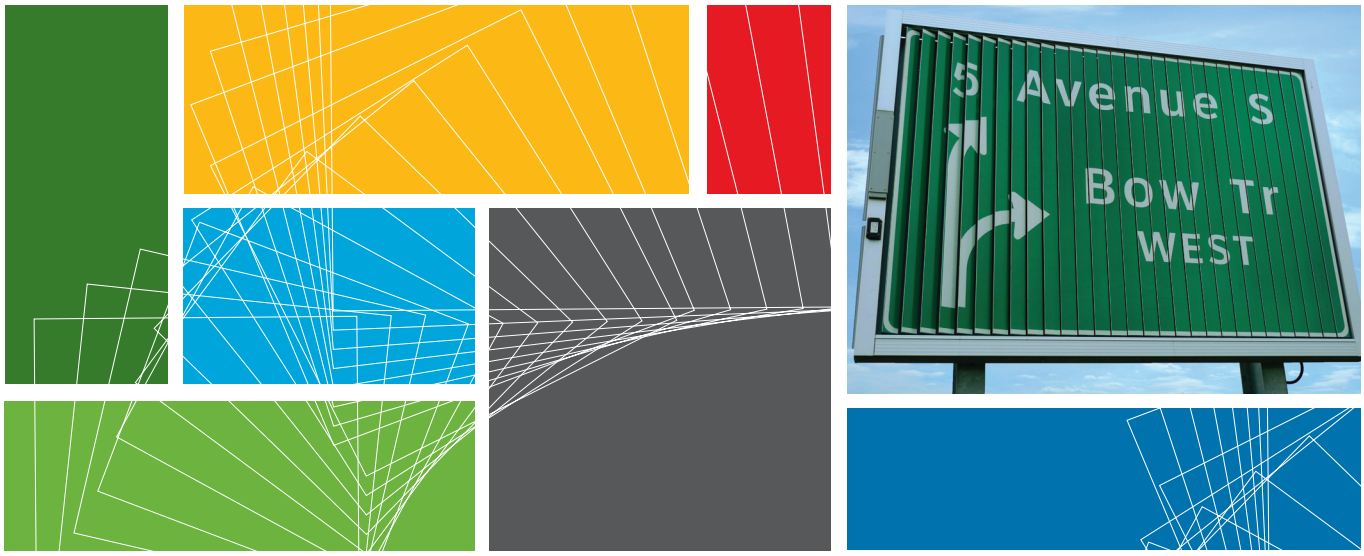
ISL Engineering and Land Services

PBA CONSULTING ENGINEERS

Inspiring sustainable thinking



CANADIAN CONSULTING ENGINEERING AWARDS 2011

Reversible Lane Control Systems

Category: Special Projects

Client/Owner: The City of Calgary
Transportation Infrastructure
Roads

Subconsultants: ICx 360 Surveillance Inc.

May 2011

Reversible Lane Control Systems

PROJECT BACKGROUND

In 2006, The City of Calgary established a “Transportation Optimization” division within its Transportation Planning business unit. Transportation Optimization was tasked with identifying, evaluating and planning improvements that would optimize the operation of the transportation system for all Calgarians. Inherent in this mission is the need to maximize the efficiency and capacity of existing road infrastructure, and to improve system operations without costly road construction projects that would impact established communities and neighborhoods. ISL Engineering and Land Services was retained by the City in the following years to work with Transportation Optimization in the detailed planning, design and implementation of numerous low-cost / high-value improvements throughout the city. In a short time, these improvements have helped achieve the program’s objectives to improve mobility for all modes of transportation.

An early success of the Transportation Optimization initiative was a pair of lane reversal projects in Calgary’s downtown core - the “5 Avenue Connector” morning reversal on Bow Trail, and the “3M10” afternoon reversal on Memorial Drive. The projects were both implemented by 2006 on a manual, trial basis, using pylons, barricades and temporary signing to direct traffic.

In 2008, based on the demonstrated effectiveness and wide public acceptance of the trial projects, the City engaged ISL Engineering and its partner firm PBA Consulting Engineers to complete functional planning, detailed design, procurement, construction and commissioning of automated control systems for both reversals.

As the first reversible lane systems to be implemented in Calgary since the late 1970s, the project was the first to be designed to modern ITS standards, with full control and integration into the City’s central Traffic Management Centre (TMC). Through a combination of traffic signals, traffic-control gates, dual-state sign boards and traffic-monitoring cameras, tied to the TMC through a fibre-optic network, central server and software platform, the City now has a flexible system that can be safely adjusted to a wide variety of traffic-flow needs. The automated systems were commissioned in March 2010.

Changing Signs on the 5 Avenue Connector

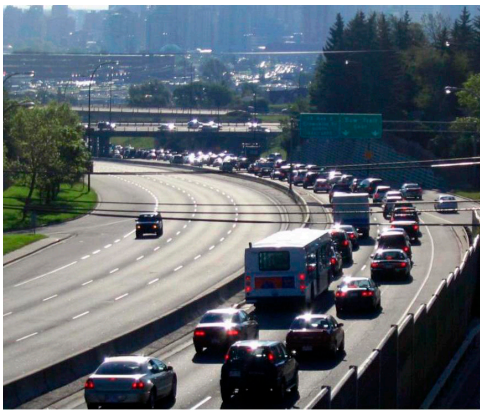
Traffic Control Gates at Bow Trail

5 AVENUE CONNECTOR

The "5 Avenue Connector" system provides an extra inbound lane to downtown Calgary by connecting the Bow Trail Expressway to 5 Avenue SW during the morning rush hour. The facility takes advantage of the highly-directional nature of traffic flows into and out of Calgary's downtown core, by allowing a portion of the morning rush hour's inbound traffic to divert to an under-used outbound roadway.

