Plowing Wider

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MDOT

Better.*Faster*.Cheaper.Safer. Smarter

MDOT
Dual Wing Pilot

Objective

Ability to clear the left and right hand shoulders with one truck

Build Up Info

- Left and Right (Junior Wings) installed on 04-1693 for the Mason Garage
- Cost approximately $10,000
- Weight of WMT empty, 38,160 pounds
- No major modification's to truck were needed

Performance

- Clears left and right shoulders as expected
- Ability to clear 20’ 6” of a ramp in one pass
- Improved efficiency with the clean up of rest areas and park n rides

Operator Comments

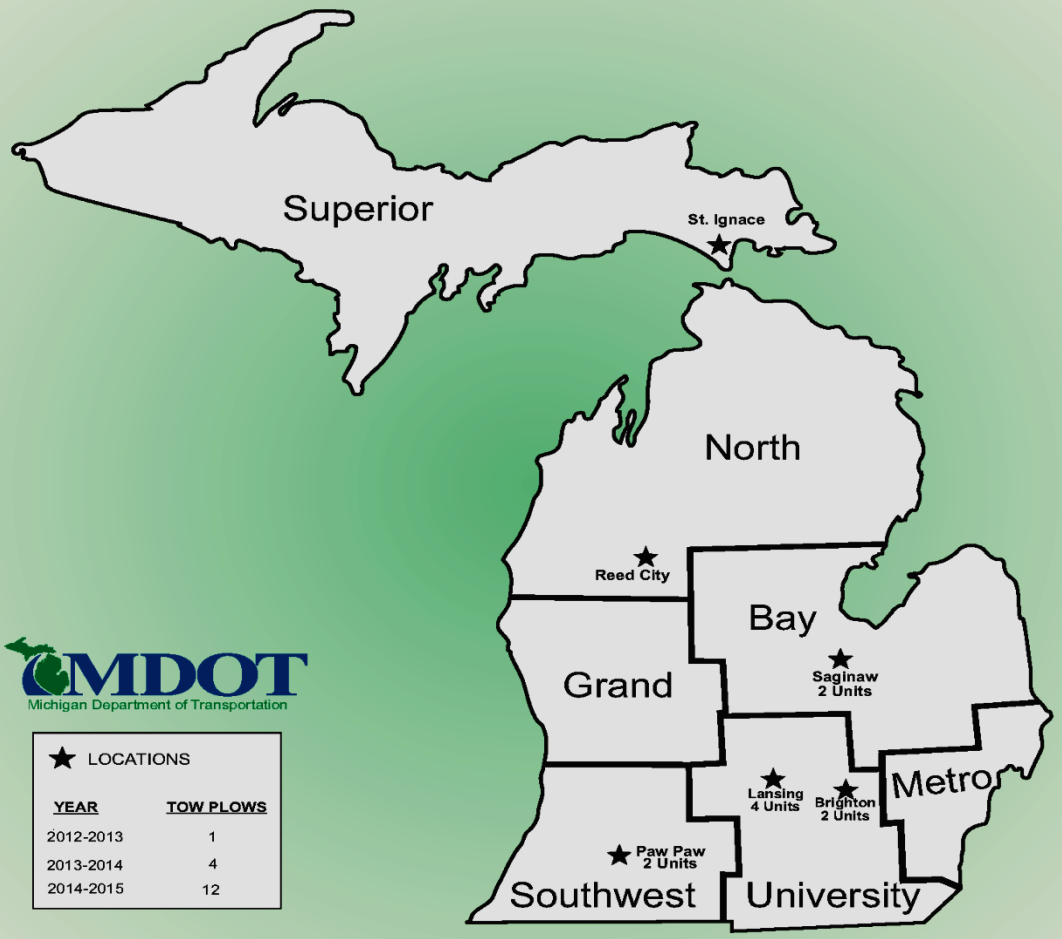
- “This has proven to me to be an excellent tool”
- “Being able to clean more of a ramp in one pass has sped up my after storm clean up”
- “Fueling and parking can be a challenge”
- “Nice to have the ability to maintain both the lanes and shoulders without switching trucks”
- “Need the ability to raise both wings at the same time with just one lever”

