

Disney's Fresh Food Now Warehouse Design



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Who is Fresh Food Now?

- Fresh Food Now (FFN) is a large food vendor located in Atlanta, Georgia primarily serving restaurants in the 200 mile radius.
- FFN strives to provide locally sourced food and beverage items to its customers in an efficient, timely, environmentally responsible, safe, and courteous fashion.
- Currently housed in 160,000 square-foot warehouse.
- It handles over 30,000 SKUs of primarily 3 categories (Dry stock, Perishables, Alcohol, & Miscellaneous)
- Current Inventory Channels - either stored in the warehouse, sent directly to stores, or handled through crossdocking



Problem Statement

- Business has continued to grow rapidly in the past ten years with little to no expansion of FFN's warehouse infrastructure and has reached its 90-95% capacity.
- Reached threshold - Forces inefficient operations and low flexibility to accommodate customers
- Failure to compete with market in crossdocking and consolidation.
- FFN projects a growth of 5.5% annually over the next 20 years



What FFN expects ?

- Needs assistance in designing the operational processes of the new warehouse in the same corporate area, McKinley Corporate Park, which will accommodate the expansion needs of the company.
- How to efficiently operate the existing warehouse (W-14) once the new facility is fully operational?

Description of current process

- FFN has approximately 200 customers in the greater Atlanta area as well as a few satellite customers that extend up to 100 miles from the current distribution center.
- FFN keeps in inventory the products commonly used across multiple restaurants, while specialty items are delivered via crossdocking

Commodity	Temperature Constraints
<i>Drystock</i>	<i>None</i>
<i>Perishable</i>	<i>35-42° F, refrigerated</i>
<i>Alcohol</i>	<i>60-70° F, climate controlled</i>
<i>Miscellaneous</i>	<i><80° F, climate controlled</i>

- W-14 operates 24 hours a day and 7 days a week with the following schedule:
 - ☐ Receiving/Putaway : 12:00am – 9:00am
 - ☐ Delivery : 2:00am – 10:00am
 - ☐ Pick/Replenishment : 8:00am – 5:00pm
 - ☐ Sanitation, Truck loading : 5:00pm – 12:00am



Our Proposed Solution

- Build a new larger warehouse (W-15) adjacent to the old one (W-14) exclusive for drystock items.
- Resurrect current warehouse; increase the space available to perishables, alcohol, crossdocking areas and one point bigger office space.
- Performed product slotting and propose changed accordingly.
- Improved cutting edge technological methods for material handling process – AS/RS, conveyors.
- Pick-to-voice system.
- Energy efficient LED lighting for W-15, ventilators to push air.



SKU Analysis – What SKUs matter?

- Total number of SKU's in SKU master = 39,154
- There about 301 dead stocks (null) which are inbound are needed to be removed from W-14 because they don't add any value.

Whs1	
D	707
L	430
Null	301
P	233
M	5

Inbound

Outbound

Item Comm..	
L	3,913
D	1,499
P	385
M	84
Null	1

Total number of SKUs based on customer demand for each commodity ordered.

Item Comm..	
L	51.04%
D	35.75%
P	12.36%
M	0.85%

Though the number of SKUs is more for alcohols, drystock products occupy significant volume and weight.



Based on volume (cubic ft.)

Item Comm..	
P	50.13%
D	37.75%
L	12.07%
M	0.05%

Based on weight (lb.)

