Law Warehouses, Inc.
NHSLC Warehouse Services RFP 2012 – 14

Proposal Offer Letter
STATE OF NEW HAMPSHIRE  
NH LIQUOR COMMISSION  
RFP 2012-14  
Warehouse Services for Spirits & Wine Product,  
Equipment & Supplies

Proposal Offer

The undersigned hereby offers to provide to the New Hampshire State Liquor Commission the services indicated in this Proposal at the pricing quoted herein in complete accordance with all conditions of the Commission’s Request For Proposal.

Name: Law Warehouses, Inc.
Address: 27 Airport Rd.  
Nashua, NH 03063
Telephone: 603-883-5531 x309

By:  
Brian Law, President

THIS PROPOSAL OFFER IS NOT VALID UNLESS SIGNED BY A PERSON AUTHORIZED TO LEGALLY BIND THE VENDOR.

This Proposal offer must be executed by the Vendor and attached to the front of its submission.

The RFP states that this Proposal is to remain valid for a period of 210 days from the Proposal due date. We take exception to this provision. Law currently has an option in place for the Seabrook facility which expires September 30, 2012 (116 days from Proposal submission). To the extent that a contract is not executed between Law Warehouses, Inc. and the NHSLC under this procurement process prior to August 30, 2012 Law reserves the right to withdraw its Proposal and shall not forfeit its bidders bond of $50,000.

Execution of Proposal Offer form signifies agreement to enter into a contract with the NHSLC which contains the General Provisions described in APPENDIX E. We agree to enter into a contract with the NHSLC in accordance with Appendix E except as otherwise addressed in our Proposal.
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Law Warehouses, Inc.
NHSLC Warehouse Services RFP 2012 – 14

Section I
Executive Summary
**Executive Summary:**

Thank you for the opportunity to submit a Proposal to continue as the distribution partner of the New Hampshire State Liquor Commission, its customers and suppliers. We are honored to have provided these services for the past forty years and are proud of our contribution to the Commission’s 126% increase in sales since 1997. On behalf of the more than 100 dedicated employees, we feel privileged to come to work every day to serve the Liquor Commission and its partners. We take our role very seriously and strive every day to ensure that all products are received, stored and delivered in a timely and safe manner. Our ambition is to continuously improve in order to provide the best distribution solution for the NHSLC. Over the past several years we have been analyzing the distribution system, evaluating solutions and securing the facilities and equipment necessary to support the NHSLC’s growth needs. Our Proposal modernizes the distribution system, creating improved service while returning on average more than $1,750,000 per year in cost savings and revenue sharing to the NHSLC. By selecting our Proposal, the NHSLC eliminates the risk of transitioning to a new supplier while returning more than $37,000,000 to the State of NH over the term of the contract.

**Key Factors:**

There are two key factors driving our analysis. First, is the substantial growth in SKUs, standing inventory and shipping volumes. Second is the impact of maintaining a two-warehouse distribution system on both cycle times and bailment pricing.
Growth

Over the course of the previous contract we began to realize that the growth in products and volumes were straining our resources. We had been adding space, equipment and labor to maintain service levels, with labor carrying the heaviest burden. This chart shows how our growth in labor expense is closely correlated with the proliferation of SKUs, each up more than 240% since 1997. The proliferation of products negatively impacts receiving, storage and picking economies of scale.

Concord has realized similar constraints as product lines have grown, reducing the number of cases per sqft that can be stored. Due to the fixed footprint of the Concord warehouse, these constraints have resulted in the transition of more and more accounts from Concord to Law in order to accommodate the SKU growth of Diageo, NH wineries and others. However in the past two years volumes from Concord have declined - down 2% in FY2011 resulting in a 2% decrease in bailment revenue and down 10% year-to-date in FY2012.

Although SKU growth has negatively impacted warehouse operations, we also recognize that it is directly related to increased case shipping growth, which is a key factor in the growth of NHSLC’s sales. For the NHSLC to continue to realize similar sales growth, while maintaining its brand as a low cost provider, it must have an efficient distribution system capable of managing not only today’s volumes, but substantial growth in SKUs, inventory and shipping volumes.
Concord Warehouse

A fundamental part of evaluating solutions has been the analysis of the efficiencies that would be gained by operating both the Nashua and Concord volumes from one facility. One of the outcomes of that analysis has been the realization that shipping from two warehouses has created an order-to-delivery cycle time from Concord that is extremely inefficient. For example, there are seven (7) North Country liquor stores with an order-to-delivery cycle time of between five (5) and ten (10) days. These stores receive delivery once a week and the NHSLC polls these stores on Monday for a Friday delivery out of Concord. As a result, if someone was to order an out-of-stock item from one of these stores on Tuesday, they would have to wait until the following Friday to receive delivery creating unnecessary lost sales.

This type of inefficiency can also be found at the highest volume stores. Should someone order an out-of-stock or warehouse-only item from any of the highest volume stores on a Friday they would have to wait until Tuesday for delivery – a four day lead time. Under our current multi-location manual operation these leads times cannot be effectively reduced. Although these are the extreme examples, it points out the inherent inefficiencies of operating from two warehouses. The current distribution model simply cannot support modernization efforts aimed at providing consumers with greater access to product.
Planning

We recognized several years ago that we must plan for this type of continued growth in order to be successful, that our solution must be able to include the Concord volumes, and that we needed to find a more efficient solution to remain competitive. To understand how other logistics operations were addressing building efficiencies we toured the country researching best practices. Following visits to Utah’s automated warehouse, a Southern Wine & Spirits distribution facility in Chicago, and attending a number of warehouse conferences, we hired System Logistics in 1997 to both automate our split case handling operation and to develop a design for construction of new warehouse space on our undeveloped land in Nashua.

System Design:

Recognizing that we needed a single large distribution facility, we began evaluating expansion concepts for our Nashua complex while searching for suitable alternative sites in New Hampshire. With the combined Nashua and Concord operations utilizing more than 400,000 square feet, we knew that we needed to build or find a single facility of at least that size in order to maintain service and provide for growth.

System Logistics, a world leader in the development of automated warehouses and material handling systems for the beverage industry, first developed a design concept for expansion of our Nashua facilities. This project proved that for this type and size of operation our existing Nashua facilities were not well-suited for expansion. As a result, we turned our attention to alternate sites. Following a state-wide site search, in 2010 we began discussions with the landlords of the only large distribution centers on the market in New Hampshire - the Poland Spring distribution center in Seabrook and the Nashua Corp property in Merrimack. We hired System Logistics to develop in depth system designs to evaluate each site. Their analysis showed that in the Seabrook facility we
could implement a very effective design concept that would meet our needs for years to come, while the Nashua Corp facility, due to its smaller size, disjointed footprint, and lower ceilings, would not be able to absorb the entire operation requiring us to store stock during peak seasons on Airport Rd.

**Why Seabrook and why automate?**

The Seabrook facility is a premier distribution facility. At 505,000 square feet with 40’ clear height, the facility is perfect for installing narrow-aisle high-bay storage racks creating greatly improved storage densities over traditional warehouses.

With 40’ of clear height and an open design, we are able to install the racking, picking and conveyor systems that substantially reduce processing time and allow picking to begin immediately following the receipt of orders, thus eliminating the current minimum eight-hour or more lag between order receipt and the order picking. The substantial increase in efficiency on many levels creates opportunities to drastically shorten cycle times. The size of the facility also allows us to install these systems to efficiently manage seasonal peaks and year over year growth without a corresponding increase in labor. With 55 truck doors and a large staging area we are able to load trailers on a just-in time basis preventing the risk of product being exposed to temperature extremes for extended periods of time. Investing in systems that generate significantly greater throughput per employee creates considerable cost savings which we will be able to pass along to the NHSLC.
Our 2012 Proposal

Following the evaluation of all the key factors in the distribution of wine and spirits for the NHSLC, we have developed a modernized strategy that incorporates the economies of scale generated by combining the Concord and Nashua volumes in one location and the efficiencies provided by operating from a modern distribution facility. We will invest more than $20,000,000 to install a combination of traditional and state-of-the-art warehouse and order fulfillment technologies creating the distribution center of the future for the NHSLC and Law. Our solution is a proven design for the beverage industry having been implemented by our systems integrator around the world with new systems currently being installed in both the United State and Europe. The completion of this transition will generate a multitude of operational and financial benefits to the NHSLC, averaging more than $1,750,000 per year and more than $37,000,000 over the term of this contract -- all while keeping supplier rates flat for the next four years.

