## Section VIII - Equipment

### Trucks

MoDOT utilizes several pieces of equipment in snow removal operations. The term truck includes dump trucks (single axle and tandem) and some pickups. Trucks may be equipped with manual or automatic transmissions. These trucks may also be fitted with attachments such as wing or underbody plows. Your supervisor should be able to answer any questions you might have about the equipment you are operating.

### Loaders

Although the types and sizes of loaders vary, the concept is still the same (move material from point A to point B). Operators should familiarize themselves with the operational and safety aspects of the particular loader they will be using.

### Snowplows

Snowplows are vital to MoDOT's success in a snow fight. Snowplows come in all shapes and forms including wing plows and underbody plows. Whichever plow you are assigned, you should take steps to familiarize yourself with the operational aspects, as well as the safety precautions attributed to that plow.

### Underbody Plows

Underbody plows are located underneath the truck. These plows have the ability to cut or "peel" ice or snow off the road's surface. This ability makes the underbody plow a very useful tool in snow removal operations.

Again, if you are assigned to a truck with a underbody plow, ensure that your supervisor demonstrates how to operate the it safely.

## Wing Plows

MoDOT's use of wing plows is increasing, but the idea of wing plows is not new.

The use of wing plows can greatly improve the efficiency of any plow fleet. By plowing snow back an additional 4 to 5 feet with each pass, the cycle time for plowing can be extended. On two-lane highways, one truck with a wing plow can maintain shoulderline to shoulderline clearance without getting off the roadway.

If you are assigned to run a wing plow, be sure you understand the operational aspects and safety precautions. Your supervisor will assist you.

## Equipment/Spreaders

There are two basic types of spreaders MoDOT uses throughout the state.

## Solid Material Spreaders

MoDOT has many types of spreaders. Ground speed spreaders have been implemented throughout the state. The ability to adjust application rates during a storm can be crucial.

The trend toward using ground speed spreaders looks to continue. Our older trucks are either mounted with v-box or tailgate spreaders that lack ground speed control. Trucks with ground speed spreaders are more efficient in both conserving material and improving safety. The new ground speed spreaders allow more hands-free control as well.

**Note:** *Proper calibration of the ground speed spreader is key to its efficiency.*

**Slip-in spreaders** slide into the dump bed of the truck and are usually accompanied by saddle tanks (on the sides) for salt brine storage. Some, but not all of these slip-in spreaders are run by ground speed computers. The operator must be aware of the particular unit he/she is using and know how to operate it properly.

**Tail-gate Spreaders** are mounted on the rear of the truck and salt is loaded in the bed. The tailgate is opened slightly, then the bed is raised to feed salt to the auger located in the spreader. Special caution should be taken when using these spreaders to make sure you do not hit low overheads with the bed in a raised position. Operators should also be sure that the auger in the spreader has been turned off before servicing.

**Equipment /Extra**

- Tow Plows
  - One-way
  - Apply dry or liquid chemical
  - Multiple lane ability

- Motor Grader
  - Wing operation
  - V-plow
  - Drifting or heavy snows

- Spreaders
- Storing of Plows

Plows should be stored on a stable surface, preferably on an asphalt or concrete pad, which allows quick attachment to the trucks. Be sure to place wood blocks under the blades to prevent damage during storage.

## Operator Check List

At the beginning of the shift, the next operator **shall** check and correct any problems with the following:

| | **Next Equipment Operator Checklist** |
|---|---|
| | Truck for body damage |
| | Loose lug nuts, tire damage, and/or flats |
| | Proper spreader gate or tailgate position |
| | Spreader hook-up devices |
| | Proper hook-up of the plow |
| | Condition and placement of the plow |
| | Plow lift chains |
| | Hydraulic hoses and routing |
| | Plow blades |
| | Springs and tripping devices |
| | Two-way radio operational |
| | GL 400 operating and in proper mode |
| | Spreader and plow controls |
| | Windshield wipers and blades |
| | On-board safety equipment and PPE |

## Post-storm Maintenance

After every storm, all equipment and attachments *shall* be **thoroughly** cleaned.

Equipment cleaning includes: washing the outside body, cleaning and removing trash from the cab, washing under the hood, washing the undercarriage, washing the dump bed, and washing the battery box.

