Executive Summary

CM

Congestion Management

Vital Component of Today's Infrastructure Planning

aeda

ALBERTA ECONOMIC DEVELOPMENT AUTHORITY

Advisors to Government

PREPARED BY

TRANSPORTATION COMMITTEE

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ACKNOWLEDGEMENT & THANKS

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Message from AEDA

Dear Premier Redford:

Your request that AEDA examine Alberta's current congestion situation and propose tangible actions to increase movement efficiency in Alberta was prescient. Our Report is attached.

We believe our Report can help the province achieve the full benefits of oil sands development as well as reduce transportation infrastructure spending throughout the province while delivering a better designed and functioning transportation system for the future.

Our Report offers fresh approaches for congestion management (CM) in the central districts of major urban centres, inner-city transportation networks, major urban and rural corridors, and the "accelerated growth region" of the Athabasca Oil Sands. Throughout, the Report defines a staged approach, from least to most cost.

There are four compelling themes in the Report:

1. Rapid urbanization throughout the world is accentuated in Alberta because of our rapid population growth. CM has therefore become an imperative whose urgency will only grow.
2. CM options can attenuate the normal expensive response of costly new infrastructure and save money, provide choice and help overcome lack of space in built up areas.
3. The economic implications of CM are substantial. CM can have a growing positive effect on both the competitiveness and worker attractiveness of the province.
4. The population, whether businesses or individuals, needs and wants creative CM solutions, and is prepared to accept price signals in exchange for increased reliability of mobility.

Thank you for the opportunity to provide this counsel.

Kind regards,

Barry M. Heck
Board Chair
AEDA

Dennis Apedaile
Transportation Chair
AEDA

Congestion Management

The entire developed world now has to wrestle with congestion management:

- **Population rates** continue to climb steadily, outpaced by rapid rates of urbanization;
- **Urban sprawl** and increased economic activity ensure that commuter demand on infrastructure continues to grow;
- **The cost of new infrastructure**—to meet peak traffic demand—has become prohibitive; and
- **Land availability** for transportation corridor rights-of-way is becoming scarce and difficult to acquire.

"Population growth is outpaced by the rate of urbanization"

"land availability is becoming scarce and difficult to acquire"

This report provides a congestion management toolbox of best practices—complete with short-, mid-, and long-term solutions to congestion issues found in Alberta— so congestion can be addressed before its effects stall industry, community growth, economic development, and international appeal.

"the cost of new infrastructure has become prohibitive"

Congestion management is now a necessary component of infrastructure and land-use planning, as demonstrated repeatedly in world-class jurisdictions, and all three levels of government in Canada benefit from the adoption of CM in the planning and implementation of infrastructure and land-use programs.

Defining and Valuing Congestion Management

So what is congestion management (CM)?

CM identifies and responds to recurring congestion resulting from peak travel periods, as well as non-recurring congestion associated with maintenance and incidents that impede traffic flows.

At the root of CM are practices that affect the demand for and the capacity and supply of infrastructure. Such practices are driven by government policies that favour certain practices over others. Government policy can also determine whether CM practices are reactive or proactive.

> "Congestion management is now a necessary component of infrastructure and land-use planning"

The benefits, or the prize, for vigorous engagement in a full range of CM activities include:

- **Increased economic productivity** through greater movement efficiency on roadways;
- **Maximized return on investment** by using full capacity of existing infrastructure;
- **Major cost savings** by delaying unnecessary capital infrastructure investments;
- **Reduced future congestion** issues through improved future infrastructure planning; and
- **Attraction and retention of skilled labour** due to more efficient travel.

> "benefits, or the prize, for vigorous engagement"

The Economic Imperative to Action

Congestion has a steep real cost to Canada and Alberta's economies. The Organization for Economic Cooperation and Development (OECD) asserts that developed countries lose 3% of GDP due to traffic congestion, amounting to approximately $7 billion/year in Alberta. The loss is too large for Alberta to ignore.

