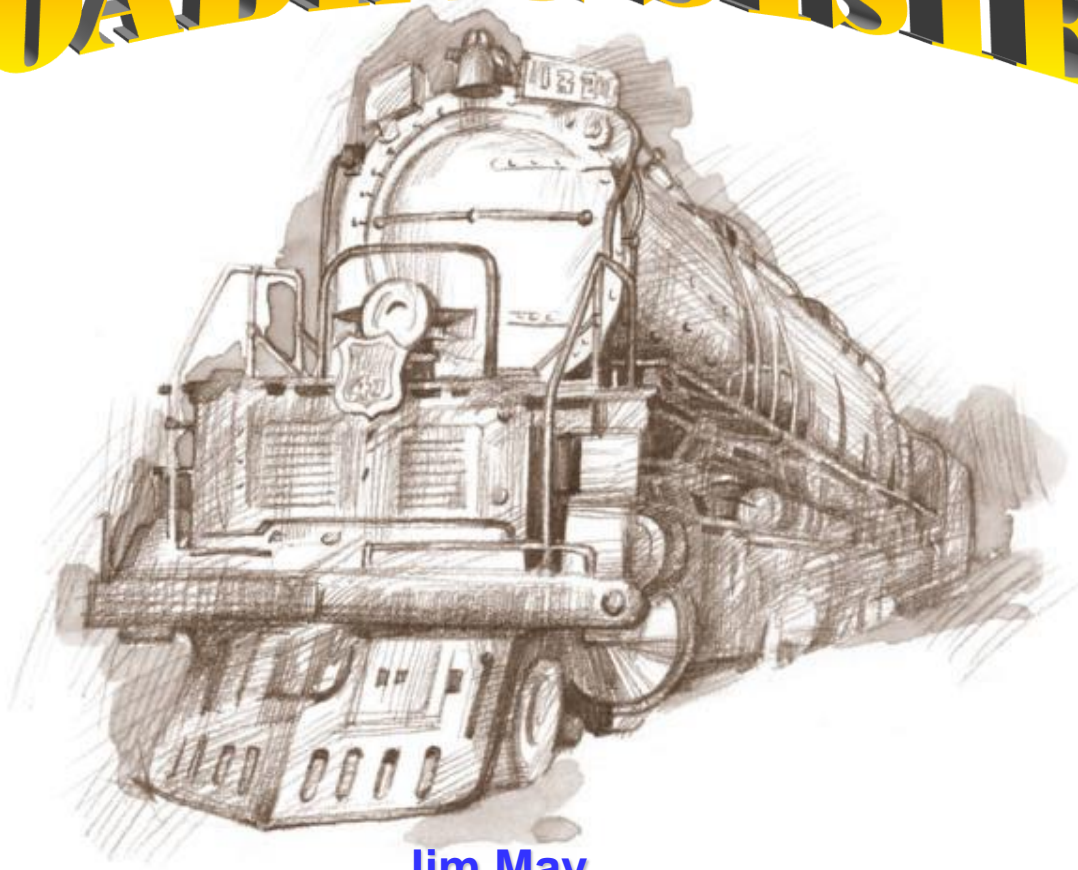


# MULTIPLE TANK CAR UNLOADING SYSTEMS



**Jim May**

**J. May Equipment/ ATA, Inc.**

**Arlington, TX**

**Fluid Fertilizer Foundation**

*Columbus, OH*

# MULTIPLE TANK CAR UNLOADING SYSTEMS



# PUMP FROM WHERE TO WHERE





# THROUGH WHAT



START WITH WHAT WILL  
WORK

[WWW.FREECALC.COM/FRICFRAM.HTM](http://WWW.FREECALC.COM/FRICFRAM.HTM)

