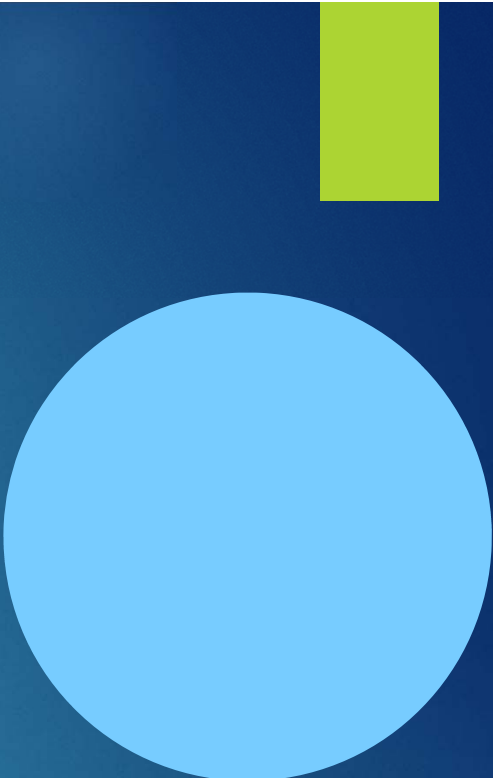




MDOT Tow Plow

USAGES AND EFFECTIVENESS FOR RIGHT OF WAY SNOW CLEARING

Goal

- Achieve a greater customer service level with less overhead.
 - Quicker return to posted Travel Speeds
 - Minimize user delay costs
 - Department Fuel Savings

Evolution of Snow Fighting

- ▶ In the early years of snow removal MDOT started off with basic front plow mounted trucks and moving up through the decades with the adaption of Wing Plows, Underbody Blades, Live Bottom Salters, Single Axle to Tandem Axles, and now finally with the Tow Plow
- ▶ The Following pictures are some of the Pictures from over the years



Evolution of Snow Fighting Cont.



Tandem Axle w/ Wing

10-13 Tons of Material with
additional 5 Feet of Clearing
Ability



Single Axle

6 to 8 Tons of Material



Tandem Axle

10-13 Tons of Material

Evolution of Snow Fighting Cont.

- ▶ As the equipment becomes better we are able to achieve better results. Finally we arrive at the tow plow. The Truck Shown here is 04-4049 out of the Brighton Maintenance Garage. This truck is the 2nd Brighton Tow Plow responsible for taking care of US23 from the I96/US23 interchange north to Owen Rd, a 76 lane mile route without counting ramps. With this route being a North/South route through primarily fields and rural areas this presents a challenge due to drifting and snow blowing across the roadway. 4049 was equipped with 200 gallons of liquid tanks on the truck and a 500 gallon tank on the trailer.



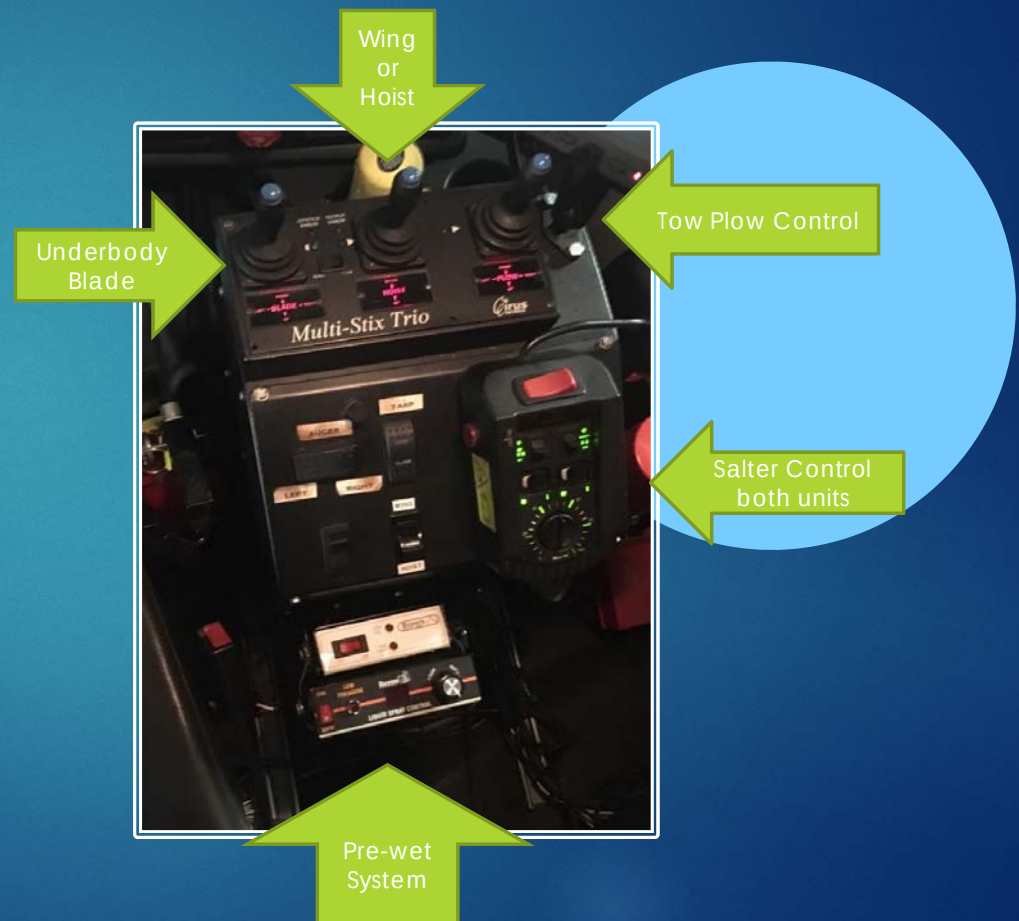
Evolution of Snow Fighting Cont.

