What Does it Take to Achieve

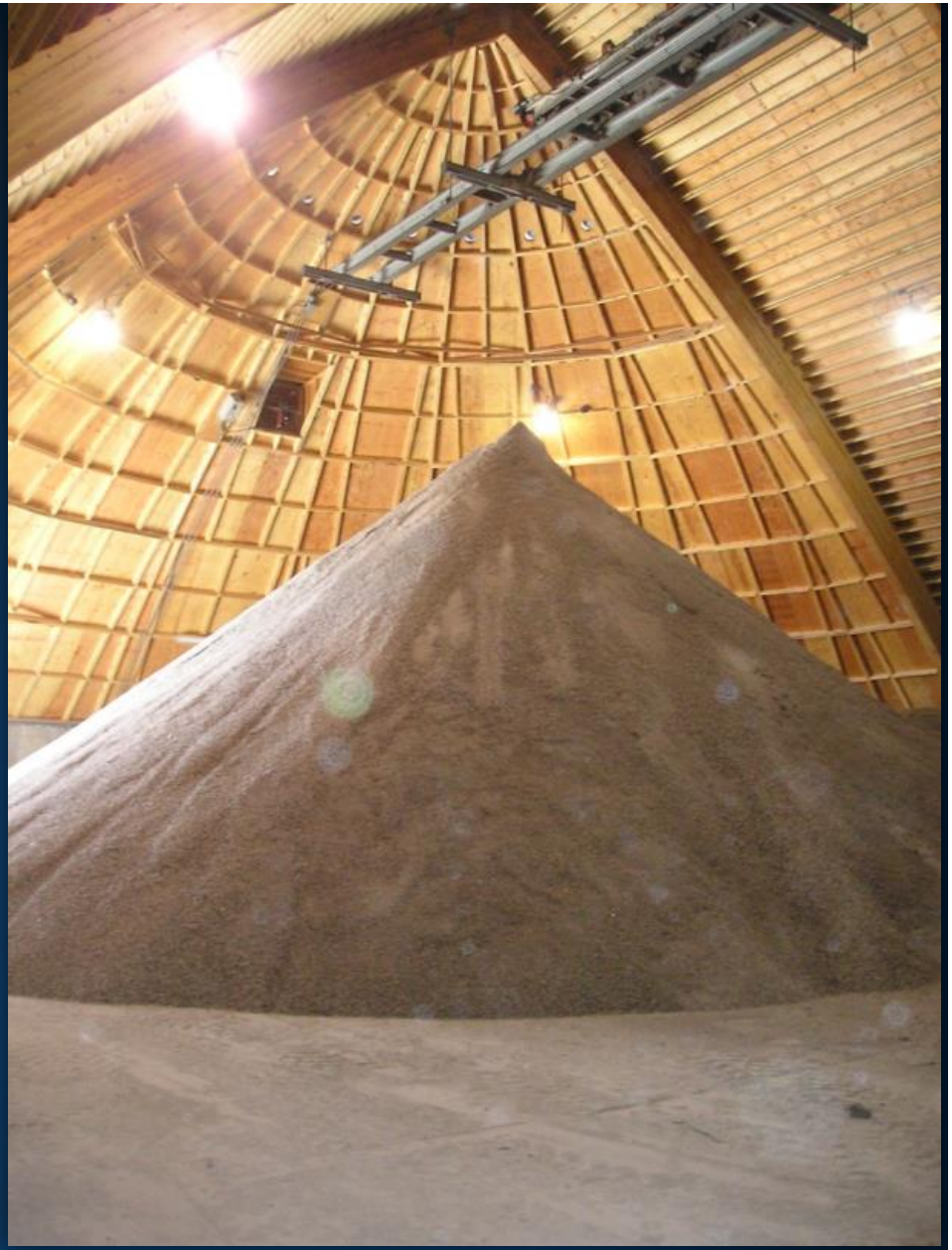
World Class Snow & Ice Services?

Larry Schneider, Streets Superintendent
City of Fort Collins
Fort Collins, Colorado

A Vision for a New Snow Facility

A New Material Storage Structure

•Total Project Cost: $3.2 Million
•Construction time: 10 months
•10,000 Tons
•220,000 Gallons



Material Storage Facility

Producing the Right Mix of Brine

Material Management

- Truck Loading Island
- Quick Attach Setup
- 4 Loading Arms
- 2 Hand Style Hoses
- 160 GPM Loading

FUELMASTER

FUELMASTER PLUS

TRIG
CHK
A+
LOADRITE Pro
EXIT
DATA
TARG
PROD
ENT
YES
ADD
CLEAR
ZERO

2211
STAY BACK

Why Alternative Fuels?

Goals

The City of Fort Collins, Colorado is determined to become carbon neutral community-wide by 2050.

- Reduce the City's greenhouse gases by 20% by 2020.
- 80% by 2030
- Consistent with a Community Goal

