two-way street system, distances travelled between origins and destinations within the system is usually 20 to 50 percent greater in a one-way street system^{iv}. While this out of direction travel may not be significant for auto drivers, it is significant for cyclists and transit users.

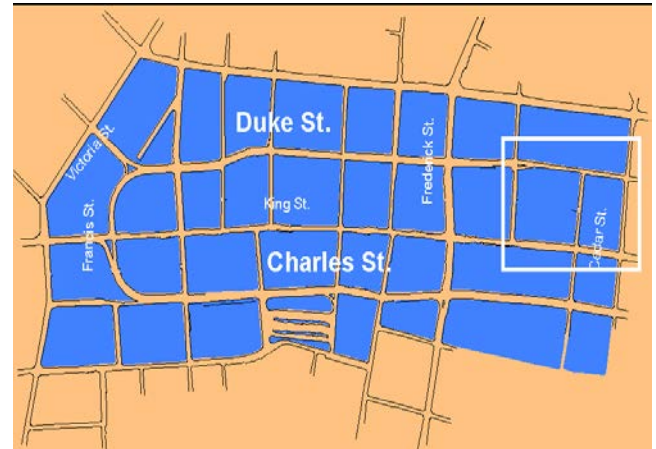
Several small but important elements were included in the design for the conversion including:

- Modifying curb radii to ensure adequate clearance in new turning directions;
- Extending an existing loading area to make up for losses in loading opportunities permitted by the one-way system;
- Removing on-street parking in specific areas to allow for turning lanes, while adding parking in other areas to the extent possible; and,
- Adding extensive signage to warn drivers of the new directions of travel.

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Kitchener, Ontario

The Duke/Charles one-way pair shown here was converted to two-way operations in 1997 following Regional and City Council approval of the Downtown Kitchener Transportation Study. The conversion involved changing the two one-way arterials (Duke / Charles) to two-way operations along ten linear blocks of the core. The study and conversion decision originated from the Mayor's task force on downtown revitalization, concerned in part by empty or underutilized "main street" property, social problems and adjacent neighbourhood impacts.



The pre-conversion downtown street system operated very well at LOS B, but was also characterized by 85th percentile speeds exceeding 63 kph compared to the posted 50 kph. The conversion required:

- Turning radius improvements;
- Some intersection realignments to resolve line-of-sight limitations with two-way operations;
- Minor modifications to ramps at two parking structures originally designed for one-way service;
- Widening the Duke Street parking lane to provide a shared parking/cycling lane;
- Some relocation of on-street parking to provide for bus turning.

The conversion cost \$400,000 (1997 \$) for traffic signal modifications that would have been required irrespective of the conversion, plus \$500,000 in capital changes on the two affected streets. The general conclusion of involved City staff and the Downtown Business Association (DBA) is that with no traffic operation or LOS problems, the conversion has supported business revitalization in the core. However, since the conversion, the Kitchener core area has also experienced a large number of new development projects that have helped stimulate downtown investment. The City also actively promotes and programs many outdoor events in the downtown, and this has also contributed to the revitalization.

There was no formal monitoring of business impacts associated with traffic conditions to relate the revitalization to the one-way conversion. In fact, many officials believed the efforts of the City and DBA would have resulted in successes with continuation of the one-way system. However, these improvements, and increases in core area employment, do confirm that the two-way system is capable of accommodating the increased traffic generation.

According to the DBA, the improvements also changed the character of downtown traffic, primarily represented by slower speeds, and this has been one of the contributing factors to the increased attraction of the core, especially for residential development and intensification.

Cambridge, Ontario

Downtown Cambridge was facing business-related changes and challenges in the late 1990s. In response, the City initiated a number of revitalization efforts, including consideration of how the core's one-way couplet system on Water and Ainslie Streets could be reverted to two-way in hopes of changing the "character" of downtown traffic to be more compatible with, and supportive of downtown business.

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A two-way conversion was constructed in association with other business revitalization and streetscape improvements in the core. The conversion was constructed over a single weekend in 2004, and although the converted streets now exhibit slower speeds resulting from two-way traffic, the lack of a truck bypass around Cambridge results in continued heavy vehicle movements through the core. But considering this, traffic conditions on the converted streets through the core still reflect acceptable Level-of-Service, and merchants were and continue to be supportive of the change.

Examples of Conversions Not Recommended and Why

Brantford, Ontario

As part of the City's Transportation Master Plan, the technical feasibility of converting the Colborne Street and Dalhousie Street one-way couplet in downtown Brantford was studied in a Class EA. Recognizing that the conversion to a two way street system may not necessarily need to include the entire study area, or may be implemented in phases, a series of one way street conversion scenarios assessed including full and partial conversion.