Tow Plow

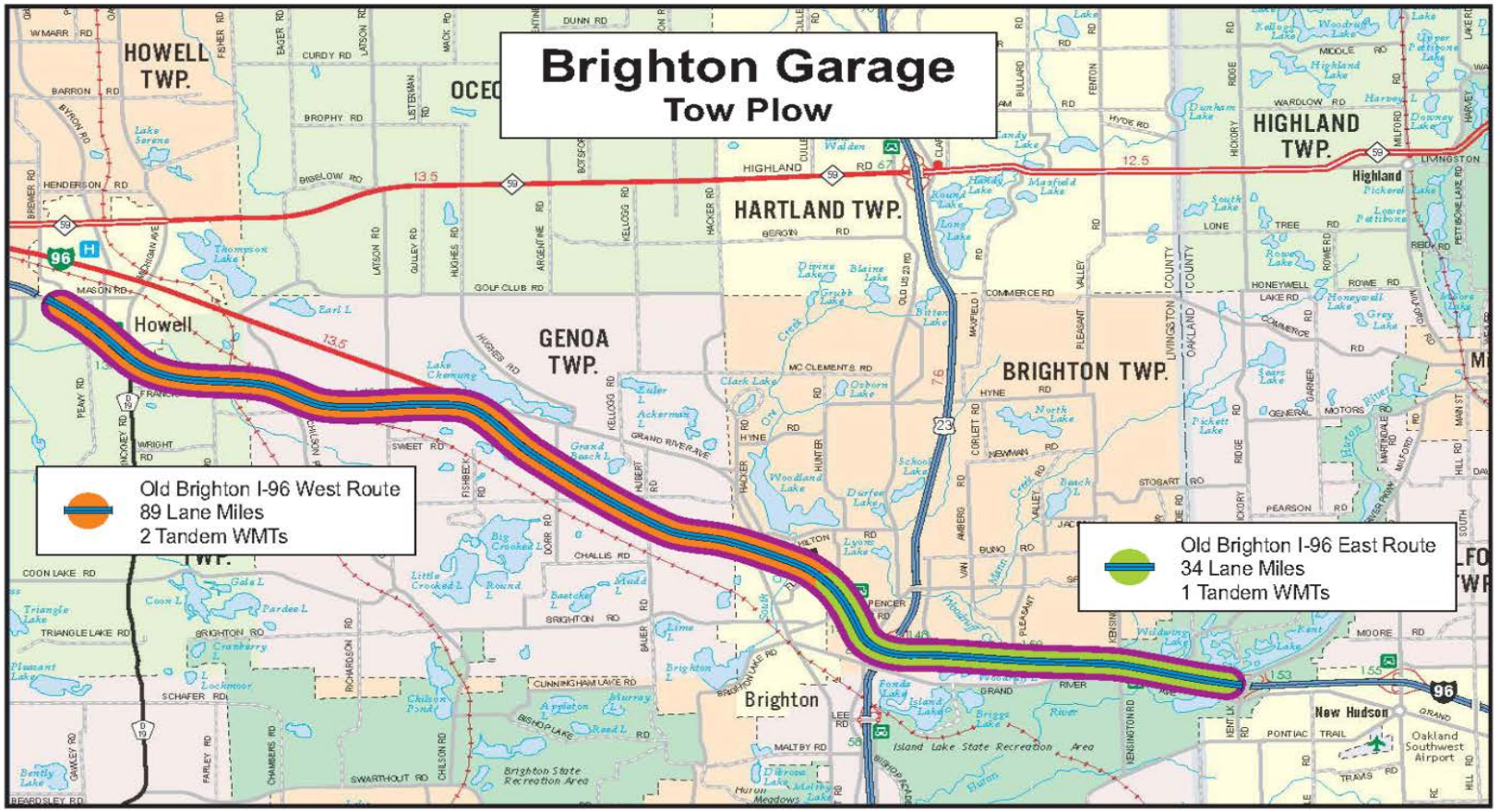
What is a Tow Plow?