Compressed Natural Gas Fleet

Compressed Natural Gas – 59 Units

- 8 tandem plow trucks
- Cost $370,000 each

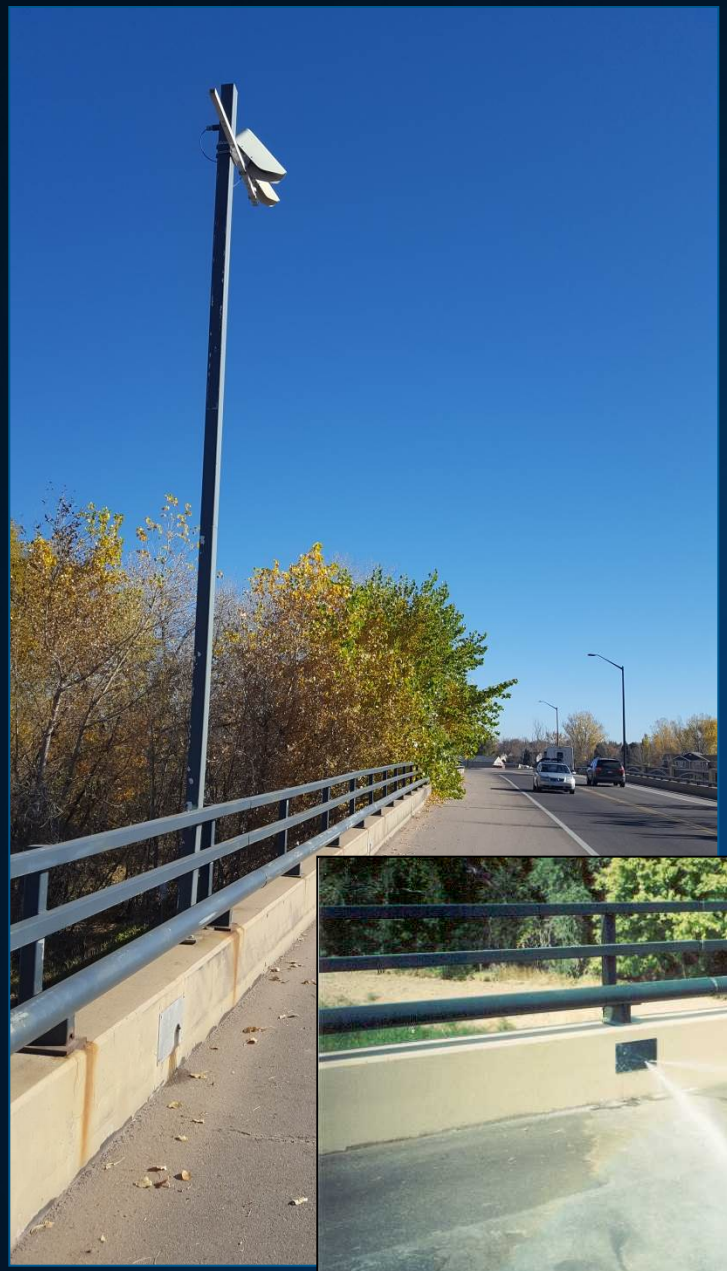
Compressed Natural Gas Station

Fort Collins Streets Facility

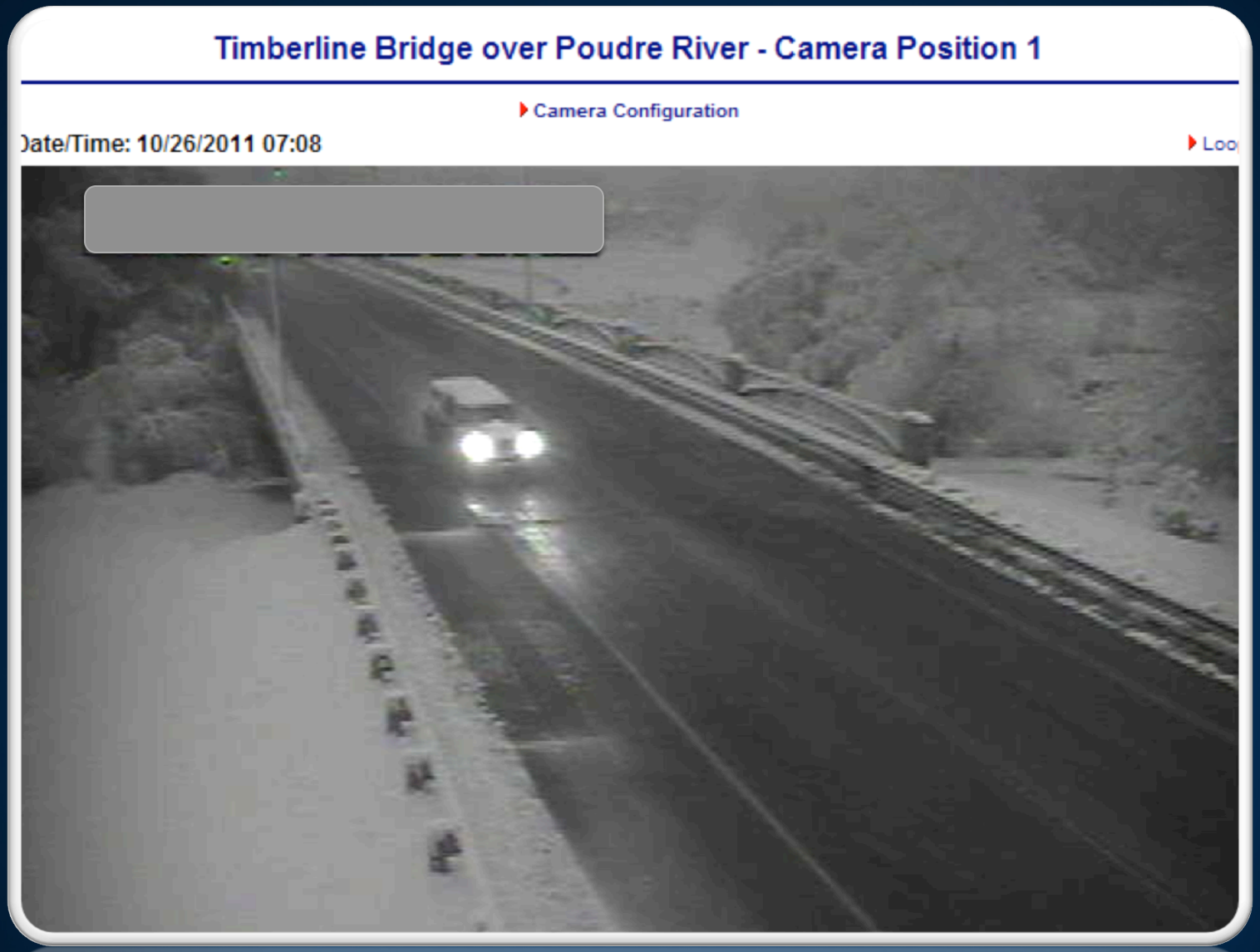
Tools for Effective Planning and Execution

Automatic Spray Systems

- Spray systems use Apogee (Non-Chloride)
- Weather sensors automatically turn on system
- Remote control clicker



Live Footage for Areas that Pose a Greater Safety Hazard



Real-time Monitoring from the Command Center

VAISALA / Navigator City of Fort Collins

Map | Station Summary | Station Wall | Stations | Forecast | Alerts | Reports

Trilby Road (Show station on map)

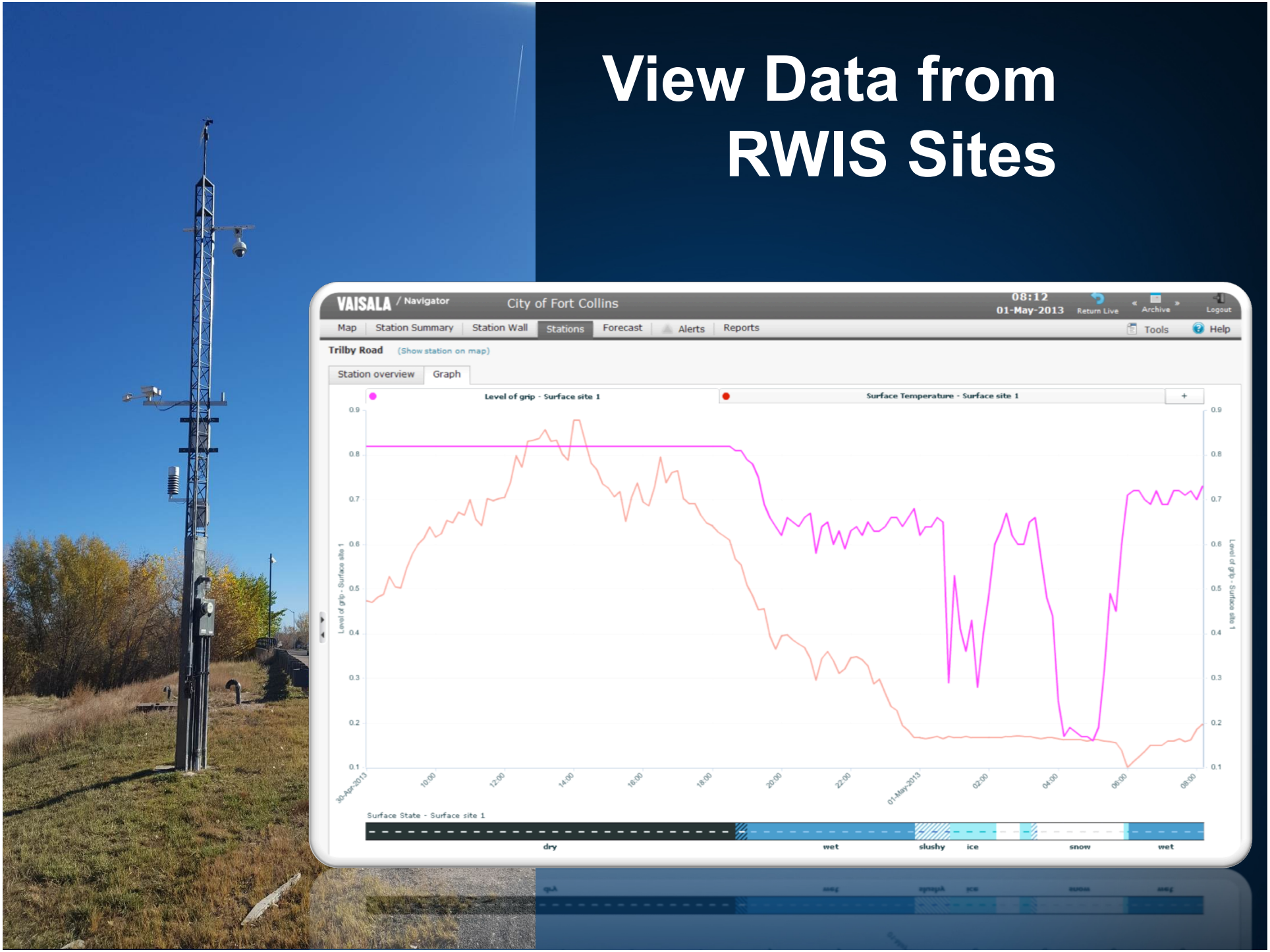
Station overview | Graph | Alert management