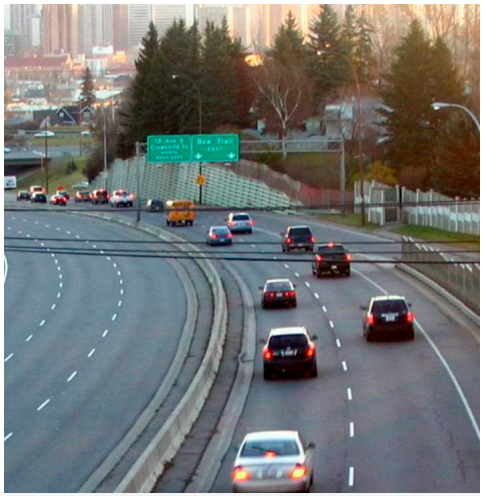
Prior to implementation of the Connector, all inbound traffic from Bow Trail was directed exclusively to the 9 Avenue corridor, and bottlenecked through a single signalized intersection at 11 Street SW. Queuing at the intersection often backed up well beyond Crowchild Trail, more than 2 km to the west. This was exacerbated by the need for high traffic volumes to make multiple lane changes over a short distance in order to turn left and head for 5 Avenue.

Functionally, the Connector now diverts traffic via the Pumphouse Road service road to the opposite side of Bow Trail, allowing vehicles to then continue travelling eastbound via westbound Bow Trail and connect directly to the 5 Avenue corridor with no weaving, turning or traffic signals to impede flow. Access to Pumphouse Road and local businesses is maintained at all times via ramps that open or close at different locations, depending on flow conditions.



Bow Trail Before the Connector

Practically speaking, the Connector has added the equivalent of a new lane of freeway capacity into the downtown core, while using existing pavement with only minor geometric revisions, such as a concrete barrier to safely separate opposing flows during the reversal period. Approximately 2000 vehicles now use the 5 Avenue Connector on a typical weekday morning. With the Connector in place, queuing on 9 Avenue has been reduced by more than 1.5 km. Travel-time delays into the downtown core were reduced by an average of 4 minutes per vehicle over the entire morning-commute period, with maximum peak-delay reductions of up to 11 minutes during the peak hour. This cumulatively saves more than 30,000 hours of idling time per year for Calgary commuters, improving quality of life along with the environmental benefits of reduced greenhouse-gas emissions.



Bow Trail After the Connector

Routing of the 5 Avenue Connector

Three westbound lanes on Memorial Drive

Variable LED Median Splitter Sign on Memorial Drive

3M10

The "3M10" lane-reversal system provides for a third westbound lane (3) on Memorial Drive (M) through 10 Street NW (10) during the afternoon rush hour. Memorial Drive is an historic roadway located just north of the Bow River, with the 10 Street intersection (Calgary's famed Kensington Corner) acting as a key commuter junction, facilitating access from the downtown core via the Louise Bridge to several routes in north Calgary. Recent initiatives by the City have also recognized the "Memorial" heritage of the roadway, paying tribute to Canadian war veterans through the "Landscape of Memory" project to enhance streetscaping, landscaping and plaza elements on the corridor.

Memorial Drive

Prior to implementation of 3M10, the 10 Street intersection was a critical bottleneck in the afternoon rush hour. The traffic signal was strained to accommodate high westbound traffic volumes on Memorial Drive and high northbound volumes on the Louise Bridge — the latter of which had already made use of reversible lanes since the mid-1970s. Queuing on Memorial Drive was often in excess of 2 km, leading many commuters to seek short-cut routes on parallel roadways through the adjacent Hillhurst and Sunnyside communities, often resulting in complete gridlock of the residential street network. Both of these inner city neighbourhoods highly value their proximity to the Bow River with its amenities, including green spaces and regional pathways, so the physical expansion of Memorial Drive to accommodate higher traffic flows would not have been a welcome solution.

The addition of a third westbound lane via the 3M10 reversal resulted in significant improvement of roadway operations, with the intersection now effectively discharging on every signal cycle with little carry-over of vehicle queues. Offset by minimal increases in eastbound delays, due to restricting flow to a single lane, the overall system saves more than 120 hours of net total delay every weekday, or more than 25,000 hours over the course of a year. More importantly, short-cutting through the nearby residential neighborhoods disappeared virtually overnight, significantly improving the safety and environment of the community. Incorporation of the "Landscape of Memory" theme within the design ensured that the automated system was non-intrusive and complimentary to the community.

PROJECT TEAM

ISL and PBA Team Members Enjoying Autumn in Calgary

The Reversible Lane Control System (RLCS) project to automate the 5 Avenue Connector and 3M10 systems was formally initiated by The City of Calgary in 2008. The client team was managed by the Transportation Infrastructure business unit, partnered with Calgary Roads, Traffic Signals division, who, as ultimate owners and operators of the facility, took a significant interest in its design and implementation. City of Calgary involvement crossed dozens of other departments, with the unique project requirements creating one of the most collaborative environments of any City project in memory.