Item Comm..	
P	71.34%
D	22.29%
L	6.33%
M	0.04%

Number of distinct SKUs for
each commodity based on
demand

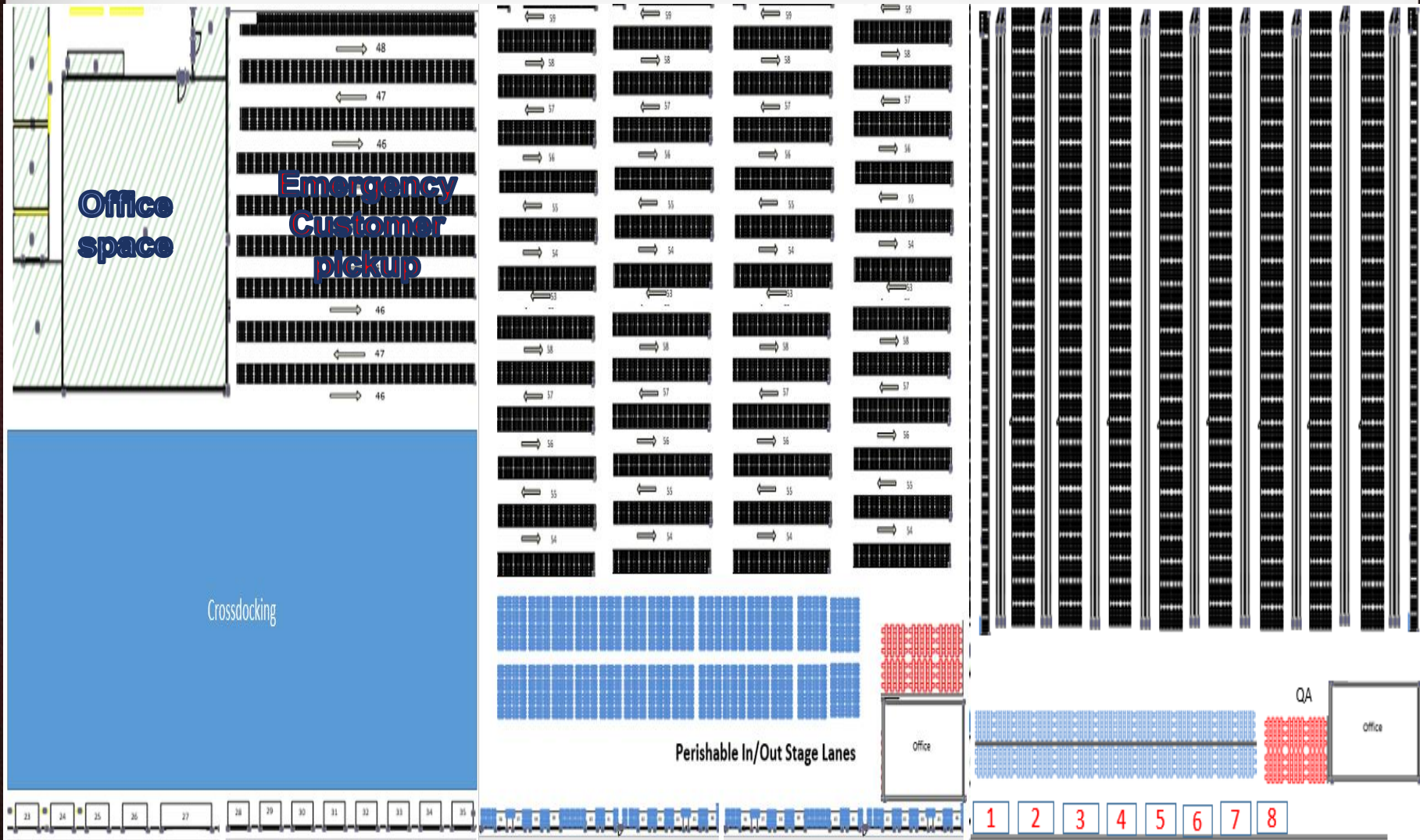
Item Comm..	
L	66.54%
D	25.49%
P	6.55%
M	1.43%



