

Winter Operations: Alternative Service Delivery



“Alternatives”

Topics for today:

- Various “models” for arranging winter services
 - Public Sector and Private Sector; or both
 - Contract Models, or “Service Models”
- Level of Service: stability, consistency
- Varying degrees of risk and risk balance
- Contract Compensation
- Evolving experience in Ontario and across Canada
- Next steps possible

Hierarchy: In-house and Outsourcing

“Mechanisms” for delivering winter operations
and year-round maintenance as well !

- Studied and introduced across the country for 20+ years
- Many degrees of “participation” - delivery/QC/QA
- Started as in-house core functions + contracted activity
- “Managed outsourcing” with decisioning in-house
- Area-wide maintenance contracts: full decision making
- Mega projects: P3 model (design, build, finance, operate, OMR)
- Winter operations usually one key component (e.g. 60+%)



INCREASING DIRECT PUBLIC SECTOR PARTICIPATION

Largely In-House Delivery Methods
for Design, Construction, and Maintenance

#1 Expansion of Outsourcing by
Traditional Methods

#2 "Hands-off" Outsourcing
of Functional Activities

Capital:

#3 Total Project Management
(T.P.M.)

#4 Design - Build

Maintenance:

#5 Area Maintenance Contracts
(A.M.C.)
(maintenance production units)

#6 Area Term Contracts
(A.T.C.)
(maintenance, reconstruction,
rehabilitation)

#7 Design - Build - Operate

#8 Design - Build - Operate -
Finance

Mega Contracts
(Regional Scope)

Special projects
only.

INCREASING DIRECT PRIVATE SECTOR PARTICIPATION



- Contract Area Boundaries / Limites des zones contractuelles
- Highways / Routes
- Express Toll Route 407 / 407 ETR Express Toll Route
- Highway 407 East Extension and Highway 412 / Prolongement de l'autoroute 407 vers l'est et l'autoroute 412
- Under construction / En construction
- Communities / Communautés

Produced by:
The Geomatics Office
MTO Highway Standards Branch

Produced for:
Provincial Highways Management Division
Maintenance Management Office

Sources:
Base Data: MTO; DCRB, Routes
Projection: Ontario Lambert Conformal Conic (MTO)
Datum: NAD 83

August 3, 2016

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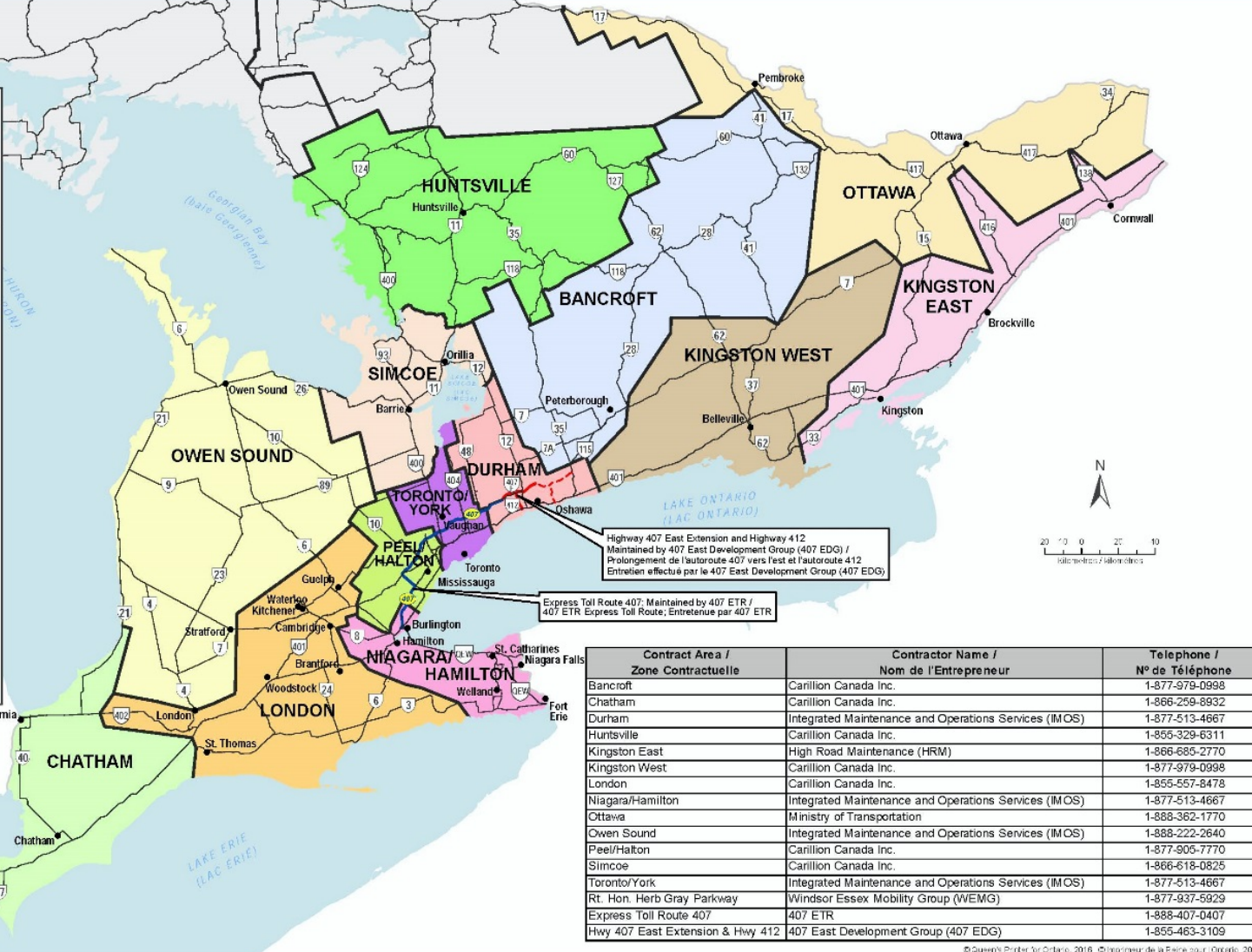
Préparé par:
Le Bureau de la Géomatique
MTO Direction des Normes Routières

