

**Problem Statement**

American Gypsum faces a warehouse layout issue at their 25 million square foot plant in Georgetown, South Carolina. The company currently has no organization or operational system for the 75 drywall products stored in the facility or the forklift transportation between the end of the production line and the warehouse. The absence of a structured system creates material handling inefficiency, storage space limitations, and a halt on the production operations.

**Company Background**

- Founded in 1963, Eagle Materials manufactures a variety of construction and building materials, such as cement, sand for hydraulic fracturing, and paperboard
- We worked on a project for American Gypsum, a subsidiary of Eagle Materials since 1985. Their first plant was however created in 1960.
- American Gypsum mines and manufactures gypsum into drywall, and has 5 plants across the US
- Facility of focus is in Georgetown, SC

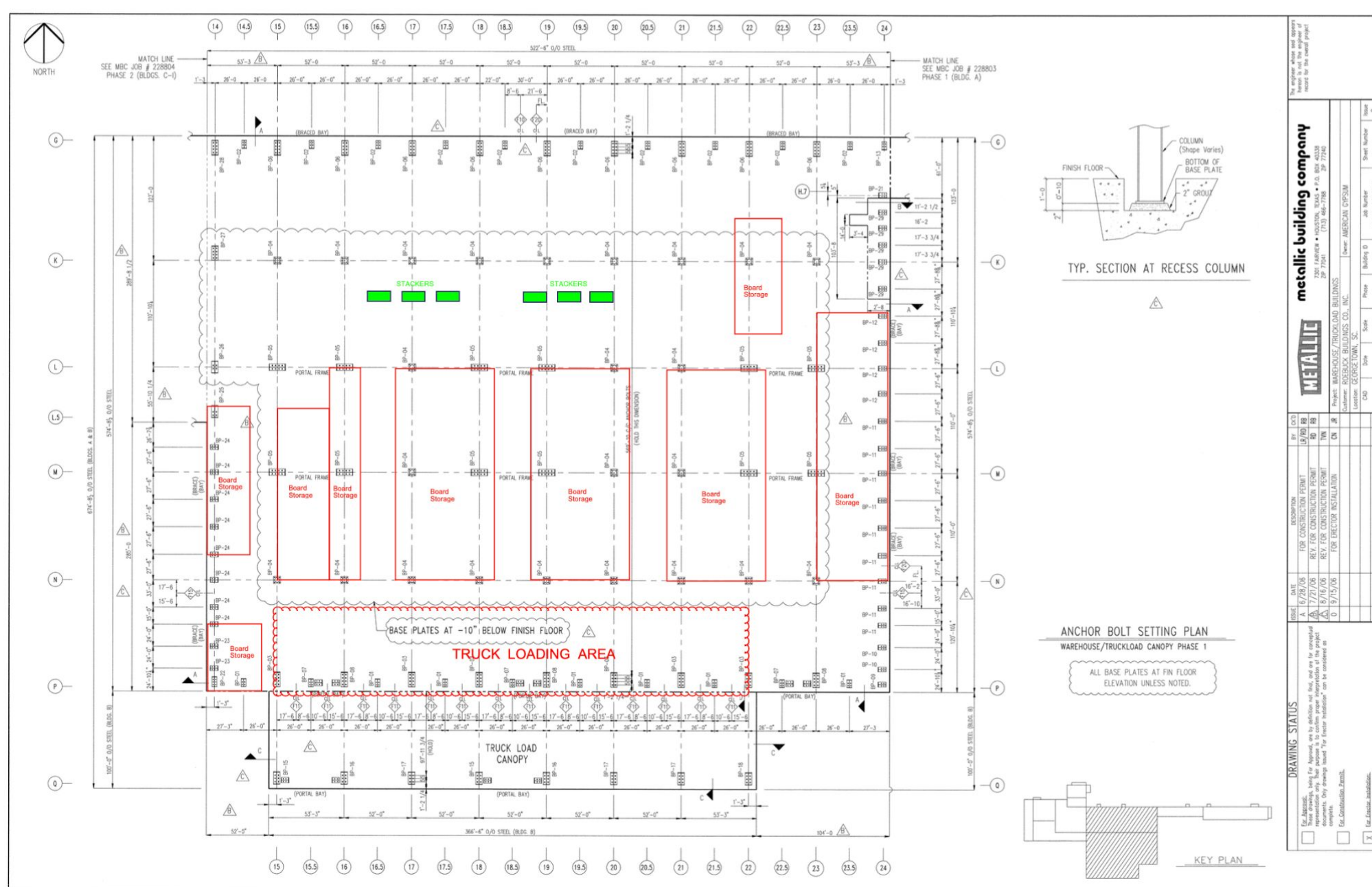


**Current System Model**



**Methods**

- Allocate square footage to each part based on demand from 4 month time interval (1:1 ratio)
- Combined CAD and draw.io to iterate design layouts
  1. Place the 4 highest-demand products at several locations throughout the warehouse to minimize forklift congestion and provide faster routes
  2. Observe production times of each product variant and place near the production area accordingly
- Final ROI calculations and proof of more effective solution
  - Gathered information on locations of 3 most-produced parts at site visit
  - Calculations involving distance traveled, forklift speed, and cost of operating a forklift for x minutes to gather, store, and load these 3 parts in the current layout vs. our improved layout