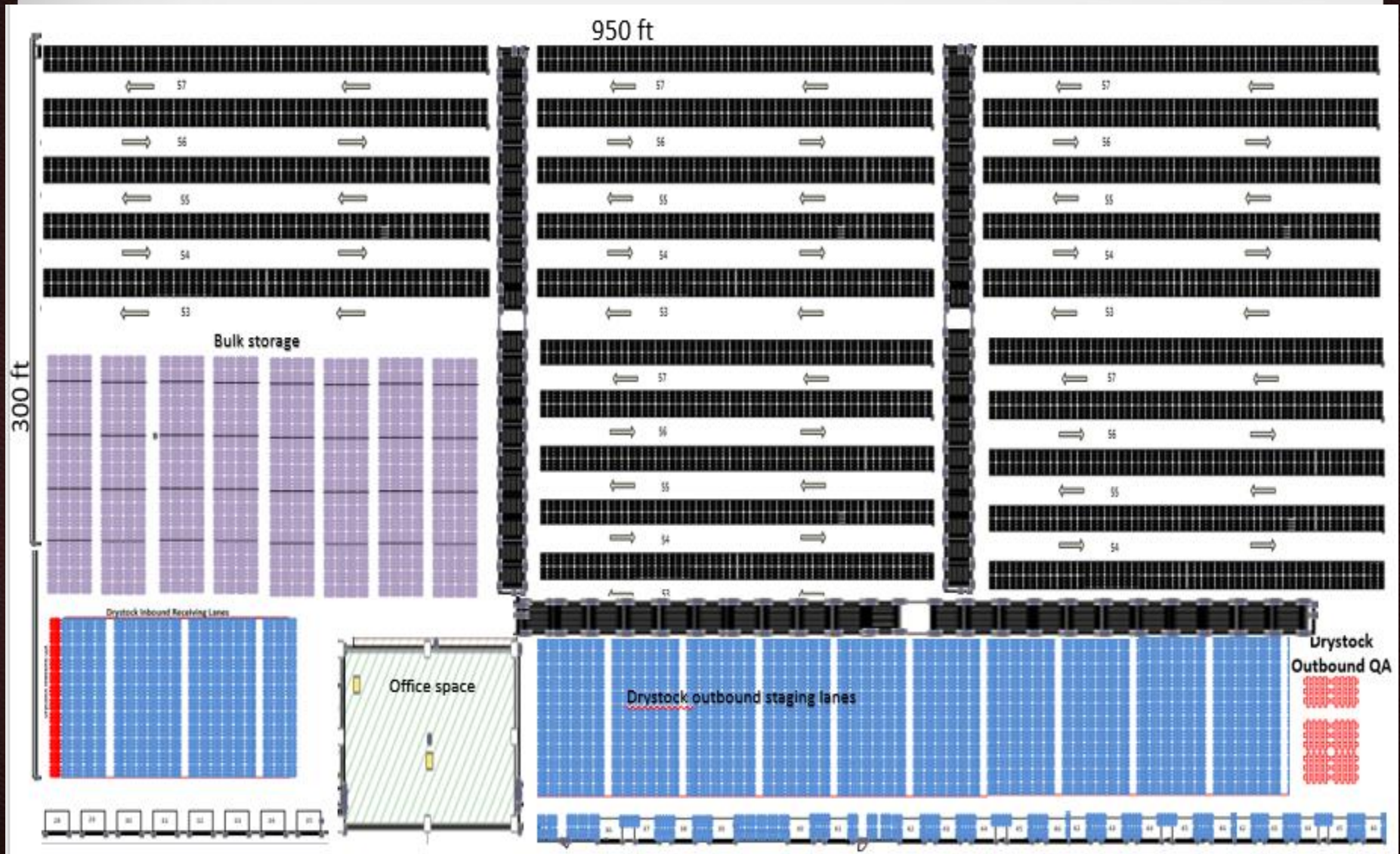
- Perishable products are the heaviest as they are composed of turkey, chicken, etc. But there are too few SKUs of them.
- Hence, drystock will be given 75% of area. 15% for perishable, 10% for alcohol and miscellaneous placed together due to temperature constraints.
- Based on the demand, space and storage constraints, the ideal strategy would be to have the new warehouse W-15 only for drystock and W-14 for all the commodities, crossdock, emergency customer pickup and the main office space.
- Area of existing W-14 = $165 \times 981 = 161,865$ sq.ft
- Since we are constrained with 310 ft on one side of the new warehouse, and projecting a 5.5% annual growth, we need an area of 442,700 sq.ft by 2034 – this meets the company's requirement.
- So W-15 will have dimensions of 300 ft x 950 ft – dedicated fully to drystock commodities.



W-14 after restructuring



New warehouse W-15

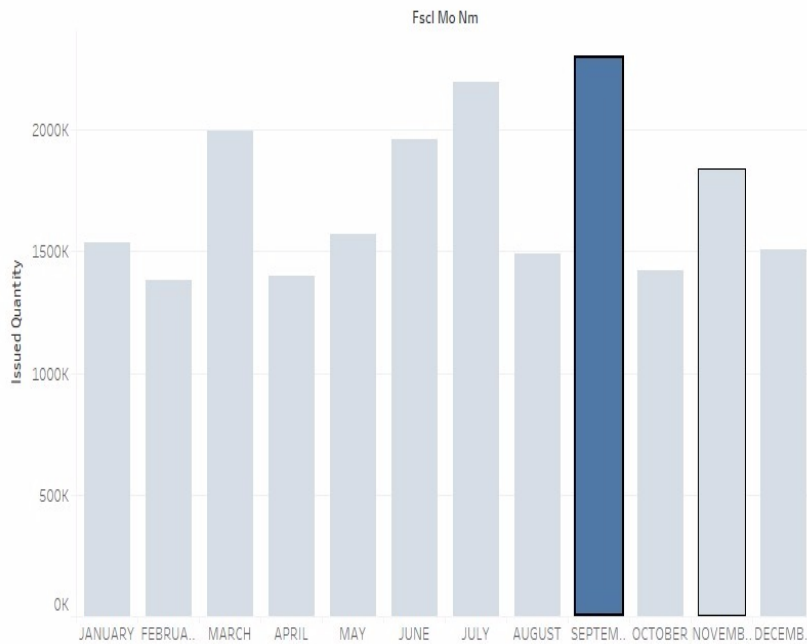


- The W-14 will be modified such that the portion of drystock from aisles 53 to 59 will be given to perishable, totally revamped with new aisle numbers and AS/RS. Liquor is now revamped with 9 aisles each equipped with AS/RS.
- This proposal is one of the optimal solutions that considers operational and technological growth, demand, and at the same time minimum investment.
- W-14 will also have the operation that allows for customer walk-in/pickup is desired, in the area which was previously aisles 46-49.
- Bulk storage for drystock is removed from W-14, office space is pushed back, aisles 1-12 are removed as a result, and this space is given to crossdocking