- A steerable trailer-mounted plow
- Articulates to one side doubling total plow width
- Equipped with hopper or tank for dispensing deicer
- 26’ moldboard

Tow Plow Deployment



Brighton Garage Tow Plow



Cost Savings for Brighton Garage Tow Plow

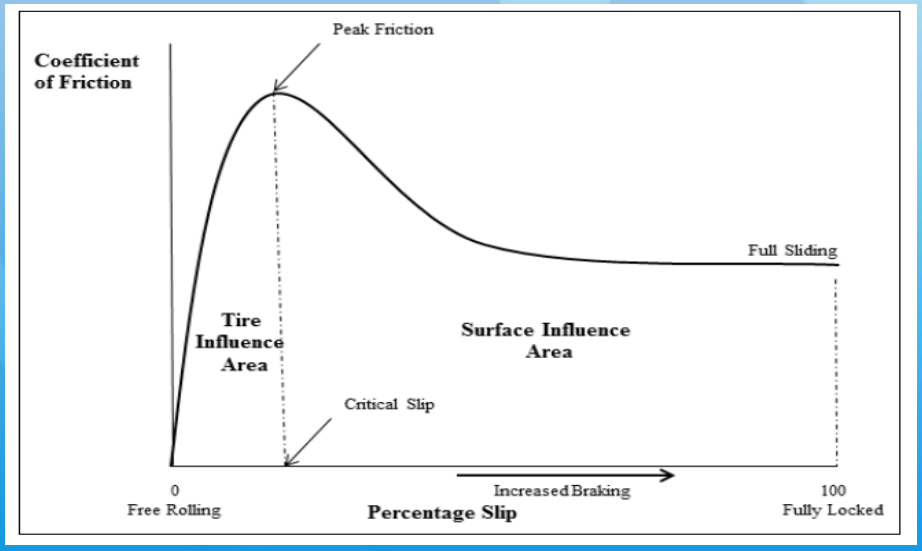
	Cost Savings for Brighton I-96 Route				
	Equipment	**Operators**	**Equipment Cost/Hour**	**Operator Cost/Hour**	**Total Cost/Hour**
Old Strategy	3 Tandem Axles WMT's	3	$178	$135	$313
New Strategy	2 Tandem Axle WMT's 1 Tow Plow	2	$161	$90	$251
				Savings Per Hour	**$62 (20%)**
	Tow Plow Payback Period	$90,000 cost / $62 per hour	= **1452 hrs**		

Evaluating the Use of Tow Plows in Michigan
OR14-006
Progress Meeting 3
(02/10/2014)

Dr. Nishantha Bandara P.E.

Friction Data

- Dynatest 6875 Continuous Friction Tester (CFT)
- Fixed-slip tester and measures Peak Friction



Dynatest 6875 Interior

Temperature Display for Air and Surface

Dash Display for Speed and Mu

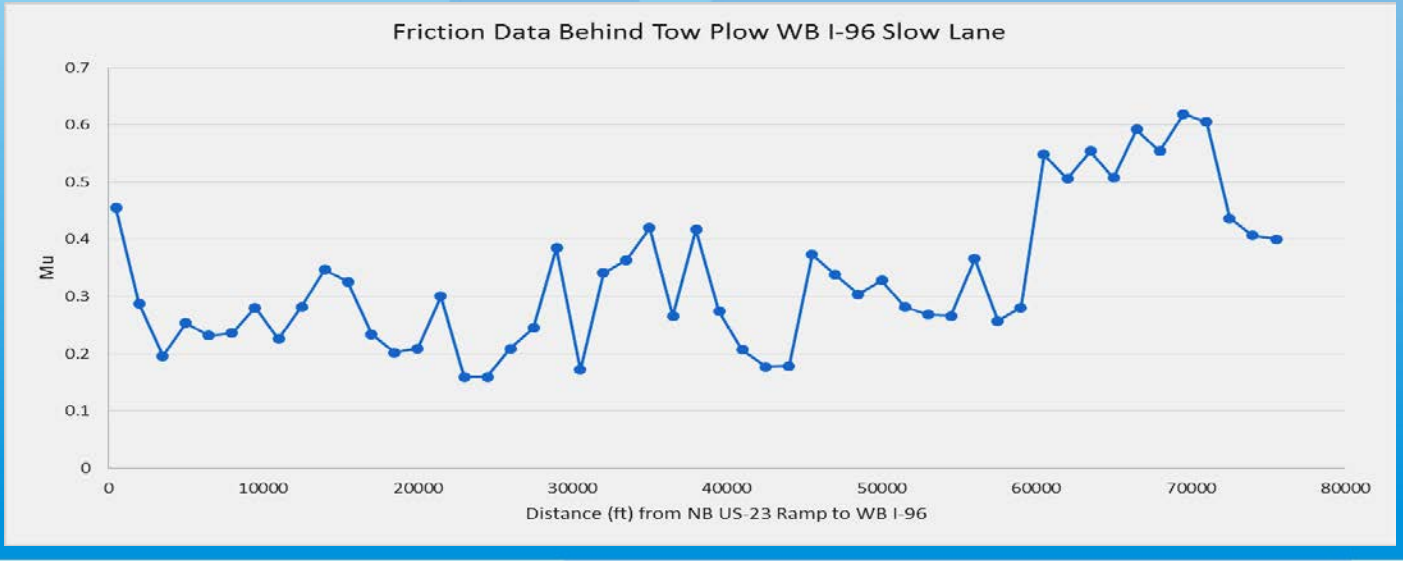
Laptop controlling data collection Software