Operational Benefits of Modernization:

One of the most significant operational benefits our Proposal provides is dramatically reduced order to delivery cycle times for licensees and NHSLC stores. Rather than the current extreme of a ten-day lead time between order and delivery, stores will be able to measure their order-to-delivery cycle time in hours, and for many stores, six (6) days per week. The NHSLC will be in position to generate substantial growth by giving their customers greater access to more than 10,000 products while also reducing the risk of stock-outs and reducing backroom inventories. The distribution system can now be a strategic resource in NHSLC’s modernization efforts aimed at
satisfying consumer demand for easier access to a broader range of products. We see wine and spirit distribution as a growth industry for the state of NH and have developed a plan to account for unlimited future growth for the Liquor Commission.

Suppliers will also benefit by shipping to a single warehouse, while realizing improved sales through a reduction in stock-outs, shorter cycle times in stores, significantly improved receiving cycle times and stable bailment pricing. We propose no increase in bailment pricing through the first rate term of this contract.

**Financial Benefits of Modernization:**

Not only would service be enhanced, but our research has shown that the high volume nature of the current Concord products, when combined with Nashua’s products to create a single distribution center, generates on average more than $1,750,000 annually in transportation cost savings, warehouse cost savings and revenue sharing that can be returned directly to the State. Following transition of the Concord vendor-owned products to Seabrook in October 2012, the following cost savings will be implemented. (Note: the following are all charges currently paid by the NHSLC directly, not billed to Suppliers and, thus, represent direct savings to the State).

**Elimination of the NHSLC in the Feeder Program:** Combining all vendor stock into our system provides the opportunity to internally manage the feeder program during the transition year. As a result the NHSLC’s cost of transferring and purchasing feeders is eliminated, savings the NHSLC more than $30,000 annually.

**Elimination of the Order Processing Fee Charged to the NHSLC:** Elimination of this fee results in direct savings to the NHSLC of more than $475,000 annually.
**Elimination of the January 1, 2013 Rate Increase:**

Elimination of the rate increase, scheduled to go into effect on January 1, 2013, results in direct annualized savings to the NHSLC of more than $65,000. In addition, it results in indirect savings of an additional $1,200,000 due to increases that would not be applied to Suppliers and, therefore, would not be passed through to the NHSLC in the form of Supplier price increases.

**The combined first-year savings to the NHSLC is more than $550,000.**

Upon final transition of all liquor operations from Nashua to Seabrook in the fall of 2013 the following direct cost savings and revenue sharing will take effect:

**Revenue Sharing:** Law Warehouses will pay directly to the NHSLC a per-case revenue sharing fee based upon the number of cases shipped. In the first year alone this will provide income to the NHSLC of more than $250,000. Based on our proposed scale, revenue sharing will surpass $500,000 by FY2016 and $900,000 by FY2019.

**Transportation Savings:** Economy of scale efficiencies generated by the warehouse operation can also be applied to deliveries to state stores. The improvement in load factors generated by delivering from one location, under the current Nashua delivery schedule, allows us to reduce the Transportation fee for delivery to NHSLC stores by a weighted average reduction of $0.06 per case for every case shipped to NHSLC stores savings the NHSLC $200,000 per year.
Combined Return to the NHSLC: The first year return to the NHSLC following implementation is $1,000,000, while the average combined return of savings and revenue sharing realized directly by the NHSLC is more than $1,750,000 per year, generating a combined return to the State of more than $37,000,000 during the term of the contract.

![Chart showing combined savings and revenue savings to NHSLC totaling approximately $37,000,000 over contract term.](chart)

Implementation

There are two timing elements that are directly linked to the implementation of these financial benefits. First, is the transition of all vendor-owned products and inventory from Concord to Seabrook prior to the end of October 2012. Second is the full installation and testing of our new warehouse systems in Seabrook, scheduled for the fall of 2013 based upon Law being selected no later than August 2012.

In our previous Proposal, the timeline for the transition of the Concord volumes occurred following installation of the new system, which was to occur largely during a period of free rent. Due to the improving economy and renewed interest in the Seabrook facility we have been required to maintain our existing agreement which requires rent to begin effective May 1, 2012. The loss of 9-months free rent will add more than $1,250,000 in cost without any off-setting revenue without the transition of the Concord vendor owned products. Therefore, the execution of this contract prior
to the end of August 2012 and the transition of the Concord vendor owned inventory prior to October 31, 2012 are directly related to our ability to implement these financial benefits for the NHSLC.

**Summary**

Law Warehouses has been providing reliable distribution services to the NHSLC for more than forty years. As a New Hampshire based family owned and operated company, committed to applying our vast institutional knowledge to the betterment of the NHSLC Distribution System, we are uniquely positioned to take the NHSLC into the future without the major risks created by transitioning to a new vendor, a vendor whose primary commitments may not be to New Hampshire.

The start of a new long-term contract provides the optimum timing for a mutual investment in the modernization of systems best suited to meet the needs of the NHSLC for years to come. The State of NH has a history of partnering with corporations for the purpose of utilizing private investment and industry expertise to create specific structural and financial benefits for the State of NH and its citizens. In 1998 the State of NH entered into a contract with Okemo Mountain Inc. (OMI). This partnership created a service benefit for the citizens of NH by creating a better ski area and a financial benefit for the State through revenue sharing. In FY2011 Okemo returned more than $500,000 to the State of NH.

We are prepared to make the investments necessary to secure the facilities, systems, and resources necessary to create the distribution center of the future for the NHSLC while returning more than $37,000,000 to the State of New Hampshire. We look forward to working with the NHSLC, its suppliers and customers for the next twenty years and encourage the NHSLC to move swiftly to put these benefits in place as soon as possible.
Law Warehouses, Inc.
NHSLC Warehouse Services RFP 2012 – 14

Section II
Summary of Innovations
Section II – Innovative Ideas

(Reference RFP Section 1.7.3: Innovative Ideas and Appendix C, Item IX-1: Rate and Price Analysis - Value-added Services)

This section is presented, as requested in the RFP sections referenced above, to clearly identify and summarize the operational enhancements being provided in subcontractor’s proposal and to identify costs savings being provided. We are proud to offer these improved services and revenue enhancements to the State of NH. We are also privileged to have created a distribution solution that not only meets the short- and long-term needs of the NHSLC, Suppliers and Licensees but is probably the only automated solution being offered that has been tested and proven in distribution facilities around the world. The value of these proven capabilities is priceless when compared to the potential cost of disruptions in service to the NHSLC and the resulting loss in revenue for the State. The innovative solutions, cost savings and revenue sharing are summarized below.

**Automation:** In order to position the State of NH and the NHSLC to be leaders in the bailment Control State arena, Law has developed a solution using automation where it was deemed appropriate to help diminish the upward pressure on long-term costs and support the State’s ability to maintain its liquor branding in the state. This automation, in conjunction with combining inventory and shipping from one strategically located facility, will allowed improved efficiencies, better service and the ability to reduce costs and share revenues with the NHSLC. (See Section III of our proposal and our response to RFP Section 3-IX, Rate and Price Analysis).
**Improved Receiving/Expanded Hours:** The new Seabrook facility and the transition to bar code scanning has the potential to dramatically reduce the receiving processing time providing more open appointments during the normal work day. Law Warehouses will maintain a schedule of available receiving appointments from 6:00am to 9:30pm, which is beyond that required in this RFP, unless both parties agree otherwise. Law will continue its process of adding appointments when necessary to meet peak demand periods.

**Overnight Picking:** The overnight picking assumed in our proposal will reduce the order to ready-for-shipment cycle time from two or more days in the current two-warehouse system to an “order today ship tomorrow” cycle time. By reducing the cycle time, in some cases by several days, stores can better control orders to replace sales and enhance service levels to their customers, all while reducing back-room safety stock levels.

**Reduced Delivery Cycle Times:** The implementation of this Proposal provides the NHSLC with six (6) day per week delivery for the highest volume stores, reducing the labor impact of receiving extremely large deliveries coming out of busy weekends and holidays. This extra delivery day provides an opportunity for stores to reduce their back room inventories, freeing up inventory dollars while making their back rooms more efficient.

This system also dramatically shortens the order-to-delivery cycle time should Law Motor Freight also be chosen as the NHSLC’s transportation provider. Rather than the current two-day or more lead time between order and delivery, stores will be able to take advantage of an “order today receive delivery tomorrow” cycle time.
The six (6) day schedule, in conjunction with shortened cycle time, provides an opportunity for the NHSLC to service on-line customers in a timely manner. Reducing the cycle time to “overnight” creates the service levels expected of these consumers, driving up consumer demand for both the NHSLC website and NHSLC stores.

Not only would service levels be enhanced but our research has shown that the high volume nature of the current Concord products, when combined with Nashua’s products to create a single distribution center, generates significant transportation cost savings, warehouse cost savings and revenue sharing that can be returned directly to the State.

Reduced Cost/Revenue Sharing Innovations: Following transition of the Concord vendor-owned products to Seabrook in the October 2012, the following cost savings will be implemented.

Elimination of the NHSLC in the Feeder Program: Combining all vendor stock into our system provides the opportunity to internally manage the feeder program during the transition year. As a result the NHSLC’s cost of transferring and purchasing feeders is eliminated, savings the NHSLC more than $30,000 annually.