ON Line Friction Piping Loss-FreeCalc

# “SIZE MATTERS!”

*Based on FreeCalc.com*

	<i>PRESSURE DROP</i>	<i>HEAD LOSS</i>
3" Pipe per 100' @ 500 GPM	22.5 PSI	52'
4" Pipe per 100' @ 500 GPM	5.59 PSI	12.9'
6" Pipe per 100' @ 500 GPM	0.71 PSI	1.6'
8" Pipe per 100' @ 500 GPM	0.18 PSI	0.4'

3" Pipe per 100' @ 1000 GPM

87.99 PSI

203.3'

*Basically Impossible*

4" Pipe per 100' @ 1000 GPM

21.62 PSI

49.5'

6" Pipe per 100' @ 1000 GPM

2.66 PSI

6.1'

8" Pipe per 100' @ 1000 GPM

0.67 PSI

1.5'

# COMPARE PIPE BY DIAMETER

3" PIPE INTERNAL IS 7.0686 SQUARE INCHES

4" PIPE INTERNAL IS 12.5664 SQUARE INCHES

*4" IS 5.4978" LARGER, 78% LARGER THAN 3"*

6" PIPE INTERNAL IS 28.2744 SQUARE INCHES

*6" IS 15.708" LARGER, 2.25 TIMES LARGER THAN 4"*

8" PIPE INTERNAL IS 50.2656 SQUARE INCHES

*8" IS 21.991" LARGER, 78% LARGER THAN 6"*

**IT'S NOT GUESSING,  
IT'S ENGINEERING**

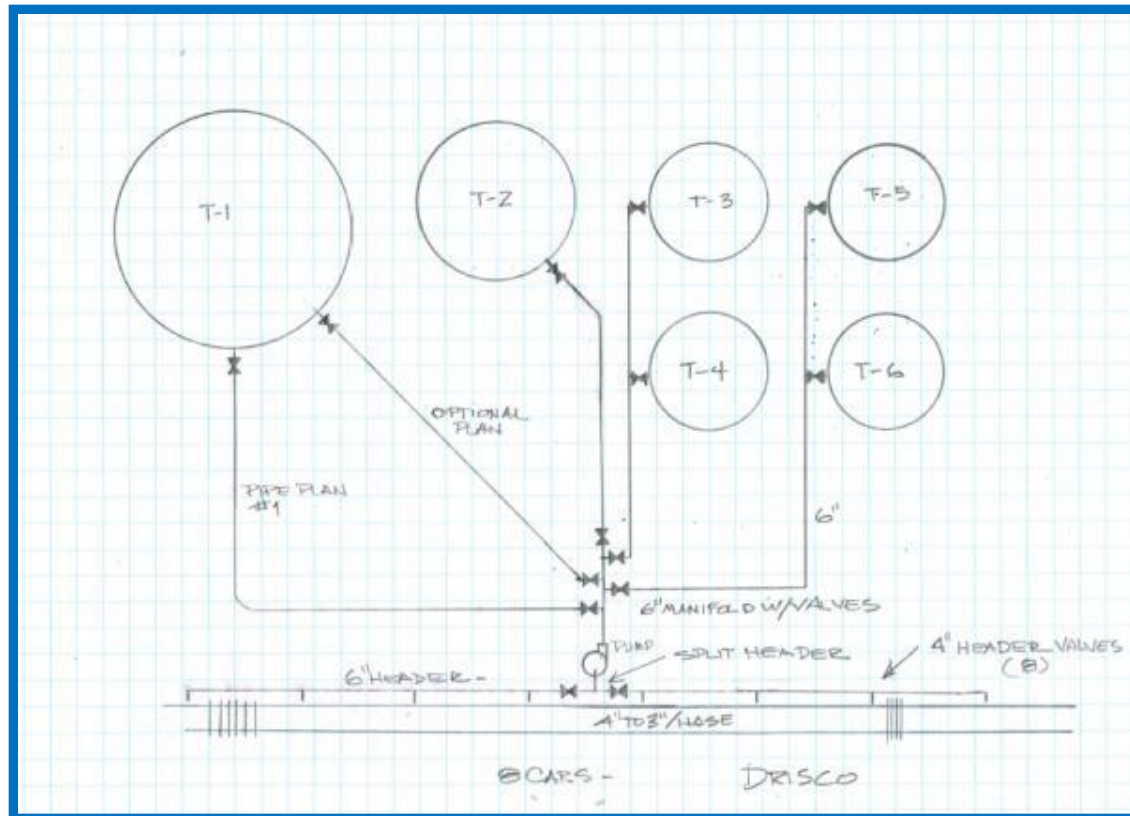


# DESIGNS BASED ON FLOW CALCULATIONS



# ALWAYS START WITH BASIS FOR DESIGN

- Flow Diagram, no dimensions from where to where with all valves indicated



