

Inventory Optimization



Distribution Center, Plainfield, IN



Executive Summary

- The Kohl's Distribution Center in Plainfield, IN has successfully streamlined their storage operations.
- Out of **1450** SKUs remaining in manual storage, only **7** SKUs can be transferred to the automated storage facility.
- As a result, the manual storage area is now 78.6% vacant.

It is recommended that Kohl's work closely with a storage solutions provider **to determine the future outlook for the current operations of their manual storage facility.**



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- Storage Summary
- Analysis of Inventory of SKUs in Manual Storage Area
- Impact on Efficiency & Cost
- Recommendations
- SWOT Analysis
- Summary

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- **Storage Summary**

Storage Summary

Definitions

Totes: bins where items are placed within the automated storage system

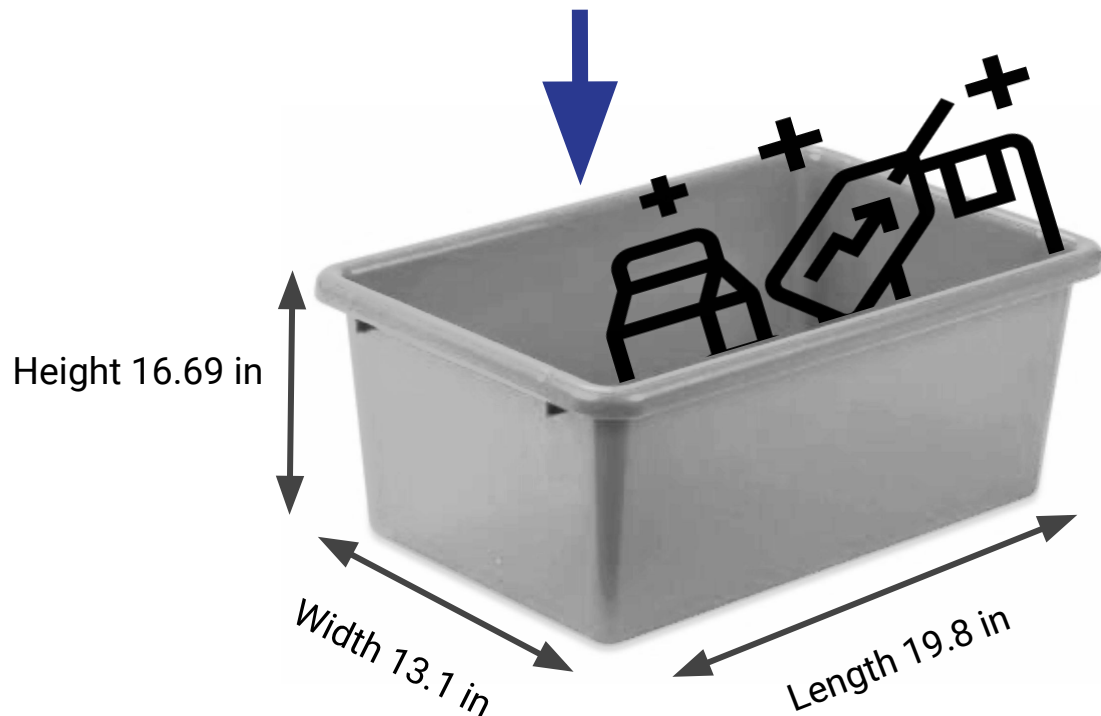
Units: quantity or number of each product within the distribution center

Stock Keeping Unit- SKU: is an ID of a product

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Storage Summary

≥ 10.7 Items/Tote



Grey Tote:
Volume = 4329.05 in³
Maximum weight = 50 lbs

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Substantial Capacity Available in both Manual and Automated Facilities

SKU Category	Unit Count	Unit Capacity	Capacity Available
Manual	152,340	713,889	78.66%
Automated	7,352,885	13,000,000	43.44%

