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Drain Tile Placement Trailer

COUNTY: Traill County in North Dakota

DESIGNERS: Jay Showers and Cory Ackerman

ADDRESS: Traill County Highway Department
              319 2nd Avenue Southwest
              Hillsboro, North Dakota 58045

CONTACT: Jay Showers, Cory Ackerman, Corwyn Martin

E-MAIL: corwynm@nd.gov; kshower@nd.gov;

TELEPHONE: (701)636-4341; (701)430-9320 Jay

PROBLEM STATEMENT: A tile dispenser must be rented for tiling operations. The dispenser:

- Is too heavy for the tractor it was mounted on. The combined weight of the dispenser and a full spool of drain tile mounted on the tractor's three-point hitch created a rollover hazard.

- Has to be rented far in advance. Inclement weather on dates when the dispenser was rented meant the crew wasn't able to use it.

- Is unavailable when the road crew discovers unforeseen road section that needs drain tile. Consequently, the crew is unable to lay drain tile.

SOLUTION: Design a trailer specifically for transporting a full spool of drain tile with capabilities of unwinding and laying the tile into a trench.

The trailer is designed with the following components: a spoked wheel bed over the frame, a pointed steel cylinder, hydraulic pump and control, and single cylinder diesel engine. The hydraulic pump and control are used to lift the wheel bed to an upright position and the steel cylinder to parallel position. Prior to lifting the wheel bed, the rear of the wheel is folded down. The trailer is backed up so the steel cylinder slides through the spool opening. A bracket with spokes is then pinned over the spool end. The hydraulic pump and control are used to lay the wheel bed and drain tile spool on the trailer frame. The steel cylinder now points upright. Once on the construction site the holding bracket is unpinned which in turn allows the spoked wheel to unwind the drain

tile into the trenched road. A pickup, dump truck, or other vehicle can be used to tow the trailer.

LABOR, EQUIPMENT, MATERIAL:

The following equipment was used: Welder, chop saw, paint sprayer

The following materials were used:

40' – 1" flat steel
260" – 2" x 4" steel tube
15' – 4" x 4" square steel tubing
20' – 2" x 2" angle iron
9' – 6" steel cylinder
4' x 4' - ½" steel plate – cut to fit
Fuel tank
Hydraulic tank
Hydraulic pump and control
Single cylinder diesel engine – on hand
Hoses – on hand
Battery
Jack
Pintle hook
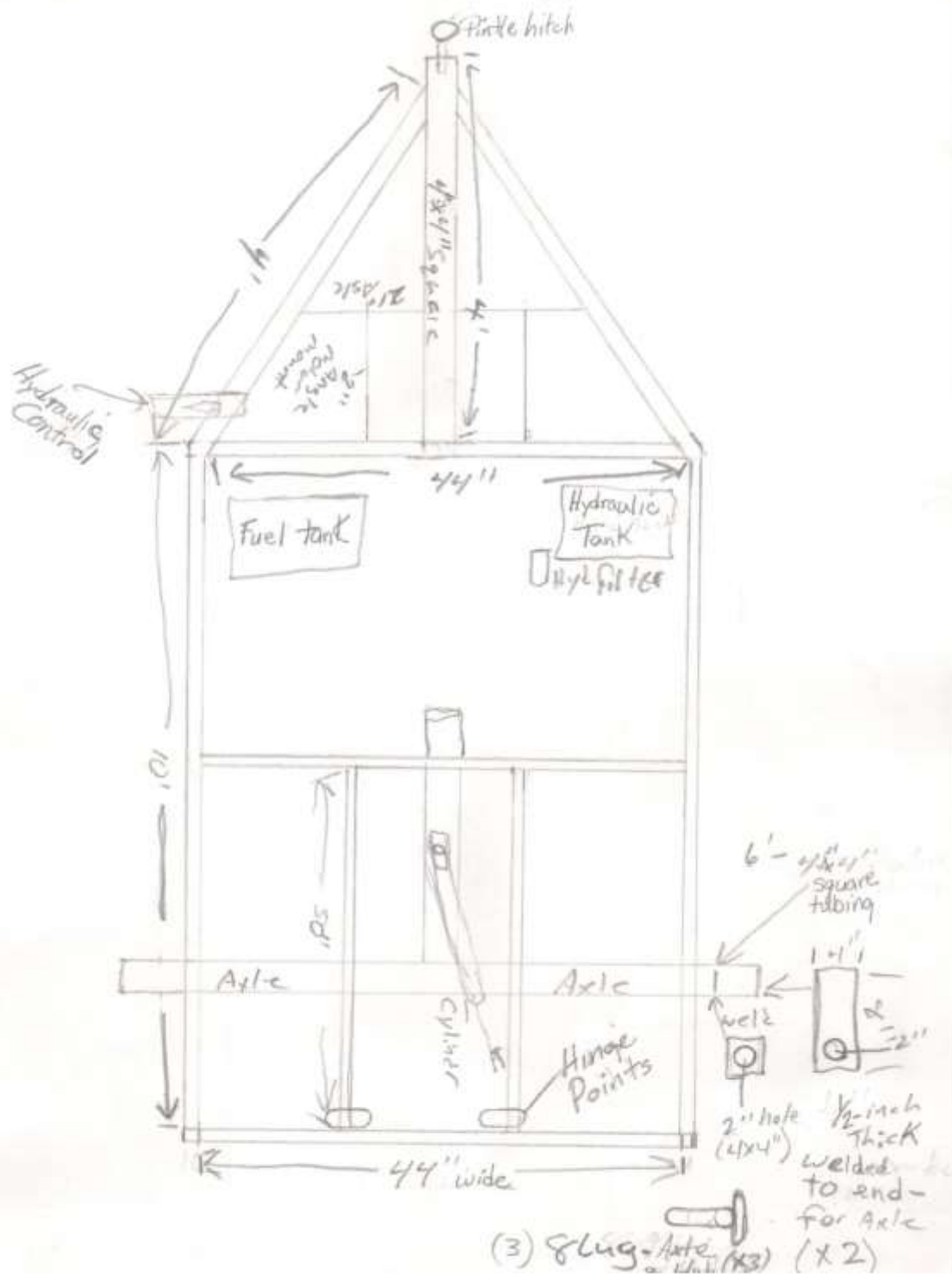Brake lights, turn signals and wiring – on hand
2 16.5" wide tires