Losses are a result of:

- **Lost time** and increased vehicle operating costs;
- **Freight delay** and logistics costs;
- **Labour costs** and reduced attraction and retention of skilled labour;
- **Increased health care costs** due to injuries and fatalities; and
- **Extra greenhouse gas** emission costs.

> "developed countries lose 3% of GDP due to traffic congestion"

Real costs are difficult to assess accurately, but a transportation analysis for the Athabasca Oil Sands Region CRISP[1] determined that an incremental investment of $1.5 billion in CM practices would realize a return of $11 billion (i.e., 733% return on investment) from reduced travel time, reduced safety/collision risk, and reduced carbon costs.

[1] *Comprehensive Regional Infrastructure Sustainability Plan*

"stakeholders are employing creative approaches"

The real economic risks of traffic congestion have driven jurisdictions around the world to action. From China to Sweden and many jurisdictions in Canada, stakeholders are employing creative approaches to congestion that favour least cost before high cost solutions. Rapid technological advancements also spark creative solutions to congestion.

Some common lessons are now clear:

- **First, CM practices need not be costly** to produce marked returns on government investment. The current method of managing congestion in Alberta—generally by constructing additional infrastructure—is neither cost effective nor sustainable, and can be supplemented or replaced by more creative CM practices.
- **Second, users of road infrastructure are willing to pay a premium** for more reliable transportation networks, reduced travel time, and reduced safety risks (net benefit), provided they have a choice.
- **Third, technology is quickly broadening the CM toolbox** of best practices.

Alberta stakeholders—including Alberta Transportation, the cities of Edmonton and Calgary, and the Fort McMurray area— have begun to study and implement innovative solutions to congestion, but there is still enormous opportunity as jurisdictions grow more sophisticated in using CM.

"embed CM practices into the planning and implementation of all infrastructure and land-use programs"

This report makes clear the importance of CM to Alberta's economic development and urges governments—whether municipal, provincial, or federal—to embrace and take the necessary steps to embed CM practices into the planning and implementation of all infrastructure and land-use programs.

Staged Approach to Manage Alberta's Traffic Congestion

In Alberta, the greatest levels of congestion occur in the urban cores of Calgary and Edmonton and on arterial systems that bring traffic to the city centres. Congestion is also evident along the north-south QE2 axis between Calgary and Edmonton, the Highway 63 axis between Edmonton and Fort McMurray, and within the Fort McMurray region. In all cases, rapid economic and population growth has outpaced transportation infrastructure development.

Alberta congestion is characterised within four main geographic categories:

1) Central Business Districts;
2) Inner-City Networks;
3) Major Urban/Rural Corridors; and
4) Accelerated Growth Regions.

A staged approach to CM enables efforts to focus on less costly infrastructure optimization before investing in costly infrastructure:

Stage 1 – Reduce Demand (Short-Term, Least Cost)

Reduce commuter and industry peak demand on transportation by reducing the total number of trips and by distributing traffic across the transportation network and across time periods;

"reduce demand"

Stage 2 – Manage Demand (Mid-Term, Medium Cost)

Manage peak and non-peak demand on infrastructure by optimizing the use of existing infrastructure and improving system performance through better lane management (e.g., flex lanes, driveable shoulders) and exciting new technologies, including intelligent transportation systems (ITS can collect real-time traffic data and communicate traffic and transit conditions directly to commuters and optimize existing signal systems in response to changing flows and accidents);

"manage demand"

Stage 3 – Increase Supply (Long-Term, Most Cost)

Use capital expenditures to upgrade or develop new infrastructure (e.g., interchanges, commuter rail, intermodal hubs, expanded or new roadways, high speed rail, etc.) and increase the capacity of the transportation network to meet growing traffic demand.

"increase supply"

With this three-stage framework applied to each of the four geographic congestion areas, Alberta can proactively address traffic congestion before the issues become major impediments to economic development, productivity, and quality of life. Table ES-1 summarizes the staged CM approach, while Figures ES-1, ES-2, and ES-3 illustrate the concepts.