Storage Summary

143x More SKUs in Automated Facility

143x More Unique SKUs in Automated Storage Facility

Storage Facility

Automated

Manual



Unique SKUs (Count)

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Constraints for Automated Storage Area:

1. Volume $\leq 4329.05 \text{ in}^3$
2. N-Sort
3. $\geq 10.7 \text{ Units/Tote}$
4. Available for Sale
5. Not Fragile / Not Liquid
6. $\geq 25 \text{ units available}$
7. No Tech

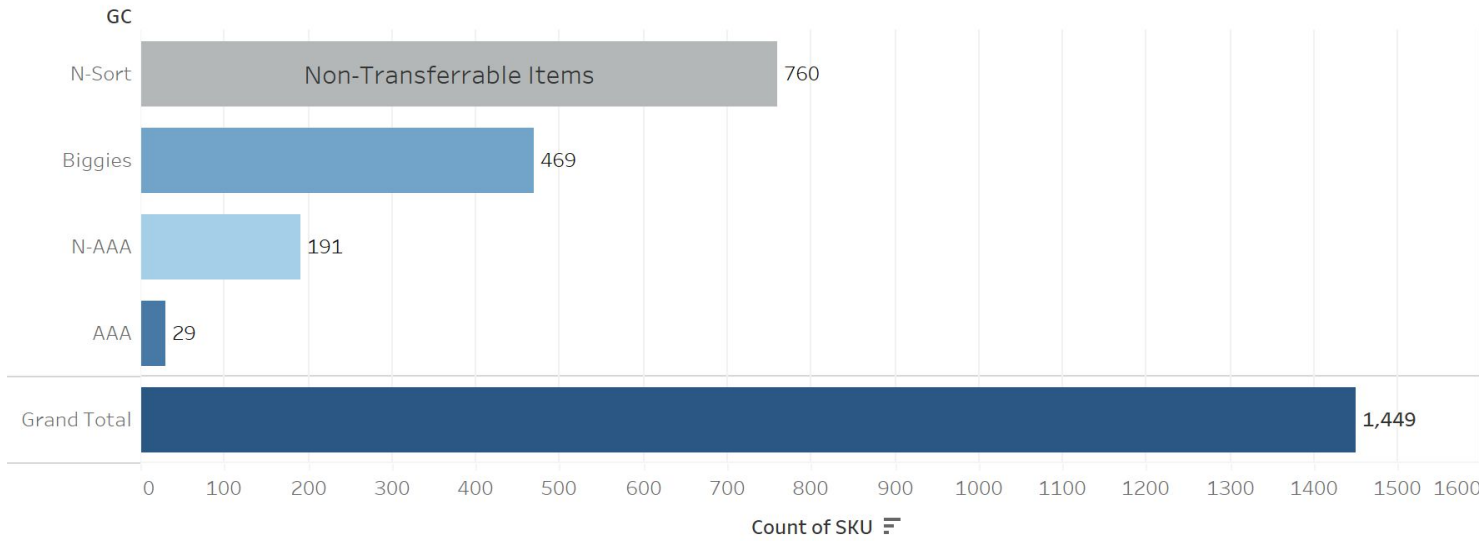
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- **Analysis of Inventory of SKUs in Manual Storage Area**