Flow Capacity desired.

Maximum cars on spur

Volume divided by the elapsed time desired

Flow capacity multiplied by design factor.

Such as 110% or 125%

Marginal Systems work at marginal capacity.

# BASIS FOR DESIGN

- HOW MANY CARS
- CAR SPACING, CENTER TO CENTER
- RAILROAD REGULATIONS FOR SET BACK OF EQUIPMENT. NOZZLE HEIGHT USUALLY NOT AN ISSUE. KEEP LOW.
- SELECT MATERIALS OF CONSTRUCTION, TYPE PIPE
- PIPE SIZE (From *FreeCalc.Com*)

# DESIGN SOMETHING

- BASED ON DESIRED FLOW AND DISTANCE
- SELECT A PUMP
- SELECT A PIPE SIZE
- CALCULATE OVERALL DISTANCE INCLUDING TANK HEIGHT
- COUNT AND ADD FITTINGS, 90° ELBOWS, VALVES AND T's.. Add to length
- CONFIRM WITH [FreeCalc.com](http://FreeCalc.com)



# The less Feet The Less Friction

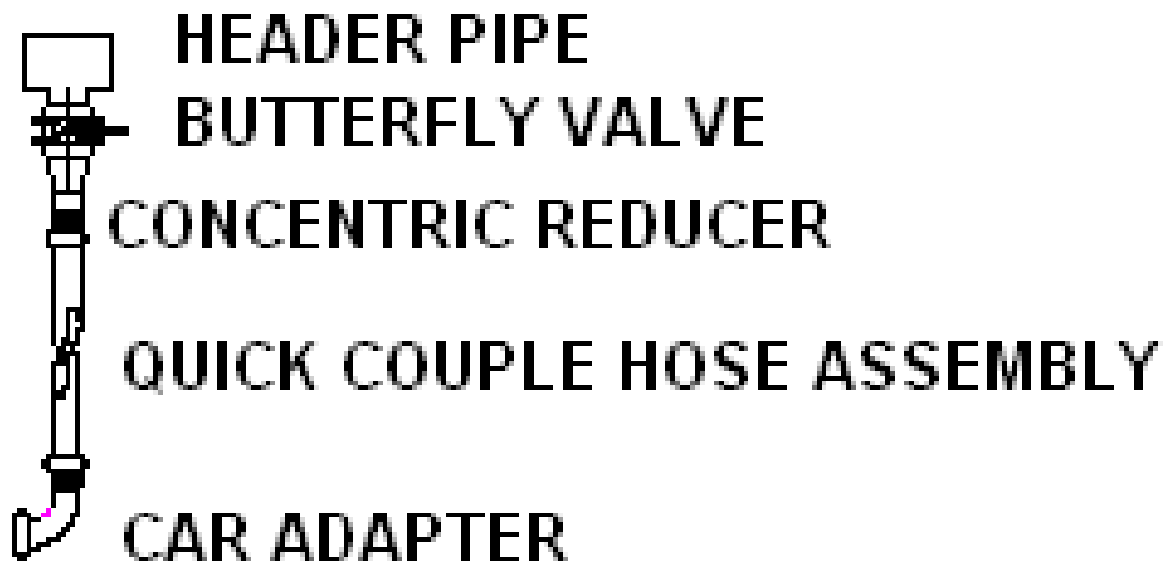
Item	3"	4"	6"	8"
90 Elbow	7.9	11.4	16.7	21.0'
45 Elbow	4.0	5.1	8.0	10.6'
T - Branch	16.4	22.0	32.7	49.0'
T - Run	6.1	7.9	12.3	14.0'

Fittings add to the overall length.  
They must be calculated in the  
flow capacity.



