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Problem:

- Vegetables and other fresh produce are difficult to transport from field to the market
 - Customers expect only the best looking and non-damaged produce to buy
 - They pick over any damaged or bruised product, resulting in lost profit for the farmer
- Current mode of transport is with rigid frame wagons that do not offer any protection from road hazards, such as potholes and rough roads

Background:

- Farmer near Battleground, IN specializing in vegetables and other fresh produce.
- Wagons are pulled into town from Battleground during the morning hours, where the wagons will sit through the day, letting customers pick out the produce they want
- Wagon must be able to handle a max of 4,000 lbs



Final Design

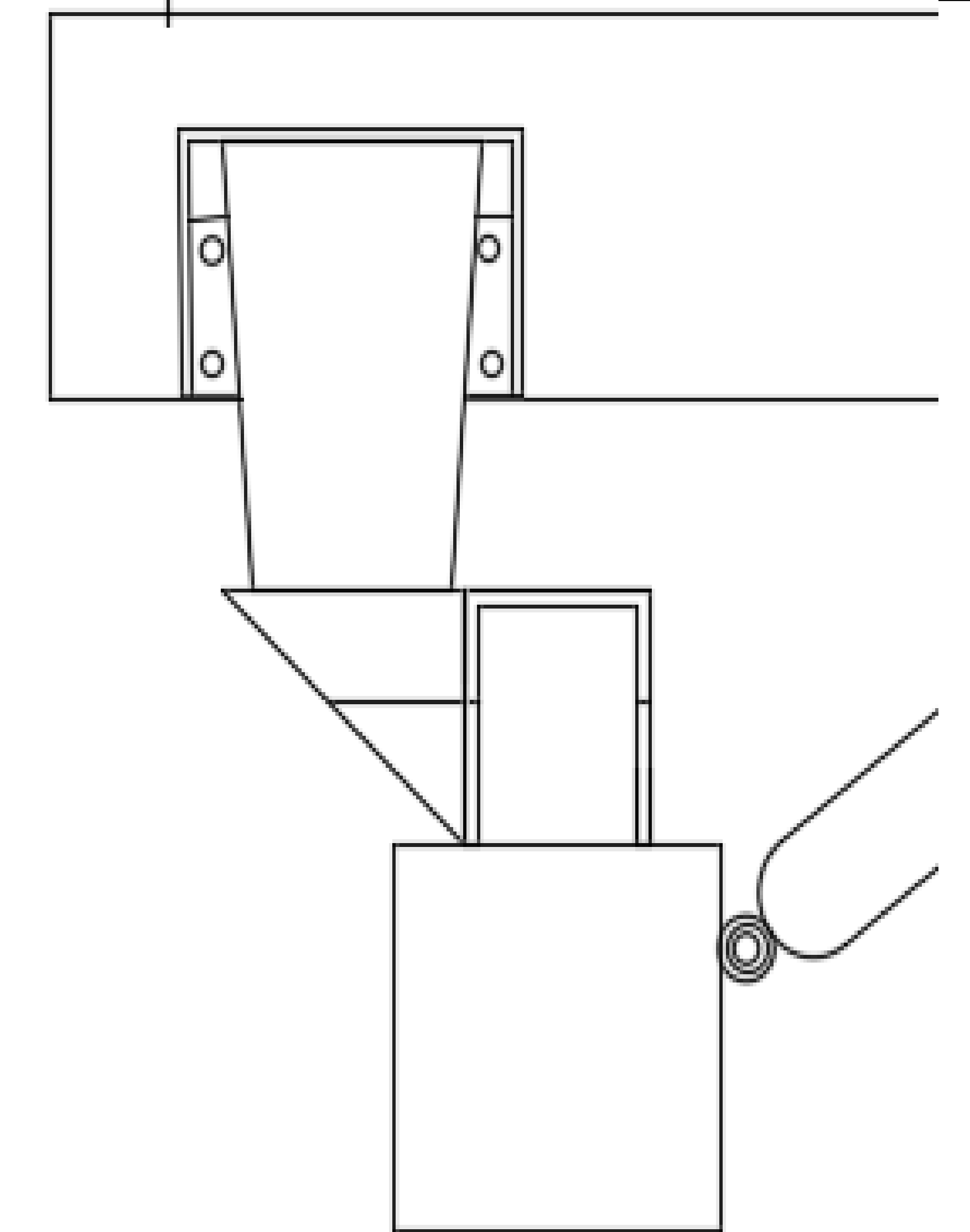
Criteria: Maintenance, Cost, Durability, Ease of Installation
Variability in Load

The team decided that Solution #4 best suited the criteria that we had set out to meet.

- Solution #1 was too expensive and was not feasible
- Solution #2 did not meet the ease of installation due to limits in mounting space
- Solution #3 was not feasible due to the height that it put the wagon bed

Final Solution: **Solution #4- Air Bags**

- Air Bags mounted low, to allow minimum height to the wagon, only adding 3-1/2" to the height
- Custom mounting brackets
- Shock Absorbers to allow lateral support of the Air Bags
- Shock Absorbers dampen the vertical motion
- Can be made in on-farm shops by farmers



AutoCad Assembly Drawing

Alternative Solutions

Solution #1- A-Arm Design

- Complicated design
- Requires constant maintenance and upkeep
- Expensive to implement
- Large amounts of custom modifications