Analysis of SKU Inventory in the Manual Storage Area

N-Sort Items **Cannot** be Transferred

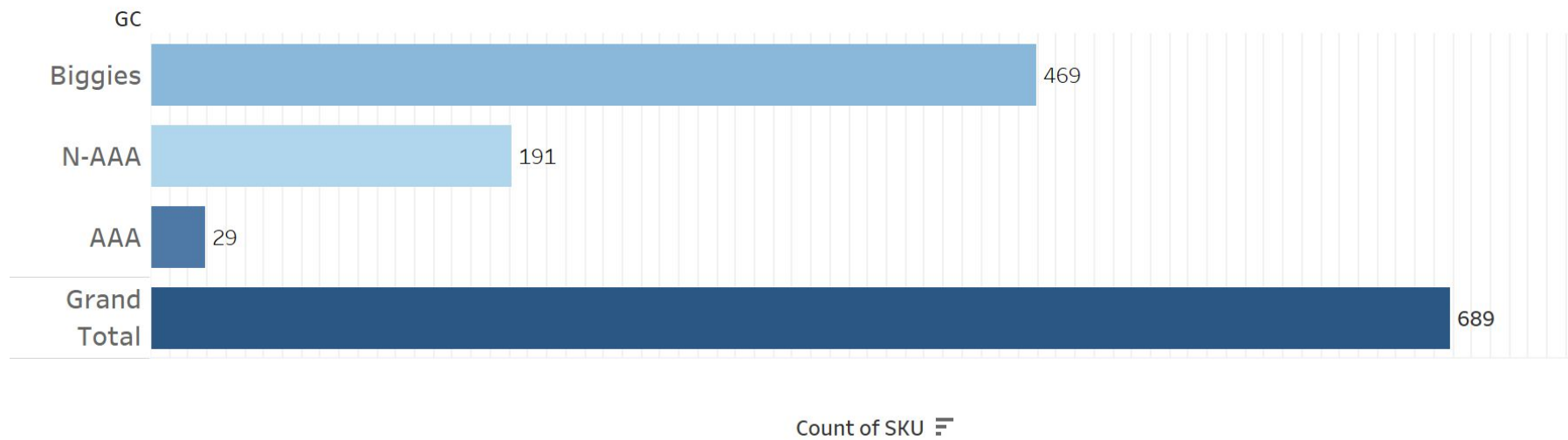
52.5% of SKUs Left in Manual Storage are N-Sort Items and Cannot be Transferred



SKU Inventory Analysis in the Manual Storage Area

Only Biggies, N-AAA, and AAA Remain

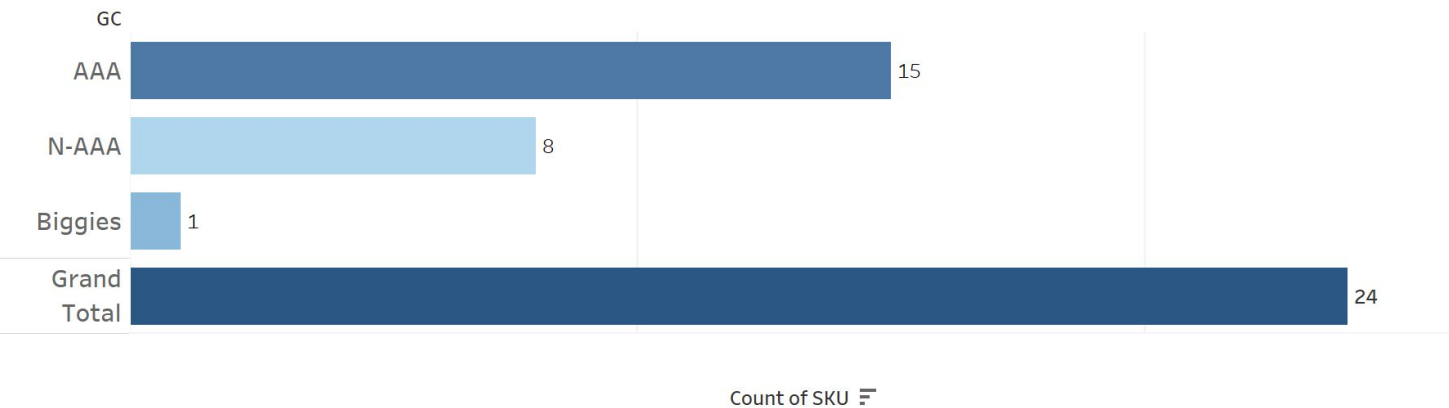
689 SKUs Remain for Further Analysis



Analysis of Inventory of SKUs in Manual Storage Area

24 SKUs can be **considered** for Transfer after Adding Constraints: > 10.7 U/T, Available for Sale, Not Fragile, and >25 units