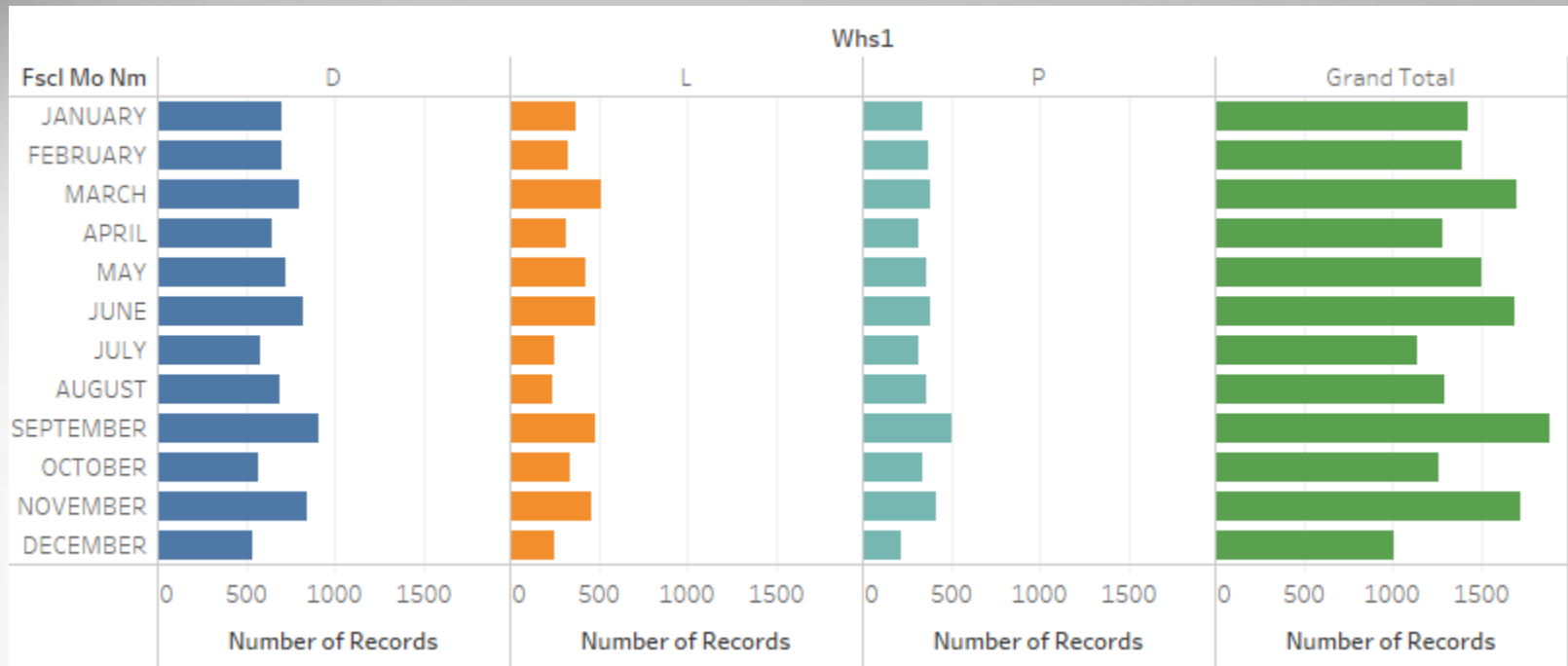


Volume distribution vs Customer order

- There was not much variance with respect to seasonality of demand. In 2015, September had the maximum demand. This gave an idea of average number of pick-lines per month (week/daily data not available). This with projected growth gave an idea of labor and operational costs.



FscI Mo Nm	Item Commodity Temperature				Grand Total
	D	L	M	P	
JANUARY	1,821	2,683	47	647	5,198
FEBRUARY	1,841	2,723	51	681	5,296
MARCH	2,188	3,385	64	715	6,352
APRIL	1,740	2,541	38	603	4,922
MAY	1,887	2,908	40	646	5,481
JUNE	2,037	2,936	51	736	5,760
JULY	1,567	2,079	36	568	4,250
AUGUST	1,724	2,437	34	635	4,830
SEPTEMBER	2,709	3,801	64	950	7,524
OCTOBER	1,952	2,557	44	722	5,275
NOVEMBER	2,416	3,216	55	761	6,448
DECEMBER	1,444	2,036	28	403	3,911



- Average number of shipments received in a month (more shipments mean a larger number of receiving dock and/or more labor)

SPACE UTILISATION

- Crossdocking area - 26400 sq.ft with 13 doors, 5 for receiving and 8 for shipping, equally spaced.
- Area allocated for perishable – 72600 sq.ft with 12 doors. The perishable commodity area of the warehouse will be equipped with 5-high pallet racks as per the segregation code to ensure no cross-contamination.
- Area allocated for liquor – 34600 sq.ft with 8 doors.
- Area allocated for drystock – 285000 sq.ft (The whole of the W-15).
- These include respective small sub-office spaces, QA space, inbound/outbound staging lanes.