- ▶ As you can see in this picture this tow plow is able to effectively clear both lanes of I96 and the left shoulder in one pass. Along with applying material to both lanes at once. Previous to the tow plow this operation would normally take 2 to 3 passes to accomplish. All the while losing what progress the operator has made in the other lanes.



Operation of Truck and Tow Plow

- ▶ The operation of the tow plow is not much different than using a regular tandem axle truck with a wing. The only differences between such trucks is the far right Joystick now controls the tow plow and where in some of our trucks would have the 2nd function of the Dickey John Controller control a Liquid application that function now is the Material Application rate for the tow plow.



Facts about the Truck

- ▶ 12 Ton of Material on the truck with another 10 ton on the trailer.
- ▶ Option of having a liquid tank mounted on the front of the trailer for the application of Brine, Boost, or Calcium Chloride.
- ▶ 9' Left wing for clearing shoulder while you are clearing lanes
- ▶ Able to clear 29' of roadway in one pass with tow plow fully deployed and wing deployed
- ▶ Works with existing Hydraulic Systems, in our trucks the only difference between our regular Tandem Trucks and the Tow Plow Truck are the hard lines with quick disconnects ran to the back of the truck.

Cost of Truck and Tow Plow

- ▶ Average cost of Building a Winter Maintenance Truck with Wing Plow – \$220,000
- ▶ Average cost of Tow Plow Trailer and Hopper – \$95,000
- ▶ Example for Three Lane Roadway
 - ▶ 3 Tandem Axle trucks with wings – \$660,000
 - ▶ 2 Tandem Axle trucks with wings and 1 Tow Plow – \$535,000
 - ▶ Total Savings \$125,000

Operating Cost for Truck and Equipment

- ▶ Tandem Axle Winter Maintenance Truck – \$67.70 Per Hour
- ▶ Wing Blade on Truck - \$11.40 Per Hour
- ▶ Tow Plow Trailer - \$43.12 Per Hour
- ▶ Total Cost of Truck – \$122.22 Per Hour
- ▶ Example for Three Lane Expressway
 - ▶ \$225.90 Per Hour for 2 trucks with wings and 1 without wing to Maintain without Tow Plow
 - ▶ \$189.92 Per Hour for 1 Truck and 1 Tow Plow with left wing
 - ▶ \$35.95 Per Hour Savings



Additional Benefits

- ▶ Reduced Potential for Operator Errors while applying material and also when plowing in tandem with other operators.
- ▶ Trailer is also more forgiving when accidental contact occurs
 - ▶ Trailer is independent and can move over when it makes contact with an obstruction. Trailer will move over instead of breaking off of the truck like a traditional wing plow.
- ▶ Faster return to regular traffic speeds improving Mobility in inclement weather conditions.

Further Innovations to Tow Plow

- ▶ At the Grand Ledge MDOT Maintenance Garage Mechanic Pete Bengal was able to design a Cross Conveyor system to deposit Material right in front of the tire to keep more of the material in the Lane of Traffic.
- ▶ Work is being performed to create a Mirror that will move out with the tow plow automatically so the operator can keep track of the end of the plow with greater ease. Currently operators have to manually move the mirror out to see the end of the plow.
- ▶ Additional Shielding in order to simplify cleaning of the Tow Plow after snow events.
- ▶ Single Quick Disconnect Block for all Hydraulic fittings

As an Operator

- ▶ As an operator of the Tow Plow it is necessary to be able to multitask. When the tow plow is fully deployed taking 2 Lanes of traffic the usage is very simple, just ensure proper lane placement of the truck to clean both lanes effectively. You will need to watch both lanes to make sure no obstructions are in the lanes in which you are working.
- ▶ When running the tow plow on the shoulder of the roadway clearing the shoulder you will need to watch in the mirror to make sure you are not clearing any further than the edge of the roadway. Compared to using a regular wing truck the tow plow is especially easy to use because you can select how far out you would like to clear from 1 foot to a 12 foot path without adjusting the truck in the lane.

As an Operator Cont.

- ▶ In this short video we have an example of the adjustability of the tow plow for clearing shoulders and varying lane widths.



