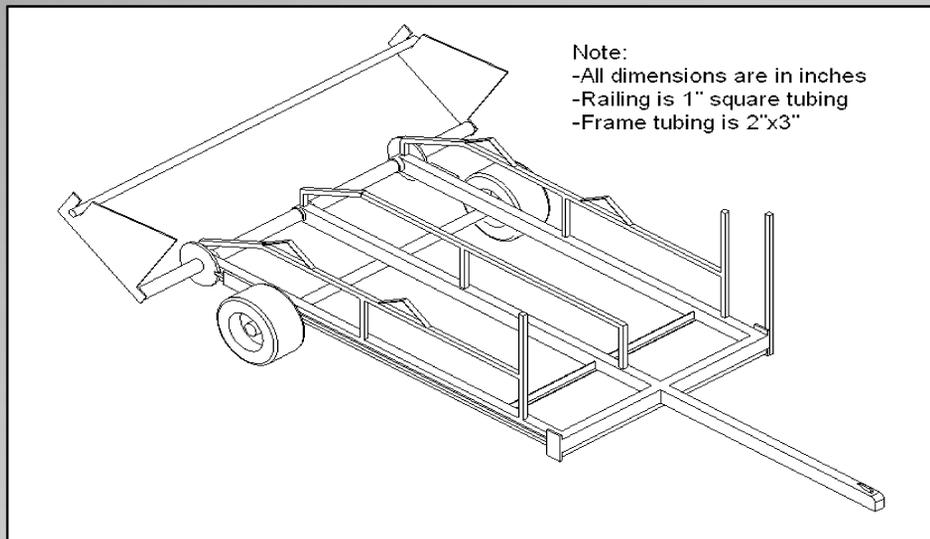


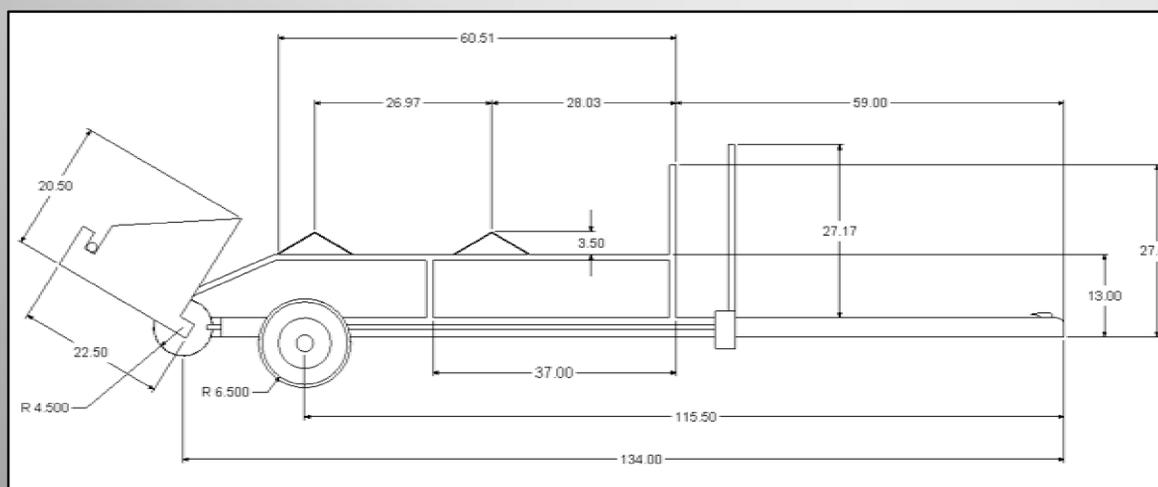
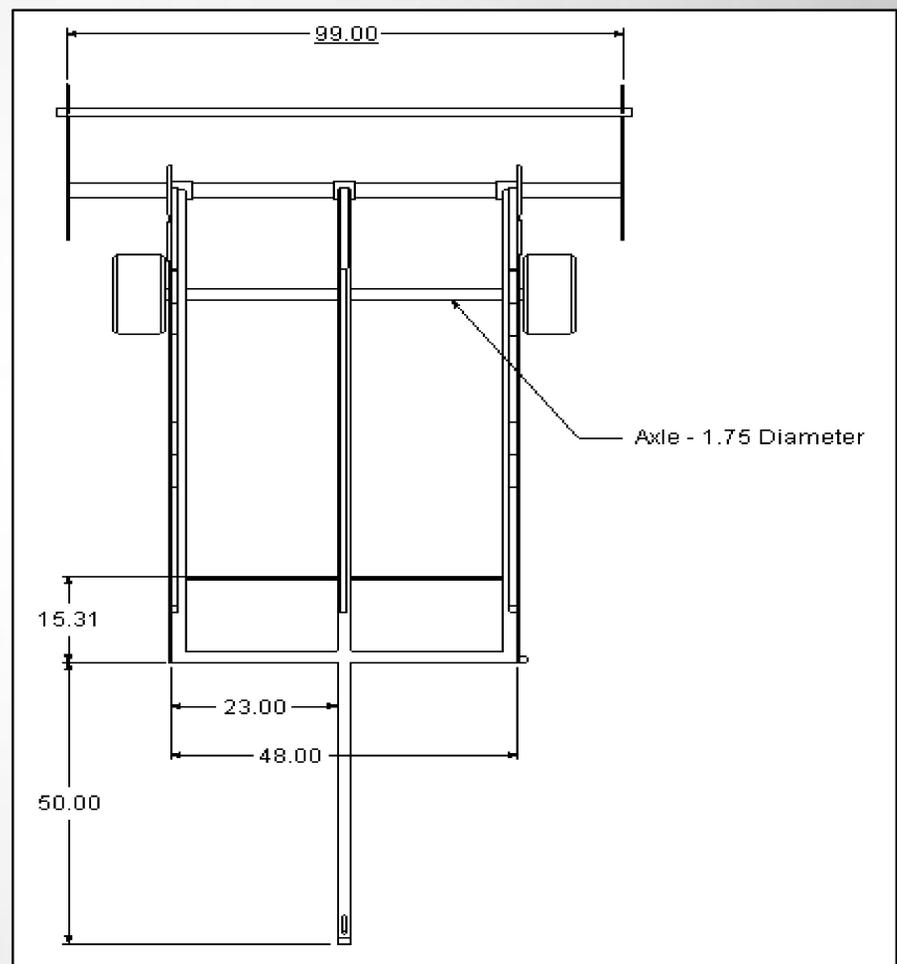
# Erosion Control Blanketing Trailer