Attachment cleaning includes: cleaning the spreader and plow (inside and out) and making sure the equipment is free of salt residue.

After a **thorough** cleaning, the truck and attachments **shall** be properly serviced. Servicing includes: greasing all fittings and checking all fluid levels (engine oil, hydraulic fluid, anti-freeze and washer fluid). The operator shall also check wiper blades for wear, inspect the wheels for loose lugs, inspect all equipment and attachments for damage and/or wear.

## Post-season Cleaning and Storage

It is important to clean all snow removal equipment **thoroughly** after each storm. It is just as important to clean and properly store equipment after the snow removal season has ended.

All equipment used in snow removal should be thoroughly cleaned of all salt residue and greased. Special attention should be given to the moving parts of the cinderbeds, as they should be treated with an anti-rusting agent, like Lubra-Seal. It is very important to flush and treat the pumps on the brine applicators to ensure they do not freeze and crack.

**Spreader Maintenance**

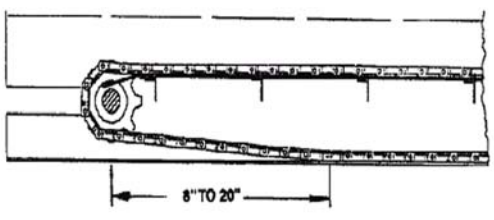
Inspect spreader prior to installing in truck. Once installed never perform service with the spreader on. **Always shut off the hydraulics and truck prior to performing maintenance.**

- Inspect for and ensure that all safety guards and shields are in place
- Inspect drag chains for damage and proper tension
- Check drag chain gear box for leaks, damage, and proper fluid level. Ensure gear box vent is not clogged
- Inspect GL-400 cables for damage. Clean connections and lubricate with a dielectric grease (use small amount)
- Inspect all hydraulic lines for damage and leaks
- Inspect pre-wet system tanks, hoses, pumps for leaks and damage. Remove and inspect pre-wet filter screen for debris
- Inspect gate jack and lubricate as needed

**Chain Inspection**

Chain inspection/maintenance is important for proper operation of the spreader and is vital to the performance of the spreader. Disregard to chain condition and proper tension can lead to drag chain failure.

- Inspect bearings for damage.
- Lubricate all bearing and fittings prior to winter storm
- Inspect chain condition and tension.
- When chain is under proper tension, it should drop to the frame rail from 8” to 20” back from front chain drive




## Plow Maintenance

Inspection of the plow is critical prior to using during a winter storm. The inspection process should continue throughout the storm.

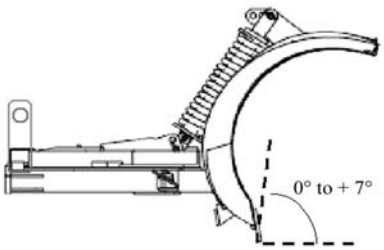
- Inspect plow bits for damage and excessive wear
- Discontinue use of plow if the bits are worn pass the carbide inserts. Failure to do so can result in moldboard damage. Replace worn bits before continuing plowing operations
- Inspect plow arms for wear or damage and ensure pins are in place
- Inspect plow frame for damage and ensure plow frame is level when installed on truck

- Inspect trip springs for damage and proper mounting
- Check all hydraulic hoses and fittings for damage and leaks
- Inspect plow lift arm and frame for damage and that all pins are in place
- Inspect plow lift cylinder for damage and leaks
- Inspect plow lift chains for wear and damage
- Ensure plow markers are installed and in good condition

## Plow Set-up

A properly set-up plow can save time and money with less wear and tear on the plow and the roads.

When installing new plows to current fleet or using current plows with new fleet, it's imperative that plow angle set-up is performed and maintained. The following explains plow set-up.