ROW camera recording images at 150 foot intervals

Display for road condition Survey data

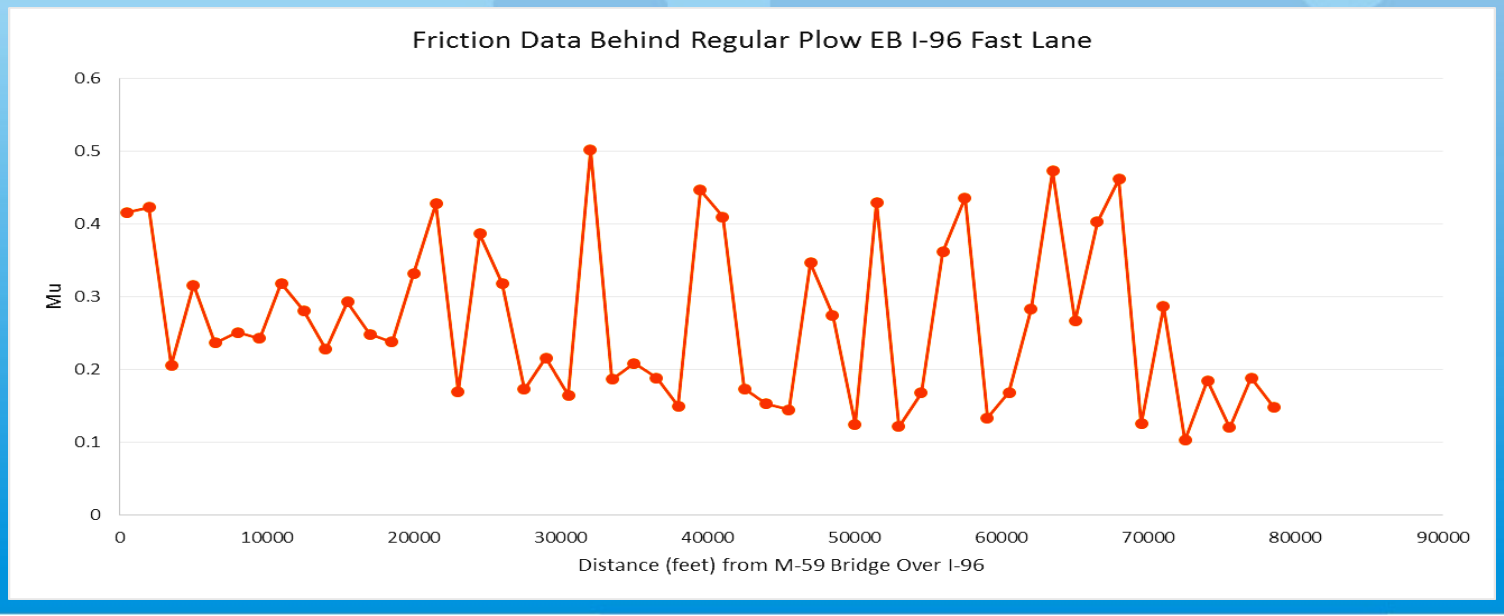
Winter Storm 1 – 01/01/2014

- Friction Data
  - Start : NB US-23 to WB I-96; End: M-59 Bridge over I-96
  - Lanes Plowed: WB I-96 Middle/Slow Lane
  - Average Mu = 0.33; Average Operating Speed = 38.2 mph
  - Only 10% of the traffic passed the tow plow