Partial conversion scenarios were eliminated from further consideration due to safety concerns with the two way street system termination treatments. Ideally, the transition between the two way street system and the one way street system should physically prevent the possibility of wrong way movements to avoid the potential for head on collisions. Based on the restricted geometry within the downtown street system, each potential termination area was reviewed to determine if an adequate design was possible within the existing property limits. At each of the potential termination intersections, design measures could not be introduced to physically prevent head on collisions without significant acquisition of property or significant impacts to on-street parking and sidewalks.

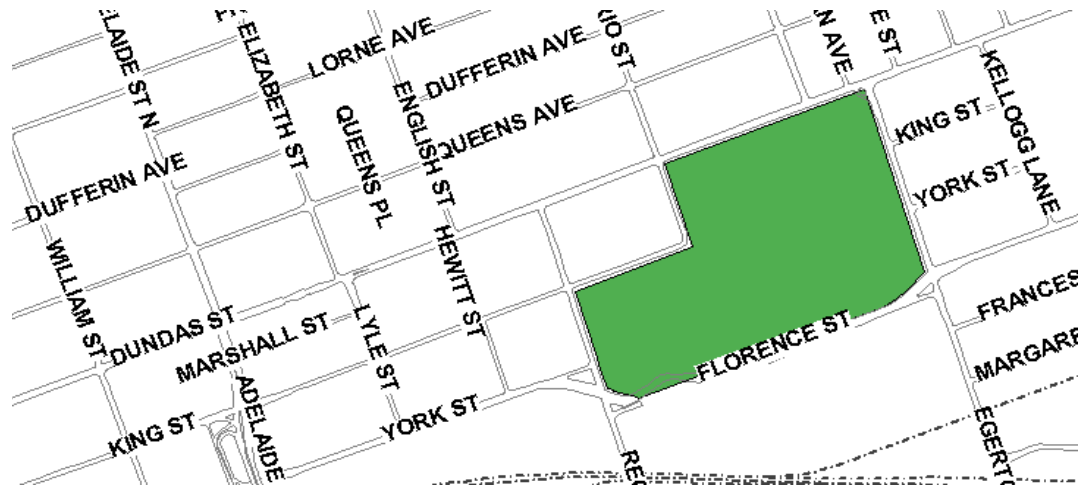
Over the past 15 years the downtown has also experience significant growth and improvement associated with the Wilfrid Laurier University campus established in the core.

For these reasons, the partial conversion was not recommended as a long term solution. As these risks may be mitigated, to some degree, through the use of traffic control measures such as signing, pavement markings and other warning devices, a partial conversion could only be considered as an interim measure during implementation of the entire system. This has not been supported by City Council based mainly on questions of cost / benefit.

London, Ontario

Based on the technical assessment carried out to convert King Street and Queens Street in downtown London as shown below to two-way operations, it was concluded that the risks and impacts of conversion would appear to outweigh the potential benefits to area businesses and residents. This conclusion was heavily influenced by the fact that businesses on Dundas Street, running between King Street and Queens Street already accrue the benefits of two-way traffic, and any changes to these one-way streets would unlikely alter volumes on Dundas Street by more than 10-15% under a best case scenario.