# DESIGN SOMETHING

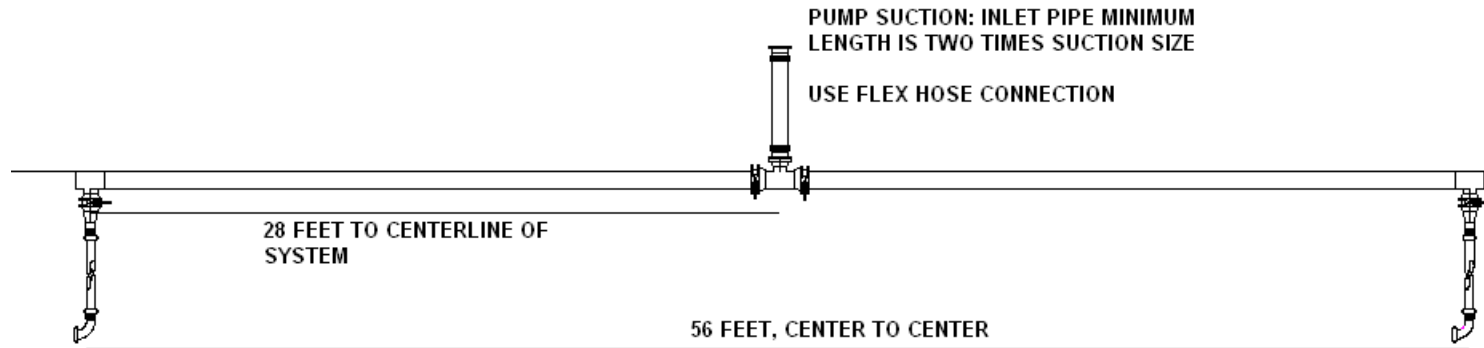
- INDIVIDUAL CAR CONNECTIONS
- SELECT VALVE SIZE