Winter Storm 1 – 01/01/2014

- Friction Data
  - Start : M-59 Bridge over I-96; End: 1st turnaround after US-23
  - Lanes Plowed: EB I-96 Fast Lane/Left Shoulder
  - Average Mu = 0.27; Average Operating Speed = 34.5 mph
  - No traffic back-up behind plow

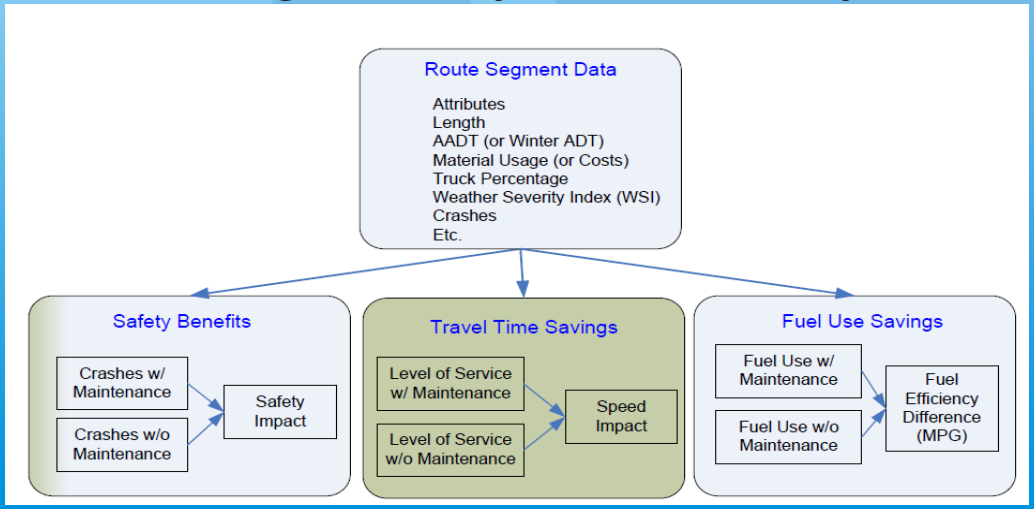


Winter Storm 1 – 01/01/2014

- Pavement Surface Condition – EB I-96
  - Behind Tow Truck (Middle Lane) – Wheel Track Bare – 100%
  - Behind Tow Plow (Slow Lane) – Wheel Track Bare – 100%

Task 4: Benefit Cost Analysis of Tow Plow to Traditional Plow

- Overall framework from NCHRP study 20-07 will be adopted
- NCHRP study focused on cost/benefit in statewide basis
- This study will focus on benefit/cost for each maintenance segment (snow route)