Zone	Primary (case)	Reserve (pallet)
Perishable	1300	3300
Liquor	450	1900

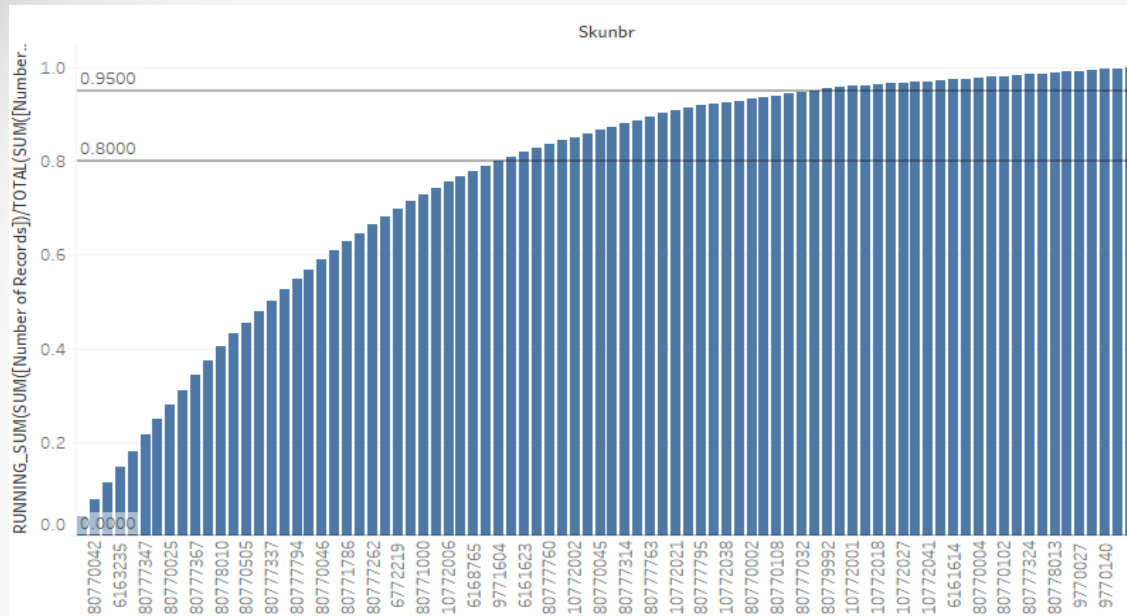


SPACE UTILISATION – W15

- Projecting a 5.5% growth, new W-15 will have 4 bay high, total of 14000 pallet locations with 3500 for forward and 10500 for reserve.
- The bulk storage will be floor storage with 3-pallet high stacking – 2000 reserve pallet picking.
- W-15 will have 29 dock doors – 8 for inbound and the rest for outbound. It has 3 conveyors – 2 sub conveyors and 1 main. Main aisle runs through the 300 ft and each cross aisles are 32 ft.
- No of aisles : 50
- Single deep pallet racks are used as they are existing, simple, serves the purpose in this case. Also, accessories like carton flow and pushback modules can be added to modify future use.



ABC ANALYSIS & PRODUCT SLOTTING



The list of items for each commodities were sorted in descending order line sequences so that items with the most order lines are at the top. Cumulative running totals were found, order line counters were created “A”, “B” and “C” velocity rankings were given. There were 300 stocked items out of 20k odd items that had no movement. These has to be discarded or found out as to why it was not found in the database. The bottom 20% in each commodity should be moved to direct-to-store. For lack of space all of them cannot be shown here.

Skunbr	Sku Description	Supply Chai..	
9150900	DUMMY 17013	WH	0.01%
9150909	DUMMY 17022	WH	0.01%
9150911	DUMMY 17024	WH	0.01%
9150912	DUMMY 17025	WH	0.01%
9150913	DUMMY 17026	WH	0.01%
9150914	DUMMY 17027	WH	0.01%
9150915	DUMMY 17028	WH	0.01%
9150925	DUMMY 17038	WH	0.01%
9150927	DUMMY 17040	WH	0.01%
9150931	DUMMY 17043	WH	0.01%
9150943	DUMMY 17047	WH	0.01%
9150951	DUMMY 17050	WH	0.01%
9151201	DISPOSABLE 17056	WH	0.01%
9151202	DISPOSABLE 17057	WH	0.01%
9151205	NAPKINS 17059	WH	0.01%
9151207	NAPKINS 17060	WH	0.01%
9160014	PLATES PLASTIC 17087	WH	0.01%
9160035	PLASTICTYPE ITEMS 17095	WH	0.01%
9169058	DISPOSABLE 17151	WH	0.01%
9169060	DISPOSABLE 17152	WH	0.01%
9169062	DISPOSABLE 17153	WH	0.01%