Conclusions

- Jurisdictions around the world employ CM practices to support their social and economic goals;
- Many congested locations in Alberta lack the physical space to expand infrastructure, while others suffer reduced transportation system capacity due to urban sprawl imposing disproportionate infrastructure maintenance and repairs/costs;
- Alberta has the opportunity to not only catch up but also take a leadership position vis-à-vis Canadian and North American counterparts in implementing CM, starting now;
- If congestion is not addressed proactively, it will impede industry growth and undermine the productivity of a healthy economy;
- Existing and emerging Intelligent Transportation Systems (ITS) tools provide extraordinary opportunities to engage travellers in CM;
- Society (industry and people) is willing to pay a congestion price for transportation services where there is a recognizable net benefit;
- Congestion pricing is a normal part of any comprehensive CM plan;
- CM practices minimize capital and operational infrastructure costs, promote more efficient uses of existing infrastructure, and manage demand on the transportation system leading to a positive return on investment;
- Alberta must address congestion management now if it wants to be a fiscally-prudent, world class economic jurisdiction;
- Existing rail networks offer rights-of-way and infrastructure through inner-cities to central business districts and can provide expeditious and productive commuting time.

Recommendations for the Alberta Government

Policy

- Adopt congestion management (CM) policies and commit to implementation;
- Make CM planning a mandatory, embedded part of all infrastructure programs;
- Implement CM using a staged approach to distribute and reduce traffic demand, manage infrastructure demand, and increase supply.

Implementation

- Have capital and operating infrastructure programs identify economic benefit of CM on government costs, social costs, business costs, and commuter costs;
- Encourage industry to partner in, own, and operate evolving multimodal transportation services;
- Introduce win-win-win congestion pricing to manage travel demand and improve infrastructure productivity;
- Plan transportation system redundancy to mitigate the negative impacts of infrastructure maintenance and renewal, incidents (e.g., collisions), and inclement weather;
- Take immediate steps to plan and secure multi-use corridors needed for effective infrastructure, community, and industrial growth management into the future.

TABLE ES-1

Congestion Management Strategic Application

	Central Business Districts (CBD) Urban centres typified by a concentration of retail and office buildings and high population density during weekday work hours.	**Inner-City Networks** Inner arterial road networks of urban centres linking major corridors to the CBD, typified by high congestion periods during morning and afternoon worker commutes and roadway bottlenecks into CBD.
Stage 1 **REDUCE DEMAND**	■ Eliminate commuter trips and promote telecommuting (i.e., working from home); ■ Promote car/bike sharing (i.e., rent and drop-off) and use of multi-use trails connected to transit; ■ Reduce single vehicle occupancy travel and promote car-pooling and HOV lanes; ■ Induce modified commuter behaviour and introduce congestion pricing during peak demand periods, either through ITS technology or parking fees; ■ Spread travel demand to off-peak periods through staggered business hours; ■ Restrict freight hauls to off-peak periods; ■ Growth management synergy between land-use planning and transportation planning so transportation system is in place before development; consideration must be given to special event venues (e.g., arenas and stadiums) that create significant traffic spikes.	
Stage 2 **MANAGE DEMAND**	■ Manage bottlenecks (e.g., river crossings) with flex-lane technologies that optimize the functionality of expensive bridge infrastructure; ■ Optimize traffic signalization.	■ Capture real-time traffic data (through ITS) to communicate traffic conditions to travelers and adjust signal systems based on real-time events; ■ Improve roadway arterial/collector network (expressways); ■ Mitigate bottlenecks and optimize infrastructure with flex-lane operations that vary direction between AM and PM periods; ■ Optimize traffic signalization.
Stage 3 **INCREASE SUPPLY**	■ Develop higher volume unimpeded transportation alternatives, including BRT, LRT, and newer technologies such as the straddle bus, that are well-connected to multi-modal hubs in the inner-city and suburbs.	■ Collect local traffic (i.e. bicycles and cars) and distribute to major destinations via high volume transportation modes (i.e. BRT, straddle bus, LRT); ■ Develop multi-modal transit hubs that provide quick, convenient linkage between local traffic and major destinations.