Elimination of the Order Processing Fee Charged to the NHSLC: Elimination of this fee results in direct savings to the NHSLC of more than $475,000 annually. The first year savings to the NHSLC is more than $500,000.
Substitution of the January 1, 2013 Rate Increase: Law proposes to substitute the current 14% rate increase, scheduled to go into effect on January 1, 2013, with the rate structure in this proposal. Doing so results in direct, annualized savings to the NHSLC of more than $65,000. In addition, it results in indirect savings of up to an additional $1,200,000, which represents increases in rates that would not be billed to Suppliers and, therefore, would not be passed through to the NHSLC in the form of Supplier price increases.

Although there is no way to know with certainty how much of the increased Supplier costs would be passed on to the NHSLC, a reasonably low estimate of 50% would increase the NHSLC’s delivered cost by $600,000. This would either have to be absorbed by the NHSLC, thereby reducing profits, or would have to be passed on to consumers, impacting its branding.

Upon final transition of all liquor operations from Nashua to the new system in Seabrook in the fall of 2013 the following direct cost savings and revenue sharing will take effect:

Revenue Sharing: Each month Law Warehouses will pay to directly to the NHSLC a per-case Revenue Sharing Fee. The 'per case' fee will be scaled based upon the total number of cases shipped from our Seabrook facility over the previous rolling twelve months.

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<th>Projected Year</th>
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<tr>
<td>5,500,000 cases</td>
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<td>6,000,000 cases</td>
<td>$0.15/case</td>
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Transportation Savings: Economy of scale efficiencies generated by the warehouse operation can also be applied to deliveries to state stores. The improvement in load factors generated by delivering from one location, using the current Nashua delivery schedule, allows us to reduce the Transportation fee for delivery to NHSLC stores by a weighted average reduction of $0.06 per case for every case shipped to NHSLC stores savings the NHSLC $200,000 per year.

Summary of Savings: The average combined savings and revenue realized directly by the NHSLC is more than $1,750,000 per year, generating a combined return to the State of more than $37,000,000 during the term of the contract.

![Total Direct Revenue and Savings to NH Liquor Commission](image-url)
Section III
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Law Warehouses has engaged System Logistics, a global leader in automated beverage fulfillment, to analyze and design an automated order fulfillment system to support wine and spirits distribution to exceed the requirements set forth by the New Hampshire State Liquor Commission “Request for Proposal – 2011-12 Warehouse Services for Wine and Spirits and Related Products”

The system design and fulfillment solution proposed offers the New Hampshire State Liquor Commission a long-term opportunity to benefit from automation in beverage fulfillment and achieve the following…

✓ SKU proliferation
✓ Scalability
✓ Direct and indirect labor savings
✓ Improved associate safety
✓ Order accuracy
✓ Provide marketplace advantages
✓ Increased customer satisfaction through reduced product damage and lowered delivery cost

This document describes the design in detail including data analysis, equipment design, and software function. Inside you will find.

• A description of the data analysis we have worked on together

• An overview of the layout and capacities for all areas
Law Warehouses

- A detailed description of operation for each part of the system
- A detailed description of all the software running the system
- A description of our project implementation plan
- A detailed testing plan

You will find this to be interesting reading, especially since you will be able to imagine every possible situation coming up that would impact the system operation. Please take the time to read through this system plan. While the system is physically large, it uses proven methods of operation and simple equipment that has been working in the industry for years. The Best Fit software used to create the pallets in this system is an ideal solution for Law Warehouses. The combination of the buffer needed to build pallets creates the large waves that simplify everything else in the system design. This is a superb application of new and existing technology and it will give the NHSLC a competitive edge for years to come.

1. Company Overview

System Logistics – Corporate Profile

SYSTEM LOGISTICS is a global integrator of automated case and each pick systems and industrial automation. System Logistics is part of larger group – SYSTEM Spa, established and headquartered in Modena Italy since 1970.

System Spa employs over 1,000 employees worldwide and has international presence with 23 branches in 19 countries. SYSTEM Spa technological center in Fiorano operates 11 plants covering over 1,300,000 ft²

System Logistics, North America is located in Lewiston, Maine under 100,000 ft² for corporate offices, engineering and manufacturing. Software engineering and project services are located in Grand Rapids, Michigan. Sales offices are located in every major market throughout the United States and Canada.
System Logistic Integration Capabilities

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<td>MOPS ™Robotic layer picking</td>
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<td>Diamond™ Pick /Put to Light</td>
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System Logistic Food & Beverage References

- Corona Extra
- Coca-Cola
- Maspex
- Green Mountain Coffee Roasters
- Inalca
- National Beef
- San Benedetto
- Fresenio
- Perfetti Van Melle
- Eukanuba
- Unfi
- Veroni
- Pulled Top
- Sys-T
- MU Corp.
- S Corp.
Tychy – POLAND

- Fully robotized layer picking + automatic “goods to man” box picking
- 54,000 pallets
- 15 Stacker Cranes
- 8,500 picking lines/day
- 6,000 shipped pallets/day

Waterbury – VT

- Green Mountain Coffee is the second largest and fastest growing coffee company in the United States.
- System Logistics' US team built this turn-key facility for Green Mountain Coffee in 2003. The facility uses AS/RS to automate fulfillment solution for each picking, case picking and manual “rainbow” pallet top-off building.
- Shipping rates exceed 3,600 cartons per hour
**Piedras Negras – MEXICO**

System Logistic built this system as part of Grupo Modelo support of the new brewery at Piedras Negras, Mexico. This plant solely provides the US and Canada with Corona beer products. The facility uses AS/RS and LGV to automate fulfillment solutions to and from the brewery.

- 16 Stacker Cranes
- 215,424 pallets positions
- 3,000 pallets per hour thru-put

**Sandalo – SPAIN**

Sandalo Spain is the largest order buffer system in the global Coca Cola network. It is in its 3rd expansion growing to 100,000 pallets. System supports the automated picking of completed layers, and has a goods to man system for manually picking less than layer quantities for customer orders.

- 65,000 pallets
- AS/RS Stacker Cranes
- 3,000 picking lines/day
- Automated Layer Picking
- 1200 pallet thru-put per day
System Design – Law Warehouses Wine and Spirits Fulfillment

Law Warehouses is proposing to support wine and spirits fulfillment from a new and modern distribution center. This distribution center will promote trending technologies in beverage fulfillment such as paperless picking, automated storage and retrieval, automated conveyors and robotic mixed case pallet building. This new and modern distribution center will incorporate a well-balanced mix of conventional and automated handling systems to assure order accuracy and on-time delivery and offers…

- Large number of loading docks for shipping and receiving
- Expansive yard for trailer management and staging
- High building for maximum storage density
- High suppression fire protection system
- Ample office space and employee facilities
- Expansion space

The distribution center is managed by intelligent software systems to facilitate inventory, receipts, product putaway, paperless case and bottle picking, intelligent conveyor routing, automated case labeling, automated pallet building and shipping. Technologies include the following…

- High bay storage racks serviced by narrow aisle wire-guided lift trucks
- Multiple level pallet flow pick modules and conveyors to store and pick high velocity SKUs
- Automated storage and retrieval system to store and pick low velocity SKUs
- Conveyor system for transporting, picking, and sorting cases
- Automated system for case sequencing and robotic mix case palletizing
The objective of this intelligent and efficient beverage handling system is to minimize product touches, speed order processing, assure accurate and timely shipping, accommodate peak velocity and plan for scalability.

The following is a broad description of our proposed wine and spirits fulfillment operation.

**Receiving**

Product is received in Law Inventory and assigned to either reserve or forward stock locations. Receipt operators use wireless network terminals to identify receipts and receive processing instruction. Product is palletized either as single or mixed SKUs. Full pallets are transferred to end-of-aisle staging rack for putaway by narrow aisle lift trucks.

**Putaway**

Lift truck operators use wireless network terminals for instruction to retrieve pallets from the staging racks and perform putaway. High velocity SKUs are stored adjacent the pallet flow pick-modules. These pallets are putaway using turret trucks. Low velocity, generally mixed case pallets, are stored adjacent the automated storage and retrieval system. These pallets are putaway using stockpickers.

**Replenishment**

Lift truck operators use wireless network terminals for instruction to retrieve pallets from reserve storage racks and replenish pallet flow pick locations in the pick-modules or deliver mixed case pallets to a conveyor induction area for replenishment in the automated storage and retrieval system.
Picking

This system incorporates three automated paperless picking processes: (1) high velocity SKUs are picked by light on conveyor from the pallet flow modules (2) low velocity SKUs are picked by automated storage and retrieval system on conveyor with no operator interface and (3) bottle picks are batch-picked by light on conveyor. Wave picks from all three picking operations are sorted by conveyor into an automated case buffer and sequencing system.