Préparé pour:
Division de la gestion des routes provinciales
Bureau de gestion d'entretien

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3 août 2016

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Highway 407 East Extension and Highway 412
Maintained by 407 East Development Group (407 EDG) /
Prolongement de l'autoroute 407 vers l'est et l'autoroute 412
Entretien effectué par le 407 East Development Group (407 EDG)

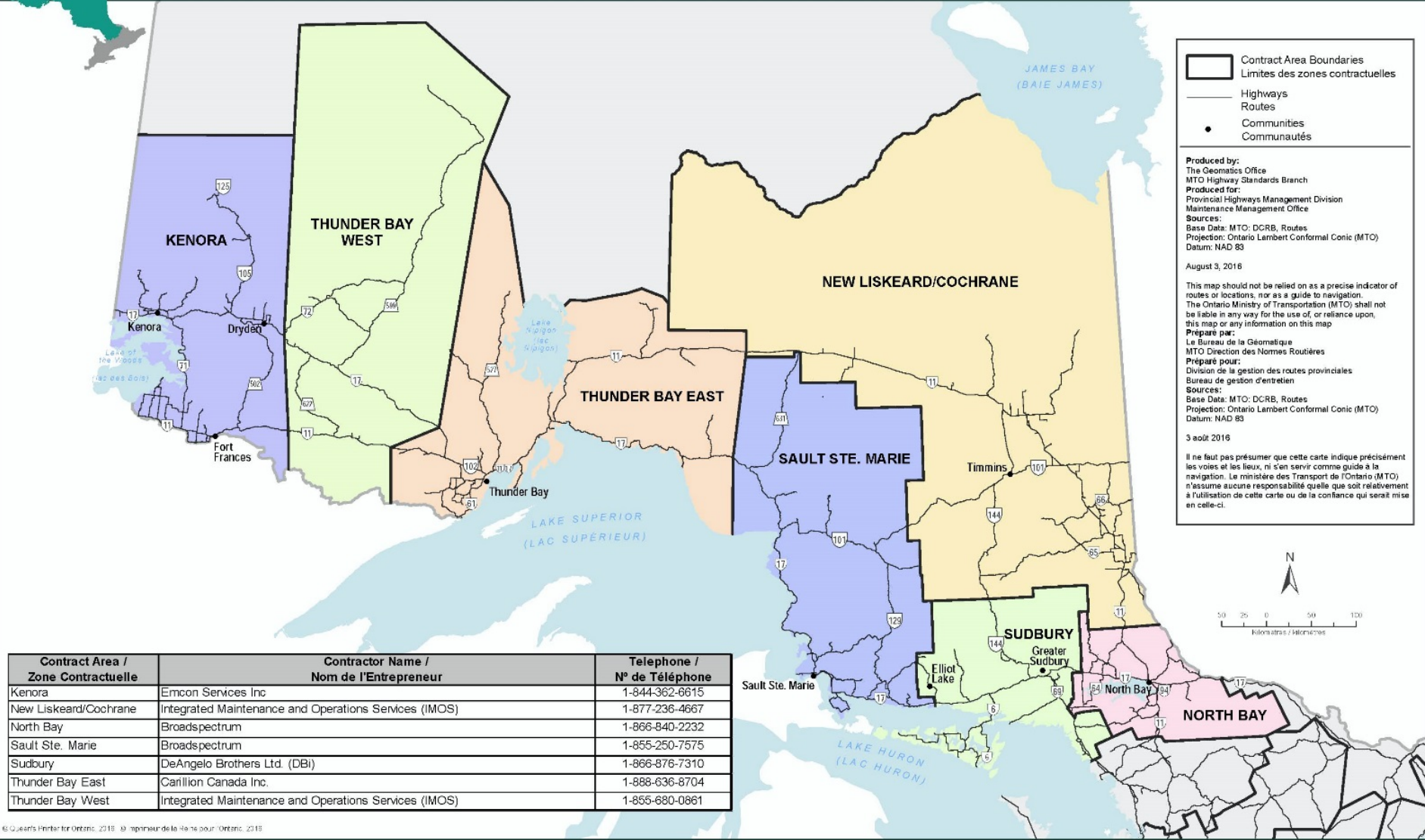
Express Toll Route 407: Maintained by 407 ETR /
407 ETR Express Toll Route; Entretien par 407 ETR