Using a partnered approach, ISL Engineering led the multi-disciplinary consulting team, with responsibility for project management, transportation planning, roadway design, signing and marking design, detour design, utility coordination, environmental management, and construction planning and management. PBA Engineering was responsible for the electrical engineering, control system architecture, design of traffic-control devices, control cabinets, video-monitoring equipment, power distribution, communication networks, construction services and integration with the City's Traffic Management Centre (TMC.) PBA's sister firm, ICx 360 Surveillance Inc., provided hands-on support with control-cabinet assembly and adaptation of their Cameleon ITS™ control software.

The Contractor team involved a number of resources and suppliers. Procurement and construction occurred throughout 2009 by various methods including Requests for Proposals, Design / Build contracts, and traditional construction tenders. Field work was shared by ACE Construction Company, for electrical infrastructure and steel structure installation, and Graham Infrastructure for civil and structural construction, road modifications and landscaping. Key suppliers included Valid Manufacturing, for the traffic-control gates, Prismaflex International, for the prismatic message signs, and Interprovincial Traffic Services, for LED signs and signals. Final field wiring and commissioning involved extensive participation of the City of Calgary Traffic Signals Shop, whose hands-on work helped provide practical knowledge and training for future maintenance of the system.

ACE Construction Erecting a Camera Tower

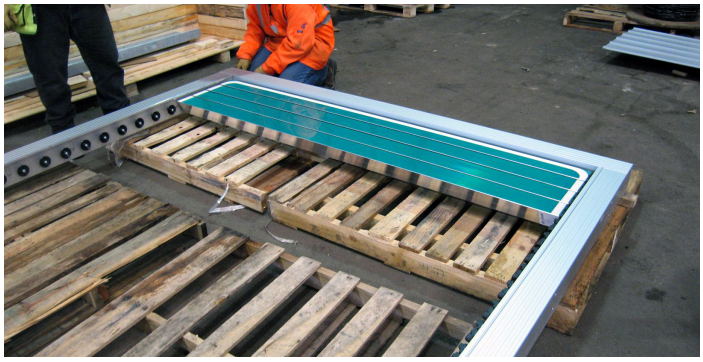
The RLCS project was completed within a total budget of $3.8 Million — highly cost-effective in comparison to roadway widening projects, which typically run into the tens of millions of dollars, the manual operation of the reversals, which cost more than $400,000 per year on an ongoing basis, and the savings in fuel from reduction of idling time, estimated to be on the order of 100,000 litres annually.

TRAFFIC CONTROL DEVICES

Project implementation began in 2008 with development of a Functional Plan to describe the form, function and layout of the automated control system. The traffic operations of the reversals had been well established through the trial periods, so the design team's challenge was to safely and effectively replicate the manual operation of pylons, barricades, signs and human crews with automated devices. Both systems had traffic operational elements that made them unique among existing lane reversal systems in Canada, and which increased the engineering complexity of the automation.

