

2022 INNOVATION CHAMPIONS CONTEST

Push-All Dozer - Enhanced

COUNTY: Benson County Highway Department

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PROBLEM STATEMENT: With snowfall and high winds, snowdrifts on the road become packed tight. When the front wheels of the maintainer hit a hard-packed drift, the maintainer bounces, leaving extra snow on the road. This creates a rough ride for the motoring public in already hazardous conditions. A v-plow can be used. The height of the v-plow and wind create a draft, increasing snow fog and difficulty in seeing the road. In addition, the v-plow is big, clumsy and challenging especially on the narrower roads and tight corners.

Gravel or sand need to stockpiled at the county shops. Trees must be removed from the ditches and piles of dirt or rocks need to be moved. A dozer or loader has to be brought in from one of the outlying pits in order to accomplish this.

SOLUTION: Designed and built the push-all dozer. This innovation was designed and built in 1996 and has since been enhanced. The push-all dozer was enhanced with quick attach hooks (a Falls lift group) so it can be easily be attached and used on any of the road department's maintainers. A used snow plow wing was used for the front part of the dozer instead of building it from scratch. The width of the dozer was increased to 9 feet, a foot wider than the previous dozer.

Every push-all dozer attachment is designed with the same harness and quick attach so it can be used on any maintainer. It attaches to the front of the maintainer with the quick-attach lift. This phenomenal piece of equipment serves multiple purposes. It is used for stock piling gravel at the shops, removing trees in the ditches, moving dirt piles, and for rock and snow removal. Unless the snow is deep enough to require use of a v-plow, the push-all dozer is the operators' preferred choice for snow removal. The operators have a better view over the front the dozer to see what is happening, tightly packed snow drifts are easily removed and snow fog created during snow removal is significantly reduced.

EQUIPMENT, MATERIAL AND LABOR:

Equipment used:

Acetylene torch
Electric hacksaw
Welder – wire
Skill saw with metal cutting blade
Level
Tape measure

Materials:

Salvage material:

Snow plow wing – 9 feet in length (cut from 12 feet)

New material:

- (4) 2-1/2" x 2-1/2" x 37-1/2"L, 1/4" tubing (ends cut at angle)
- (2) 2" x 2" x 37", 1/4" tubing (ends cut at angle)
- (4) 4" x 4" x 14", 1/4" tubing (main push beams)
- (3) 10" W x 38", 1/2" flat iron (sent to machinist to cut, bend, and roll)
- (2) 8" x 33", 1/2" flat iron (end caps)
- (1) 36" x 36", 5/8" flat iron (steel push plate)
- (1) 4' x 32", 3/16"- flat iron (reinforcement plate)
- (2) Falls quick attach hooks
- (1) 9' cutting edge

Total Labor Hours: (*Includes time needed for design and discussion*)

1 person – 65 hours
1 person – 8 hours

COST SUMMARY:

- (4) 2-1/2" x 2-1/2" x 37-1/2", 1/4" tubing = \$156
- (2) 2" x 2" x 37", 1/4" tubing = \$62
- (4) 4" x 4" x 14", 1/4" tubing = \$136
- (3) 10" W x 38", 1/2" flat iron = \$73
 To cut/roll/bend = \$23
- (2) 8" x 33", 1/2" flat iron = \$100
- (1) 36" x 36", 5/8" flat iron = \$159
- (1) 4' x 32", 3/16" flat iron = \$126
- (2) Falls quick attach hooks = \$800
- (1) 9' cutting edge = \$125

Total Cost: \$ 1,760 plus labor

SAVINGS AND BENEFITS:

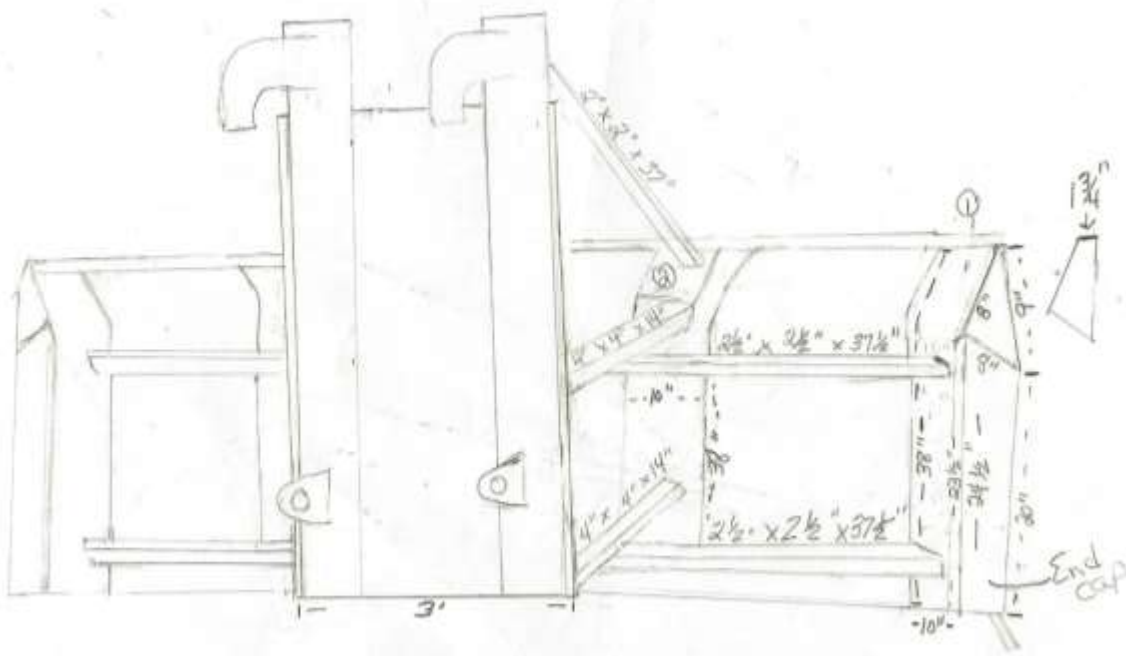
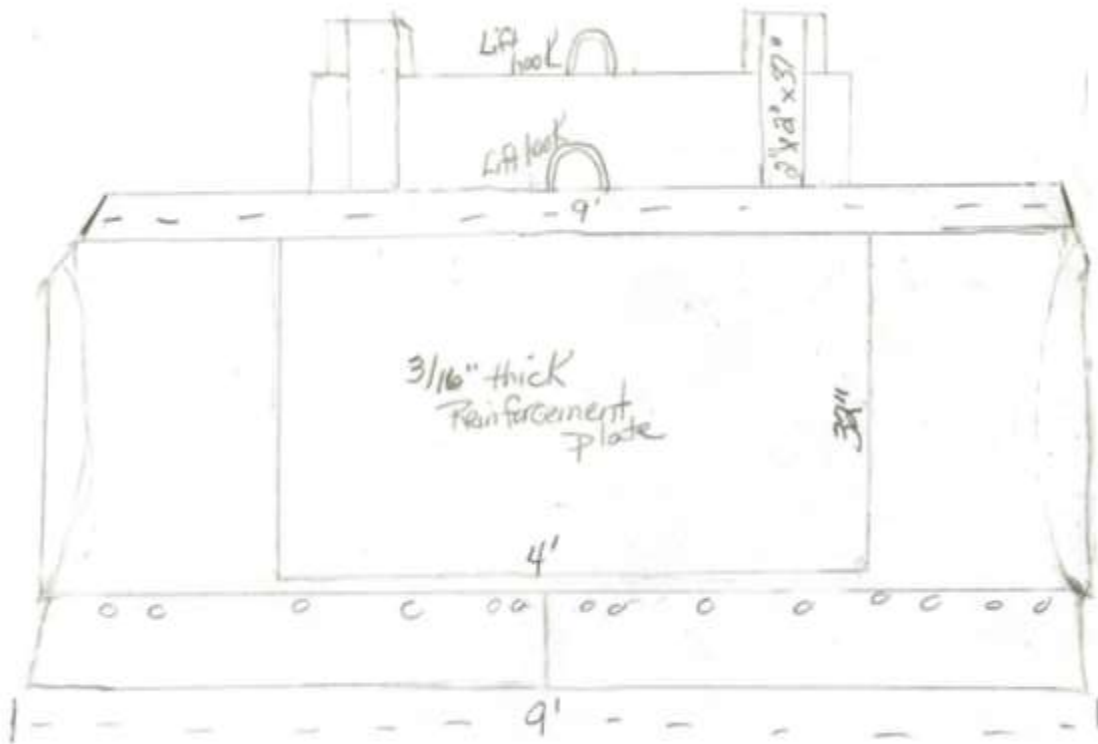
When using the push-all dozer for snow removal there is less snow fog, so operators are better able to see the road and the motoring public. It is no longer necessary to bring a loader or dozer to the shops to stockpile gravel. This improved operators' efficiency. At times, an operator may finish grading return to the shop with 15 to 30 minutes remaining in the workday. The operator can attach the push-all dozer to the maintainer and stockpile gravel hauled into the yard earlier that day. The push-all dozer attachment allows for many tasks to be completed with one piece of equipment as opposed requiring the use of two or three pieces of specialized motorized equipment. The push-all dozer increases safety and makes more efficient use of equipment, manpower and time.

ANNUAL OPERATING COSTS:

Prior to using the innovation – A loader or cat dozer was driven from a pit site or another shop to the location where it was necessary to stockpile gravel. Another piece of motorized equipment was needed to move dirt or remove trees growing in the ditch. A v-plow was required to remove all wind-blown packed snow on the roads, even smaller drifts.

After using the innovation – Because there is always a maintainer and a push-all dozer at each shop, an operator can easily attach the push-all dozer to any one of the maintainers to stockpile gravel brought to the shop yard earlier that day. With the push-all dozer attachment, fewer motorized vehicles (such as dozer or loader) are needed to get the jobs done. Snow fog is reduced when using the push-all dozer to remove wind-blown packed snow on the road.

SCHEMATIC WITH DETAIL:



Front of Push-all dozer



Reinforcement plate



Cutting edge



Side, backside of push-all dozer/ Falls lift group/quick attach hooks



Steel push plate – falls quick attach group/hooks



Main push beams



Tubing cut at angle to snug fit with weld.



Push-all dozer stand



In down position when not in use.
Prevents dozer from tipping over
when not attached to maintainer.



Push-all dozer attached to maintainer



Stockpiling gravel