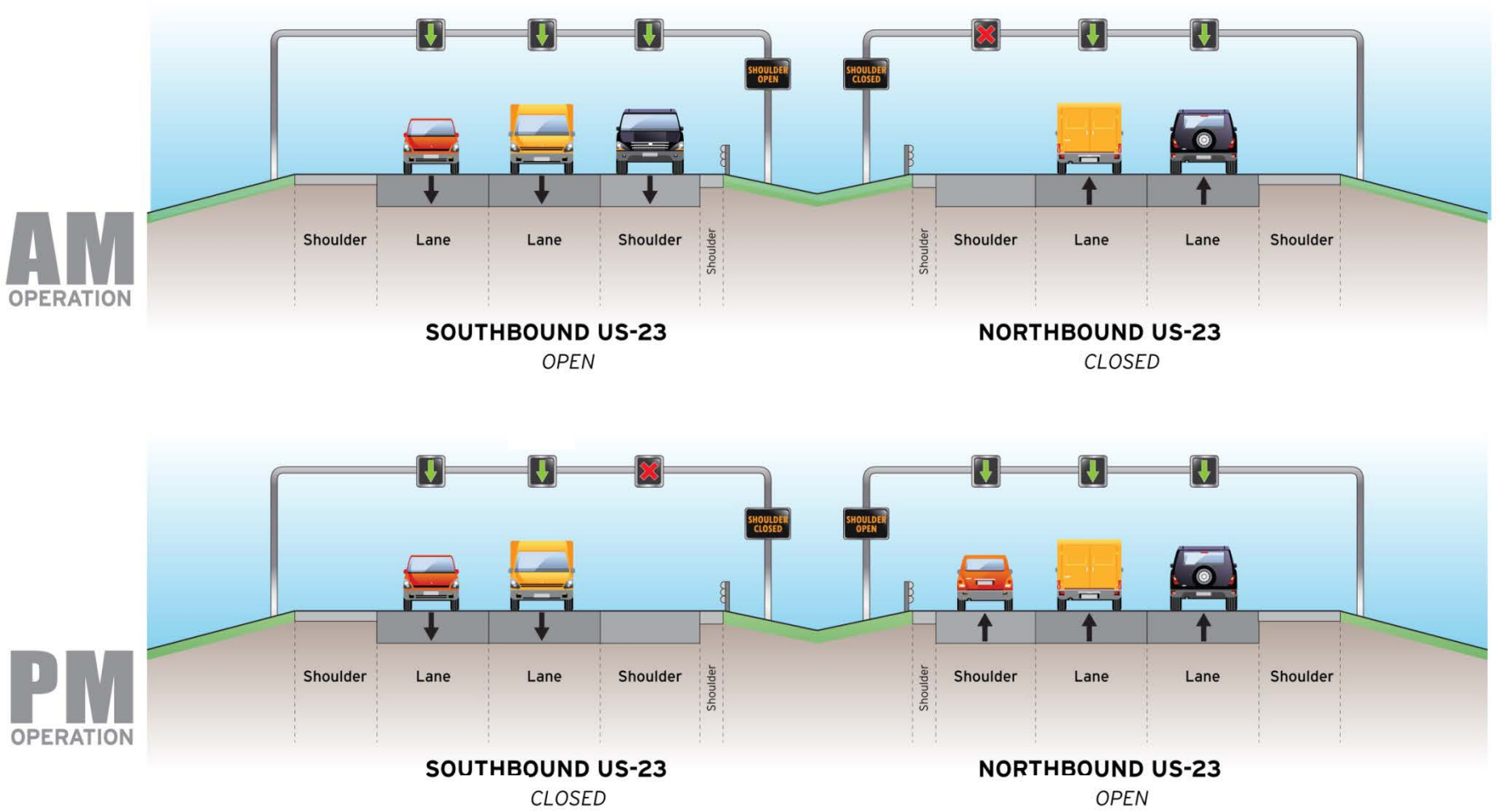
Task 4: Benefit Cost Analysis

- Winter weather related accident database for Livingston County
  - Accident data from 2007 to 2012 on MDOT maintained roads

Date	Time	# of units	weather	Road Conditions	Road Name	Intersecting Road	Run	Accident	Distance
1/3/2007	6:30	3	CLOUDY	ICY	I-96	GRAND RIVER	1	O	100 FT E
1/3/2007	5:35	2	CLEAR	ICY	I-96	CHILSON	1	O	1750 FT E
1/3/2007	6:45	1	CLEAR	ICY	I-96	CHILSON	1	O	1000 FT E
1/8/2007	10:00	2	CLOUDY	snowy	I-96	US-23	1	O	150 FT E
1/8/2007	9:45	2	CLOUDY	snowy	I-96	US-23	1	O	100 FT E
1/8/2007	8:20	1	snow/blowing snow	ICY	I-96	GRAND RIVER	1	O	500 FT W
1/8/2007	8:30	1	snow/blowing snow	ICY	I-96	GRAND RIVER	1	O	300 FT W
1/8/2007	10:08	1	snow/blowing snow	ICY	I-96	US-23	1	O	150 FT E
1/8/2007	8:52	2	snow/blowing snow	snowy	I-96	GRAND RIVER	1	O	300 FT E
1/13/2007	8:05	1	RAIN	ICY	I-96	HIGHLAND	1	C	1 MILE W
1/14/2007	10:05	2	SLEET/HAIL	ICY	I-96	DORR	1	O	500 FEET E
1/14/2007	11:20	1	SLEET/HAIL	ICY	I-96	US-23	1	O	1/2 MILE E
1/14/2007	8:58	1	SLEET/HAIL	ICY	I-96	GRAND RIVER	1	O	.2 MILE W
1/14/2007	12:02	1	SLEET/HAIL	ICY	I-96	CHILSON	1	O	500 FT W
1/14/2007	12:10	2	snow/blowing snow	ICY	I-96	HIGHLAND	1	O	100 FT E
1/14/2007	10:20	1	SLEET/HAIL	ICY	I-96	GRAND RIVER	1	O	1 MILE W
1/14/2007	10:30	1	SLEET/HAIL	ICY	I-96	US-23	1	O	100 FT W
1/14/2007	8:58	1	SLEET/HAIL	ICY	I-96	GRAND RIVER	1	O	1 MILE W
1/14/2007	9:50	1	SLEET/HAIL	ICY	I-96	DORR	1	O	1000 FT E
1/15/2007	5:25	1	SLEET/HAIL	ICY	I-96	GRAND RIVER	1	C	200 FT W
1/18/2007	9:30	1	CLOUDY	ICY	I-96	US-23	1	B	1/8 MILE W
1/19/2007	13:52	2	snow/blowing snow	snowy	I-96	CHILSON	1	O	1.5 MILE E