Total Labor Hours: 2 employees, 200 hours
(*Note: this includes time for design, discussion, building, modifications and painting*)

DRAWING (SCHEMATIC) WITH DETAILS:

Total out side is 12 foot circumference

Takes 16 of
These spokes
1"x1" square
(can use 1/4")

Hole to fit Hub & studs

Table

These Are
1" square 67" Long
welded to Plate

3 points hinged for folding under

2' plate

Same on others

holes for studs in hub

1/2"-Plate
30" Round

1" plate stock
40' Long

15"

1" Plate
1/2 (thick)

angle iron leg for table

1/2" Plate
13 1/2" W X 11" L   Hinge point

(This plate is welded & mounted)
to top of frame.

plate welded to bottom

33"

13 1/2"

Bottom Plate for Axle support

This goes on top of Table To Pick- up spool

6"x9' upright steel cylinder

2' Round
1/2" Thick

8 holes drilled to fit hub studs

COST SUMMARY:
Materials - $3,333.61
Labor - $9,155.66

Total cost - $12,490.27

SAVINGS AND BENEFITS *(monetary and/or safety related)*:
The department has experienced a savings in time, money and manpower.

- The need to schedule and rent the tractor mounted drain tile dispenser is no longer necessary.
- With the drain tile trailer, the road crews are able to lay drain tile on <u>any</u> road project where there are known as well as unforeseen water issues.
- The drain tile trailer is much safer than utilizing a tractor with a mounted dispenser and drain tile spool. The trailer has provided a safer work environment for employees.
- Fewer employees are needed to operate the drain tile trailer versus all other alternatives. Typically more than one employee is needed when using the tractor mounted drain tile dispenser at a road project or when transferring the dispenser from one vehicle to another.

Drain tile trailer in transport mode.

Rear of spoked wheel folded down prior to lifting bed.

Hydraulic pump lifts spoke wheel bed.

Spoked wheel bed fully extended and ready for spool of drain tile. Note – small spoke wheel on cylinder end is removed prior to loading spool, then placed over spool to secure.

Single cylinder diesel engine.

Hydraulic control.

Safety bracket locks wheel to frame during transport.