Promenade Rt. Hon. Herb Gray Parkway
Maintained by Windsor Essex Mobility Group (WEMG) /
Entretien par Windsor Essex Mobility Group (WEMG)

Contract Area / Zone Contractuelle	Contractor Name / Nom de l'Entrepreneur	Telephone / N° de Téléphone
Bancroft	Carillion Canada Inc.	1-877-979-0998
Chatham	Carillion Canada Inc.	1-866-259-8932
Durham	Integrated Maintenance and Operations Services (IMOS)	1-877-513-4667
Huntsville	Carillion Canada Inc.	1-855-329-6311
Kingston East	High Road Maintenance (HRM)	1-866-685-2770
Kingston West	Carillion Canada Inc.	1-877-979-0998
London	Carillion Canada Inc.	1-855-557-8478
Niagara-Hamilton	Integrated Maintenance and Operations Services (IMOS)	1-877-513-4667
Ottawa	Ministry of Transportation	1-888-362-1770
Owen Sound	Integrated Maintenance and Operations Services (IMOS)	1-888-222-2640
Peel/Halton	Carillion Canada Inc.	1-877-905-7770
Simcoe	Carillion Canada Inc.	1-866-618-0825
Toronto/York	Integrated Maintenance and Operations Services (IMOS)	1-877-513-4667
Rt. Hon. Herb Gray Parkway	Windsor Essex Mobility Group (WEMG)	1-877-937-5929
Express Toll Route 407	407 ETR	1-888-407-0407
Hwy 407 East Extension & Hwy 412	407 East Development Group (407 EDG)	1-855-463-3109

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Contract Area Boundaries
Limites des zones contractuelles

Highways
Routes

Communities
Communautés

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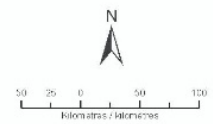
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Contract Area / Zone Contractuelle	Contractor Name / Nom de l'Entrepreneur	Telephone / N° de Téléphone
Kenora	Emcon Services Inc	1-844-362-6615
New Liskeard/Cochrane	Integrated Maintenance and Operations Services (IMOS)	1-877-236-4667
North Bay	Broadspectrum	1-866-840-2232
Sault Ste. Marie	Broadspectrum	1-855-250-7575
Sudbury	DeAngelo Brothers Ltd. (DBI)	1-866-876-7310
Thunder Bay East	Carillion Canada Inc.	1-888-636-8704
Thunder Bay West	Integrated Maintenance and Operations Services (IMOS)	1-855-680-0861

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Winter Equipment

About **1,000** snowplows and combination units work on our highways.