# Wrong & Right



# CENTER TO CENTER

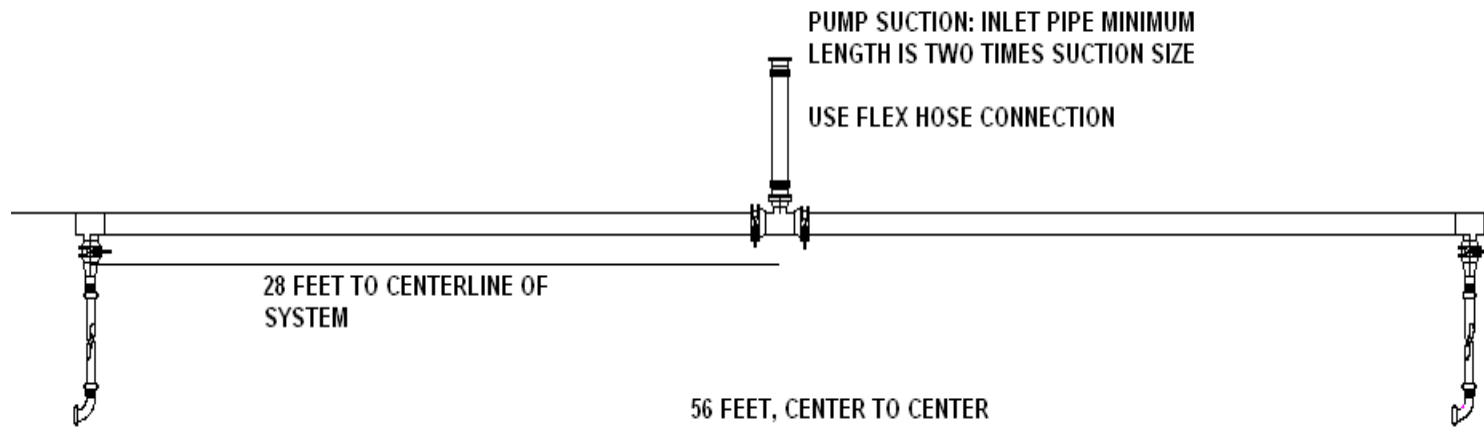


- Confirm Car Sizes with Local RR representative



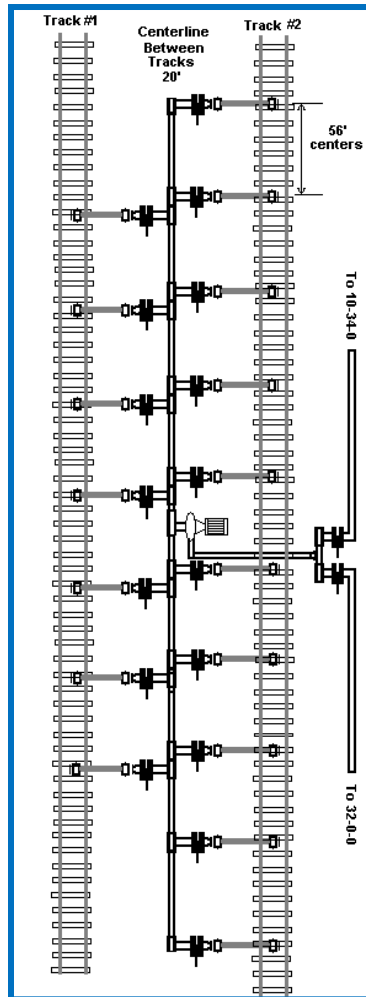
# OTHER LITTLE THINGS

- \*Separate the header at the pump,  
Allows isolation of less than full number of cars
- \*Add an air elimination valve at the pump suction
- \*Add hose racks to minimize spill from hoses
- \*Drip Pans under cars