Palletizing

During the wave process, cases are sorted and stocked in a series of vertical storage and retrieval devices adjacent automated palletizing stations. This system buffers cases until they are ready to be palletized. Intelligent software recognizes the sequence to retrieve cases from buffer storage and build pallets. Robots are used to build pallets in a predetermined pattern. As the pallets are built, they are also shrink-wrapped. There is no operator interface for palletizing orders. Empty pallets are automatically presented to the robots and full pallets automatically moved from the robotic palletizers.

Shipping

Lift truck operators use wireless network terminals for instruction to retrieve order pallets from pallet conveyor accumulation lines and deliver them to their assigned loading dock.
2. System Overview

2.1 System Objectives

The system was designed with the following goals in mind:

- Design the system for the building in Seabrook NH
- Reduce the labor required throughout the operation
- Increase the pick rate and general efficiency of workers
- Store a minimum of 21,720 full pallets and 5,255 half pallets in a cost effective way
- Pick and palletize an average of 20,000 cases per day and a peak of 40,000 cases per day
- Be capable of taking large orders and shipping them within a reduce cycle time
- Increase space efficiency by using the full building height
- Incorporate the existing bottle picking system
- Design the system to support future expansion both in rate and capacity
- Use a simple interface with the existing WMS to minimize Law IT efforts and cost.

Some of the most important benefits of this system are:

**Future Expansion**

The system is designed to expand in both capacity and rate. These can be expanded separately or together. Expansion capacity is designed into every area of the system.

**Proven Technology and Equipment**

All equipment, controls, software packages, operating systems and computer hardware have been used successfully many times in other systems. Proven technologies minimize surprises.
**Large reduction in Labor**

The labor required for picking has been significantly reduced and made far more efficient. The labor required for packing and stacking cases to pallets has been nearly eliminated. This will provide a far more cost effective path for future growth in the system over the next twenty years.

**Flexible Operation**

The system has been designed so orders, work in process, and labor can be easily shifted to match changing requirements. The WES software supplied by us has been used in multiple other systems.

**Fast Response**

The system is designed to process any size order on the same day it is electronically received.

**2.2 Data Analysis**

We have been working on this project for the last three years. In the course of this project we have been analyzing data for this system going back to 2007. Data shown in this section is taken from various times between 2008 and 2010. All data shown is combined totals from both Law Warehouses and the Concord warehouse. Data showing total SKU usage and comparisons is from 2008. Since this is comparison data it will not change much. Order, rate, and SKU usage data is taken from July 2010 and reflects the current volumes. This data has been organized into spreadsheets which are the basis for this system design.

The data is described in two sections. The first is the SKU analysis. This gives us the storage requirements for the system. This data allows us to decide the best storage methods to use, and organization of the SKUs to support the picking goals.
The second section shows the order data. This data allows us to decide the best technologies and picking methods to use. This tells us what the system must produce during average and peak times. This data shows us what labor to plan for and how orders must move through the system.

### 2.3 SKU Analysis

#### 2010 Data

SKU data was also separated for the month of July in 2010 since it had the highest peak days recorded so far. This gave us real daily data for SKU volumes and replenishment case quantities. This also gave us truly accurate order data to work with.

#### Law SKU Analysis

Law did an extensive SKU analysis on the current inventory this year. This listed all the possible SKU classifications including, SKU code, gift, status, and receipt. Since many of these codes required separate pallet locations this spreadsheet calculated the true number of required pallet locations in reserve storage. The system layout was matched to this quantity of pallet locations.

- 21,720 full pallet locations
- 5,255 half pallet locations (2,628 full locations)
- 24,348 total full pallet locations
SKU Data

Cases Shipped per SKU - July 2010

<table>
<thead>
<tr>
<th>Classification</th>
<th>SKUs</th>
<th>%</th>
<th>Cases per month</th>
<th>%</th>
<th>Avg cases per day</th>
<th>%</th>
<th>Avg lines per day</th>
<th>%</th>
<th>SKU pallets avg per day</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top 5% of SKUs</td>
<td>316</td>
<td>5%</td>
<td>247,879</td>
<td>56%</td>
<td>11,267</td>
<td>56%</td>
<td>5,599</td>
<td>43%</td>
<td>198</td>
<td>56%</td>
</tr>
<tr>
<td>Top 10% of SKUs</td>
<td>632</td>
<td>10%</td>
<td>310,840</td>
<td>70%</td>
<td>14,129</td>
<td>70%</td>
<td>7,856</td>
<td>61%</td>
<td>248</td>
<td>70%</td>
</tr>
<tr>
<td>Top 15% of SKUs</td>
<td>948</td>
<td>15%</td>
<td>348,525</td>
<td>79%</td>
<td>15,842</td>
<td>79%</td>
<td>9,242</td>
<td>72%</td>
<td>278</td>
<td>79%</td>
</tr>
<tr>
<td>Top 20% of SKUs</td>
<td>1,264</td>
<td>20%</td>
<td>373,947</td>
<td>85%</td>
<td>16,998</td>
<td>85%</td>
<td>10,210</td>
<td>79%</td>
<td>298</td>
<td>85%</td>
</tr>
<tr>
<td>Top 50% of SKUs</td>
<td>3,160</td>
<td>50%</td>
<td>430,061</td>
<td>97%</td>
<td>19,548</td>
<td>97%</td>
<td>12,438</td>
<td>96%</td>
<td>343</td>
<td>97%</td>
</tr>
<tr>
<td>Bottom 50% of SKUs</td>
<td>3,161</td>
<td>50%</td>
<td>11,073</td>
<td>3%</td>
<td>503</td>
<td>3%</td>
<td>462</td>
<td>4%</td>
<td>9</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>6,321</td>
<td>100%</td>
<td>441,134</td>
<td>100%</td>
<td>20,051</td>
<td>100%</td>
<td>12,900</td>
<td>100%</td>
<td>352</td>
<td>100%</td>
</tr>
</tbody>
</table>

Notes

This chart shows all SKUs picked in July of 2010 sorted by cases picked. These are the combined SKUs for both Law Warehouses and the Concord warehouse.

- 72% (6,321 SKUs) of the total of 8,788 SKUs were touched in 22 days of picking in July.
- The breakdown across the 5, 10, 15% classifications were very similar to previous data.
- The bottom 50% (3,161 SKUs) account for only 3% of cases shipped and 2,467 SKUs were not touched at all during this month.

With the top range of SKUs in pick modules the next 60% of SKUs will get hit every month. These SKUs need to be available for picking but in smaller quantities per pick location.
### SKU Data

#### Avg SKU Pallets per Day (per SKU) - July 2010

<table>
<thead>
<tr>
<th>Classification</th>
<th>SKUs in July</th>
<th>SKUs %</th>
<th>Cases per month</th>
<th>Cases %</th>
<th>Avg cases per day</th>
<th>Avg lines per day</th>
<th>SKU pallets avg per day</th>
<th>%</th>
</tr>
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</tr>
<tr>
<td><strong>Total</strong></td>
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<td><strong>100%</strong></td>
<td><strong>441,134</strong></td>
<td><strong>100%</strong></td>
<td><strong>20,051</strong></td>
<td><strong>12,900</strong></td>
<td><strong>352</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

#### Notes

This chart shows all SKUs picked in July of 2010 sorted by average pallets used per day (SKU pallets). These are the combined SKUs for both Law Warehouses and the Concord warehouse.

- 70% (248) of the pallets used were for 632 of the fast SKUs. These would be full pallets.
- The breakdown across the 5, 10, 15% classifications were very similar to previous data.
- The bottom 50% (3,161 SKUs) account for only 3% of cases shipped and 2,467 SKUs were not touched at all during this month.

With the top range of SKUs in pick modules the next 60% of SKUs will get hit every month. These SKUs need to be available for picking but in smaller quantities per pick location.
SKU Data
Summary Points

• There are on average a total of 8,788 SKUs to be stored in the system. All of these SKUs are received and stored in cases. All of these cases are stored on pallets. This allows quick and efficient transport within the facility.

• The system will need a minimum of 24,348 full pallet positions in reserve storage.

• A typical day touched a range of 2500 to 3000 SKUs. The peak day (July 6) touched 3254 SKUs. This means that on any given day less than 35% of the SKUs get hit.

• In the peak month of July 2010 over 70% of the SKUs were touched. This makes it very probable that nearly all SKUs would be touched in a period of 3 to 6 months.

• Approximately 840 fast SKUs can be placed in pick modules. This means that an average range of 1,700 to 2,200 slower SKUs must be touched for picks every day outside of the pick modules.

• By concentrating the fast moving SKUs in pallet flow modules we can reduce the replenishment transactions to around 250 pallet moves per day (32 per hour). This can support pick ranges of 15,000 to 20,000 cases picked per day (over 70% of case picks).