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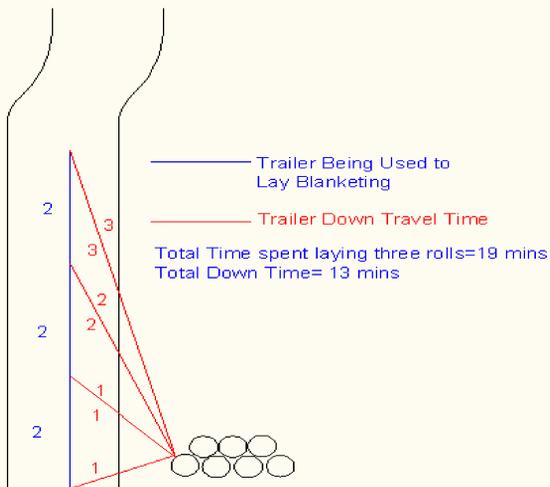
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We designed and constructed a large roll erosion control blanketing trailer to better fit the needs of those who lay netting on a large scale. The reason for the new design is because of the inadequacy, inefficiency, and obsolete structure of an older model. The new trailer provides accommodation for additional roll capacity, with user friendly features such as lighting, easy loading, an adjustable armature, and durability.



## Waterway using single roll trailer

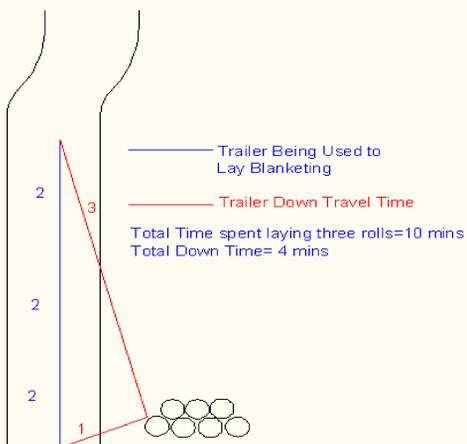


- Time loss driving to supply source of the netting rolls.
- Ineffective loading of trailer armature.
- Unbalanced load on trailer.
- Negative tongue pressure on ATV.
- Unproductive use of trailer space.
- Fixed Armature.
- Difficult to use in adverse weather conditions.

## Advantages of Blanketing with Triple Roll Trailer

- Carrying Capacity of 2 rolls + 1 in armature
- Adjustable armature
- Specified weight distribution
- Time efficient loading
- Decreased travel time
- Increased visibility due to added lighting

## Waterway using triple roll trailer



## Disadvantages of Blanketing with Single Roll Trailer



**Time and Efficiency Analysis For Single Roll Trailer laying 30 rolls, 3 wide and 10 long.**

# of Rolls Laid	Time to load	Travel Time	Time Working	Total Time	Total Down Time
1	1	2	2	5	3
2	1	2	2	10	6
3	1	2	2	15	9
4	1	4	2	22	14
5	1	4	2	29	19
6	1	4	2	36	24
7	1	6	2	45	31
8	1	6	2	54	38
9	1	6	2	63	45
10	1	8	2	74	54
11	1	8	2	85	63
12	1	8	2	96	72
13	1	10	2	109	83
14	1	10	2	122	94
15	1	10	2	135	105
16	1	2	2	140	108
17	1	2	2	145	111
18	1	2	2	150	114
19	1	4	2	157	119
20	1	4	2	164	124
21	1	4	2	171	129
22	1	6	2	180	136
23	1	6	2	189	143
24	1	6	2	198	150
25	1	8	2	209	159
26	1	8	2	220	168
27	1	8	2	231	177
28	1	10	2	244	188
29	1	10	2	257	199
30	1	10	2	270	210