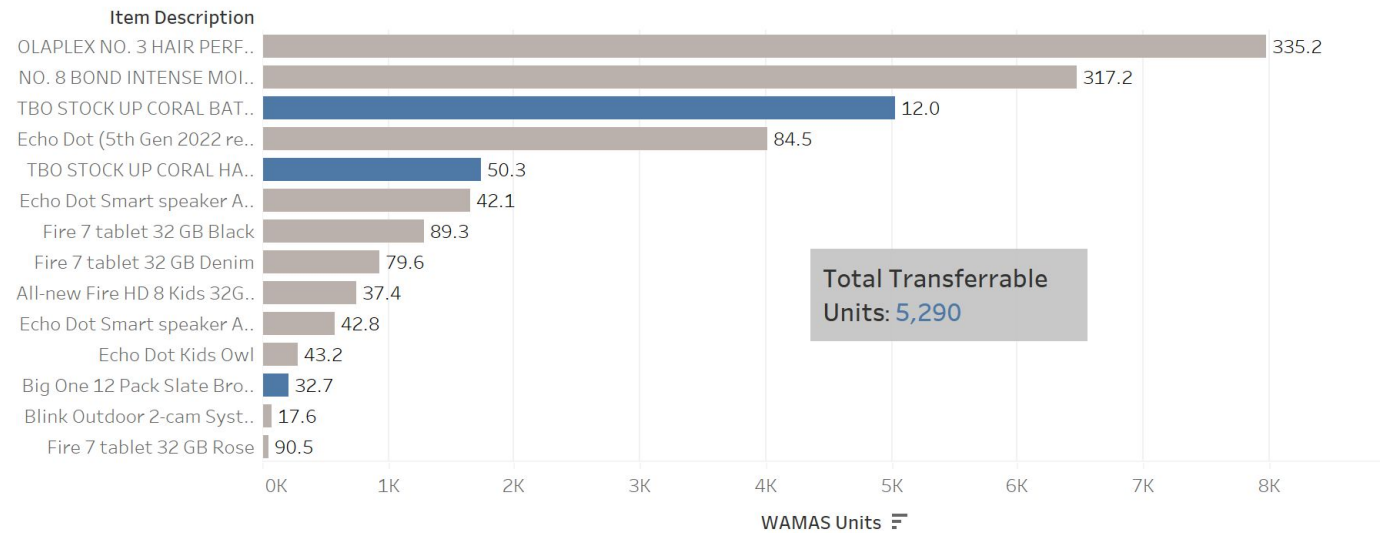
Only 24 SKUs can be Considered for Transfer