995 PLOW
BLADES 

730 SALT/SAND
HOPPERS 

ontario.ca/wintermaintenance

Preferred Equipment Choices



Preferred Equipment Choices

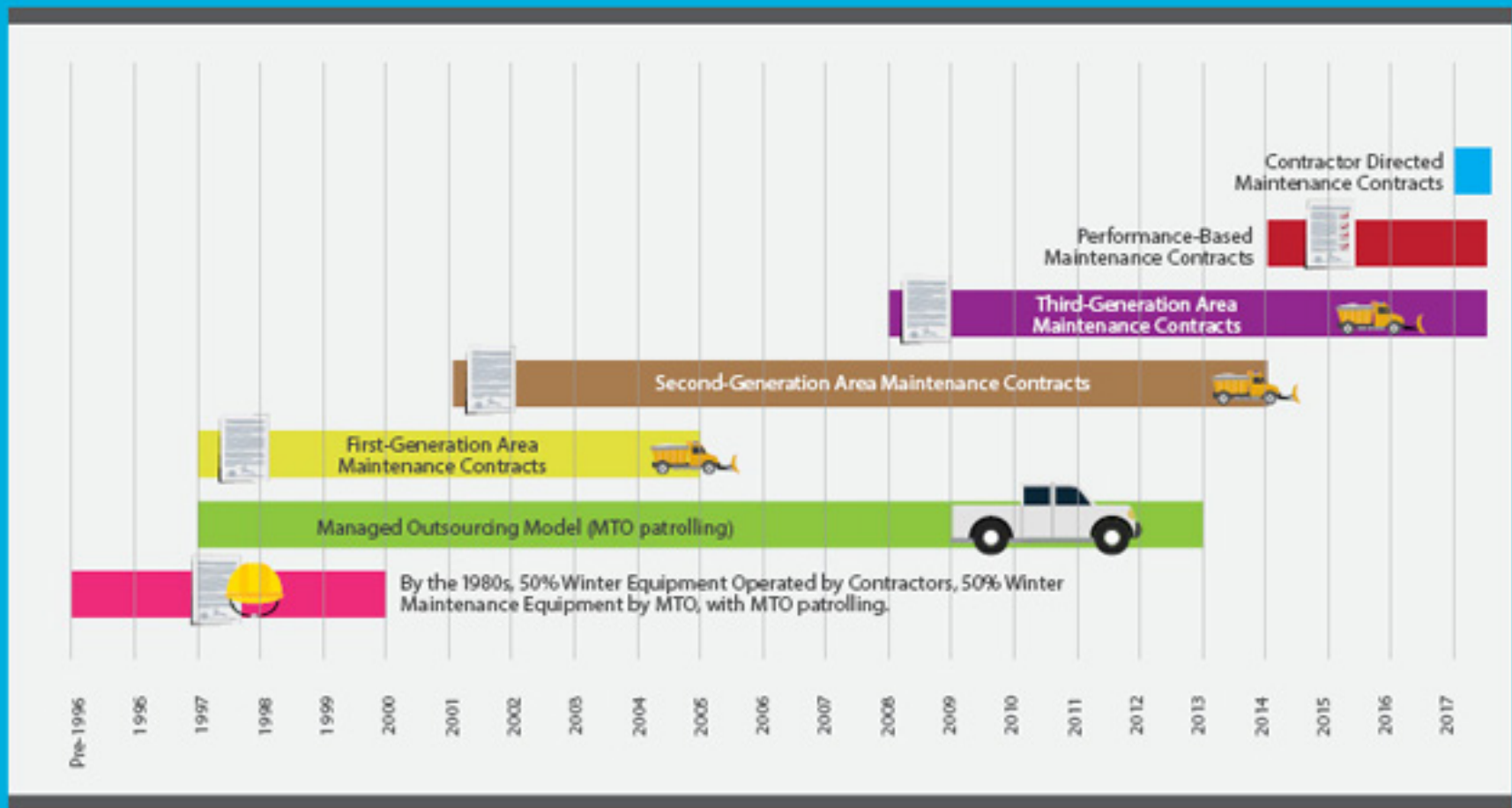


Preferred Equipment Choices

Polar Flex Blades



MTO's Contracting Timeline



Miller Highway Maintenance Operations Across Canada

2017

Sea-to-Sky Highway
Horseshoe Bay to Whistler, BC
25-year OMR P3
98 km – 2 to 5 lanes

Golden Ears Bridge
Langley to Pitt Meadows, BC
35-year OM P3
13 km – 6 lanes with 1 km bridge

Autoroute 25
Montreal to Laval, PQ
35-year OMR P3
50 lane km with 1 km bridge & causeway

City of Hamilton, ON
Now in season-14 of 19 contract-
years of winter maintenance on
Priority 1 roads - 49 winter trucks

Fredericton-Moncton Highway, NB
30-year OMR P3
195 km of 4 lane divided highway
with two 1 km bridges

407ETR, ON
14-year on-going winter
maintenance contract on this 99-
year toll highway - 64 winter trucks

Winter - Level of Service

1. Primary objective

- a. essentially bare pavement as soon as possible after the winter event, usually within 8 hours for a typical event

2. Initial response

- a. direct liquid prior to the event
- b. followed by salting prior to 0.5 cm of snow
- c. Followed by plowing upon 2cm of snow or slush