Slow moving items in the warehouse
That has to be moved to direct-to-store

Drystock

Skunbr	Sku Description	Supply Chai..	
9770138	DUMMY 17251	CD	0.00%
9770214	DISPOSABLE 17309	CD	0.00%
9770296	DUMMY 17353	CD	0.00%
9770299	DUMMY 17355	CD	0.00%
9770300	DISPOSABLE 17356	CD	0.00%
9770320	DISPOSABLE 17362	CD	0.00%
9770360	DUMMY 17373	CD	0.00%
9770365	DUMMY 17376	CD	0.00%
9770510	DISPOSABLE 17415	CD	0.00%
9770538	DISPOSABLE 17431	CD	0.00%
9770539	DISPOSABLE 17432	CD	0.00%
9770991	DISPOSABLE 17609	CD	0.00%
9771040	DISPOSABLE 17614	CD	0.00%
9771041	DISPOSABLE 17615	CD	0.00%
9771042	DISPOSABLE 17616	CD	0.00%
9771043	DUMMY 17617	CD	0.00%
9771044	DUMMY 17618	CD	0.00%
9771323	DUMMY 17748	CD	0.00%
9771324	DUMMY 17749	CD	0.00%
9772038	DISPOSABLE 17828	CD	0.00%
9772039	DISPOSABLE 17829	CD	0.00%

Crossdocked commodities that
has to be moved to direct to store

Total number of SKUs = 1499



70110144	ALCOHOLIC ITEMS 19577	WH	0.02%
70111014	ALCOHOLIC ITEMS 19671	WH	0.02%
70112376	ALCOHOLIC ITEMS 19782	WH	0.02%
70115314	ALCOHOLIC ITEMS 19896	WH	0.02%
70116103	ALCOHOLIC ITEMS 19935	WH	0.02%
70118084	ALCOHOLIC ITEMS 20013	WH	0.02%
70124164	ALCOHOLIC ITEMS 20217	WH	0.02%
71712056	ALCOHOLIC ITEMS 28157	WH	0.02%
74740234	ALCOHOLIC ITEMS 28403	WH	0.02%
74748073	ALCOHOLIC ITEMS 28510	WH	0.02%
74748084	ALCOHOLIC ITEMS 28513	WH	0.02%
78780234	ALCOHOLIC ITEMS 29914	WH	0.02%
79BL0000	ALCOHOLIC ITEMS 29992	WH	0.02%
79CN9445	ALCOHOLIC ITEMS 30127	WH	0.02%
79NR1636	ALCOHOLIC ITEMS 30161	WH	0.02%
79NR2436	ALCOHOLIC ITEMS 30168	WH	0.02%

Slow moving items in the warehouse
That has to be moved to direct-to-store

There are 694 Crossdocked commodities that
has to be moved to direct to store

For Perishable commodities, there were no slow moving products, primarily due to its nature and shelf life. FFN has done a perfect job which they should continue after expansion.

Alcohol

Total number of SKUs = 3913



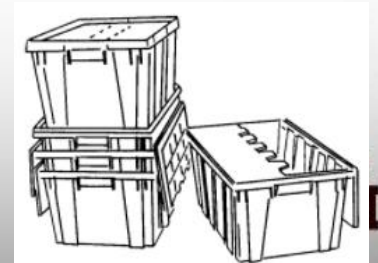
Equipment selection - Drystock

- Reserve Inventory is stored on pallet racks, each rack consists of about 3 pallets per level, 4-high rack
- Eaches stored in shelves in designated area, one conveyor is designated to sortation
- Counterbalanced lift trucks are used here to move pallets and replenish stocks
 - Able to efficiently move pallets and replenish all heights/levels in the warehouse
- Orders pickers are guided by a pick-to-voice system
 - Pick-to-voice systems are low investment costs and higher accuracy. Using this over paper based system can help us to reduce errors by 80-90%. This means more picks can be performed per hour.
- Six flat belt conveyors are set up and each aisle has a conveyor running across
 - Chosen because of repetitive movements of product in same path and to eliminate labor travel
- Sortation is handled by a sliding shoe sorter.