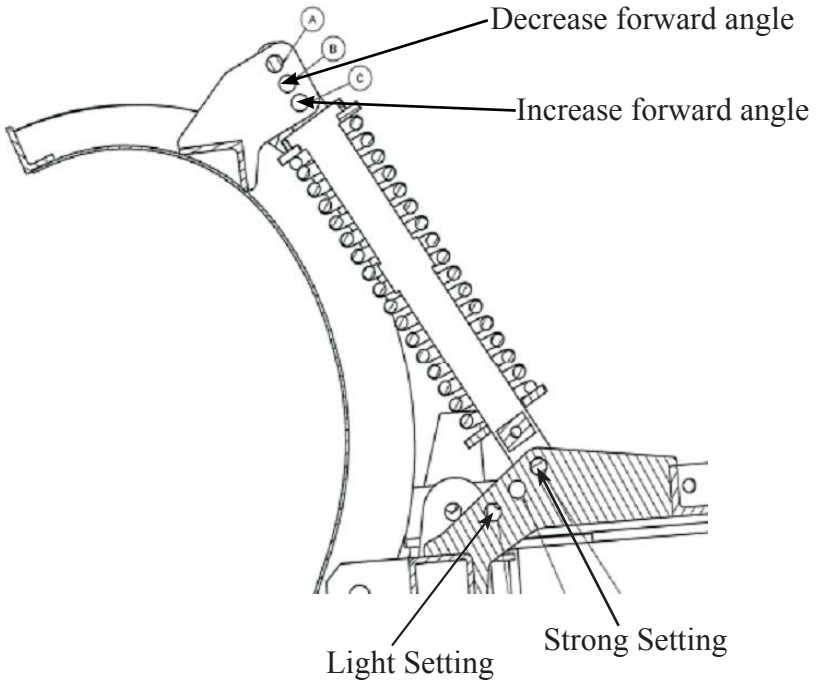



- Plow frame should be set level when installed to the truck

- ✦ Plow frame adjustment is done with the plow arms and requires drilling pin holes at the proper locations
- ✦ Plow blade angle should be set at zero to seven degrees forward
- ✦ Plow blade angle is adjustable through the moldboard position usually by adjust ing the trip springs on newer plows
- ✦ Too much back angle (1 to 10 degrees negative or more) will cause a “skiing effect” and could cause snow to blow over the plow
- ✦ Too much forward angle (eight degrees or more positive) will cause “chatter” and can damage the road and plow. It can also make the plow jump after hitting an obstacle

**Plow Trip Tension for Viking Plows**

- ✳ Trip tension can be adjusted so that the plow will trip with either light force or can be increased so that the plow will need greater force to trip during an object strike.
- ✳ Trip tension for viking plows is accomplished by changing the bolt position on the bottom mount of the trip spring.
- ✳ Mounting the bottom of the trip spring further away from the moldboard will increase the trip tension.
- ✳ Mounting the bottom of the trip spring closer to the moldboard will reduce trip tension allowing the plow to trip over more easily.



## Section IX - Equipment Maintenance

It is the supervisor's responsibility to ensure that the following maintenance, safety, and clean-up procedures are followed. Personnel **shall** follow the regular vehicle maintenance schedules, as required.

**Pre-season Preparation** – All equipment should be prepared for winter prior to inclement weather. October 15th is a good target date. Trucks, plows, and spreaders are to be inspected as to operating condition, painted if necessary, and any structural defects repaired. All spreaders will be properly calibrated for liquid and solid material applications.

**Pre-storm preparations** – Personnel should follow the vehicle maintenance schedule set forth by MoDOT in the lubrication chart and follow the guidelines of the CDL safety checklist. Before each forecasted storm and before material is placed in the spreader, the operator **shall** check the following on the spreader and plow.

| | |
|---|---|
| | Bearings and chains for looseness |
| | Hydraulic hoses and connectors for wear |
| | All grease fittings and ensure they are properly greased |
| | Spreader and plow-mounting devices |
| | Operation of spreader conveyor, spinner, and liquid applicators |
| | Condition of snow plow blades |
| | Spreader for debris or foreign material |

**During-storm Maintenance/Inspections**

During the storm and at the end of every shift, the operator **shall** check and correct any problems with the following:

| | **Previous Equipment Operator Checklist** |
|---|---|
| | Belts and hoses |
| | Engine oil |
| | Anti-freeze |
| | Windshield washer fluid |
| | Brake fluid |
| | Fuel level |
| | Lights (driving, brake, warning, and spreader lights) |
| | Hydraulic fluid level |
| | Remove trash from cab |