3. Frequency of Service – by Class of road or highway

- a. Continuous service, meaning vigilant monitoring
- b. Salting as brine concentration diminishes
- c. Plowing as accumulations require (2 cm)
- d. Circuit time – theoretical vs. actual

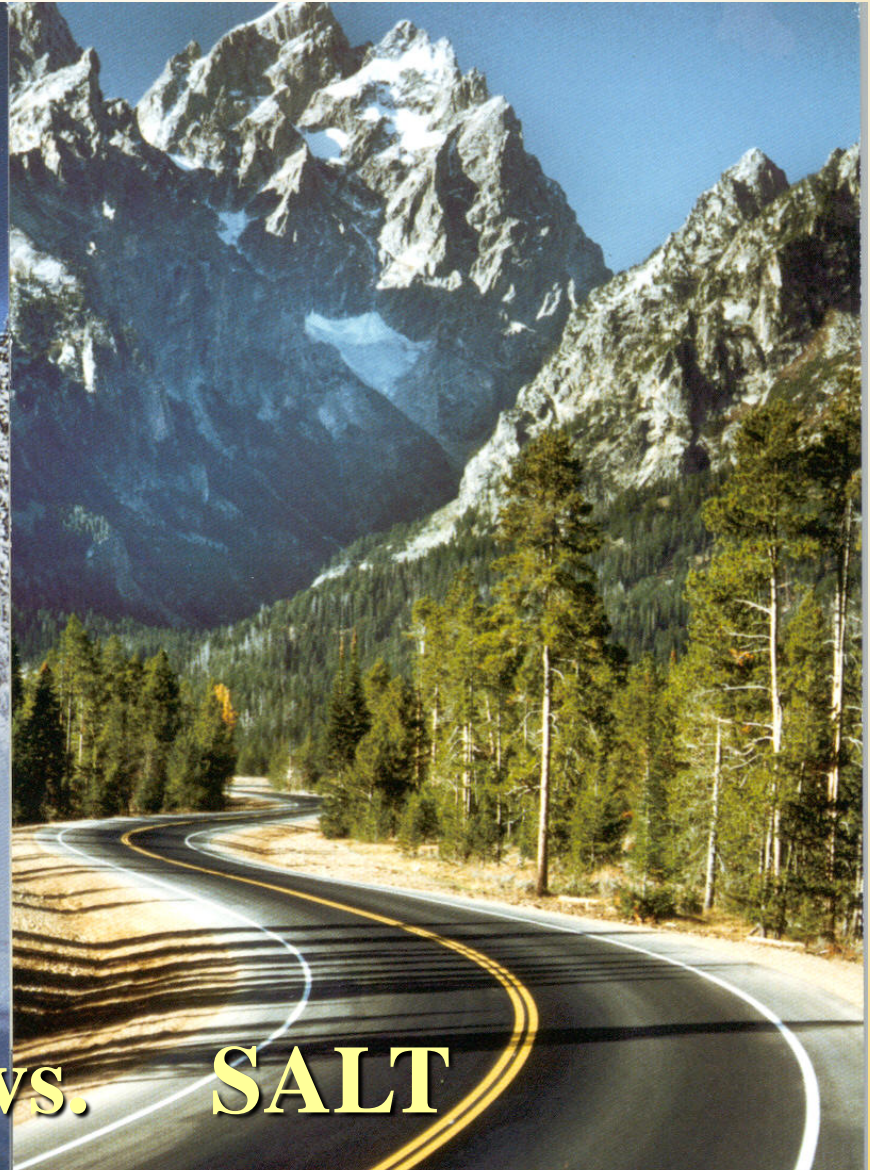


Level of Service - LOS



SAND

vs.



SALT

ISO Quality Approach

1. Say what you do
2. Do what you say
3. Prove it



Level of Service - Proof

- Aim for true end-result specifications
- That can be objectively measured; not “interpreted”
- Use available technology: e.g.
 - Infrared thermometers for pavement temperature
 - Electronic spreader controllers with GPS
 - Road and weather sensors
 - Mobile road and weather monitoring
 - Friction measurements

Level of Service - Proof

"Track My Plow"

- dash cameras in patrol vehicles
- take pictures of the roadway
- defined intervals of time, distance or vehicle operation (stops, turns)
- data stored and images available on the website
- historical record of road conditions

Graph Show Replay Show Show Traffic **Unit Show** Alternate Yard Hide Inputs Show Live Mode OFF Images Hide Map: Lines **Arrows** Reduce Activity Show

Trips Range Last

Date: 2017-08-02
Unit: 162824

Clear Selection

2	03:58	04:06
3	05:43	06:32
4	08:04	12:01
5	12:32	17:07
6	17:58	20:56
7	21:37	22:09