Accident Type	Code
Incapacitating Injury	A
Non-incapacitating Injury	B
Possible Injury	C
No Injury	O
Fatal	K

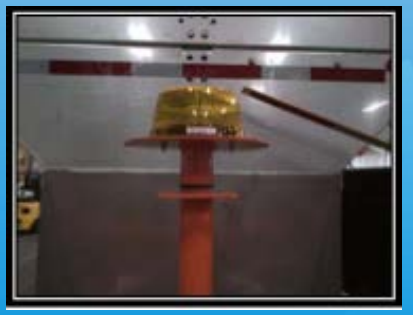
Future Tow Plow Application
US-23 ATM



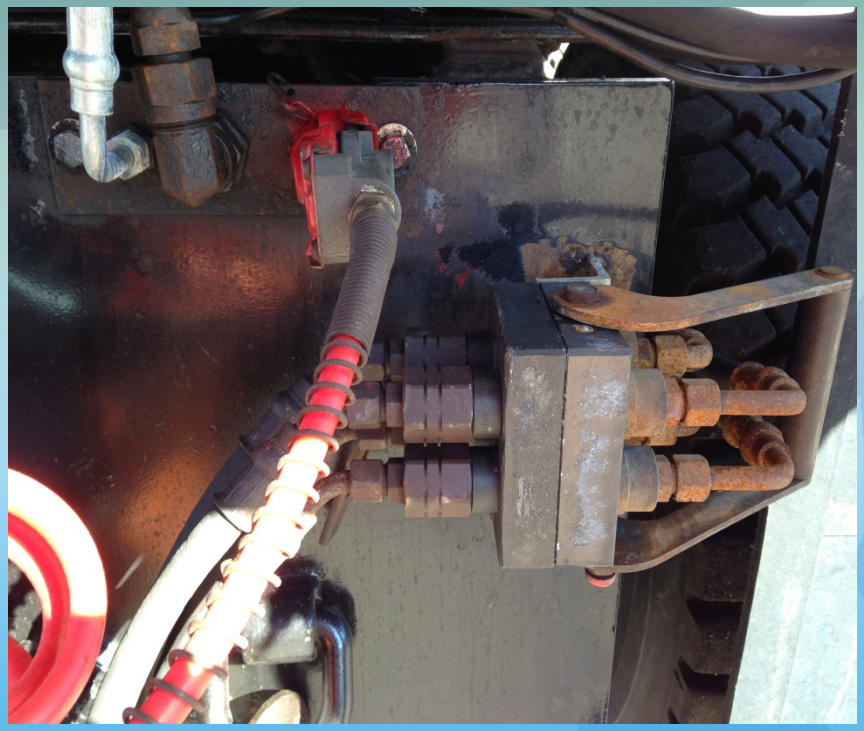
Modifications to Truck and Tow Plow

- Kuper cutting edges
- Proximity switches and hour meter
- Spot lights
- Additional stop, park and turn lights
- 5 additional strobe lights
- Hydraulic directional valve
- Work lights
- Additional mirror