Total Time **4.5hrs**  
 Total Down Time 3.5hrs  
 Efficiency % 22.22

**Time and Efficiency Analysis For A Three Roll Trailer for Laying 30 rolls, 3 wide and 10 long.**

# of Rolls Laid	Time to load	Travel Time	Time Working	Total Time	Total Down Time
1	2	1	2	5	3
2	0	0	2	7	3
3	0	3	2	12	6
4	2	1	2	17	9
5	0	0	2	19	9
6	0	3	2	24	12
7	2	1	2	29	15
8	0	0	2	31	15
9	0	3	2	36	18
10	2	3	2	43	23
11	0	0	2	45	23
12	0	10	2	57	33
13	2	3	2	64	38
14	0	0	2	66	38
15	0	10	2	78	48
16	2	3	2	85	53
17	0	0	2	87	53
18	0	10	2	99	63
19	2	1	2	104	66
20	0	0	2	106	66
21	0	3	2	111	69
22	2	1	2	116	72
23	0	0	2	118	72
24	0	3	2	123	75
25	2	1	2	128	78
26	0	0	2	130	78
27	0	3	2	135	81
28	2	3	2	142	86
29	0	0	2	144	86
30	0	10	2	156	96

Total Time **2.6hrs**  
 Total Down Time 1.6hrs  
 Efficiency % 38.5  
 Increase in Efficiency % 16.2

Also with armature being able to let down take one person to lay the netting instead of two which increasing the rate of which stapling can occur

**An Average Job of 30 Rolls**

- With the single roll trailer the total time of 4.5 hours is needed to complete the job, with a total down time of 3.5 hours.
- With the triple roll trailer it takes a total time of 2.6 hours to complete the job with a total down time of 1.6 hours.
- Using this New trailer, it takes 42% less time to do the same amount of work.

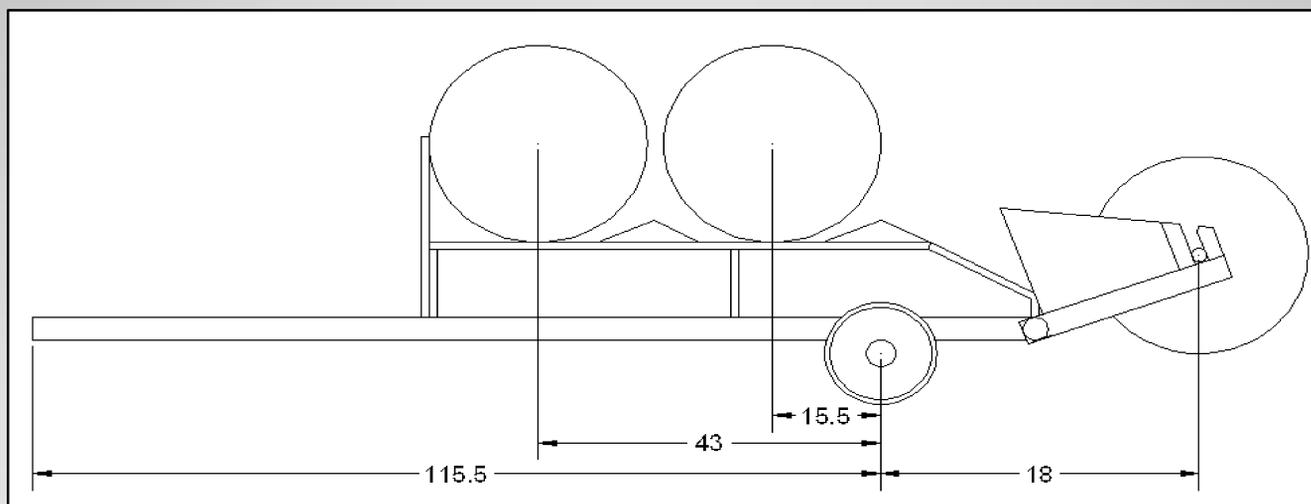


## Trailer Balancing and Tongue Weight

#of rolls	Torque at Tongue in Ft-Lbs	Weight at Tongue Lbs
Empty	192.5	20
1	-182.5	-19
2	712.5	74
3	1035	108

**Torque** = (Distance from the center of a bale of netting to the axle in feet) x (Weight of Netting Roll in Pounds)

**Weight at tongue** = (Torque in ft-lbs) / (Distance from the end of the tongue to the axle in feet)



- We have a fully constructed trailer that is capable of laying erosion control blanketing. There is an extra capacity portion of the trailer designed for carrying 2 extra rolls of netting. The axle was positioned so the load is evenly distributed across the trailer.
- This trailer will be a valued asset to the Holtkamp Erosion Control business. With this trailer, less labor is needed which saves both time and money. Also, larger jobsites can be completed in less time, allowing the Holtkamps to expand their business and take on larger jobs.
  - In an average season, this trailer equates to a savings of approximately \$1,500. Since it costs approximately \$500 to build the trailer, it is easy to see that it pays for itself 3 times over in a single season of use. Ultimately this trailer will increase their bottom line. Once the Holtkamps begin to use this trailer, they will see the increased efficiency of their own erosion control business.