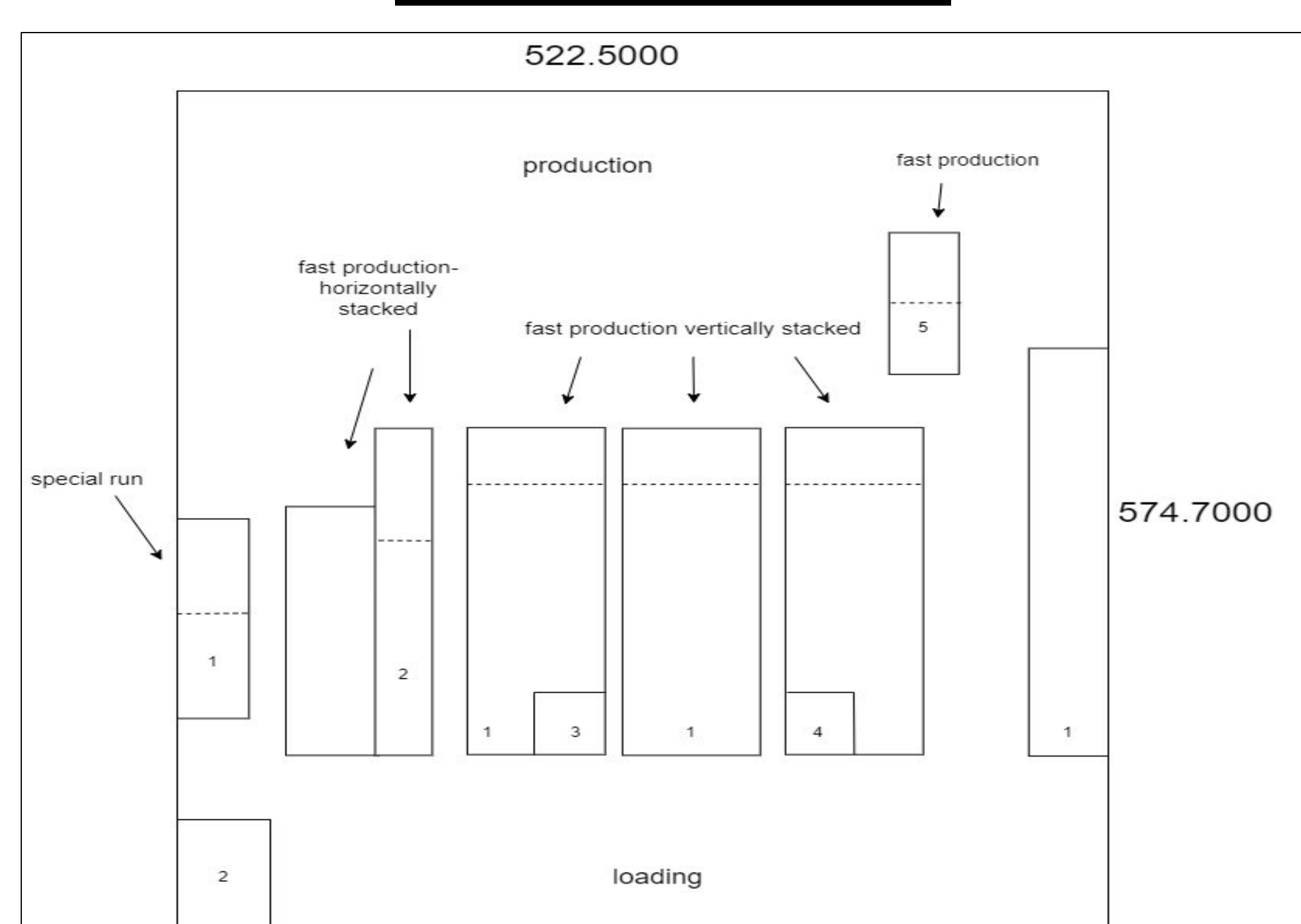


**Current Square Footage Per Product**

Item	Square Footage	Estimated Certain Dimensions	Percentage of Total Square Footage	Coordinate points (bottom left, top right)	Dimensions (L x W)
Board Storage	3405.932	Yes	1.13%	(0,0) & (46.7,72.85)	72.85 x 46.7
Board Storage	5576.523	Yes	1.86%	(0, 148.35) & (37.03, 298.96)	150.61 x 37.03
Board Storage	7049.751	Yes	2.35%	(54.5, 120.875) & (93.5, 301.635)	180.76 x 39
Board Storage	5719.978	Yes	1.91%	(93.5, 120.875) & (119.5, 340.875)	220 x 26
Board Storage	17168.905	Yes	5.72%	(138.5, 120.875) & (216.5, 340.875)	220 x 78.04
Board Storage	17168.905	Yes	5.72%	(241.3, 120.875) & (319.34, 340.875)	220 x 78.04
Board Storage	17168.905	Yes	5.72%	(341.84, 120.875) & (419.88, 340.875)	220 x 78.04
Board Storage	4485	Yes	1.50%	(393.88, 379.67) & (432.88, 494.67)	115 x 39
Board Storage	15217.3	Yes	5.07%	(469.25, 120.875) & (522.5, 406.65)	285.77 x 53.25
Miscellaneous	323.419	No	0.11%		
Truck Loading Area	31978.917	No	10.65%		
Free Space	175021.569	Yes	58.29%		
Total Area of facility	300285.104	No	100.00%		



**Final Layout**



Calculate distance traveled by forklift to collect all 3 products and store them in both layouts

Calculate time spent by forklifts to complete collection and storing based on base speed of 5 miles/hr for both layouts

Calculate cost of operating a forklift for collection and storing in both layouts

Compare cost and time of operating forklift for collection and storing in both layouts to identify time savings and return on investment

**Challenges & Future Work**

No current system (hard to quantify improvement with new system), hard to decide which variables should be chosen for layout creation and their weight (demand, production time, product...), not able to see continuous improvement of solution (can't go back and change variables through continuous implementation)