RichardB
Pickup Truck
102701
112803
132879
162823
Plow
Portable
Tow Plow Trailer
Maple
Thunder Bay

2017-08-02 12:36:03
HIGHWAY 401 COLLECTOR,
City of Toronto

2017-08-02 12:43:54
HIGHWAY 401 COLLECTOR,
City of Toronto

Weather: Road-weather “RWIS”

1. Forecast - pavement+weather
2. Data - to monitor trends
3. History - to help your storm review

- Road-weather: predict and track changing conditions
- Information and decision support (the MDSS time has come - Maintenance Decision Support System)
- Learn together
- Evolve your strategy, to adjust resources, and optimize performance, develop your “decision tree”



Weather: Bridge-weather



Weather: Road-weather



Weather: Road-weather



	AMC Number	Area	AMC Contractor	Dates		Term (years)	Bid Price Lump Sum Annually	In-Scope Capital + Unincorporated Roads	Total Bid Annually	In-Scope as a % of Total	2-lane km
				Start	End						
1	2009-03	North Bay	Transfield	29-Apr-10	31-May-22	12.1	\$10,697,000	\$1,570,280	\$12,267,280	13%	1,245.0
2	2009-04	Chatham	Carillion	1-May-10	30-Apr-19	9	\$6,930,286	\$1,565,370	\$8,495,656	18%	764.2
3	2009-05	New Liskeard/Cochrane	IMOS	17-Oct-10	15-Jun-22	11.6	\$16,200,000	\$3,910,600	\$20,110,600	19%	2,271.7
4	2010-06	Sault Ste Marie	Transfield	1-Jun-11	31-May-23	12	\$12,194,000	\$2,837,425	\$15,031,425	19%	1,756.0
5	2010-07	Thunder Bay West	IMOS	1-Jun-11	31-May-24	13	\$5,700,000	\$3,550,960	\$9,250,960	38%	1,092.0
6	2010-08	Owen Sound	IMOS	1-Jun-12	31-May-24	12	\$9,886,231	\$2,064,500	\$11,950,731	17%	988.0
7	2011-10	Huntsville	Carillion	1-May-12	31-May-23	11.1	\$9,096,000	\$2,900,000	\$11,996,000	24%	1,286.7
8	2011-11	Sudbury	DeAngelo	1-Jun-12	31-May-23	11	\$8,997,311	\$2,672,700	\$11,670,011	23%	1,321.5
9	2011-12	London	Carillion	1-May-12	31-May-24	12.1	\$11,293,000	\$1,992,250	\$13,285,250	15%	1,245.5
10	2011-13&14	Ottawa/Kingston East	High Road	1-Oct-12	30-Apr-25	12.6	\$15,652,291	\$4,550,000	\$20,202,291	23%	1,923.2
11	2012-15&16	Bancroft/Kingston West	Carillion	1-May-13	30-Apr-25	12	\$10,989,486	\$4,546,000	\$15,535,486	29%	1,608.0
12	2012-17	Niagara/Hamilton	IMOS	17-Apr-13	31-Jul-26	13.3	\$7,300,000	\$2,779,010	\$10,079,010	28%	835.5
13	2012-18	Thunder Bay East	Carillion	17-Jun-13	31-May-24	10.9	\$12,292,000	\$3,012,630	\$15,304,630	20%	1,835.4
14	2012-19	Simcoe	Carillion	1-Oct-13	31-Jul-26	12.8	\$7,053,000	\$2,105,250	\$9,158,250	23%	625.7
15	2012-20	Durham	IMOS	1-Aug-13	31-Jul-26	13	\$6,143,085	\$2,012,000	\$8,155,085	25%	636.0
16	2013-21	Peel/Halton	Carillion	1-Aug-14	31-Jul-26	12	\$9,634,900	\$3,479,110	\$13,114,010	27%	1,016.1
17	2013-22	Toronto York	IMOS	15-Aug-14	31-Jul-26	12	\$13,487,599	\$2,524,025	\$16,011,624	16%	731.6
18	2015-01	Kenora (PBMC)	Emcon	1-Sep-15	30-Jun-20	4.8+3	\$17,794,768	\$1,235,360	\$19,030,128	6%	1,623.6
	Notes:					Total:	\$191,340,957	\$49,307,470	\$240,648,427		22,806
	1	Kenora has 950kn LRBs as well				Min:	\$5,700,000	\$1,235,360	\$8,155,085	6%	626
						Max:	\$17,794,768	\$4,550,000	\$20,202,291	38%	2,272
						Average:	\$10,630,053	\$2,739,304	\$13,369,357	21%	1,267