Major Corridors	Accelerated Growth Regions
Highway road networks (whether in urban or rural setting) that connect urban centres, typified by multiple road lanes, higher speed limits, and limited traffic signalization (freeways).	Areas of pronounced population growth and urbanization, usually typified by low infrastructure capacity relative to demand.
■ Designate HOP lanes designed for multiple-occupant vehicles or single-occupant vehicles on a variable congestion price; ■ Encourage freight hauls to off-peak periods through congestion pricing.	■ Spread travel demand to off-peak periods through staggered business hours; ■ Introduce congestion pricing on major industry corridors during peak periods; ■ Growth management synergy between land-use planning and transportation planning so transportation system has capacity for associated development.
■ Introduce ramp metering to control traffic entering the freeway system and redirect traffic to the inner-city arterial/collector system when freeway breaches congestion limits; ■ Optimize infrastructure with flex-lane operations that vary direction between AM and PM periods; ■ Designate BRT-dedicated lanes, which can later be transitioned for car use, or implement LRT, HCR, or HSR within the corridor.	■ Encourage use of higher volume modes of transportation and improve utilization of park-and-ride/ BRT transport of workers to site; ■ Designate HOP lanes and flex-lanes on major industry routes; ■ Optimize traffic signalization.
■ Dedicate MUC for future staging of roadway expansions, transit, utilities, and growth management planning; ■ Transition signalized expressways into non-signalized freeways (interchanges); ■ Develop higher-volume multi-modal alternatives to the freeway (e.g., BRT, LRT, HCR, HSR); ■ Plan roadway redundancy and construct one lane in each direction beyond current capacity needs.	■ Upgrade and expand roadway infrastructure to support timing and location of industry growth; ■ Develop higher-volume multi-modal alternatives (e.g., HCR and airport hub expansion) to meet industry growth and commuter volume.

ACRONYMS:

BRT – Bus Rapid Transit
LRT – Light Rail Transit
HCR – Heavy Commuter Rail
HSR – High Speed Rail
ITS – Intelligent Transportation Systems
HOV – High Occupancy Vehicle
HOP – High Occupancy Pricing
MUC – Multi-Use Corridor

DEFINITIONS:

Expressways – Major highways and urban arterial roadways that contain at-grade crossings and signal controls
Freeways – Free flow movement with no at-grade crossings or signal controls

FIGURE ES-1

Central Business District

Strategic Application

Stage I • **REDUCE DEMAND**

ELIMINATE THE TRIP
Telecommuting

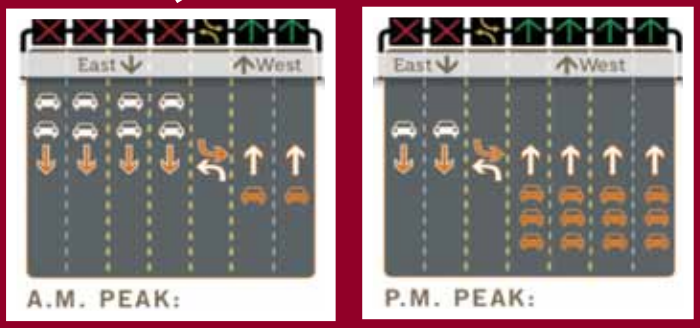
CONGESTION PRICING
Modify commuter behaviour through price signals

GROWTH MANAGEMENT
Transportation planning = land use planning

Stage II • **MANAGE DEMAND**

SIGNAL OPTIMIZATION
Synchronize traffic signals

CENTRAL BUSINESS DISTRICT
Manage bottlenecks during AM
and PM congestion



FLEX LANES
Managed directional peaks

Stage III • **INCREASE SUPPLY**

HIGH VOLUME TRANSPORTATION:

Bus Rapid Transit (BRT)

Straddle Bus

Light Rail Transit (LRT)