Analysis of Inventory of SKUs in Manual Storage Area

Total 5,290 AAA Units and 3 SKUs transferable

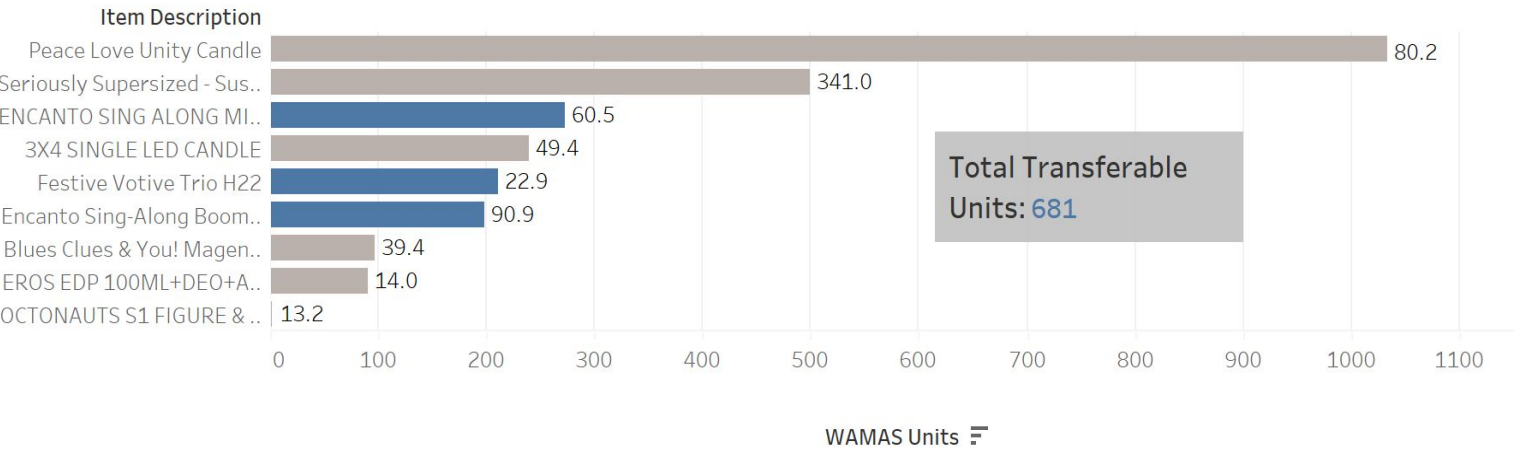
Transferrable AAA SKUs



Analysis of Inventory of SKUs in Manual Storage Area

Total **681 N-AAA Units** and **3 SKUs** transferable

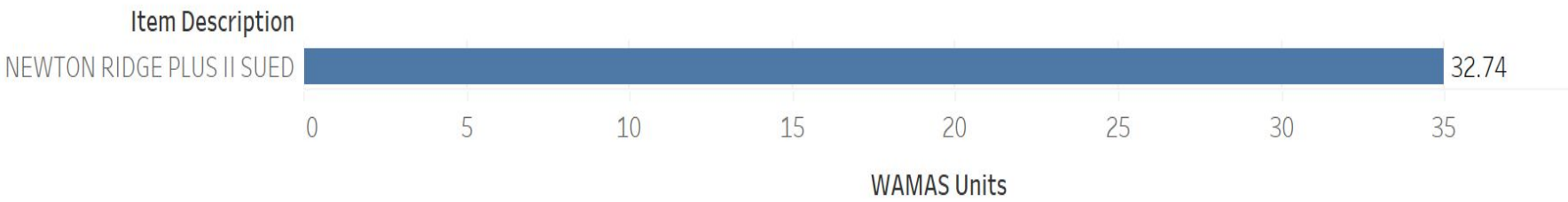
Transferrable N-AAA



Analysis of Inventory of SKUs in Manual Storage Area

Only 1 SKU Categorized as Biggie Meets All Constraints

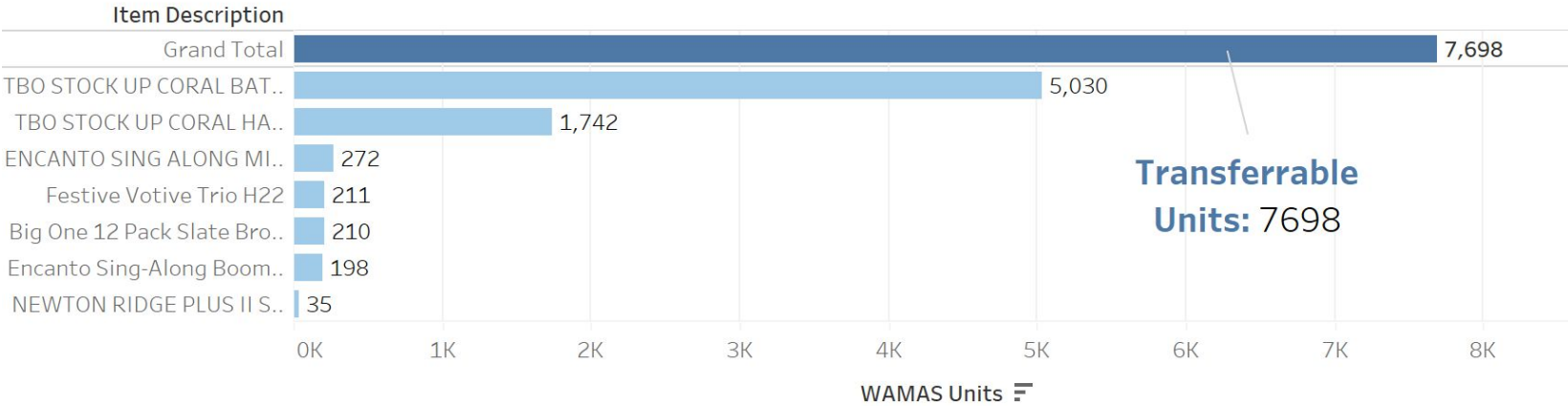
Transferrable Biggies



Analysis of Inventory of SKUs in Manual Storage Area

Decreases Manual Storage Capacity by 5.05%

Total WAMAS Units that Meet ALL Constraints is only 7,698