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Concept of Risk Sharing

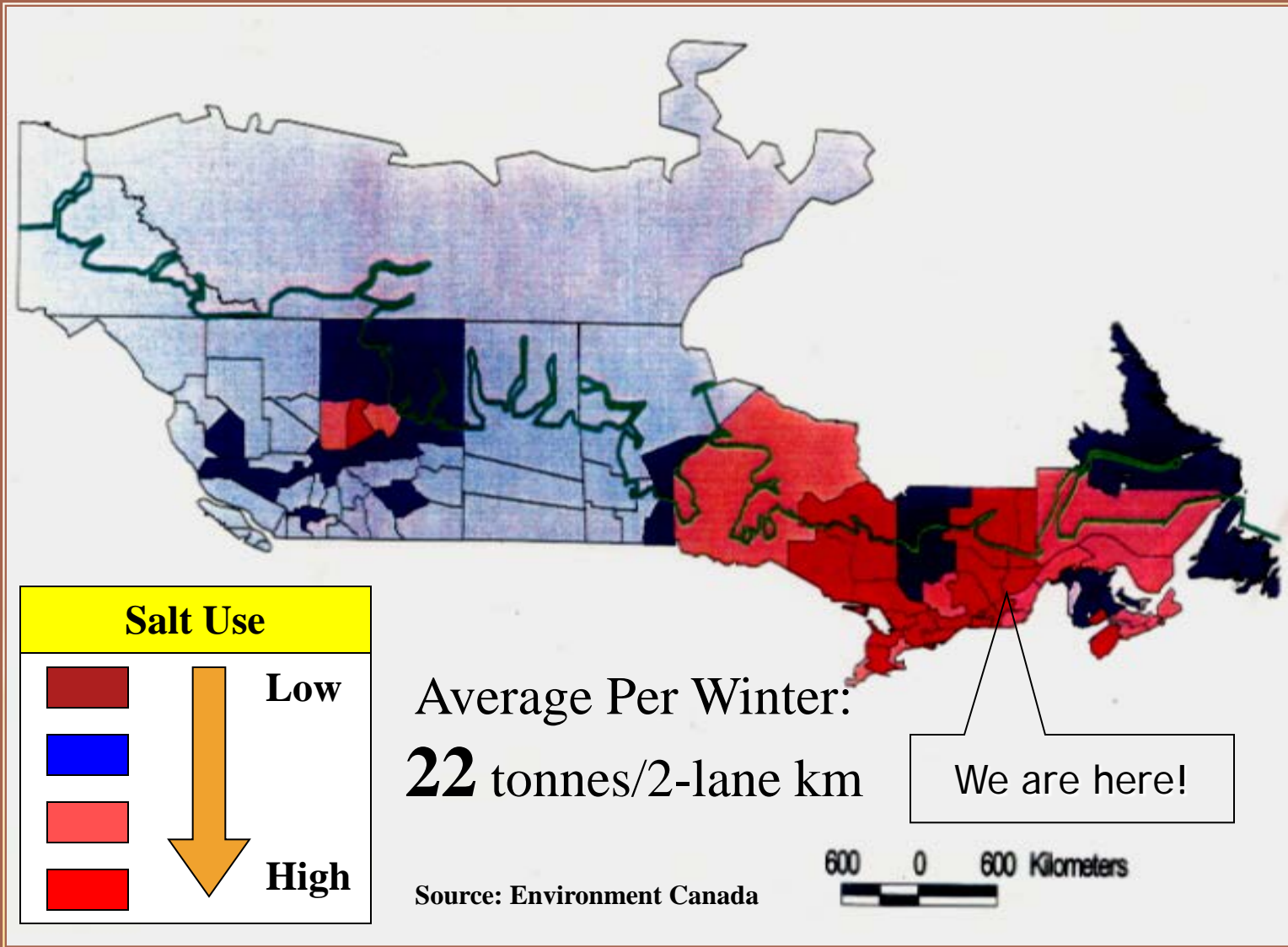
- Risk “accepted” or “transferred” to the party best able to manage it
- This includes the obligation of decision making; judgement
- Long term contracts spread-out the averages
 - Winter severity variable
 - Wage escalation accommodated in the price bid by the contractor
 - Equipment capital cost amortization is a contractor risk
- Consumer Price Index annually

Concept of Risk Sharing

- Salt risk sharing: <90% and >110% of 10-year average: invoice cost
- Fuel price adjustment based on tender-date benchmark
 - Monthly, based on 4% of lump sum
(assumed portion that equates to fuel)
- New concept of benchmark for winter hours
 - Bid based on prescribed hours; payment or payback at fixed rate