• The other 30% of the case picks (5000 cases per day) must be made from the other 7,988 SKUs. This is too many SKUs against too few cases to make any kind of manual pick module effective. This is a good application for an automated pick module where all the SKUs can be made available and the required rate keeps the module to a reasonable size.

• The cases on hand data shows us the approximate split in quantity between full SKU and mixed SKU pallets. We know that over 57% of the pallets on hand (8200 pallets in 2008) were for only 879 SKUs. This is an average of 9.3 pallets per SKU. These would all be full
pallets of 1 SKU. This also allows us to forecast which areas of rack should be dedicated to full pallet storage.

- The next 40% of the SKUs average 1.4 pallets per SKU. The next 50% of SKUs average 3.5 SKUs per pallet. This ratio is further divided by different SKU classifications such as gift packages etc. This means that approximately 6000 SKUs are stored on pallets holding multiple SKUs or contain less than full pallet quantities. This requires a picking methodology that can pick individual cases off pallets to resupply the automated pick module.

Storage Conclusions

VNA Rack

Very narrow aisle pallet rack is the best choice for storing reserve pallets. This provides the densest and most cost effective storage for the 40’ building height. This method also supports full pallet movement for replenishment of the modules and case picking from pallets on man up VNA trucks.

Pallet Flow Pick Modules

Case picking from pallet flow modules is the most effective and cost efficient method for storing the fast SKUs. The space allows 4 levels in two modules holding approximately 800 SKUs.

Automated Case Buffer

An automated case buffer will be used to store the remaining 8000 SKUs. This allows smaller quantities per SKU while still keeping all SKUs available for immediate picking.
2.4 Order Profiles

Order data tells us what we have to pick and ship in a day. It also tells us the form it will be shipped in, and how much time we have to do it. This data tells us what picking and packing technologies we need in the system design. This is a design choice based on the building, order requirements, and labor available.

Order data is shown in real days. This shows us the true peaks and averages we need to design the system to. It also forms the basis for future growth projections. The following data is taken from the month of July 2010. This month contained the highest volume day yet seen but also had a good sample of heavy and average days as well. It is noteworthy that the order data shown here for 2010 is remarkably similar to order data reviewed in 2008. This shows that the orders and general shipping volumes are not subject to radical peaks and valleys of demand.

The following table shows order data from the month of July 2010. Orders are listed by day with SKUs hit that day, stores shipped to, lines picked, cases picked, pallets shipped and SKU pallets consumed. Pallets shipped is based on dividing total cases by an average of 50 cases per pallet. SKU pallets were calculated by dividing the cases by an average of 57 cases per pallet (from 2008 SKU data)

**Peak Day**

The peak day is highlighted in orange. This was the highest volume day recorded so far. Note that this day was 37% higher (10,800 cases) than the next highest day (July 27). Knowing the possible range of the peak days allows us to make good decisions about system design. We can expand the system design or decide to work longer hours based on the frequency of these peaks.
Average Peak Day

The average peak day shown near the bottom is calculated by taking the average from the top 5 days of the month (highlighted in yellow). This gives us a good idea of a typical high volume day that will happen once or twice a week. This is a volume that the system should handle in a normal work day simply by adding a few hours of operation.

Average Day

The average day is calculated by taking all the categories and dividing them by 22 days. This gives us the typical work day (highlighted in blue). This volume can be expected every day and the system should handle this volume easily in a normal work day. Keep in mind that this number represents the midpoint average. This means that half the days in month were more than this and half the days were less. Two days were selected in the chart for being very close to the calculated average day (July 2 and 29).

Order Analysis by Day

Extensive spreadsheet analysis was done on seven of the selected days. Individual orders were isolated and sorted to get a detailed picture of the work required each day. The following pages show charts from the peak day and an average day. Each page has relevant summary notes.
### Order Profiles – July 2020

<table>
<thead>
<tr>
<th>Date</th>
<th>SKUs hit</th>
<th>Stores</th>
<th>Lines per day</th>
<th>Cases Shipped</th>
<th>Pallets shipped</th>
<th>SKU pallets</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/1/2020</td>
<td>15,065</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>7/2/2020</td>
<td>2,471</td>
<td>144</td>
<td>12,371</td>
<td>19,671</td>
<td>440</td>
<td>345</td>
</tr>
<tr>
<td>7/6/2020</td>
<td>3,254</td>
<td>213</td>
<td>23,339</td>
<td>39,908</td>
<td>877</td>
<td>700</td>
</tr>
<tr>
<td>7/7/2020</td>
<td>3,114</td>
<td>187</td>
<td>16,756</td>
<td>26,132</td>
<td>568</td>
<td>458</td>
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<tr>
<td>7/8/2020</td>
<td></td>
<td></td>
<td>11,622</td>
<td>17,040</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7/9/2020</td>
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<td>9,348</td>
<td>14,067</td>
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<td></td>
</tr>
<tr>
<td>7/11/2020</td>
<td></td>
<td></td>
<td>99</td>
<td>185</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7/12/2020</td>
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<td>14,479</td>
<td>22,405</td>
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<tr>
<td>7/13/2020</td>
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<td>17,195</td>
<td>25,414</td>
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</tr>
<tr>
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<td>10,166</td>
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<tr>
<td>7/15/2020</td>
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<td>11,325</td>
<td>16,348</td>
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<tr>
<td>7/16/2020</td>
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<td>9,371</td>
<td>13,883</td>
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<tr>
<td>7/19/2020</td>
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<td>15,597</td>
<td>24,987</td>
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</tr>
<tr>
<td>7/20/2020</td>
<td>3,105</td>
<td>215</td>
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<td>25,706</td>
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<td>451</td>
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<td>7/21/2020</td>
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<td></td>
<td>10,179</td>
<td>15,920</td>
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<tr>
<td>7/22/2020</td>
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<td>11,589</td>
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<td>7/23/2020</td>
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<td>9,679</td>
<td>14,403</td>
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<td>159</td>
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<tr>
<td>7/29/2020</td>
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<td>19,319</td>
<td>449</td>
<td>339</td>
</tr>
<tr>
<td>7/30/2020</td>
<td></td>
<td></td>
<td>10,469</td>
<td>15,911</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Avg day</th>
<th>SKUs</th>
<th>Stores</th>
<th>Avg lines</th>
<th>Avg cases</th>
<th>Avg ship pallets</th>
<th>avg SKU pallets</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>2605</td>
<td>160</td>
<td>12,900</td>
<td>20,052</td>
<td>440</td>
<td>345</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Avg peak day</th>
<th>Avg peak SKUs</th>
<th>Avg peak Stores</th>
<th>Avg peak lines</th>
<th>Avg peak cases</th>
<th>Avg peak (top five days avg)</th>
<th>Avg peak SKU pallets</th>
<th>Avg peak ship pallets</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>3,143</td>
<td>199</td>
<td>18,596</td>
<td>29,622</td>
<td>661</td>
<td>520</td>
<td>440</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Peak day</th>
<th>peak lines</th>
<th>peak cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3,254</td>
<td>213</td>
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<td></td>
<td>877</td>
<td>700</td>
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</table>

For July (totals for month)

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<td>7,739</td>
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</tr>
</tbody>
</table>

**Notes**

- A range of 2,500 to 3,000 SKUs are touched every day. This means that 2,300 to 3,200 SKUs will need to be picked that are not in the pick modules.
## Order Profiles – Average Day

![Graph](image)

<table>
<thead>
<tr>
<th>Order Classification</th>
<th>Stores</th>
<th>%</th>
<th>Cases</th>
<th>%</th>
<th>Lines</th>
<th>%</th>
<th>Pallets</th>
<th>%</th>
<th>Case /line avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 + cases</td>
<td>1</td>
<td>1%</td>
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</tbody>
</table>

This graph shows the day listed by orders (stores) and sorted by cases highest to lowest. Order size classifications are listed in a chart below. Column shown in the graph are highlighted in the chart.

- Note the low average ratio in all order classifications (1.8 cases per line). This ratio is consistent no matter how big or small the order is in total cases.
- This means that the larger an order gets the more labor it requires to pick. This is because the number of SKUs to pick (lines) increases in close proportion to the amount of cases.
Order Profiles – Peak Day

This graph shows the day listed by orders (stores) and sorted by cases highest to lowest. Order size classifications are listed in a chart below. Column shown in the graph are highlighted in the chart.

The low average ratio remains consistent (1.3 cases per line). Even though more orders were picked, the volume came from primarily from a few large orders hitting a more SKUs.

SKUs touched jumped to 3,254 from an average of 2,605. Since the lines to case ratio remains low this means that SKU volume increases proportionately to case volume. In short big days will require more labor to hit more SKUs.
## Order Profiles

### Avg Day Orders July 29, 2010 - Cases and Lines

<table>
<thead>
<tr>
<th>Order Classification</th>
<th>Stores</th>
<th>%</th>
<th>Cases</th>
<th>%</th>
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</tbody>
</table>

This graph shows the day listed by order classification with the same information listed in a chart below.