Table 1: Costs of Modifications	
Hydraulic Directional Valves	$600
Drop Chutes	$200
Plumbing	$300
Additional Light on Truck	$100
Additional Mirror	$150
Rubber-Cutting Edges	$3,640
Additional Strobe Lights	$450
Stop, Park, and Turn Lights	$450
Total	**$5,890**



Modifications

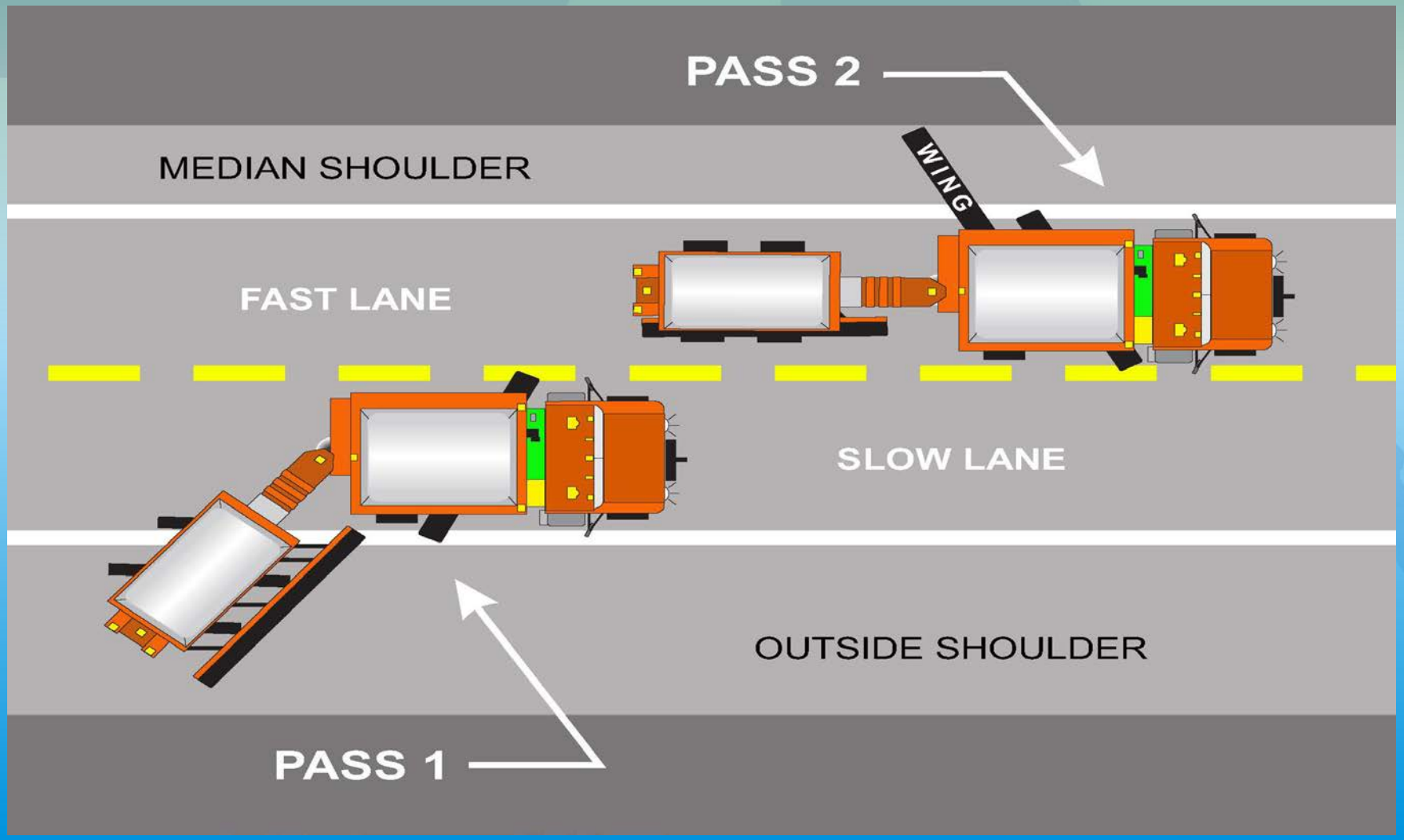


Quick Connect

Mud Flap to Reduce Salt Bounce

What Would Happen if You Added a Left Wing?

Two-Pass Clear Concept (TPC²)



Questions?