08-Oct-2013 08:00

08-Oct-2013 08:00

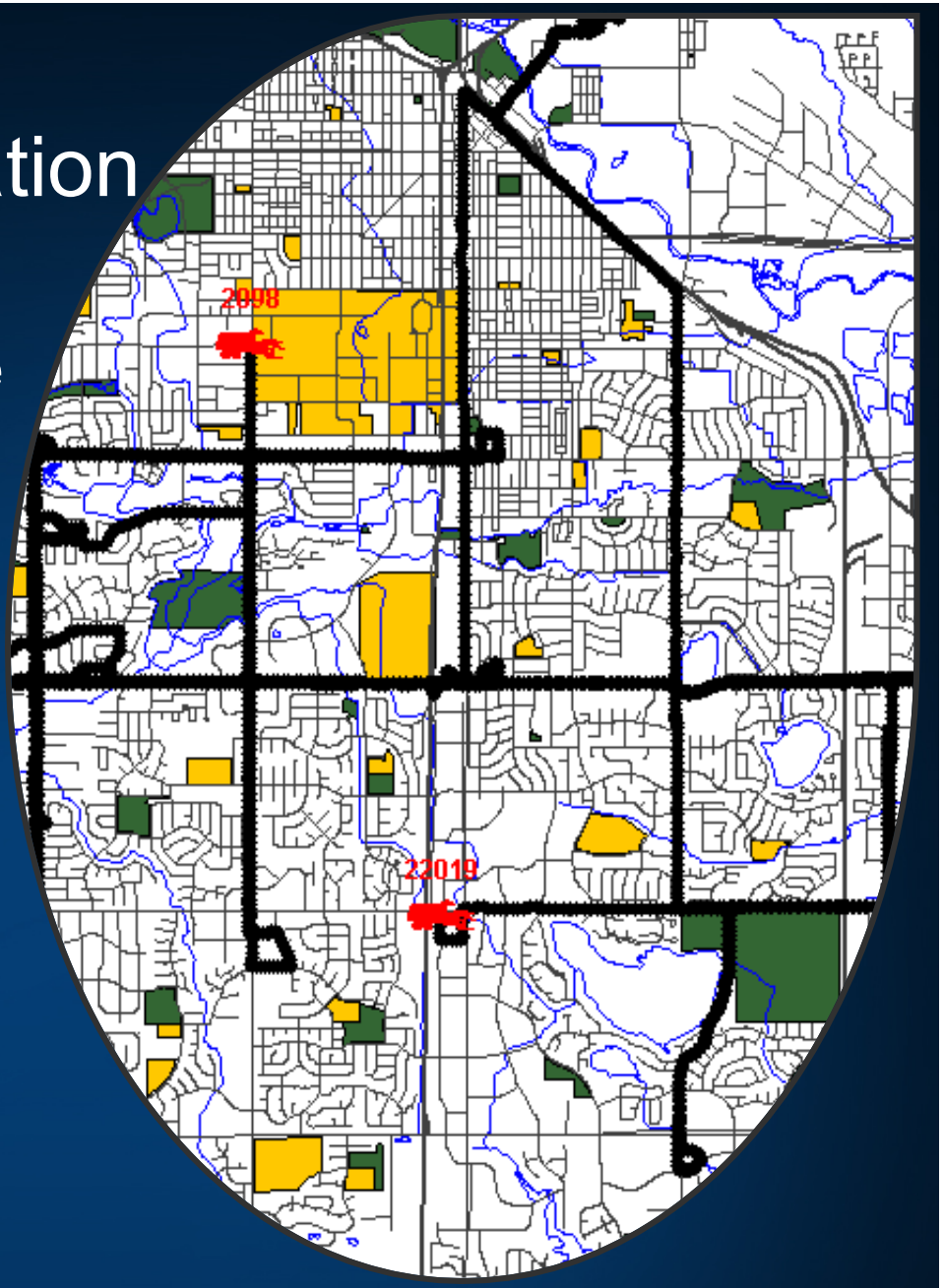
Air Temperature	45.5 °F
Dew Point Temperature	37.9 °F
Relative Humidity	75 %
Level of grip	0.82
Surface State	dry
Surface Temperature	50.5 °F

View Data from RWIS Sites



Automated Vehicle Location

- GPS Location, Time and Date
- Vehicle Speed
- Driver
- Plow Up/Down
- Material Applied
- Lane Miles Plowed/Deiced
- Road/Air Temperature
- Incident Mitigation
- Data History