As an Operator Continued

- ▶ The Cab of the Truck is very customizable. Much like a regular truck the operator can choose Joystick Locations, although as a state we do seem to be standardizing the locations of the Joysticks to ensure operators are able to go from truck to truck without having to learn a new pattern.
- ▶ Clearing Highway Exits and Entrances is simplified. With traditional trucks multiple passes are required for all ramps, usually 3 passes per ramp sometimes more. With the tow plow an operator is able to clear an entire ramp in 1 pass from edge to edge including the Point/Gore.

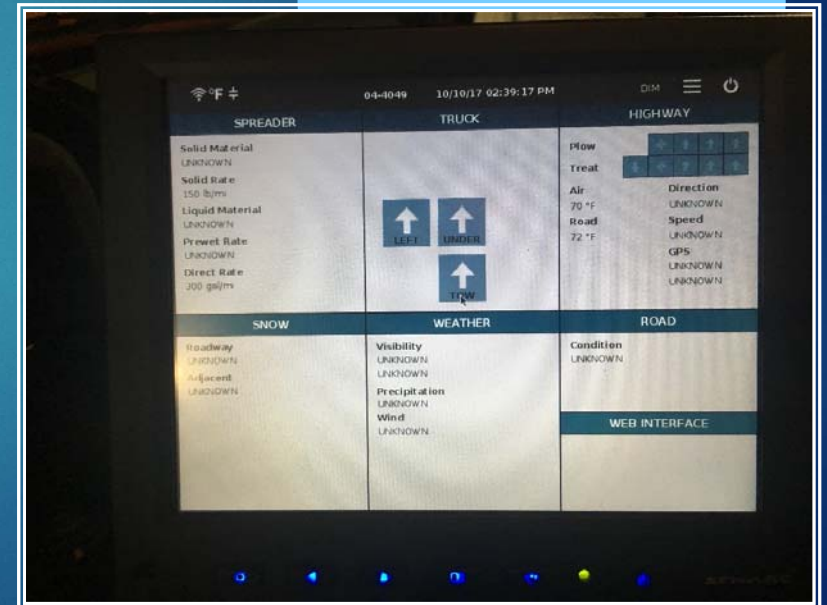
As an Operator Cont.

- ▶ In the winter of 2015-2016 a Tow Plow was taken up to Otsego County to showcase the effectiveness of the truck. Here are some short videos from that trip.
- ▶ As you can see the tow plow is able to clear the lane and entire shoulder in one pass.
- ▶ Also as seen the Tow Plow is very visible due to the additional lights along the Trailer.



As an Operator Cont.

- ▶ Using Freeway turnarounds is extremely easy. The trailer can follow exactly in the trucks tracks turning left. This is very useful when turning at the end of a route. Turning right the trailer is just like driving with a regular trailer.
- ▶ The AVL screen gives the operator a Live view of current conditions and future forecast right on the screen so decisions can be made in the field without having to go back to the garage. The screen does lock out when GPS motion is sensed within the system so the operator must be stopped when using it.



As an Operator Cont.

- ▶ The Tow Plow is very responsive, and in Many cases you are able to adjust for an obstruction much faster than with a regular wing.
- ▶ As stated earlier the Tow Plow is more forgiving in the event of incidental contact with an obstruction. As seen here with a regular wing the truck would have been turned into the rail.



Operator View from Mirrors

- ▶ This is the typical view an operator can expect from the mirrors of the tow plow. As we covered earlier this is an exceptional piece of equipment due to the adjustability of where you would like the plow placed in the lane or shoulder.



Tow Plow Challenges

- ▶ Keeping the trailer in Excellent condition during winter operations is somewhat of a challenge. As operators we have found the following things out.
 - ▶ Most Buildings within the state are not designed to accommodate such a long piece of equipment. As garages we have found ways to maximize and use all of our available storage space, the tow plow has required us to reevaluate these arrangements. This has caused some minor concerns such as having to move the tow plow to get another truck out for routes that do not require the tow plow.
 - ▶ As seen here in Brighton we park this tow plow in the middle of our building, this truck must be moved in order to get out any of the Single Axle Trucks.



Tow Plow Challenges Cont.



Frame Rails

The frame rails hold a lot of salt. The best way we have found is to flush with a large volume hose.



Back of Trailer

The back of the trailer holds more salt. Also the back of the hopper has been opened up to help flush out material.



Spinner

The Spinner flings the salt around very well on the road, it also packs the frame rails very well.

For all of these washing concerns we have found a liberal amount of time with a High Volume hose works very well to clean the trailer completely.

Notes from Operator Experience

- ▶ Tow plow operates best with at least half of a load of material in the hopper, this is especially true with a wet and heavy snow.
- ▶ The adaption of LED lights on the Hopper, back of the truck, and on the tail light bar of the trailer have greatly helped enhance operator visibility of the operation being performed.
- ▶ When unpinning the safety pins as additional safety precaution remove the middle pins first so the plow remains pinned on each end. Then remove the end pins from behind the plow itself. This way in the event of Hydraulic system pressure loss the plow will not hit the person unpinning it.

Additional Videos

- ▶ [MDOT Tow Plow Training Video](#)
- ▶ [Clearing snow off Jackson I94 Barrier Wall](#)