- Note that on an average day over 60% of the cases come from orders of between 200 and 1000 cases per order. This comes from a group of 29 orders out of 174 (16% of orders).
- Note the consistent ratio of lines to cases throughout all order classifications.
Order Profiles

This graph shows the day listed by order classification with the same information listed in a chart below.

- Note that on a peak day the majority of the case volume shifts to an even smaller group of very large orders. On this day 22 orders (10%) accounted for 60% of all cases shipped.
- Note the ratio of lines to cases increases in the larger orders. This means more cases per SKU are being picked, within these classifications) on peak days.
## Order Profiles

### Avg Day Orders July 29, 2010 - Percentage Breakdown

<table>
<thead>
<tr>
<th>Order Classification</th>
<th>Stores</th>
<th>%</th>
<th>Cases</th>
<th>%</th>
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<td>449</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

This shows the percentages by order classification with the same information listed in a chart below.

- Note that on an average day 56% of the total orders (97 stores) account for only 9% of the cases shipped and 11% of the total lines.

- At the other end of the spectrum 11% of the orders (22 orders) contained 54% of the cases shipped and 47% of the total lines.
Order Profiles

### Peak Day Orders July 6, 2010 - Percentage Breakdown

<table>
<thead>
<tr>
<th>Order Classification</th>
<th>Stores</th>
<th>%</th>
<th>Cases</th>
<th>%</th>
<th>Lines</th>
<th>%</th>
<th>Pallets</th>
<th>%</th>
<th>Case /line avg</th>
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</thead>
<tbody>
<tr>
<td>1000 + cases</td>
<td>10</td>
<td>5%</td>
<td>15,572</td>
<td>39%</td>
<td>7,664</td>
<td>33%</td>
<td>311</td>
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<tr>
<td>500 - 1000 cases</td>
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<td>8,107</td>
<td>20%</td>
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<td>6,229</td>
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<td>200 - 300 cases</td>
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<td>4%</td>
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<tr>
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<td>73</td>
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<td>1.5</td>
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<tr>
<td>1 - 10 cases</td>
<td>45</td>
<td>21%</td>
<td>267</td>
<td>1%</td>
<td>247</td>
<td>1%</td>
<td>45</td>
<td>5%</td>
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</tr>
<tr>
<td>Totals</td>
<td>213</td>
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<td>39,908</td>
<td>100%</td>
<td>23,339</td>
<td>100%</td>
<td>877</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

This shows the percentages by order classification with the same information listed in a chart below.

- Ratios of orders to total cases are similar on peak days.
- This points out that it would be wise to release large amounts of small orders together by carrier so they can be picked and palletized at the same time. Multiple small orders should be consolidated onto single pallets for efficiency picking and palletizing.
Order Profiles
Summary Points

- All shipments are palletized before loading onto trucks. The typical shipping pallet holds an average of 50 cases. With an average peak day of 30,000 cases this means days of shipping 600 pallets will be common. Peak days of 40,000 cases can go out to 800 pallets per day.

- Over 90% of the cases shipped go out on orders that require multiple pallets to ship. This means that any system that builds pallets automatically will require a buffer large enough to hold hundreds of cases per order. This must also be large enough for multiple orders.

- Orders getting 50 cases or more (this includes 90% of all cases shipped) will put an average range of 35 different SKUs on every shipped pallet of 50 cases. Due to the consistent lines to case ratio, this is true on both average and peak days.

- Because of the high SKU count on every pallet there will be no layer picking. Automated pallet building software must be able to absorb all the cases sizes and calculated building of pallets with a wide range of box sizes on every pallet.

- It is very common for 3,000 SKUs to be touched in a single day of order picking. This means that any choice of picking and storage methods must be able to access all of these SKUs locations quickly enough to get all cases to the shipping dock at close to the same time.

- Smaller orders (less than 50 cases per order) make up over 50% of all orders but have less than 10% of the total cases. These orders should be consolidated onto pallets going to the same carrier. This allows efficient palletizing and shipping.
• With 840 of the fast SKUs in the pick modules we can expect a range of 65 to 75% of all cases picked to come from the pick modules. On an average day of 20,000 cases this will be an average of 15,000 cases per day or 1,875 cases per hour in an 8 hour day.

• The remaining 30% of the picks will come from 8,000 “slow” SKUs. This would be an average of 6,000 cases per day and 4,375 lines. This turns into 547 lines and 750 cases per hour. 2,000 of these 8,200 SKUs will be touched each day.

Conclusions

Automated Palletizing

The volume and complexity of the order pallets will continue to grow. In the future this will consume unreasonable amounts of labor in a manual system. An automated palletizing system can handle the growth and complexity of the order pallets and eliminate the labor of stacking order pallets.

Palletizing / Pick Buffer

For this application, a system that builds pallets automatically will require a buffer large enough to hold hundreds of cases per order. This must also be large enough for multiple orders. This will require a buffer of holding a range of 5000 to 8000 cases. In short the bigger the better.
Order Profiles

Pick Module Technology

The pick modules hold 846 SKUs and pick 1,100 lines (1,759 cases) per hour on the average. A wave of half the buffer is equal to 4,000 cases (2,500 lines). This means at any given time 2,500 lines would be in process in the pick modules. With 846 SKUs this would be an average of 3 lines per SKU and 5 cases per SKU. In short there would be a pick needed from almost every location. Picking directed by light displays would be the best choice for this application. It allows pickers to see and move quickly to all the work in pick aisle and does not slow them down in between picks.

Automated Case Picking

An average of 547 picks (750 cases) must be made every hour against the remaining 8,000 SKUs. This would be an extremely large manual picking system. The low lines to cases ratio makes the labor required to pick and replenish from this many locations unreasonable. It would also be very difficult to manage the waves needed to support the pick buffer. This combination of available SKUs, discreet case selection, and pick rate make it a good application for an automated case buffer. This allows picking at a high rate, makes all SKUs available, and is completely responsive to electronic pick waves. The only labor required is for replenishment. This can be managed in batches from the VNA aisles.
2.5 Flow Chart

The graphic above shows the system flow from operation to operation. Capacities are listed under the operation symbols. Rates are shown attached to the arrows running between operations. There are labels showing the forms of the items transported items on the arrows between the operations as well. Areas of specific importance and that require added description are highlighted in yellow. The system flow remains the same regardless of the volume shipped. It is the same whether it is an average, peak, or slow day. Areas of expansion are shown in grey.

Average Day

Rates shown in the flow chart are rates for the average day. This is done for simple explanation.

- 20,500 cases for 160 stores would ship on an average day
- 12,900 lines would be picked from 2600 SKUs on an average day
- Approximately 440 pallets would be shipped on an average day
Peak Day

Peak rates would follow the same operations flow.

- 40,000 cases for 220 stores would ship on an average day
- 23,400 lines would be picked from 3,254 SKUs on a peak day
- Approximately 700 pallets would be shipped on a peak day

Flow Chart

Reserve Rack

All inbound SKUs are received in trucks that are fluid loaded (not on pallets). Cases are pulled out from the trucks on slip sheets and palletized according to SKU and group of SKUs. All cases of received SKUs will be palletized for storage.

Reserve Rack

All inbound pallets are stored on the reserve racks. These are pallet racks in a VNA (very narrow aisle) system. Pallets are brought to the VNA system from the receiving docks. VNA trucks store the pallets in the racks according to the type of SKU (fast or slow).

Case Pick Module

The fastest moving 804 SKUs (fast SKUs) are picked from two case pick modules. Cases are picked directly from the pallets. This allows a very large volume of cases to be picked (930 cases per hour) with a minimum of replenishment labor (32 pallet moves per hour). The two case pick modules will pick approximately 70% of all the cases picked per day.
Carousel Case Pick

The carousel case pick is an automated case picking system that holds the remaining 7,984 SKUs. Cases are stored in individual locations. The system can pick individual cases as needed for the palletizers in shipping. This allows a very high pick rate against a very large quantity of SKUs. This would be impossible to achieve in a manual picking system.

Bottle Pick

The bottle pick system is used to pick individual bottles into cases for orders. The output is full cases that go to the palletizers in the same way as cases coming from the other two picking zones. This subsystem picks a fraction of the cases that the other two picking systems generate.

Sorter

The sorter takes all the cases from the three pick modules and sorts them to the correct palletizing modules. There are four palletizing modules. Each palletizing module has 8 VLS units. This creates 32 possible sort destinations for the sorter. An average day would be 2,603 cases per hour (43 per hour avg). The max rate of 4 palletizers is 3200 cases per hour (53 per minute). The sorter will be sized to handle 100 cases per minute to handle surges and recirculation.
VNA Case Pick

The VNA case picking operation replenishes the carousel case pick system. Cases are picked from the reserve rack on man up VNA trucks. Pick quantities are optimized for efficient picking from the reserve rack aisles. Pallets are stripped of cases and sent into the automated case pick system.