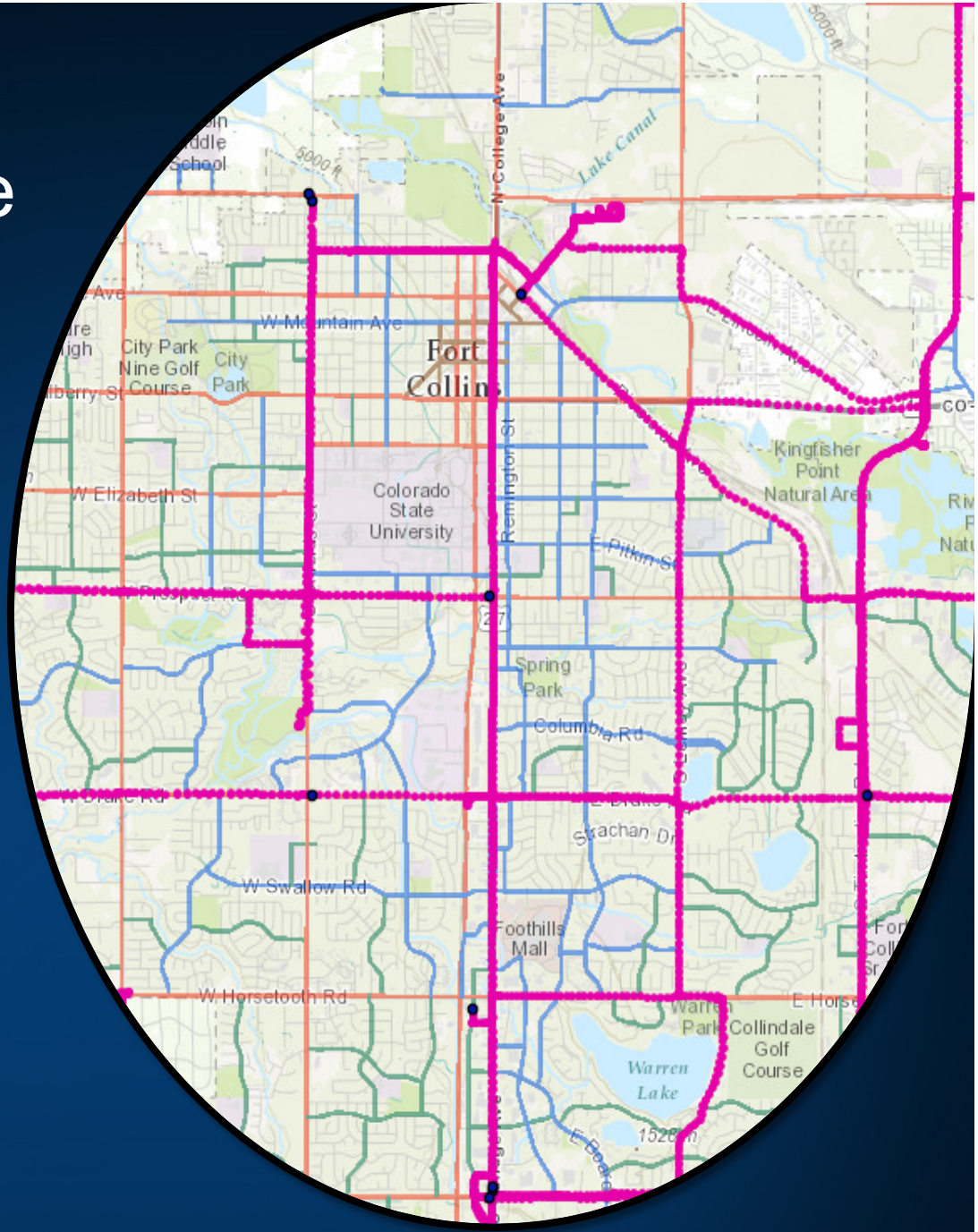
Monitoring Vehicles in Real-Time

Trucks Reporting within the last 5 minutes

TRUCK#	ROAD_TEMP	PLOW	RADIO#	DRIVER_NAME	MATERIAL	GRAN_RATE	AI_RATE
2089		Down		James White	LIQD	0	15
2095	29	Down	992	Larry Jungmeyer	LIQU	10	35
22018		Up		Jason Grant	LIQD	0	33
2220		Up		Dale Johnson	SALT	50	0
2747		Up		Bennie Cortez	SALT	0	0
27003		Up		Kyle Rakoczy	SALT	0	0
27700		Up		Shawn Drake	SALT	150	0
2097	29	Down	920	Doug Davis		0	25
22016		Up		Dan Williams	SALT	0	0
2211		Down	983	Ed Hintz	LIQD	0	33
2241		Down	952	Justin Pedrosa	LIQD	0	40

Public AVL Website

- Snow Route Status Map
- Shows Last 4 Hours of Plowing/Deicing
- Gives the Public Breadcrumb Trails



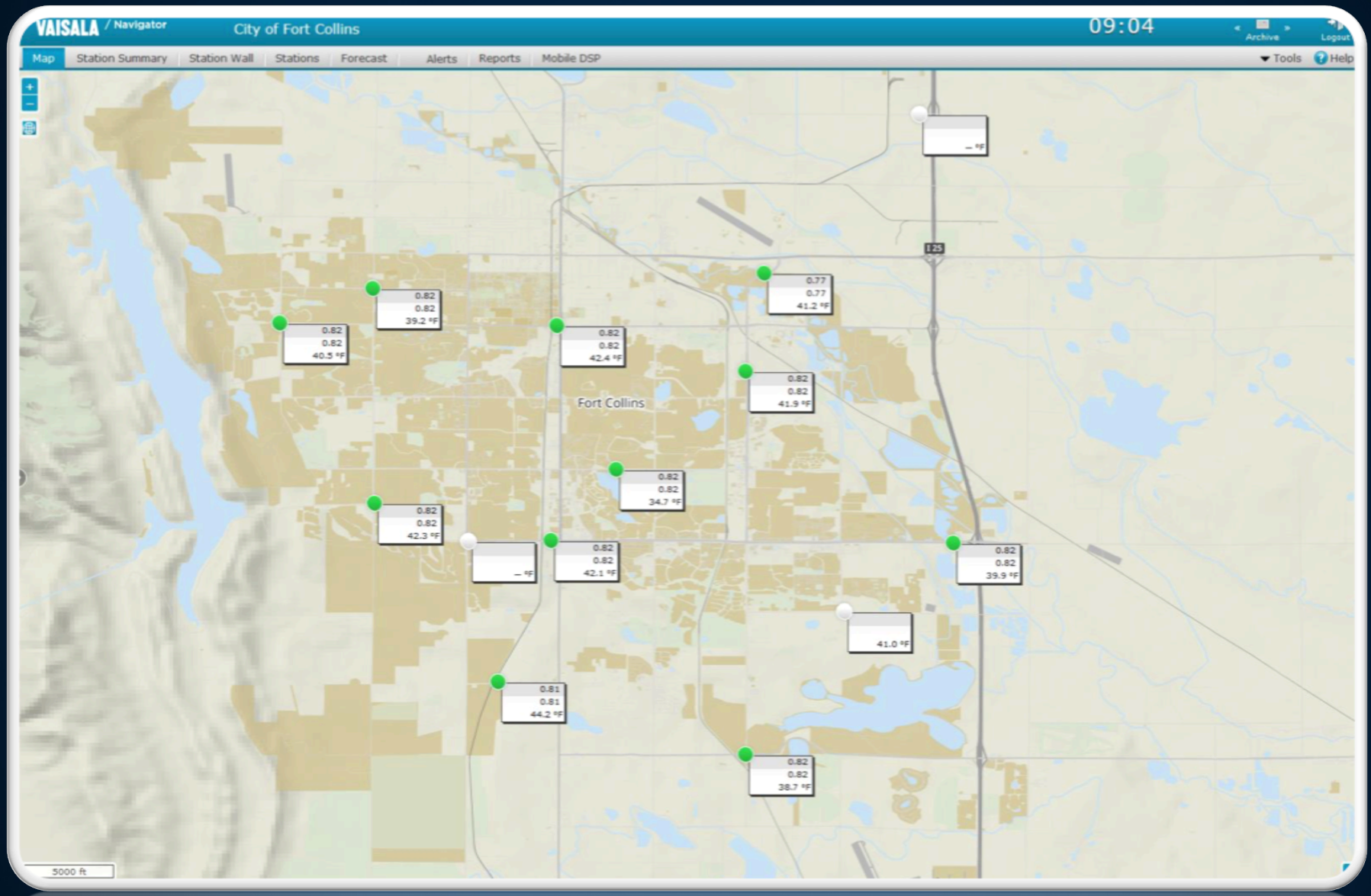
Weather Forecasts and Pavement Temperatures