Memorial Drive Cross-over Area

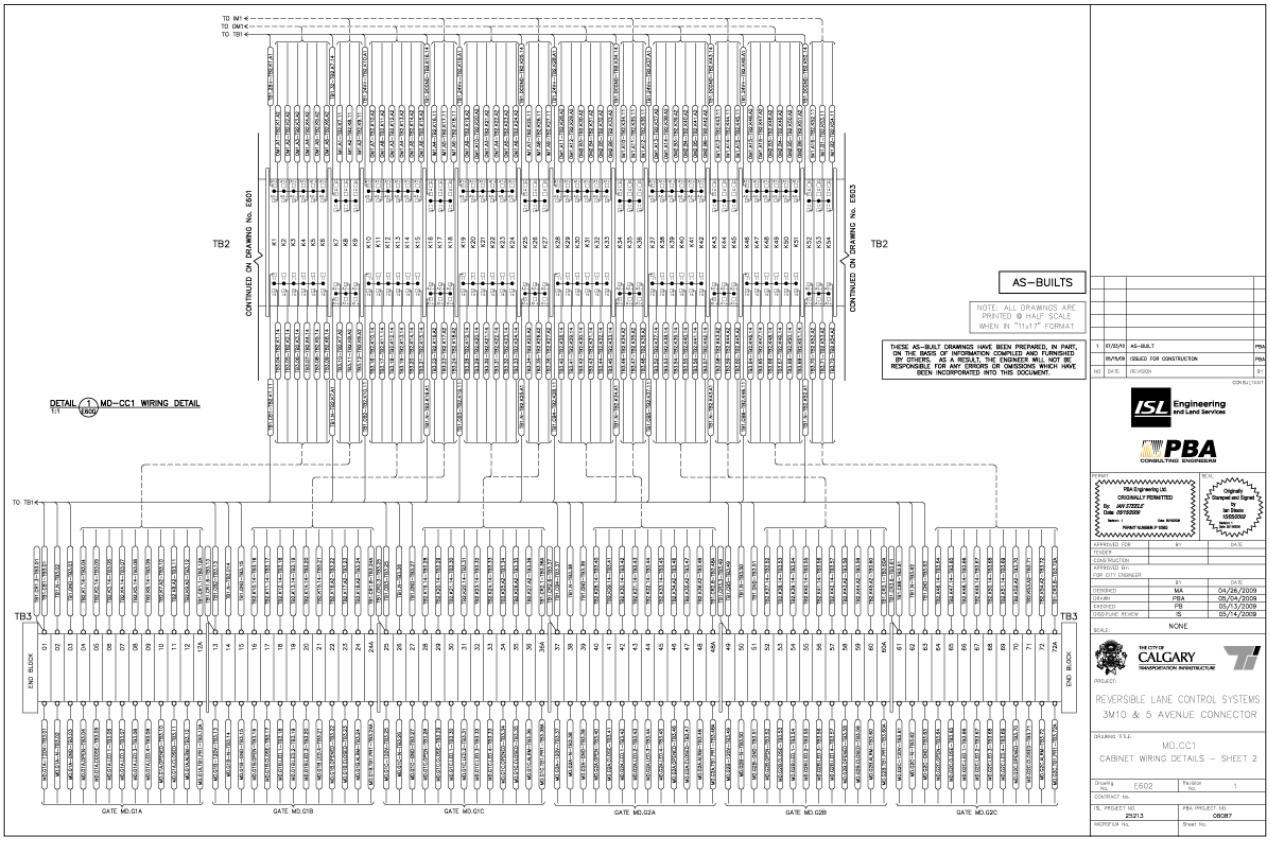
Traffic Control Gate Mechanics



Prism Sign Assembly

The 3M10 system is unique because the contra-flow lane on Memorial Drive is separated from other lanes in the same travel direction by a raised concrete median over a distance of more than 400 m. Thus, westbound traffic must travel on both sides of the median before completing a number of complex lane merge / cross-over maneuvers to safely bring traffic back onto the same carriageway. The cross-over maneuver, located at a downstream intersection, was safely managed during the manual trial by placing dozens of traffic cones on the road to completely direct traffic on a daily basis — an option that, by definition, wasn't available for an automated system. Pop-up bollards were briefly considered to replace the pylons, and ruled out due to unknown safety performance and reliability in Calgary's winter climate. The cross-over now makes use of signals, signs and line marking exclusively. Overall, the 3M10 reversal is controlled through traditional LED lane control signals, with two sets of traffic gates to close the opposing eastbound lane and assist the cross-over / merge maneuvers in the westbound direction.

The 5 Avenue Connector system is unique in that it represents a true "contra-flow," with the reversal not occurring adjacent to its own direction of travel, but rather on the opposite side of an opposing roadway over a distance of several kilometers. It is a "gated" flow system, with most of the length of the contra-flow lane being physically separated from other roadways, and with access controlled through a number of ramps and gateways depending on flow state. Coupled with LED signals to advise of lane closures and prismatic dual-state message signs that provide clear traffic directions depending on time of day, the system ensures that access to and egress from the contra-flow, through the traffic control gates, is safe and well understood by drivers.



Cabinet Schematic Plan

TMC Servers

PTZ Camera

CONTROL SYSTEM OVERVIEW

Three previously-existing lane reversal systems in Calgary were implemented in the 1970s and to this day operate on a stand-alone basis with analog clocks. Since that time, the City's Traffic Management Centre (TMC) has brought new sophistication to managing traffic movements near the downtown core. The TMC uses traffic-monitoring cameras, automatic incident-detection systems and the latest traffic signal control software to gather real-time traffic information. These tools allow TMC personnel to respond to abnormal traffic conditions by notifying trouble trucks or emergency services, revising signal timings or posting limited information for motorists on Dynamic Message Signs or over the City's Traffic Advisory Radio. It was a key project objective that the new reversible systems be integrated with these existing sophisticated traffic-management systems to become part of the TMC operation.

To meet the unique safety requirements of the 5 Avenue Connector and 3M10, the automated systems provide video monitoring and remote-control capability to the TMC operators. Nine pan-tilt-zoom (PTZ) cameras (seven new and two existing) were installed for the project. Among other uses, these allow operators to visually verify that lanes are clear prior to operating gates or opening a lane to opposing traffic.

All field devices are monitored and operated from the TMC through five distributed controllers and two remote I/O cabinets, that provide direct interface to devices on Memorial Drive and Bow Trail. A fibre-optic-based Ethernet network provides fault-tolerant communications between the TMC and the distributed control cabinets, while the remote I/O cabinets are connected via 802.11G wireless communications.

Each distributed control cabinet houses a GE Fanuc Versamax programmable logic controller (PLC) that monitors and operates the traffic-control devices under supervisory control from the head-end control system. Each cabinet is equipped with a touchscreen graphical user interface that allows for local operation in the event of communications loss with the TMC.

Controller Cabinet

"A well thought out study to maximize existing infrastructure (roads) through the excellent employment of lane lighting and computer technology is a *must see* for all major cities in Canada. Challenging to get it right yet be simple enough for the average driver. Much benefit to people and society."

Judge's Comment, 2011 Showcase Awards, *Alberta Innovators*, Spring 2011, Consulting Engineers of Alberta. The Reverse Lane Control Systems project received an Award of Merit in Studies, Software and Special Services.

SOFTWARE SYSTEM

Two redundant PC-based servers, located at the TMC, run the Cameleon ITS™ (Intelligent Transportation System) software. This software platform is an easily customized, off-the-shelf product developed by PBA's sister company ICx 360 Surveillance, which has seen widespread use for reversible-lane systems in the United States. The City of Calgary had recently adopted Cameleon ITS™ as the platform for its City-wide video and sign-control system at the TMC, so expanding its use for the RLCS was a natural choice. Cameleon ITS™ provides a graphical user interface with fully-integrated video to a number of operator workstations, and runs the control sequences that automate the lane reversals through the field cabinets and devices.

All user screens, prompts and operating sequences were developed for the specific requirements of the RLCS project. Through interaction with City personnel and two Software Validation Workshops, ICx reduced the number of operator screens to just two — one for Memorial Drive and one for the 5 Avenue Connector. The stylized operator maps use roughly 100:1 compression, along the direction of traffic flow, and allow the operator to visually monitor system status for the entire reversal area, in real time.