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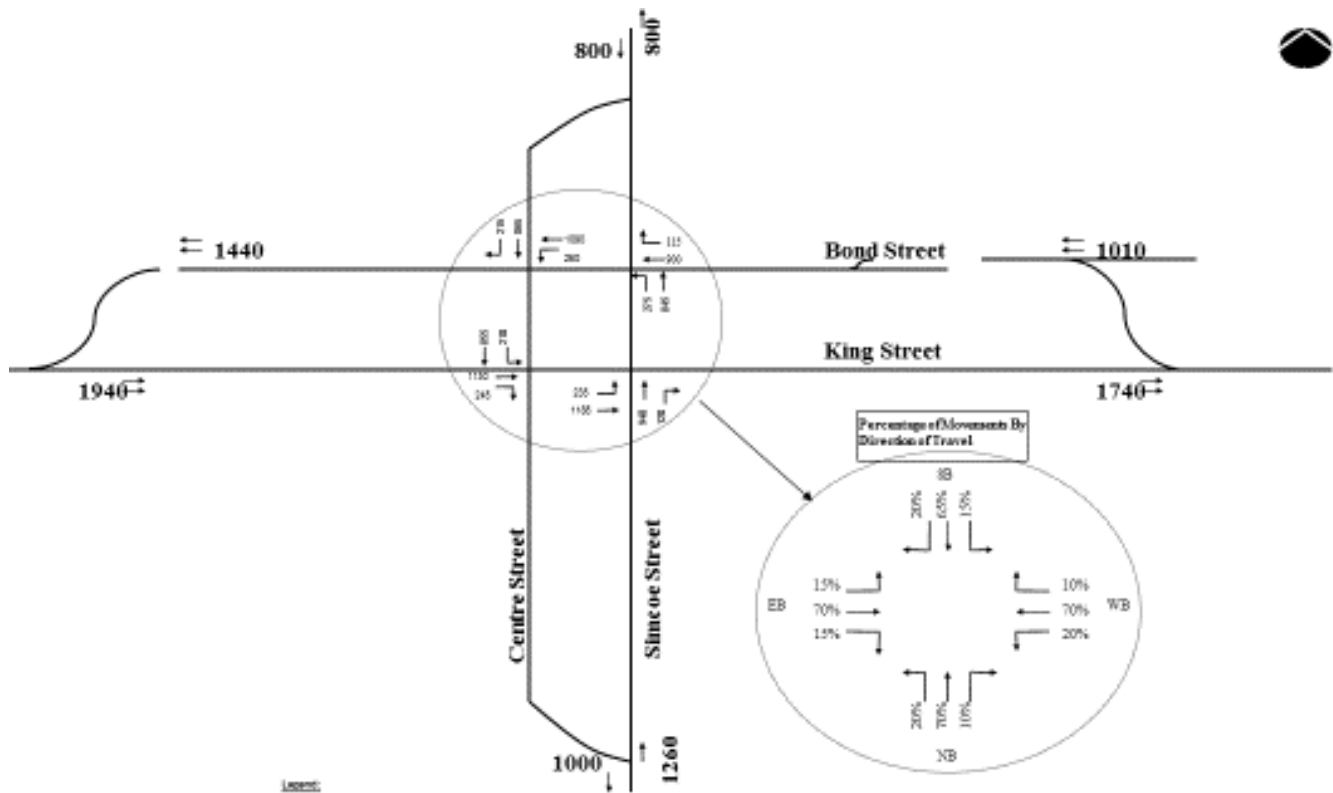


It was therefore recommended that, subject to the outcome of any discussions with area businesses and residents, the City pursue further the concept of implementing traffic management measures on Queens Avenue, and potentially King Street, in combination with minor operational changes on Dundas Street, but not convert the one-way street to two-way.

Oshawa, Ontario

A conversion of Oshawa's one-way street system to two-way began in 1996 as part of the downtown revitalization strategy. As a result of that exercise, one-way sections of four one-way streets were first converted to two-way operations. Council then decided to proceed with a phased investigation of the practicality, feasibility, cost and impacts of converting the major King/Bond and Simcoe/Centre one-way couplets shown below in the downtown to two-way operations. Council would then decide whether to continue this review into design and implementation planning.

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Both full and partial conversion concepts were evaluated for King/Bond because of its length. Three final conversion alternatives were evaluated and compared with Existing Conditions:

- Full Two-Way Conversion along the entire length of the Simcoe/Centre and King/Bond pairs, with 2 lanes per direction and sufficient intersection turn lanes;
- North-South Simcoe/Centre Conversion only, and;
- East-West King/Bond Conversion only.

The evaluation concluded that the existing condition option is the most preferred alternative from purely a transportation perspective. Full conversion consistently ranked as the worst approach from the traffic perspective. The estimated capital cost (1996\$) of a North-South Conversion was 960,000 to \$1.43 million, and \$2.45 to \$3.15 million for East-West Conversion and \$3.41 to \$4.38 for Full Conversion.

From a purely economic perspective, this study concluded that the downtown's projected image, including the physical design and operation of the streets, has a direct impact on the area's ability to attract investment, including retailing. Therefore, the conversion alternatives were evaluated based on several economic factors, namely; exposure to potential clients, traffic speed and friction, parking, elements of intimacy, physical and psychological barriers and construction/disruption. Specific conclusions from this economic assessment were:

- Estimated 30% increase in traffic volumes along King or Simcoe Streets resulting from conversion would benefit adjacent retailers with acceptable operating conditions;
- Reduced speeds would increase motorist awareness of their surroundings in the downtown, thereby enhancing visibility;

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- The North-South Conversion of Simcoe and Centre offers the least potential impact on on-street parking (other than the Existing Condition), and;
- Retail sales are expected to increase from between 0.3 to 1.4% as a result of the North-South Conversion, depending on the extent of associated on-street parking loss.