View Forecast Meteogram

Time (MDT)	Pavement Temp (° F)	Pavement Cond	Pavement Frost Prob (%)	Pavement Potential Evap	Deck Temp (° F)	Deck Cond	Deck Frost Prob (%)	Deck Potential Evap	Air Temp (° F)	Dew Point (° F)	Rel Humidity (%)	Wind	Wind Speed (miles/ hour)	Wind Gust (miles/ hour)	Wind Chill (° F)	Precip Type	Precip Prob (%)	Precip Rate (in/ hr)	Precip Accum (in)	Snow Rate (in/ hr)	Snow Accum (in)	Sky	Time (MDT)
Wed 06:00	32	Slush	10	41	31	Snow	10	34	28	28	100	NE	5		23	SN	90	0.06	0.00	0.8	0.0	OvrCst	Wed 06:00
Wed 07:00	32	Slush	5	78	32	Snow	0	78	25	25	100	NE	5		19	SN	80	0.06	0.06	0.7	0.8	OvrCst	Wed 07:00
Wed 08:00	32	Slush	5	79	32	Snow	0	79	25	25	100	ENE	5		19	SN	80	0.05	0.12	0.7	1.5	OvrCst	Wed 08:00
Wed 09:00	32	Slush	10	35	32	Snow	5	35	29	29	100	VRB	3		28	SN	70	0.05	0.17	0.7	2.1	OvrCst	Wed 09:00
Wed 10:00	32	Slush	15	15	32	Snow	10	19	32	32	100	ENE	4		28	SN	70	0.04	0.22	0.6	2.8	OvrCst	Wed 10:00
Wed 11:00	32	Slush	20	4	32	Snow	10	9	34	32	92	NE	5		30	SN	70	0.04	0.26	0.6	3.4	OvrCst	Wed 11:00
Wed 12:00	33	Slush	15	13	32	Snow	15	13	34	31	89	NE	6		28	SN	60	0.03	0.30	0.4	4.0	OvrCst	Wed 12:00
Wed 13:00	32	Slush	10	27	32	Snow	10	15	32	30	92	NNE	5		26	SN	60	0.02	0.33	0.2	4.4	OvrCst	Wed 13:00
Wed 14:00	32	Slush	15	20	32	Snow	10	23	33	28	82	VRB	3		34	SN	50	0.02	0.35	0.2	4.6	OvrCst	Wed 14:00
Wed 15:00	32	Slush	10	36	32	Snow	10	26	32	29	88	VRB	3		32	SN	40	0.01	0.37	0.1	4.8	OvrCst	Wed 15:00
Wed 16:00	33	Slush	10	33	32	Ice	5	33	33	27	78	VRB	2		34	SN	30	0.01	0.38	0.1	4.9	OvrCst	Wed 16:00
Wed 17:00	32	Slush	5	39	32	Ice	5	35	33	25	72	VRB	1		34	SN	30	trace	0.39	trace	5.0	OvrCst	Wed 17:00
Wed 18:00	32	Slush	5	49	32	Ice	5	49	31	25	78	VRB	1		32	SN	20	trace	0.39	trace	5.1	OvrCst	Wed 18:00
Wed 19:00	31	Slush	0	51	32	Ice	0	51	24	22	92	VRB	0		25	SN	20	trace	0.39	trace	5.1	MCldy	Wed 19:00
Wed 20:00	29	Snow	5	36	32	Ice	0	52	22	22	100	VRB	1		23		0	0.00	0.39	0.0	5.1	PClr	Wed 20:00
Wed 21:00	28	Ice	5	37	32	Ice	0	63	20	20	100	VRB	2		19		0	0.00	0.39	0.0	5.1	PClr	Wed 21:00
Wed 22:00	26	Dry	10	33	27	Ice	5	41	18	18	100	VRB	2		17		0	0.00	0.39	0.0	5.1	PCldy	Wed 22:00
Wed 23:00	24	Dry	10	29	25	Ice	5	33	18	18	100	VRB	3		17		0	0.00	0.39	0.0	5.1	MClr	Wed 23:00
Thu 00:00	23	Dry	15	24	24	Ice	10	26	17	17	100	VRB	3		17		0	0.00	0.39	0.0	5.1	Clr	Thu 00:00
Thu 01:00	22	Dry	15	29	22	Ice	10	30	17	17	100	NW	4		10		0	0.00	0.39	0.0	5.1	Clr	Thu 01:00
Thu 02:00	22	Dry	15	32	21	Ice	10	30	16	16	100	NW	4		10		0	0.00	0.39	0.0	5.1	MClr	Thu 02:00
Thu 03:00	21	Dry	20	39	20	Ice	15	34	15	15	100	NW	5		7		0	0.00	0.39	0.0	5.1	MClr	Thu 03:00
Thu 04:00	20	Dry	15	51	19	Ice	15	43	14	13	95	NW	6		5		0	0.00	0.39	0.0	5.1	MClr	Thu 04:00
Thu 05:00	20	Dry	15	45	18	Ice	15	35	14	13	95	NW	6		5		0	0.00	0.39	0.0	5.1	PCldy	Thu 05:00
Thu 06:00	19	Dry	10	51	17	Ice	10	39	13	10	87	NNW	6		3		0	0.00	0.39	0.0	5.1	PCldy	Thu 06:00
Thu 07:00	18	Dry	10	42	16	Ice	15	28	12	11	95	NW	6		3		0	0.00	0.39	0.0	5.1	PCldy	Thu 07:00
Thu 08:00	20	Dry	15	28	17	Ice	25	11	15	14	95	NW	4		8		0	0.00	0.39	0.0	5.1	PCldy	Thu 08:00
Thu 09:00	26	Dry	5	41	20	Ice	25	9	21	17	84	VRB	1		21		0	0.00	0.39	0.0	5.1	PCldy	Thu 09:00
Thu 10:00	35	Dry	0	73	24	Ice	25	11	28	21	74	VRB	2		28		0	0.00	0.39	0.0	5.1	PCldy	Thu 10:00
Thu 11:00	42	Dry	0	122	29	Ice	10	29	35	23	61	VRB	1		35		0	0.00	0.39	0.0	5.1	PCldy	Thu 11:00
Thu 12:00	54	Dry	0	259	33	Ice	0	45	39	25	57	VRB	2		39		0	0.00	0.39	0.0	5.1	PCldy	Thu 12:00
Thu 13:00	58	Dry	0	320	32	Ice	0	47	37	25	61	VRB	2		37		0	0.00	0.39	0.0	5.1	PCldy	Thu 13:00
Thu 14:00	61	Dry	0	354	34	Slush	5	38	39	25	57	VRB	1		39		0	0.00	0.39	0.0	5.1	PCldy	Thu 14:00
Thu 15:00	59	Dry	0	330	34	Slush	0	47	40	26	57	VRB	1				0	0.00	0.39	0.0	5.1	PCldy	Thu 15:0