The City's Traffic Management Centre

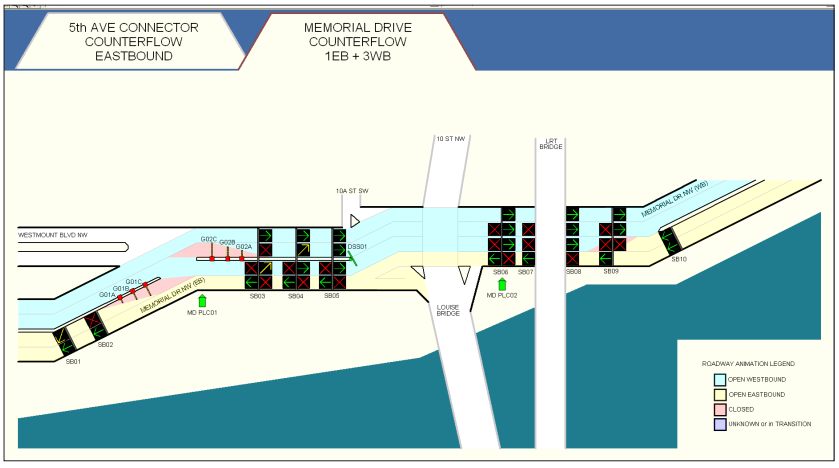
Four times per day, the Cameleon ITS™ software prompts the TMC operator to initiate or remove the lane reversal — typically operating the 5 Avenue Connector between 6:00 and 9:00 a.m., and 3M10 between 3:30 and 6:30 p.m. In the event of major traffic incidents or special events, such as the annual Stampede Parade, system administrators can readily extend or revise operation times to suit local conditions. An example from earlier this year was during a major water main break when access from Bow Trail to 9 Avenue was completely cut off, and the 5 Avenue Connector was used as a detour route on a round-the-clock basis during repairs.

Each lane reversal consists of a sequence of operations that has been carefully analyzed and timed to ensure the safety of motorists using the lanes. Control from the TMC is fully automated, with the control system executing the various sequence steps in the correct order and with the correct timing. No safety-critical operation, such as moving a gate or opening a lane to traffic, can proceed until the operator has visually confirmed it is safe to proceed using the PTZ cameras, which are automatically oriented by the software to provide the operator with the correct viewpoint (or multiple viewpoints.)

TMC Operator

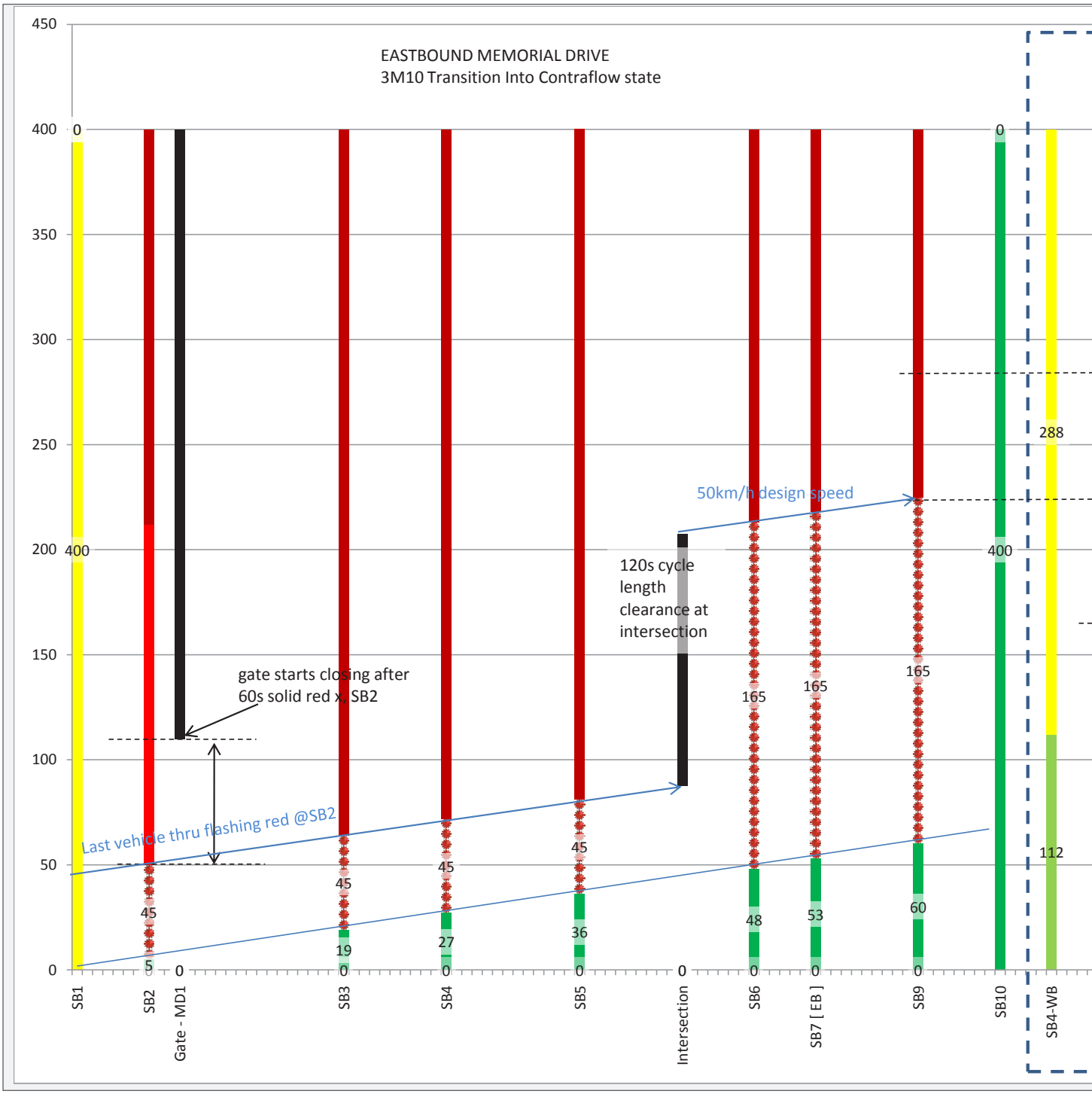
"Excellent use of existing infrastructure to reduce commuting pain. Modern technology and processes applied to a real everyday problem. An improvement over the historical way."