Solution #2- Coil Springs

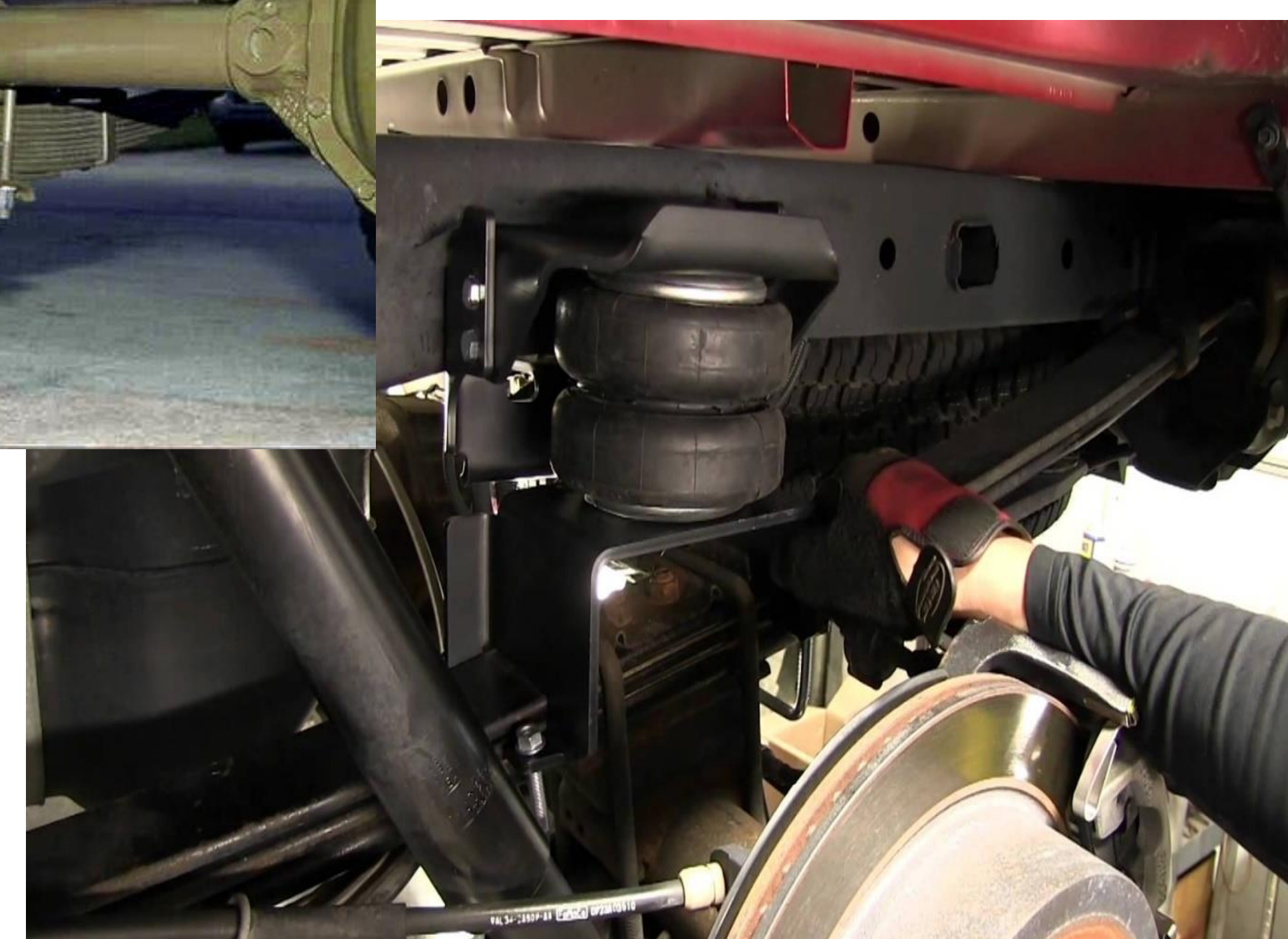
- Increases bouncing to the load
- Does not allow for variability with the load
 - Can sway and cause shifting of the load
- Adds too much height to the wagon bed

Solution #3- Leaf Springs

- Does not allow variability of load
- Requires a large area to mount
- Durable and low maintenance
- Decreases the shocks to the load, but does not dampen

Solution #4- Air Bags

- Allow variability of suspension for load sizes
- Easy Installation
- Can be mounted in smaller areas
- Require lateral support



Impact/Sustainability

- Simple design, that allows farmers easy implementation with on-farm resources
- Parts for initial build or any repair work are easily found at automotive or farm stores
- Sturdy design that can be adapted for any other use that the farmer would have to haul fragile cargo
 - This can be done through changing the shocks and air bags to others that are readily available on the market
- Helps to reduce damage and increase the profit that a farmer can make

Economic Analysis

Budget			
Items	# of Units	Cost per Unit	Total Cost
Firestone 9001 Air Bag	4	\$ 94.00	\$ 376.00
Air Hoses	1	\$ 35.00	\$ 35.00
Magnum 65177 Shock Absorbers	4	\$ 48.40	\$ 193.60
Misc. Nuts & Air Fittings	1	\$ 75.00	\$ 75.00
3/16" Steel Plates	4	\$ 50.00	\$ 200.00
		Total Cost	\$ 879.60

Estimated Economic Impact	
Damage per day	\$ 20.00
3 Days / Week	\$ 60.00
12 Weeks / Year	\$ 720.00
Equipment Lifetime - 7 years	\$ 5,040.00
30% reduction in damage	\$ 1,512.00

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