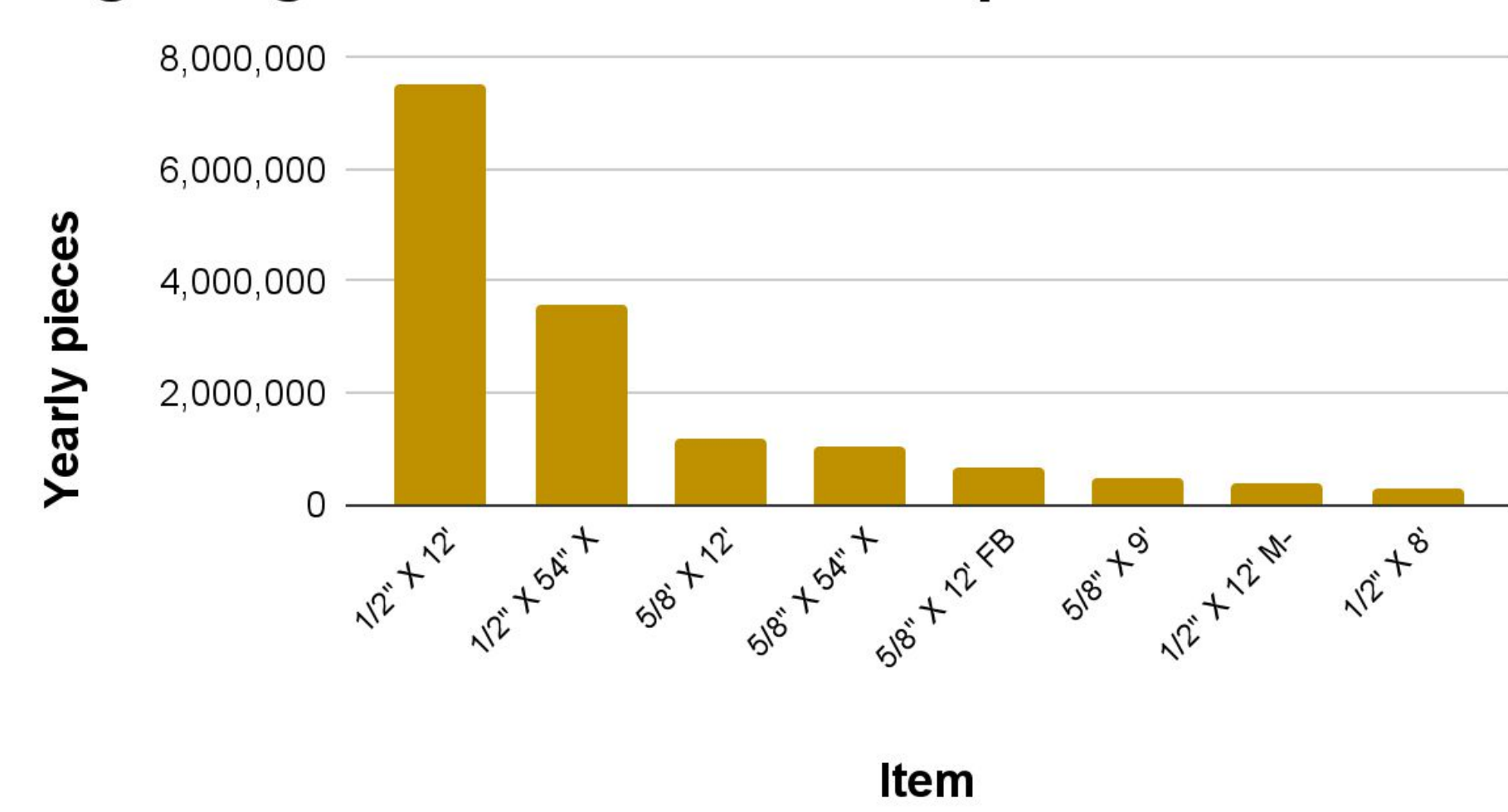
Continuous Solution Implementation and Evaluation to allow team to notice direct improvement or challenges, Implementation over long enough period of time to allow operators to get accommodated

**ROI: Forklift Cost Savings**

	Production Line to Warehouse	Warehouse to Loading Area
Total Saved per Hour	0.0594931321	0.1463151389
Total Saved per Week	9.518901137	23.41042223
Total Saved per Year	494.9828591	1217.341956
Total Saved per Year for all Forklifts	1484.948577	8521.393692

Total Savings = \$10,006.34227

**Eight Highest Demanded Items per Year**



**Square Footage Allocation**