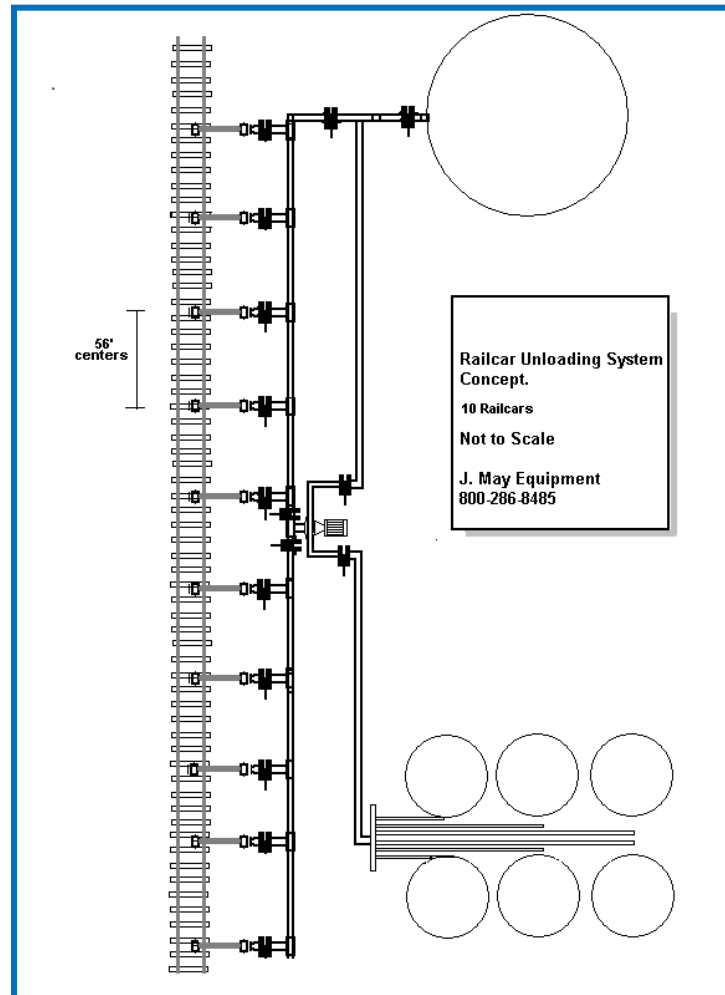


# More Things

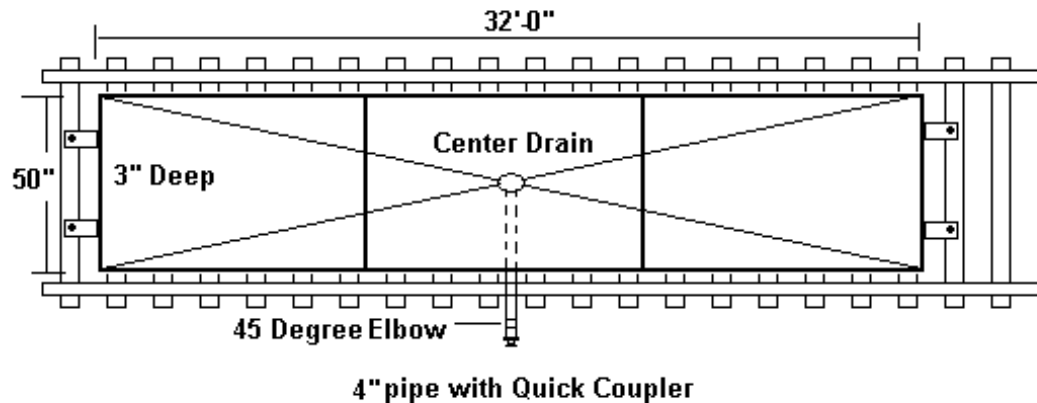
- Two Rail System



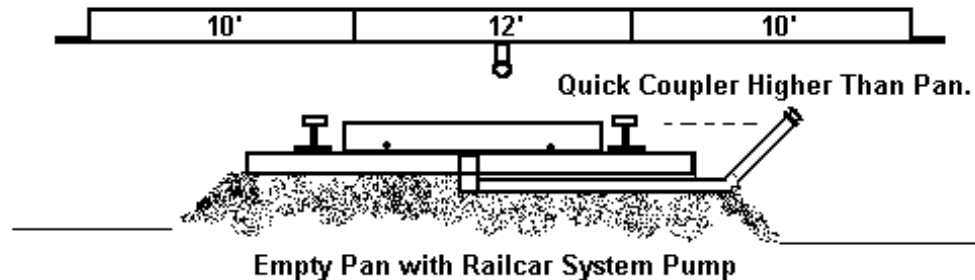
- Move Big Tank to Small Tanks



# One More



**304 Stainless Steel Construction**  
built in 3 sections, bolt together with gasket. Lag bolt to the cross-tie at each end.