Judge's Comment, 2011 Showcase Awards, *Alberta Innovators*, Spring 2011, Consulting Engineers of Alberta. The Reverse Lane Control Systems project received an Award of Merit in Studies, Software and Special Services.

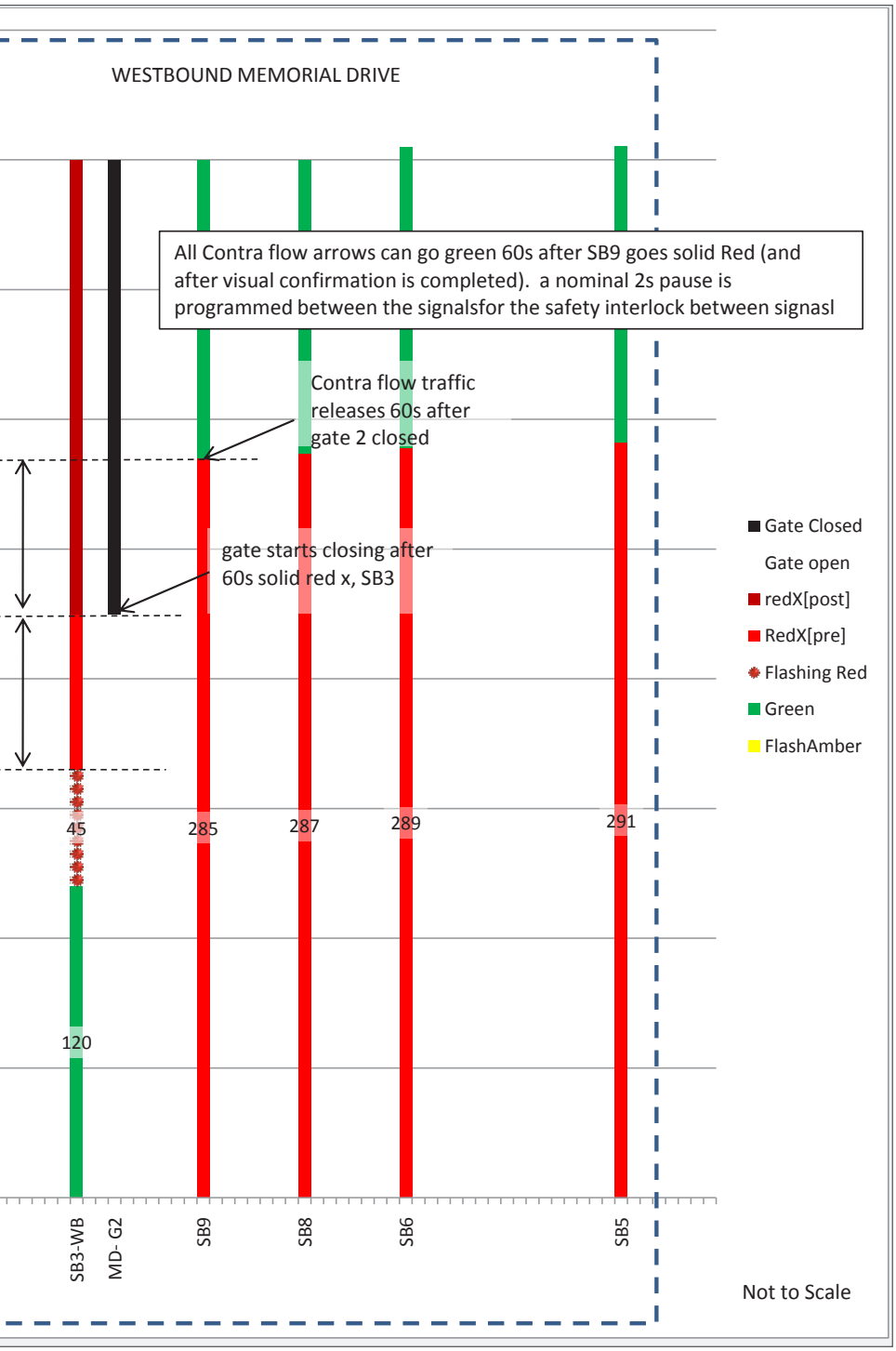


Screen Shot of Customized 3M10 Operations in Chameleon ITS™

SYSTEM SAFETY AND TROUBLESHOOTING



Time-Space Diagram of 3M10 Transition Sequence



The Reversible Lane Control Systems (RLCS) were designed as a critical Life-Safety System. System redundancies were built in at numerous levels including back-up power, a collapsed-ring fibre communication network, multiple control platforms for each device, and mirrored software systems and servers.