Analysis of Inventory of SKUs in Manual Storage Area

Small Impact on Overall Capacity in Automated Storage

Estimated Capacity by SKU

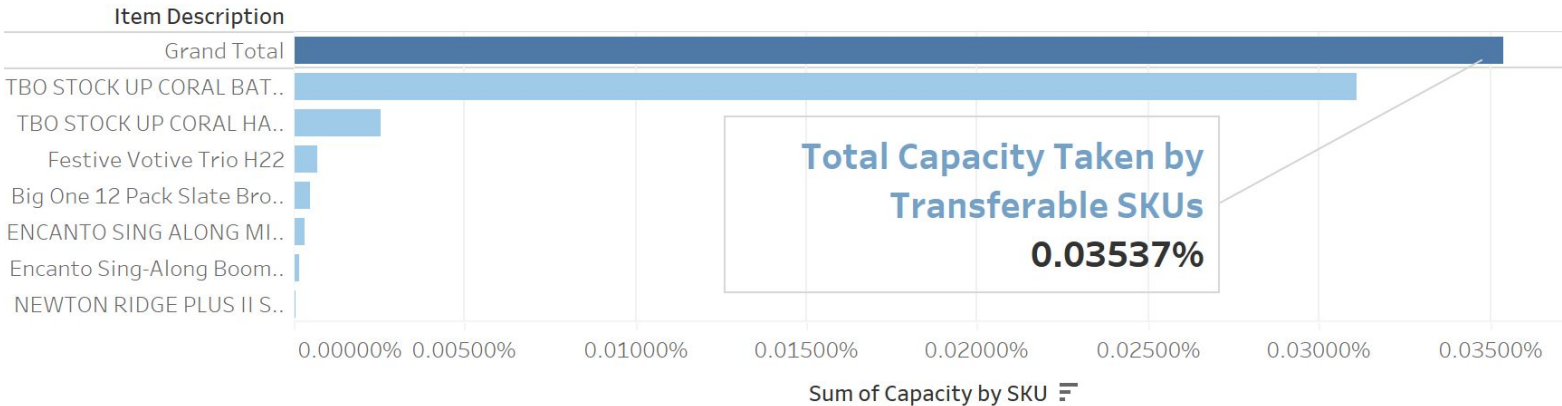


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- **Impact on Efficiency & Cost**

Impact on Efficiency & Cost

SKU Transfer Leads to Initial **Loss of \$765.43**

Method	Cost/Hr	Units/Hr	Units	Cost	Total Loss
Manual Picking Cost	\$17.50	120	7698	\$1,122.63	(\$765.43)
Automated Picking Cost	\$17.50	660	7698	\$204.11	
Transfer Cost	\$17.50	80	7698	\$1,683.94	



Impact on Efficiency & Cost

Utilizing Median Inventory Turn, SKU transfer leads to Annual **Gain of \$1439.00**