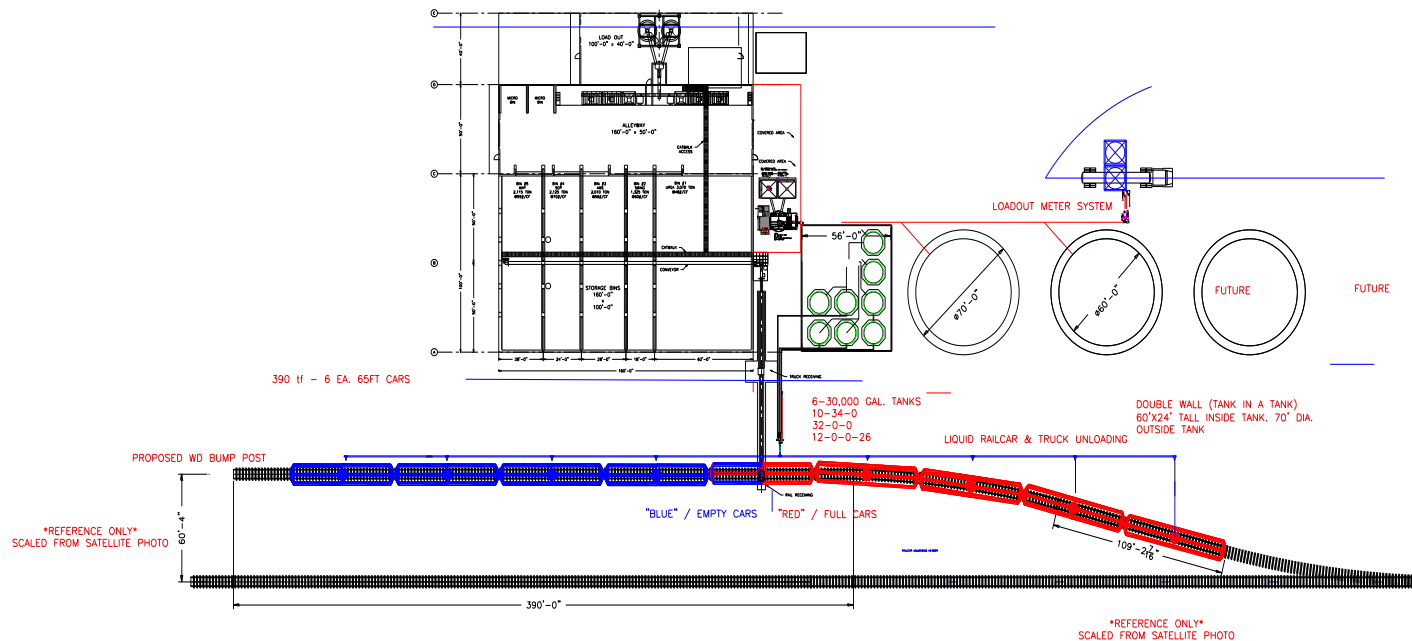


J. May Equipment Group  
800-286-8485

250 Gallon Railcar Drip Pan



- Car Position, Full & Empty, Liquid or Dry



# DRISCO, It Grows

- Drisco Pipe, Polyethylene
- [www.performancepipe.com](http://www.performancepipe.com)
- Approximately 1" per 10°F per 100 feet
- 600' Pipe and a 30°F Temp Rise = 18" Increase in Length
- It has to go Somewhere. Stress on Pipe, Pump and Fittings





# OTHER OPTIONS

- Add suction valves to unload trucks
- Add discharge valves to load trucks direct from the railcar
- **Air Blowout will clear lines.... And blow up the system. Use Extreme Caution with air blowout, anywhere, anytime**
- **Place air blowout where air cannot be trapped**



# RUBBER LINED TANKS INLET STRAINER





# Top Load or Bottom





# Alternate System

Meter Railcars or Trucks , In or Out



# ONE SYSTEM, UNLOAD EVERYTHING



Discharge manifolds should be compact and expandable



# THINGS TO REMEMBER

- Center to Center of cars
- Your design factors
- How fast you want to go is highly determined by your pocket book
- Check with tank Manufacturer for tank vent calculations. Don't blow or collapse a tank
- Labor Costs more than good equipment

# MULTIPLE TANK CAR UNLOADING SYSTEMS

- NOT JUST A PUMP & PIPE
- REQUIRES DESIGN AND PLANNING
- WORK WITH A COMPETENT COMPANY AND EQUIPMENT SUPPLIER
- ***“Don’t plan vast projects with half vast equipment”***

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