Unsafe operations are explicitly prevented by interlocks, which prevent devices from moving to a new state if any other current device state would render that state unsafe. Interlocks are enforced both locally by the distributed controllers and globally by the two head-end servers at the TMC. Examples of prohibited operations include opening a lane in two directions at once, operating devices out of sequence, or failing to respect a clearance timing interval.

Status signals from the traffic control devices and control system components are constantly monitored and logged by the Cameleon ITS™ software. In the event of any problems with the system, the TMC operators are notified by an on-screen alarm that prompts corrective actions or procedures. In the event of critical problems, additional e-mail alerts are sent to supervisors' smart phones to ensure rapid resource response.

Operator manuals were developed to provide standard operating procedures for typical operations and trouble-shooting. Device-failure contingencies have been provided in the case of the camera being obscured; and for gate collision, power loss, and a host of other possible device failures. Contingency procedures have also been established for TMC overrides, signals maintenance or re-establishment of manual detours in the event of failure of any part of the system.

SYSTEM TESTING AND COMMISSIONING

System testing was completed, incrementally, through all phases of project implementation. This included unit tests on each device, factory acceptance tests, pre-integration tests with the devices and control cabinets "in the lab," and acceptance tests of each device individually, and as part of the system, once installed in the field.

The system integration and commissioning process occurred over a two month period in early 2010, and was designed to ensure that the system was fully operable prior to the "Go Live" date. The process included two full, live field trials, scheduled late at night and with extensive detour traffic control to ensure that public traffic was not misdirected by the testing.

Live and Open for Traffic (March 22, 2010)

Formal training manuals and courses were developed and delivered prior to "Go Live," addressing a variety of audiences including system operators, administrators and maintenance personnel.

Training included development of simulation environments that allowed operators to control and troubleshoot the system using real-time screens, controls, maps and graphics. Scenarios including inclement weather, random equipment failure and traffic accidents were simulated during this training phase, so that these eventualities could be anticipated and addressed by system operators and field-maintenance personnel.

Road set for robot workers

Machines will soon replace workers on Memorial Dr. as a means of increasing traffic flow and protecting road crews.

Automated arms will soon be installed on the centre medians between 9 St. and 14 St. to replace workers who manually set up barricades to create lane reversals during the afternoon peak.

The arms will extend outward into the road to divert traffic into different lanes between 3 p.m. and 6 p.m. on weekdays.

"Our workers are out there literally playing in traffic by putting up these barricades, so this is a safety measure," said Dave Danchuk, a city spokesman for Transportation Infrastructure.

The increased availability of workers will also help expedite other city infrastructure projects, he said.

For the past two years, crews have set up and taken down barricades daily to create a contraflow, meaning three westbound lanes and one eastbound lane instead of two each way.

Lyle Aspinall SUN MEDIA

The automated arms are modeled after similar devices used in Vancouver and the project will cost approximately $4 million.

Overhead lights indicating which lanes are open — similar to those currently found on Centre St. — will also be installed.

While installation of the machines on Memorial Dr. will begin in the coming weeks, preparatory construction to also install the automated arms on the 5 Ave. connector began Thursday.

— *Jenna McMurray, 24 HOURS*

Calgary Sun Article

City staff were also involved through all stages of implementation, and gained extensive "hands on" training with the system over nearly half a year prior to commissioning. Accommodating changes and input from staff at all levels helped gain buy-in and a sense of ownership in the system from day one. A one-month Validation Period following "Go Live" allowed City crews and the design team to work out any remaining issues and make final adjustments in the day-to-day operating environment.

The system "Go Live" occurred on March 22, 2010, with both systems operating successfully under the watchful eye of live television news cameras.

"This new automated system provides an effective way of using our existing roadway infrastructure more efficiently. Not only will it continue to improve traffic flow during peak periods, but it will allow us to provide real-time assistance in identifying roadway incidents in a more efficient manner, through our TMC, to help keep Calgarians on the move."

Troy McLeod, *City of Calgary* Traffic Manager

Memorial Drive gets automated lane reversals

TRAFFIC • Automated lane reversals during the afternoon rush hour began Monday along Memorial Drive, after four years of pylons and barricades marking the changes.

And automated lane reversals will be in place for the 5th Avenue connector starting this morning.

Both reversals create an additional lane of traffic to allow more vehicles to travel in the busiest direction.

The automated system includes motorized gates and overhead lights alerting drivers to the traffic flow in each lane. Cameras allow the city's traffic management centre to monitor the operation.

Along Memorial Drive, about 440,000 vehicles use the lane reversal each year, which the city says saves westbound traffic, on average, up to eight minutes of travel time.

Calgary Herald Article

REVERSE LANE CONTROL SYSTEMS AT A GLANCE

New Application of Techniques/ Originality/ Innovation	• First Reverse Lane Control System implemented in Calgary that was designed to modern ITS standards. • The solution effectively added the equivalent of a new lane of freeway capacity into the downtown core while using existing road infrastructure.
Complexity	• Met the challenge of safely and effectively replicating the manual operation of pylons, barricades, signs and human crews. • 5 Avenue system was a true "contra-flow" with traffic traveling on the left side of an opposing roadway, and requiring strictly controlled, gated access. • 3M10 system involved directional flow on both sides of a raised concrete median, and the use of signals, gates, signing and marking to communicate a complex cross-over maneuver at a downstream intersection
Environmental Impact	• The system saves more than 30,000 hours of idling time per year for Calgary Commuters, saving greenhouse gas emissions.
Social and Economic Benefits	• Solution did not include a physical expansion of the road, preserving the adjacent neighborhoods' close connection with the Bow River system. • Solution solved cars 'cutting through' residential neighbourhoods. • The flexible system can be adjusted to a wide variety of traffic-flow needs, including emergency situations. • The system saves more than 30,000 hours of idling time per year for Calgary Commuters, improving quality of life.
Meeting/ Exceeding Client Need	• Solved gridlock in a cost effective manner, with a budget $3.8 million vs. tens of millions that could have been spent on new infrastructure. • Unique and inclusive project management approach fostered a collaborative environment across dozens of city departments. • City staff were involved throughout the implementation process and their input shaped the system. This gained buy-in and fostered a sense of ownership.