Vaisala Weather Stations

14 Fixed RWIS Sites

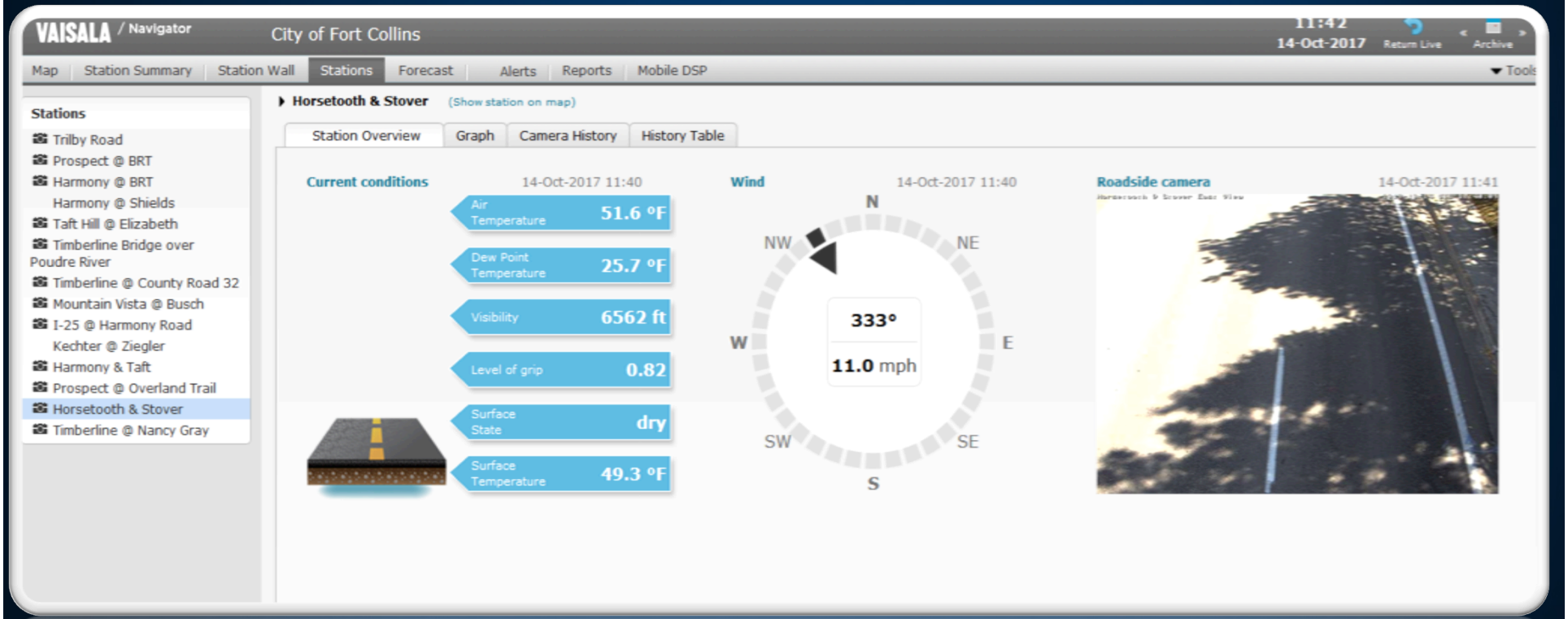


Mobile Sensor Technology

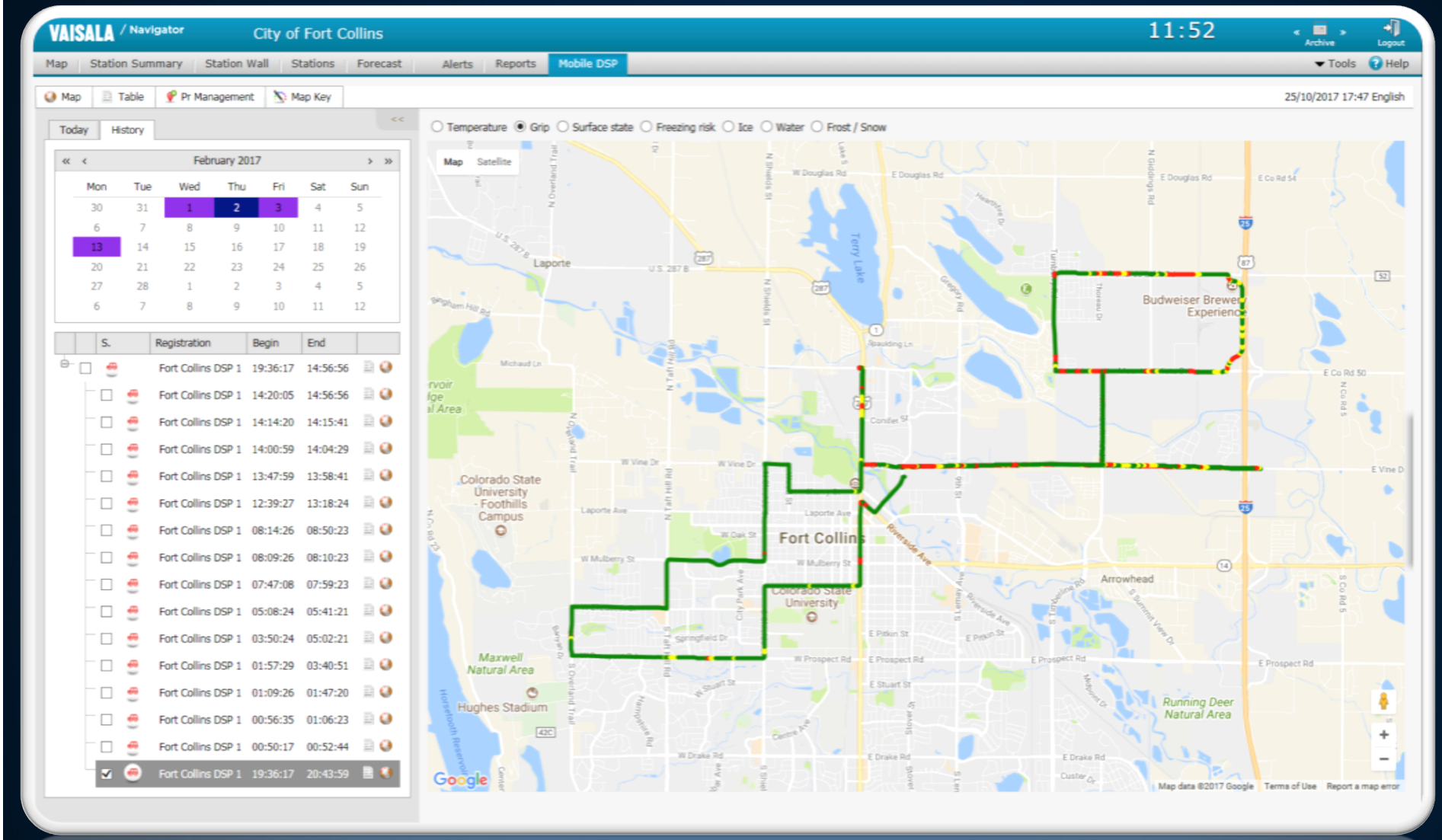
- Drive 9 routes
- Collect road condition data
  - Pavement temperature
  - Level of grip
  - Dew point
  - Air temperature
- Monitor each shift