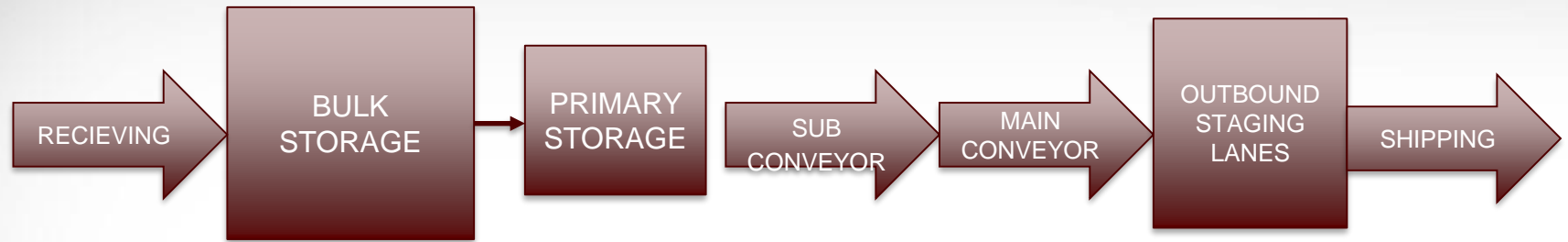


Equipment Selection – Perishable & Liquor

- Reserve Inventory is stored on pallet racks, cases and eaches stored in shelves in designated area.
- Counterbalanced lift trucks are used here as well for to move pallets and replenish stocks
- Pick-to-voice system is employed.
- Vertical Lift Module AS/RS is employed for storage and retrieval here.
- Why AS/RS ?
 - ☐ Improve order picking accuracy
 - ☐ Reduced damage to products
 - ☐ Operate in dense storage space with narrow aisles
- We suggest using 2 Methods for handling liquor(Vertical Lift Module AS/RS and Tote pans)
- Why Tote pans?
 - ☐ Travels smoothly on flat belt and roller conveyors

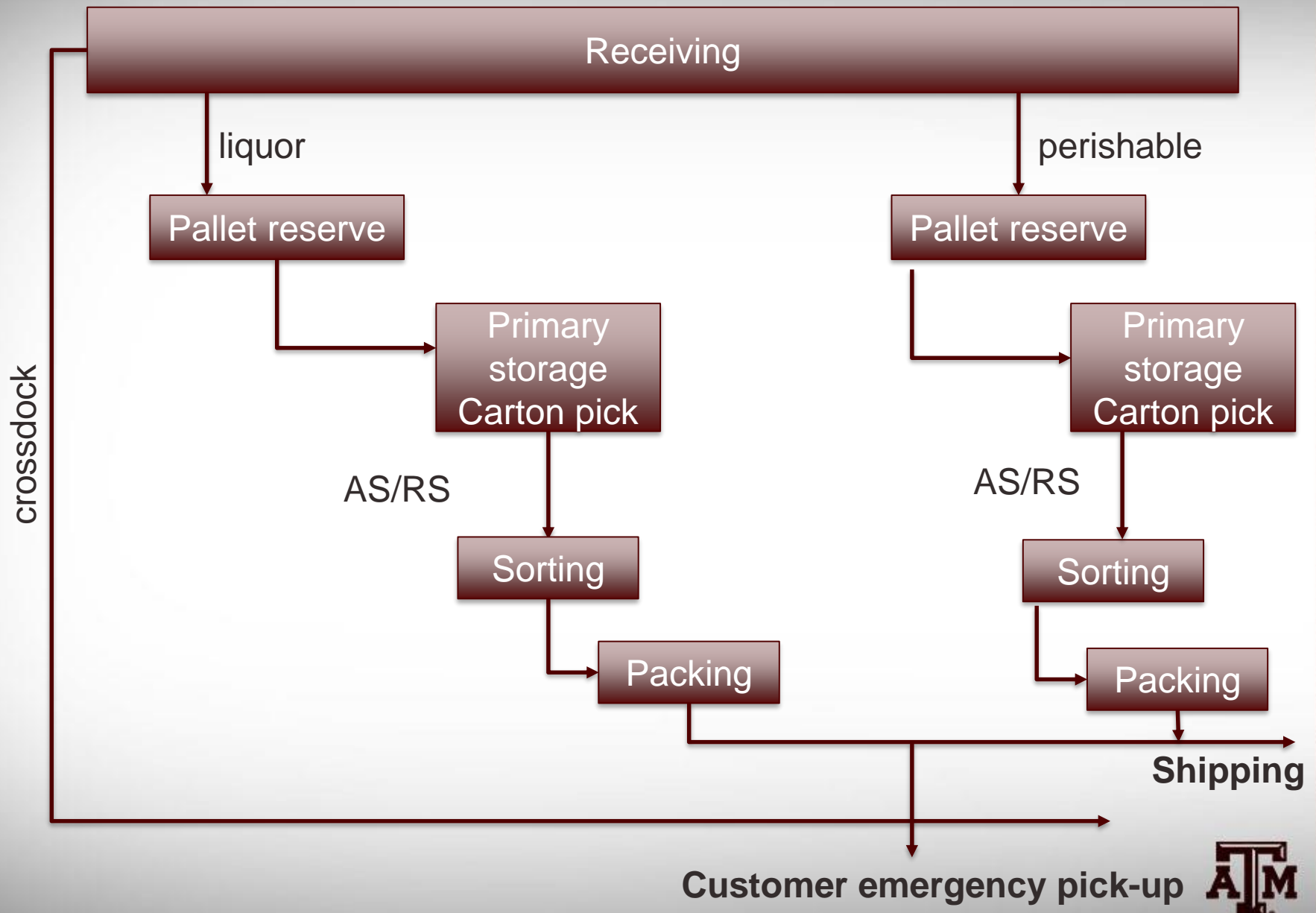


Product Flow & Operation Plan – Dry Stock – W15



- As the commodities are received from the vendor, the full pallets goes into bulk floor storage – handled by the receiving employee. Counterbalance lift trucks are used for this purpose.
- The pallets are then placed into the reserve storage first, and then to forward storage, where it is broken down into cases.
- The pickers are notified through the pick-to-voice system, where to pick and place them on the conveyor.