Kingston, Ontario

Downtown Kingston has four one-way streets; Queen, Princess, Brock and Johnson. Princess Street is a successful “main street”, while Brock, Queen, and Johnson tend to be oriented to movement of traffic east and west through the downtown. Redevelopment efforts along Brock Street were less successful and upgrading was needed. Then the City built their new multi-purpose indoor stadium off Brock Street and the City hoped this would stimulate redevelopment on the street. To support this, Queen Street was converted to two-way operations but to date no significant redevelopment has resulted. The City elected not to convert Princess Street to two-way traffic because of the preference to maintain sidewalk space in front of businesses along the corridor.

Other Examples

Edmonton, Alberta

One-way east/west streets (102 and 103 Avenues, and two one-way north/south streets (105 and 105 Streets) were converted to two way operations in 1998/99. The reason for the conversion related to the Capital City Downtown Plan's recommendations for revitalization, to make access easier within the downtown and to make "escape" more difficult for through traffic, all in support of downtown business.

There was some minor public and business concern about resulting traffic congestion and accidents, but the conversion was implemented with very little incident. The general consensus was that the traffic conditions were not been negatively affected by the conversions. The conversions mainly involved signal and signage changes, as well as some minor geometric changes. There was a net increase of 170 on-street parking spaces, requiring additional parking metres. Transit lanes were reserved on the converted street, in some cases as a continuation of previous reserved lanes. The resulting capital cost for the conversions to date is estimated at \$1.1 million (1998\$).

The Edmonton Downtown Business Association said of the one-way conversion “*was a little thing that helped turn thing around*” in the core. The conversion was implemented in a relatively simple and straightforward way, and was readily accepted by the traveling public. Only minimal changes were noted in traffic flow after the conversion.

Ottawa, Ontario

Downtown Ottawa has a number of one-way pairs, and none have been converted to two-way operations along their total length based on reasons of roadway system capacity and operational needs. However, a number of short one-way sections have been reverted to two-way for two reasons: 1) to provide improved access to abutting businesses, and 2) to eliminate the problem of one-way commercial traffic circling on adjacent residential streets, including commercial truck traffic.

The Business Improvement Associations (BIA's) in areas with one-way streets commonly respond to business complaints about access difficulties caused by one-way operations. The short conversions, usually involving no more than a block section of a one-way street, were

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responded to well by both businesses and adjacent residents. In arguing for more extensive conversions to two-way, the BIA's have promoted that a healthy core in any major city, including Ottawa, will experience a certain degree of traffic congestion, and this results from a healthy business environment.

Green Bay, Wisconsin

The City converted three one-way streets in the core in late 1999. Medians were modified, new signal heads and underground signal facilities added and signs changed, at a total capital cost (excluding labour) of about \$40,000 (1990\$). There was no actual reconstruction involved, but only re-alignments and signal/signage changes. The reason for the conversion was to simplify the one-way core area intersections, with a single one-way pair now remaining. The City's downtown design plan indicated that this pair could also be converted to two-way, but staff recommended this be delayed for three reasons; 1) not convinced it will help improve business, 2) the remaining one-way pair connects to exit and entrance ramps at a major bridge, and 3) staff would like more time to monitor and evaluate the changes to date.

According to Downtown Green Bay Inc., business people have been generally positive about the conversion, but no measurable business impact analysis has been conducted. One positive outcome of the conversion was the creation of 300 on-street parking stalls when wide one-way routes were converted to narrower two-way streets with this added parking.

Lansing, Michigan

The one-way street conversion in downtown Lansing, the state capital of Michigan, involved three one way streets. No construction was involved, and little impact was noted since the conversion was implemented over one weekend, similar to Cambridge, Ontario. Generally, merchants supported the conversion, because they believed that one way streets are difficult for customers to navigate, and giving directions to visitors is confusing.

References

ⁱ Before and After Study of a One-Way to Two-Way Street Conversion in Downtown Hamilton, IBI Group and City of Hamilton, 2004

ⁱⁱ Institute of Transportation Engineers, Traffic Engineering Handbook, 4th Ed. Washington DC: Institute of Transportation Engineers, 1992.

ⁱⁱⁱ Wainwright, W.S., Traffic Safety Toolbox, a primer on road safety. Washington DC, USA: Institute of Transportation Engineers, 1999.

^{iv} Walker, G., Kulash, W., and McHugh, B., Downtown Streets, Are We Strangling Ourselves on One-way Streets, TRB Circular E-C019: Urban Street Symposium, Washington DC, Transportation Research Board, December 2000.