Real-time Monitoring of Road & Weather Conditions

- Image
- Wind Speed & Direction
- Surface Status
- Level of Grip
- Surface Temperature
- Air Temperature
- Precipitation
- Dew Point



Mobile Access to Road Temperature & Conditions



Traffic Cameras

- 35 Major Intersections
- 10-15 Minute Delay

College @ Drake (North)

College @ Drake (West)

College @ Prospect (North)

College @ Prospect (West)

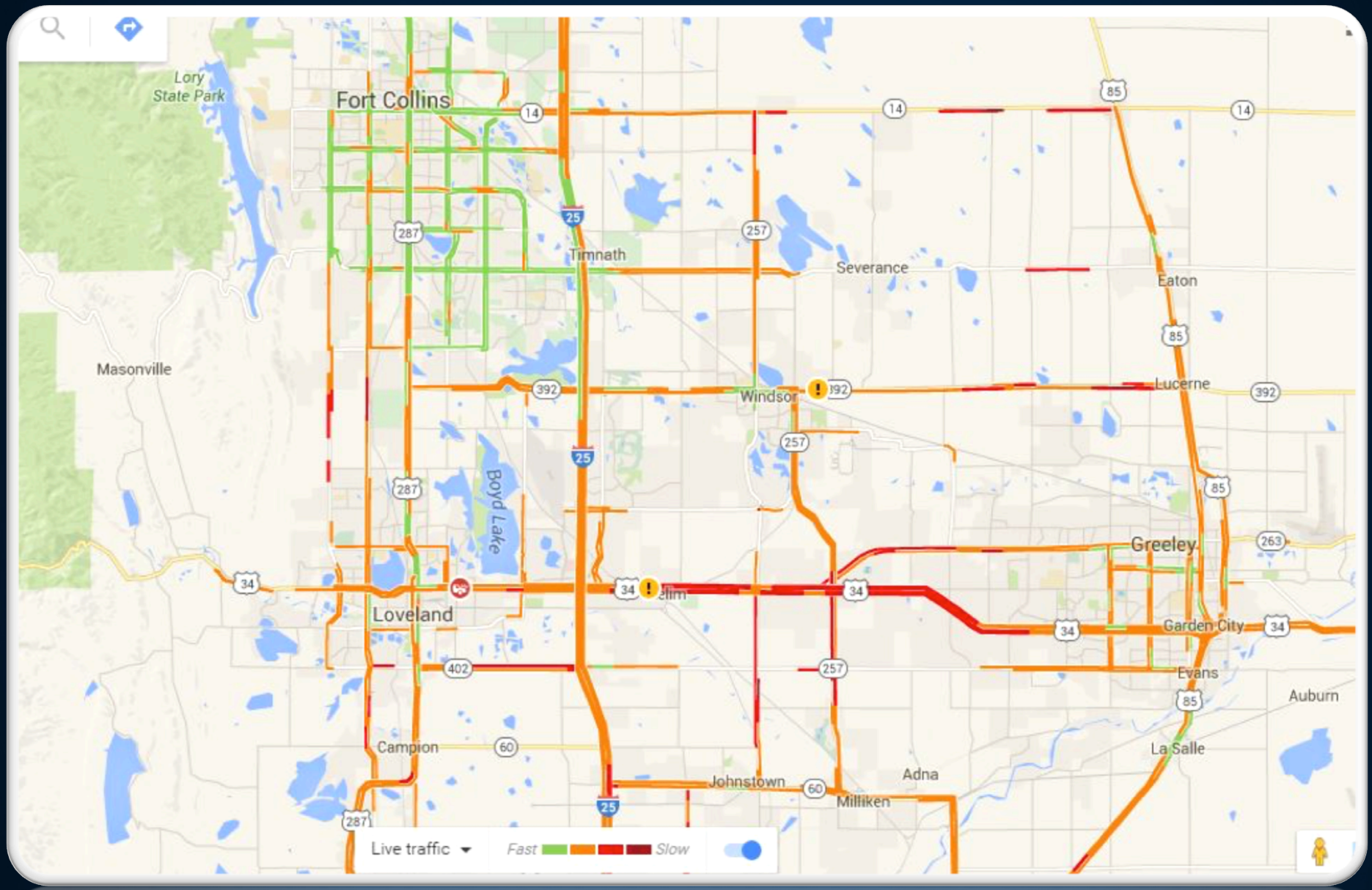
College @ Drake (South)

College @ Drake (East)

College @ Prospect (South)

College @ Prospect (East)