Flow Chart

VLS Units (Pick Wave)

The VLS units are the storage buffers for the palletizer modules. At 226 cases per VLS, up to 1,808 cases to be accumulated per module. This allows the palletizing software to work efficiently and creates a high degree of flexibility in choosing a pallet building sequence for multiple orders simultaneously.

Palletizing Module

Each group of 8 VLS units supports one palletizer. The palletizer can build pallets at a rate of 800 cases per hour. This is roughly 16 pallets per hour at 50 cases each. Cases are sorted into the VLS so they can be fed into the palletizers at the optimal rate and sequence.

Pick Wave

All the VLS units taken together hold approximately 7,232 cases. This is highlighted in yellow on the flow chart. This is almost 35% of all cases on an average day. This creates a very large and efficient pick wave in the pick modules. This method allows the pick modules to work at the best possible rate and reach the maximum rates for both the manual pickers and the automated system.
Building Flow
This graphic shows the primary flow from area to area in the building. It follows the same path as the flow chart. Note that the space required for each operation is laid out over the building drawing. This shows the actual space required for each operation.

Perimeter Aisle
All cases are moved on conveyor above the ground level. All pallets are transported on the ground level. There are fork truck aisles around the perimeter of each area for easy access and transport in any direction.

Flexible Shipping Dock
The shipping dock can be used for both shipping and receiving. Both operations can happen at the same time. The entire dock is open from one side to the other for easy truck traffic. Access aisles allow easy movement to the storage racks.

Expandable Design
Every area of the system can be expanded both in capacity and rate. All areas can be expanded separately depending on future growth or changed requirements. Storage and shipping will follow separate expansion paths.

Cube Utilization
VNA rack allows the densest and most cost effective storage for this building height. The carousel case picking area also uses the full building height for storage of individual cases.
2.7 System Layout

- Reserve Rack
  - 6,606 Pallets in section
  - Fast SKUs: 2,604 Pallets
  - Slow SKUs: 1,392 Pallets

- Reserve Rack
  - 8,178 Pallets in section
  - Fast SKUs: 2,586 Pallets
  - Slow SKUs: 1,392 Pallets
  - Medium SKUs: 5,592 Pallets

- Pick Module
  - 423 Fast SKUs 1,269 Pallets 4 Levels

- Reserve Pallet Storage
  - VNA Rack / Truck

- Fork truck recharge

- Pick Module
  - Slowest SKUs: 5,772 Pallets
  - Fastest SKUs: 2,604 Pallets

- Shipping / Receiving

- Reserve Rack
  - 8,376 Pallets in section

- Slow SKUs
  - 1,392 Pallets

- Reserve Rack
  - 6,606 Pallets in section

- Fast SKUs
  - 2,610 Pallets

- Reserve Rack
  - 8,178 Pallets in section

- Spur Pallet
  - Pick Module

- Main Transport Aisle
  - Transport Area

- Pick Pallet Module

- Expansion Path
  - Sorting / Palletizing

- Elevation

- Expansion Path
  - Storage / Picking

- Carousels
  - 8 stacks
  - 24 carousels
  - 2,640 bins
  - 21,120 total cases

- Bottle Picking System
  - 9 stacks
  - 24 carousels
  - 2,604 Pallets
The rack is designed as part of a Very Narrow Aisle (VNA) system. The aisles will be 72” wide and will only by accessed by VNA trucks. This provides exceptionally dense storage at the lowest cost.
Reserve Rack

Pallet Sizes

The system is designed around the standard GMA pallet currently used by Law Warehouses. This pallet is 48” long x 40” wide by 5” tall. Pallets will weigh a maximum of 2,200 lbs.

The maximum size pallet load for this system is 48” long by 40” wide by 64” tall. This allows the proper amount of clearance on the sides and over the top of the pallet. This is required for reliable and efficient operation of the VNA trucks. Loads can be smaller than this but they cannot be larger.

There should be no “overhanging load” on a pallet going into the VNA system. Loading of pallets should stay within the bounds of the pallet. This must be observed during the building of the pallet in receiving.

The pallet loads going into the VNA rack must not exceed the maximum sizes listed here. This is especially critical for full pallets going into the pallet pick modules. These pallet loads must be the correct size so they can be moved in and out of bay positions reliably.

Rack Summary

<table>
<thead>
<tr>
<th>Description</th>
<th>Dimension</th>
<th>Description</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bay spacing</td>
<td>8'-4”</td>
<td>Top beam height</td>
<td>31'-3”</td>
</tr>
<tr>
<td>Bay clear space</td>
<td>8'-0”</td>
<td>Top overall height</td>
<td>36'-7”</td>
</tr>
<tr>
<td>Max pallet height</td>
<td>5'-4” (64”)</td>
<td>Clearance over top pallet</td>
<td>20”</td>
</tr>
<tr>
<td>Max pallet width</td>
<td>40”</td>
<td>Lowest beam clear height</td>
<td>38'-3”</td>
</tr>
<tr>
<td>Max pallet depth</td>
<td>48”</td>
<td>Max flue space</td>
<td>12”</td>
</tr>
<tr>
<td>Clearance over pallet</td>
<td>6”</td>
<td>Min flue space</td>
<td>10”</td>
</tr>
<tr>
<td>Beam to beam</td>
<td>6'-3” (75”)</td>
<td>Side clearance for load</td>
<td>5”</td>
</tr>
<tr>
<td>Clear space under beam</td>
<td>5'-10” (70”)</td>
<td>Space between pallets</td>
<td>6”</td>
</tr>
</tbody>
</table>
The chart above is taken from the spreadsheet used to calculate the pallet capacity of the reserve rack in the system. The row numbers (1 through 42) on the left side of the chart correspond to the row numbers shown on the drawing. Each row shows the amount of bays, levels, pallets lost to columns, cross bracing, and the center aisle and the amount of pick up bays and drop. The total number of pallet storage locations for each row is shown on the far right. Totals are shown at the bottom. Half pallet locations can be added to this design. Selected full pallet locations can be used to create two half pallet locations. This can be done anywhere in the system.

- 2,078 total bays
- 58 pick up / drop off bays
- 348 total drop off positions
- 23,160 total pallets in VNA reserve rack
Pick Modules

Pick Module 1

<table>
<thead>
<tr>
<th>Level</th>
<th>Side 1 (north)</th>
<th></th>
<th>Side 2 (south)</th>
<th></th>
<th>Total for Module</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>bays</td>
<td>total</td>
<td>SKUs</td>
<td>pallets</td>
<td>in lane</td>
</tr>
<tr>
<td>1</td>
<td>28</td>
<td>56</td>
<td>51</td>
<td>3</td>
<td>153</td>
</tr>
<tr>
<td>2</td>
<td>28</td>
<td>56</td>
<td>52</td>
<td>3</td>
<td>156</td>
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<tr>
<td>3</td>
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<td>156</td>
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<tr>
<td>4</td>
<td>28</td>
<td>56</td>
<td>52</td>
<td>3</td>
<td>156</td>
</tr>
<tr>
<td>Totals</td>
<td>224</td>
<td>207</td>
<td>621</td>
<td>16</td>
<td>456</td>
</tr>
</tbody>
</table>

Pick Module 2

<table>
<thead>
<tr>
<th>Level</th>
<th>Side 1 (north)</th>
<th></th>
<th>Side 2 (south)</th>
<th></th>
<th>Total for Module</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>bays</td>
<td>total</td>
<td>SKUs</td>
<td>pallets</td>
<td>in lane</td>
</tr>
<tr>
<td>1</td>
<td>28</td>
<td>56</td>
<td>51</td>
<td>3</td>
<td>153</td>
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<tr>
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<td>224</td>
<td>207</td>
<td>621</td>
<td>16</td>
<td>456</td>
</tr>
</tbody>
</table>

Totals for Both Modules

<table>
<thead>
<tr>
<th>Combined</th>
<th>total pallets</th>
<th>1242</th>
<th>32</th>
<th>432</th>
<th>32</th>
<th>1964</th>
<th>64</th>
</tr>
</thead>
</table>

The charts above are taken from the spreadsheet used to calculate the pallet capacity of the pick modules in the system. The level numbers (1 through 4) on the left side of the chart correspond to the 4 levels in the modules. Each row shows the amount of bays, SKU lanes, pallets, and return lanes for each side. The totals for each level are shown on the right side (highlighted in blue). Totals are shown at the bottom of each chart. The combined totals for both modules are shown on the lower chart.