- From the subsystem conveyor, they are merged into the main conveyor using a sliding shoe sorter.
- Based on the customer order, the operators place barcode labels on top of the cases, labels scanned for verification, all the items are packed using shrink wrapping in the staging lanes and shipped.
- We propose a automatic overhead monorail to send the empty carton trash to recycle and use recycled products as per the management's liking of environmental considerations



OPERATION PLAN – PERISHABLE & ALCOHOL (W-14)

- For perishable commodities, the plan is to invest in AS/RS due to the savings generated in energy costs, handling and labor similar to that of drystock. It is also a way to strike a trade off between the corporate goal of remaining vested in cutting edge technology, and realizing profits at the same time. This has not been implemented for drystock due to its easy material handling and the product nature.
- For alcohol, we are adopting a tote bin & AS/RS system again due to the fragility of liquor bottles, liquor products contributing to maximum percentage of distinct SKUs and the corporate reasons explained above.



Economic Analysis – Labor Costs

<u>labour costs for 2015</u>				
<u>Roles</u>	<u>Number of employees</u>	<u>Hours per day</u>	<u>Salary per hour</u>	<u>Salary per year</u>
Receiving	17	8	\$30.00	\$1,020,000.00
Putaway/Replenishment	12	8	\$30.00	\$720,000.00
Order picker (drystock)	25	8	\$29.00	\$1,450,000.00
Order picker (perishable)	15	8	\$30.00	\$900,000.00
Order picker (liquor)	10	8	\$29.50	\$590,000.00
inventory management	5	8	\$31.25	\$312,500.00
Admin	7	8	\$40.00	\$560,000.00
Maintenance & sanitation	9	8	\$27.75	\$499,500.00
				\$6,052,000.00

Since the W-14 will be semi automatic, we propose only 47 employees for it's functioning. W-15 will have 133 employees owing to its traditional set-up and larger area.

<u>labour costs for 2016 and beyond</u>					
<u>Roles</u>	<u>Number of employees(W-14)</u>	<u>Number of employees(W-15)</u>	<u>Hours per day</u>	<u>Salary per hour</u>	<u>Salary per year</u>
Receiving	17	30	8	\$30.00	\$2,820,000.00
Putaway/Replenishment	12	21	8	\$30.00	\$1,980,000.00
Order picker (drystock)	0	45	8	\$29.00	\$2,610,000.00
Order picker (perishable)	0	0	8	\$30.00	\$0.00
Order picker (liquor)	0	0	8	\$29.50	\$0.00
inventory management	2	9	8	\$31.25	\$687,500.00
Admin	7	12	8	\$40.00	\$1,520,000.00
Maintenance & sanitation	9	16	8	\$27.75	\$1,387,500.00
	47	133			\$11,005,000.00

Economic Analysis – one time Fixed Costs

construction costs	\$52.5 per sq.ft	\$14,962,500.00
number of pallet racks needed	1750 at \$700 per 4-high pallet rack	\$ 1,225,000.00
pallets needed	14000 at \$25 per pallet	\$350,000.00
number of counterbalance lift trucks	15 at \$30000 each	\$450,000.00
conveyer belts needed - flat belt	\$3616 per ft + motor + instalation	\$400,000
AS/RS cost	1 whole system	1750000
Blue Bin cost	1000 at \$50 each	50000
Pick-to-voice cost	One for each warehouse	\$800,000

Conclusion

- The drystock will be shifted to the new warehouse (W-15) and to accommodate future growth with the recommended size and dock doors
- Alcohol and perishable stocks will be re allocated efficiently in the old warehouse(W-14). Crossdocking and office space will also be a part of W-14
- After product slotting we recommend to transfer slow moving inventory items to direct-to-store. This will also allow opportunity for forecasted growth.
- AS/RS system is introduced to handle alcohol and perishable commodities.
- Pick-to-voice system has been set up in both the warehouses.
- Counterbalancing lift trucks have been introduced to operate in the new warehouse.
- For further expansion beyond 2034, we propose to use the existing vertical space available or introduce a new warehouse for each commodity to function independently.
- Necessary economic analysis was performed which included Construction, Technology and equipment costs.



Citations

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Tools Used

- Data Visualization – Tableau (inbound analysis.twbx, outbound analysis.twbx)
- Data querying; PostgreSQL (605_project.sql)