Reversible Lane Control Systems
2 PAGE SUMMARY

Reversible Lane Control Systems Background

In 2006, the City of Calgary established a Transportation Optimization division within its Transportation Planning Business unit. Transportation Optimization was tasked with identifying, evaluating and planning improvements that would optimize the operation of the transportation system for all Calgarians, maximizing the efficiency and capacity of existing road infrastructure. ISL Engineering and Land Services was retained by the City in the following years to work with Transportation Optimization in the detailed planning, design and implementation of numerous low cost/ high value improvements throughout the city.

An early success of this initiative was a pair of lane reversals projects in Calgary's downtown core – the 5 Avenue Connector morning reversal on Bow Trail and the 3M10 afternoon reversal on Memorial Drive. The trial projects were implemented using pylons, barricades and temporary signing to direct traffic.

In 2008, based on the success and public acceptance of the trial, ISL Engineering and its partner firm, PBA Consulting Engineers, were tasked with completing a functional plan, detailed design, procurement, construction and commissioning of automated systems for both reversals, which collectively comprised the Reversible Lane Control Systems (RLCS) project.

Innovative Solutions

The automation of the manual systems posed challenges based on the unique operational attributes of the reversal systems.

For the 5 Avenue Connector, inbound traffic to downtown via Bow Trail had previously been directed exclusively to the 9 Avenue corridor, and bottlenecked through a single signalized intersection at 11 Street SW, often cueing for more than 2 km. Now, the Connector diverts traffic via a service road (Pumphouse Road) to the opposite side of Bow Trail, allowing vehicles to continue travelling eastbound and connect directly to the 5 Avenue corridor with no weaving, turning or traffic signals to impede flow.

On Memorial Drive, the 3M10 reversal system solved afternoon gridlock by providing a third westbound lane (3) on Memorial Drive (M) through 10 Street NW (10) during the afternoon rush hour. The devices on Memorial Drive have been visually integrated into the neighbourhood by incorporating an existing 'Landscape of Memory' streetscaping theme into the design. More importantly to the community, the reversal has ended the previous practice of cars short-cutting through the parallel residential streets during the rush hour period, significantly improving the safety and environment of the community.

Advancing Technology

The RLCS project advanced the state of the art for traffic control technology in the City of Calgary. New traffic control devices include motorized traffic control gates that open and close various lanes and access ramps, and variable message prism signs that change states depending on flow conditions, providing dynamic functionality while replicating the high quality appearance and function of static traffic information signs.

As the first reversible lane system implemented here since the 1970s, the RLCS is also the first to be fully integrated with the City's modern Traffic Management Centre (TMC). To meet the unique safety requirements of the 5 Avenue connector and 3M10, nine pan-tilt-zoom cameras (seven new and two existing) were integrated for the project. These allow central operators to visually verify that lanes are clear prior to operating gates or opening a lane to opposing traffic. The system provides a graphical user interface with fully-integrated video to a number of operator workstations, and runs the control sequences that automate the lane reversals through the field cabinets and devices.

Safety is built right into the system and no safety-critical operation, such as moving a gate or opening a lane to traffic, can proceed until the operator has visually confirmed it is safe to proceed using the cameras, which are automatically oriented by the software to provide the operator with the correct viewpoint (or multiple viewpoints).

In the event of problems, the operators are notified by an on-screen alarm that prompts correct actions or procedures. If it is a critical problem, additional email alerts are sent to supervisor's smart phones to ensure rapid resource response.

The software can also be used to adjust the operating characteristics and times of the lane reversals, such as maintaining the 5 Avenue Connector open while 9 Avenue is closed for the annual Stampede Parade.

Social, Environmental and Economic Benefits

The 5 Avenue connector has added the equivalent of a new lane of freeway capacity into the downtown core while using existing pavement with only minor geometric revisions.

The 3M10 reversal resulted in significant improvement of roadway operations with the Memorial Drive / 10 Street NW intersection, now effectively discharging on every signal cycle with little carry-over of vehicle queues. The overall system saves more than 120 hours of net total delay every weekday, or more than 25,000 hours over the course of a year.

The Reversible Lane Control Systems project was completed within a total budget of $3.8 million – highly cost-effective in comparison to roadway widening projects, which typically run in to the tens of millions of dollars, manual operation of the reversals, which cost more than $400,000 per year on an ongoing basis, and the savings in fuel from reduction of idling time, estimated to be in the order of 100,000 litres annually.

It was a unique project that fostered a collaborative environment across dozens of city departments. City staff were involved throughout the implementation process and their input shaped the system. This gained buy-in and fostered a sense of ownership.

The system went live on March 22, 2010, operating effectively under the watchful eye of live television news cameras, and gaining uniform media and public praise for its positive effect on traffic flow in the downtown core.