FIGURE ES-2

Inner-City Networks

Strategic Application

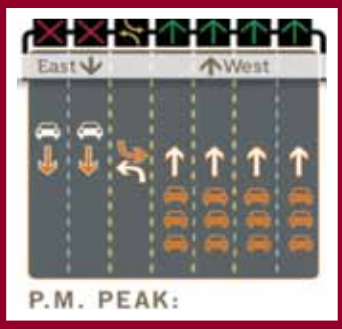
Stage I • **REDUCE DEMAND**

GREEN TRANSPORTATION
Multi-use trails linking schools, business, and station hubs

CAR-POOLING
Enhanced through High Occupancy Pricing lanes

Stage II • **MANAGE DEMAND**

NETWORK CONNECTIVITY AND OPTIMIZATION



Arterial/collector alternatives to freeway and use of flex lanes

INNER-CITY NETWORK

INTELLIGENT TRANSPORTATION SYSTEMS
Real-time signal synchronization and real-time traffic data communicated to travelers

Stage III • **INCREASE SUPPLY**

INTEGRATED INFRASTRUCTURE

Local collectors

Station hubs

Major destination distributor

FIGURE ES-3

Major Corridors

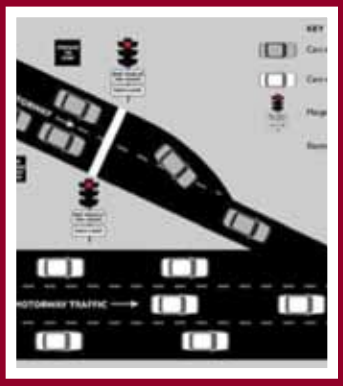
Strategic Application

Stage I • **REDUCE DEMAND**

HIGH OCCUPANCY VEHICLE (HOV) LANES
Promotes car-pooling

FREIGHT TRAFFIC MANAGEMENT
Reduce freight traffic during peak periods

Stage II • **MANAGE DEMAND**



RAMP METERING
Guarantees free-flow freeway system and redirect traffic surplus to inner-city arterial network

Stage III • **INCREASE SUPPLY**

MULTI-USE CORRIDORS (MUC)

EXPRESSWAYS TO FREEWAYS

MAJOR CORRIDORS

FLEX LANES
Zipper concrete-barrier system

ROAD LANE REDUNDANCY
One lane beyond capacity needs and dynamic shoulder lanes

HIGH VOLUME MULTI-USE CORRIDOR
Complements freeways

FIGURE ES-4

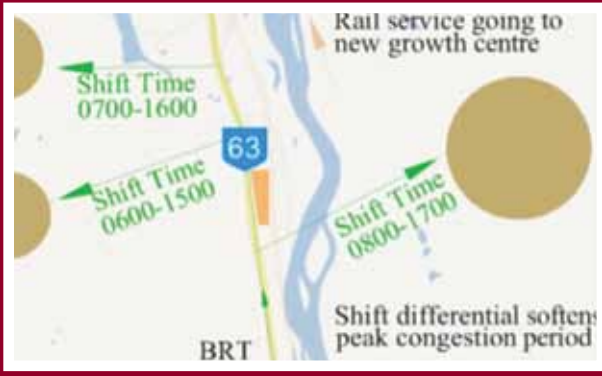
Accelerated Growth Regions

Strategic Application

Stage I • **REDUCE DEMAND**

CONGESTION (Electronic Road) PRICING
Modify commuter behaviour through price signals

GROWTH MANAGEMENT PLANNING



STAGGERED INDUSTRIAL SHIFTS

Stage II • **MANAGE DEMAND**

FLEX LANES | Manage bottlenecks and directional peaks

Zipper concrete-barrier system

ACCELERATED GROWTH REGION

HIGH OCCUPANCY VEHICLE/ HIGH OCCUPANCY PRICING LANES

Stage III • **INCREASE SUPPLY**

HIGH VOLUME TRANSPORTATION:

FREIGHT/HEAVY COMMUTER RAIL
Quick and reliable transportation of workers to site

REGIONAL/INTERNATIONAL TRANSPORTATION HUB
Accessible high-volume connectivity of road, rail, and air

INLAND INTERMODAL FREIGHT FACILITY

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