Live Traffic in Fort Collins Compared to Neighboring Cities



City of Fort Collins

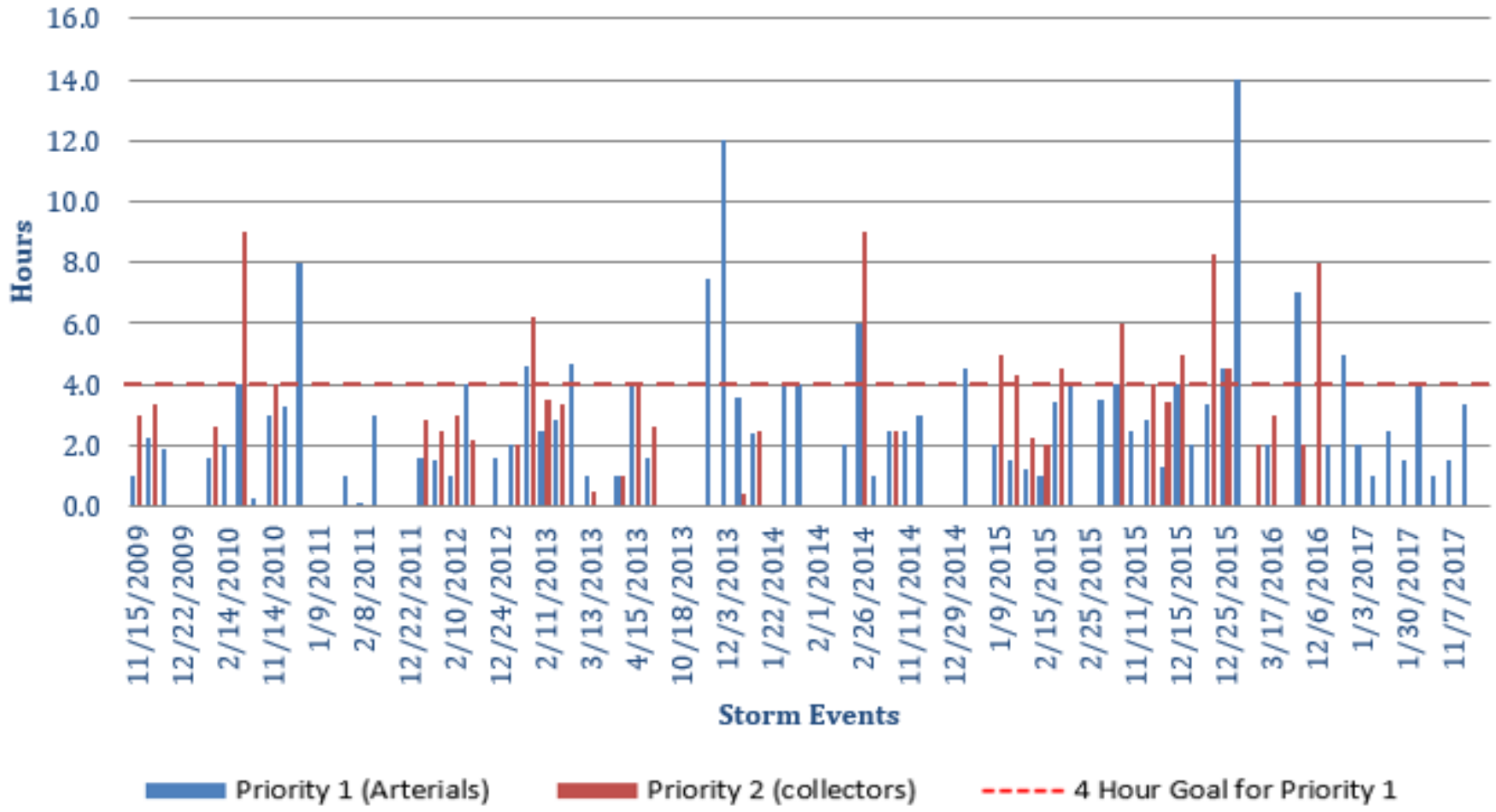
Downtown

Striving for Bare Pavement
in Record Time

Snow Removal Based on Priority Level

- **Priority 1** – Arterial Streets are plowed curb-to-curb.
- **Priority 2** – Collector Streets – Priority 2 streets are selected to complete the network of major traffic volume streets. Collector streets are not plowed curb-to-curb; snow is plowed to the gutter.
- **Priority 3** – School Areas and Bus Routes – These streets include all remaining collectors, bus routes, and access to schools. Priority 3 streets are plowed to the gutter.
- **Priority 4** – Residential Streets – only plowed when snow accumulations completely block traffic movement.
- Bike Lanes – 280 miles of bike lanes. Majority of bike lanes cleared by tandem axle plow.

Average Time to Bare Pavement



City of Fort Collins

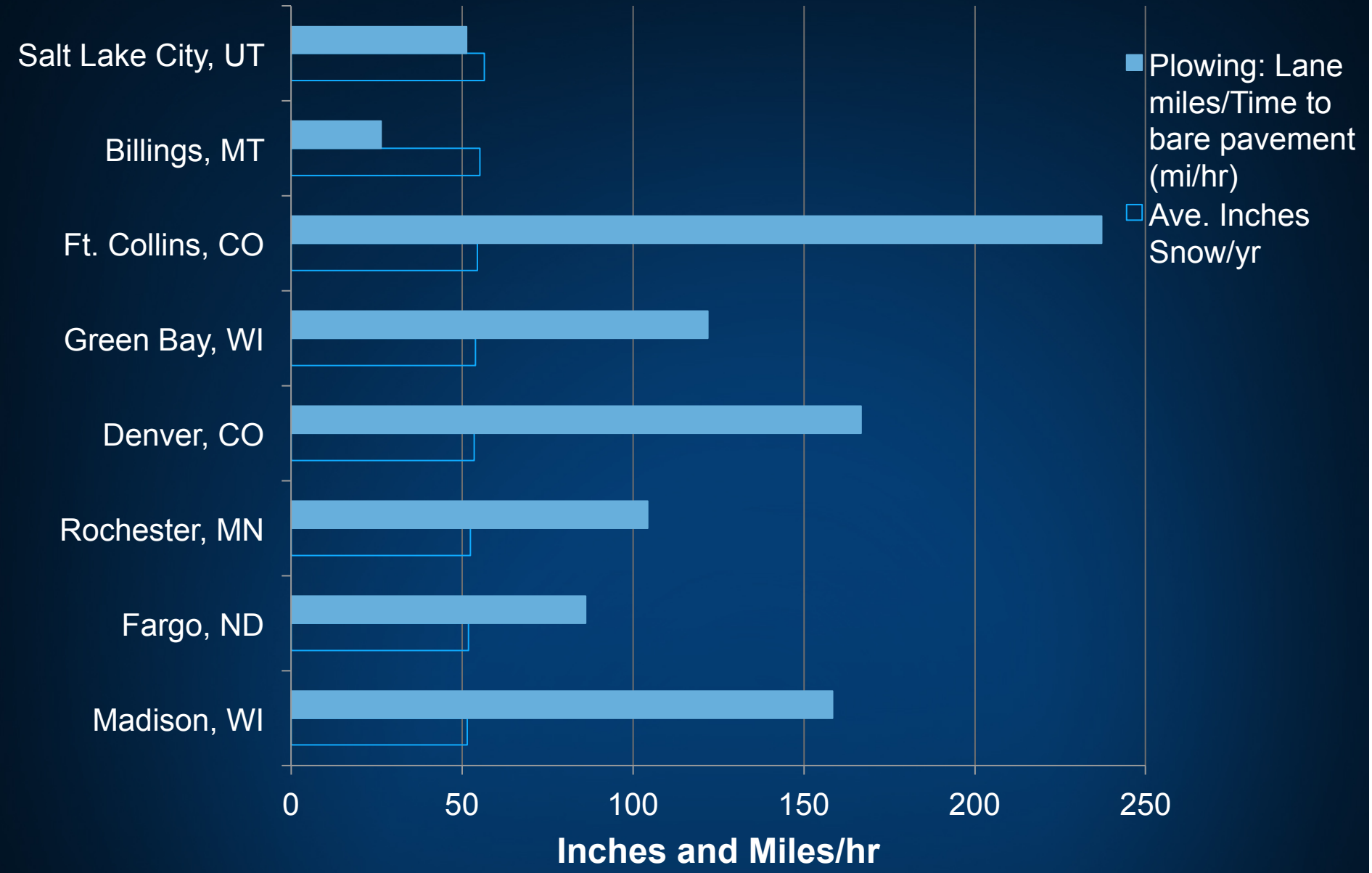
Snow and Ice in Fort Collins

Fort Collins...

Top 15 Snowiest Major City in the Nation

Lane Miles: 1257

Plowing Rate for several Snowiest Major Cities*



*30-year average annual snowfall data from NOAA's National Climatic Data Center. Major cities have a population of at least 100,000, as of the latest U.S. census estimate.

Emerging Technology

Award Winning Service

- ISO 14001:2015 Certified
- Continuing Excellence in Storage Award
- Gold Level Member – Environmental Leadership Program

NSF-ISR Registered to ISO 14001

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF

ANAB ACCREDITED ISO/IEC 17021 MANAGEMENT SYSTEMS CERTIFICATION BODY

COLORADO Environmental Leader Gold

The Nation's Highest Presidential Honor for Performance Excellence

- Established by the U.S. Congress
- Raise awareness of quality management
- Recognize companies implementing successful quality management systems

Malcolm Baldrige 2017 Award Recipient

Thank You!

Questions?