Method	Cost/Hr	Units/Hr	Units	Inventory Turn	Cost	Total Gain
Manual Picking Cost	\$17.50	120	7698	3.4	\$3,816.93	\$1,439.00
Automated Picking Cost	\$17.50	660	7698	3.4	\$693.99	
Transfer Cost	\$17.50	80	7698		\$1,683.94	

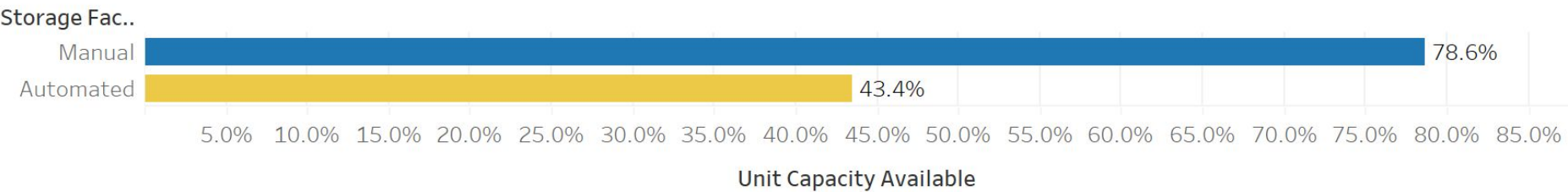
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- Storage Summary
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- Impact on Efficiency & Cost
- **Recommendations**

Recommendations

Work with Storage Solutions to Determine How to Handle **Vacancy in Manual Storage**

78.6% Available Capacity in Manual Storage Facility



Recommendations

Work with Storage Solutions to Determine how to handle **vacancy**
in **Manual Storage**

143x More Unique SKUs in Automated Storage Facility

Storage Facility

Automated



208,588

Manual

1,450

Unique SKUs (Count)



Recommendations

Potential Solutions for N-Sort SKUs

Vertical Lift Modules



Automated Vertical Carousel



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Recommendations

Transfer of 80k Units of N-Sort Items Would lead to Savings of **\$14,611.55** in the First Year and potential for **\$32,454.55** in the Second

Method	Cost/Hr	Units/Hr	Units	Inventory Turn	Cost	First Year Savings	Second Year Savings
Manual Picking Cost	\$1750	120	80000	3.4	\$39,666.67	\$14,954.55	\$32,454.55
Automated Picking Cost	\$1750	660	80000	3.4	\$7,212.12		
Transfer Cost	\$1750	80	80000		\$17,500.00		

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assuming equal picking cost and Units/Hr

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- **SWOT Analysis**

SWOT Analysis

- The analysis of cost & efficiency impacts has been conducted on the **goods occupying 21% capacity** of Kohl's manual storage area.
- Additional SKUs will be qualified for transfer if **packaging issues** can be solved for some categories such as fragile and leakable products.
- Kohl's has reduced SKUs in manual storage and **optimized the capacity** in both automated and manual storage areas.

S
Strength

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SWOT Analysis

- **Lack of sales data** hinders the optimization of manual SKU transfers and the accurate assessment of annual costs.
- **Limited access** to the internal database, resulting in the utilization of data up to January 2023.

W
Weakness

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SWOT Analysis

- **Modifying the constraints** for transferring SKUs from the manual area to the automatic area will potentially increase the storage of the automatic area for accommodating more SKUs.
- **Enhancing and expanding the flagging system** for unsortable, oversized, breakable, and fragile items would allow identification more efficient for these items that can still be moved to the automated area.
- **Including sales data** into the database would significantly enhance cost analysis, particularly considering that transfer costs are incurred only once.

O
Opportunity

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SWOT Analysis

- 1/5 of the areas in manual storage exceeded their capacity, yet there was no clear indication regarding the allocation of specific products. Introducing a **large influx of products** to these areas could potentially lead to storage issues.
- The **product categories and types may vary** from season to season in the manual area.

T
Threat

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