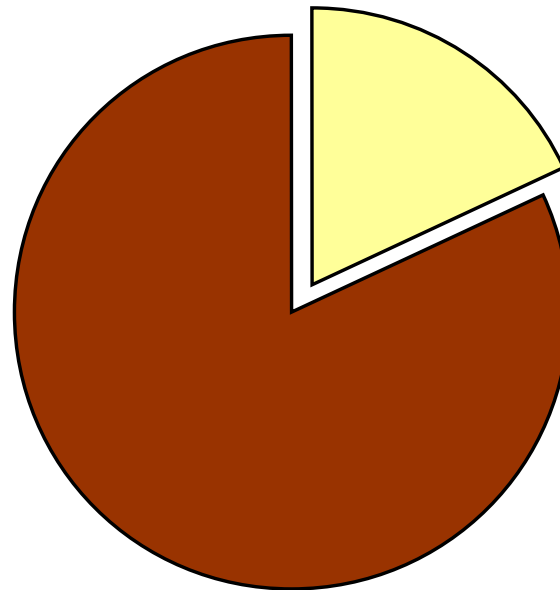
Salt Use In Canada



Salt Use on Ontario Contracts

(of the annual lump sum revenue on an Ontario Area Maintenance Contract, 15% to 20% is spent on salt alone)

Salt Expense



■ Salt

■ other

MINISTÈRE DES TRANSPORTS, DE LA MOBILITÉ DURABLE
ET DE L'ÉLECTRIFICATION DES TRANSPORTS

Guide for Best Application Practices

And spreading chart

Guide
des bonnes
pratiques
d'épandage

Édition 2017



Québec

Chartes
d'épandage

Édition 2016



Québec

Road Salt Multi-Stakeholder Working Group
September 21st, 2017

ENSEMBLE
on fait avancer le Québec

Québec

Direct Liquid

- Consider event(s) in the forecast: is a rinsing-rain possible?
- Pavement temperature trend - is your liquid suitable?
- Traffic "wind"
- Lead time to mobilize
- Proactive
- Fair-weather
- Ideal before frost



Winter Sand - for friction

- A little helps (570 kg/2-lane km)
- A lot doesn't help a lot
- Freeze-proof the pile
 - 3% per volume
 - Consider liquid alternatives when stockpiling
- "Mixes" carry a large liability
 - Don't be tempted to 50:50 or 20%
- If in doubt, spread sand, then spread salt
- Must stay on the road to reduce risk





AQTr Symposium - Trois Rivières



October 4, 2017

Contractor Compensation

- Similar to saying: “Service Provider Motivation”
- Must be cost-conscious, but also “value” oriented
- Old models:
 - Standby-days paid
 - Plus dollars per hour of operation
 - Or tonne-km payment
 - Significant impact on the salt-surrogate measure of success
 - More is better ? If-in-doubt-send-it-out ?
- Do not cause an artificial level of service
- Safety-first mindset, but aim to achieve the prescribed LOS

Thoughts for tomorrow!

As the Road Authority responsible for providing consistent safety, mobility and reliability to the travelling public:

- Establish and state the prescribed Level of Service
- Consider service delivery alternatives for your specific area and circumstances
- Develop a strategy to implement chosen alternatives and contract models
- Measure the performance of different approaches...



Thoughts for tomorrow!

- Shift winter operations toward the approach(s) that achieves optimal value
- With balanced risk
- And fair cost = compensation
- With no “gotchas” in either direction
- Communicate your chosen directions, and collaborate with all service providers



Winter Highway Maintenance Action Plan

In Ontario - Recommendations this year:

1. Have sufficient winter equipment in good working order
2. Encourage proactive use of winter materials
3. Awareness and Accurate Reporting of Road and Weather Conditions
4. Improve Reliability of Ontario 511 Website
5. Best Value Procurement of Maintenance Contracts
6. Oversight of Contractor Performance
7. Meaningful Reporting of Bare Pavement Standard
8. Monitor and Assess Remedial Measures



The Toronto Sun, Thursday June 6, 1996

Province, driver must pay woman \$200Gs

Black ice Ontario's fault

By TRISH TERVIT
and GRETCHEN DRUMMIE
Toronto Sun.

Industry is taking a
panel deci-
and a

worry since winter maintenance stan-
dards on Ontario's highways are "top
in North America". despite last fall's
\$6.5-million budget cutbacks, the
MOT's Karen Gordon said yesterday.
The cutbacks were really a reorga-

ent trucks, she said.

Yesterday's decision
lower court ruling
province's re
making
br





Salt is simply dehydrated brine

– just add water!

**Like these empty cans, of “dehydrated water”
(full of air: just add water to have H₂O !)**