- 912 total pallet lanes
- 846 SKU pallet lanes
- 2,538 total SKU pallets in both modules
- 64 return pallet lanes

Direct Lanes

1 lane on the floor level of each module will be left empty. It provides a direct line to load anything into the system that needs to go to shipping. This lane will be held open for direct placement of SKUs (by the pallet) or SKUs with odd case sizes that cannot go through the carousels. This will also be useful for any cross docking requirements that come up in the future.
Carousels
Carouse Stack Configuration

The carousel system is made up of units called stacks. Each stack has 3 carousels stacked on top of each other and one extractor at the front. The extractor picks and stores cases out of all three carousels. All three carousels can move simultaneously to present cases for the extractor to pick. Cases come and go from the stack by inbound and outbound conveyors mounted to the extractor (not shown). The graphic above shows a picture on one stack. The system has 8 carousel stacks in total.

Bin A - Small Cases

Min | Max
--- | ---
6" | 15.75"  
6" | 15"  
6" | 15"  
9" | 15.75"  
14" | 15"  

Bin B - Small Cases

Min | Max
--- | ---
6" | 15.75"  
6" | 15"  
6" | 16"  
14" | 21"  

We received case dimensions for over 6,000 SKUS. We could match 3,413 of these to the existing SKU data for the carousels (43%). The numbers shown with an * are extrapolated from that percentage.
## Carousels

<table>
<thead>
<tr>
<th>Carousels</th>
<th>Stack</th>
<th>Bin Type</th>
<th>bins per carousel</th>
<th>Shelf 1 per bin</th>
<th>Shelf 2 per bin</th>
<th>Shelf 1 / carousel</th>
<th>Shelf 2 / carousel</th>
<th>Total shelves per carousel</th>
<th>Shelves per stack</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>A</td>
<td>110</td>
<td>7</td>
<td>1</td>
<td>770</td>
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<tr>
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<td>110</td>
<td>7</td>
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<td>770</td>
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<td></td>
</tr>
<tr>
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<tr>
<td><strong>Totals</strong></td>
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<td></td>
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<td><strong>1,540</strong></td>
<td><strong>18,480</strong></td>
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<table>
<thead>
<tr>
<th>Carousels</th>
<th>Stack</th>
<th>Bin Type</th>
<th>bins per carousel</th>
<th>Shelf 1 per bin</th>
<th>Shelf 2 per bin</th>
<th>Shelf 1 / carousel</th>
<th>Shelf 2 / carousel</th>
<th>Total shelves per carousel</th>
<th>Shelves per stack</th>
</tr>
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<tbody>
<tr>
<td>22</td>
<td>8</td>
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<td>770</td>
<td>110</td>
<td>880</td>
<td></td>
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<tr>
<td>23</td>
<td>8</td>
<td>B</td>
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<tr>
<td>24</td>
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<tr>
<td><strong>Totals</strong></td>
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<td><strong>330</strong></td>
<td><strong>2,420</strong></td>
<td><strong>220</strong></td>
<td><strong>2,640</strong></td>
<td><strong>1</strong></td>
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</tr>
</tbody>
</table>

| Combined |      |          | **24**            | **2,640**       | **19,360**      | **1,760**         | **21,120**        | **8**                   |                  |

The carousel system is designed to hold the remaining 7,942 SKUs (90%) but still provide very fast automated picking across all of them. In order to achieve fast pick rates the inbound cases must be spread evenly across all stacks. This increases the probability that all stacks will take part in the outbound pick waves. This increases the overall rate for the carousel system.

The carousel buffer is split into two different sections based on different case sizes. In effect this turns the system into two buffer systems. This is because larger cases are confined to 1 stack and smaller cases are confined to 7 stacks. This method is necessary to handle the wide range of case sizes. This means the inbound cases must be spread out evenly within each buffer section.
Carousels

### Carousel Slotting by SKU

<table>
<thead>
<tr>
<th>Carousel SKU storage classification</th>
<th>SKUs</th>
<th>% SKUs</th>
<th>Range of avg cases per day</th>
<th>Range of cases per SKU</th>
<th>Total cases in system</th>
<th>Locations for cases in system</th>
<th>% of locations in system</th>
<th>Replenish frequency in days</th>
<th>Avg SKUs replenished per day</th>
<th>Avg cases replenished per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 day</td>
<td>938</td>
<td>11%</td>
<td>1.5 - 4.5</td>
<td>6 - 14</td>
<td>8,090</td>
<td>8,090</td>
<td>38%</td>
<td>2</td>
<td>351</td>
<td>2,511</td>
</tr>
<tr>
<td>4 day</td>
<td>393</td>
<td>5%</td>
<td>1 - 1.5</td>
<td>5 - 6</td>
<td>2,150</td>
<td>2,150</td>
<td>10%</td>
<td>3</td>
<td>210</td>
<td>486</td>
</tr>
<tr>
<td>25% of month</td>
<td>777</td>
<td>9%</td>
<td>.5 - 1</td>
<td>4 - 5</td>
<td>3,256</td>
<td>3,256</td>
<td>15%</td>
<td>7</td>
<td>111</td>
<td>549</td>
</tr>
<tr>
<td>50% of month</td>
<td>1,188</td>
<td>14%</td>
<td>.2 - .5</td>
<td>2 - 4</td>
<td>3,395</td>
<td>3,395</td>
<td>16%</td>
<td>14</td>
<td>149</td>
<td>357</td>
</tr>
<tr>
<td>2 case min</td>
<td>923</td>
<td>11%</td>
<td>.1 - .2</td>
<td>2</td>
<td>1,846</td>
<td>1,846</td>
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<td>14</td>
<td>66</td>
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<tr>
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<td>50%</td>
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<tr>
<td></td>
<td>8,347</td>
<td>100%</td>
<td>18,737</td>
<td>21,120</td>
<td>100%</td>
<td>972</td>
<td>4,109</td>
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</table>

**SKU Breakdown**

Calculations done on the combined SKU data were made to assign quantities of locations to these SKUs based on their usage in the previous year. We decided to have a range of no less than 3 to 4 days of storage capacity for about 1300 of the remaining SKUs. The next 2700 SKUs were assigned ranges of 2 to 5 cases each. This insures that most of these SKUs can be picked from the carousels on any given day without needing to replenish the difference. This strategy allows the VNA replenishment picking to be optimized based on multiple days usage instead of a
direct relationship based on a single day of picking. The breakdown from this calculation is shown in the above chart.

Note that no cases will be kept in the carousels for the bottom 4,148 SKUs this is because the usage is so low for these that it does not justify losing carousel locations to keep them. These SKUs average just 85 cases per day to these will be picked by the VNA trucks and replenished to the carousels first thing in the morning.

This SKU chart is taken from SKU data in August of 2010. The total SKUs is slightly different but the basic ratios (fast to slow) remain the same.
The Vertical Lift Sequencers (VLS units) provide temporary buffer storage for the palletizing modules. They store cases coming in from the sorter and pick them in the sequence required for building pallets. A horizontal beam moves vertically through the center of the unit. It is mounted on tracks and runs the entire vertical length of the machine reaching all shelf levels. A carriage moves horizontally across a beam to reach all positions on the shelf. Each VLS unit has 19 shelf levels on each side. Each shelf holds six cases making 12 cases per level.

<table>
<thead>
<tr>
<th>Description</th>
<th>Length</th>
<th>Width</th>
<th>Height</th>
<th>Determined by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum location size</td>
<td>23.62&quot;</td>
<td>23.62&quot;</td>
<td>15.75&quot;</td>
<td>VLS maximum</td>
</tr>
<tr>
<td>Maximum case size</td>
<td>22.0&quot;</td>
<td>18.0&quot;</td>
<td>15.75&quot;</td>
<td>Conveyor maximum size</td>
</tr>
<tr>
<td>Minimum case size</td>
<td>9.0&quot;</td>
<td>6.0&quot;</td>
<td>6.0&quot;</td>
<td>Conveyor minimum size</td>
</tr>
</tbody>
</table>
### VLS Units

<table>
<thead>
<tr>
<th>VLS</th>
<th>Module</th>
<th>Levels</th>
<th>Cases per level</th>
<th>Cases per VLS</th>
<th>Cases per module</th>
<th>Cases in per min</th>
<th>Total cases in per min</th>
<th>Cases out per min</th>
<th>Total cases out per min</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>19</td>
<td>12</td>
<td>226</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>19</td>
<td>12</td>
<td>226</td>
<td></td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
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</tr>
<tr>
<td>5</td>
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<td>19</td>
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<tr>
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<td>19</td>
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<tr>
<td>7</td>
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<tr>
<td>8</td>
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**Totals** | 32 | | 7232 | 4 | 64 | 64 | 64 | 64 |

### Summary

Each VLS unit has a maximum capacity of 226 cases. Each palletizing module has eight VLS units giving each module a maximum capacity of 1,808 cases. At 50 cases per pallet this is equal to 36 build pallets. At an 800 case per hour rate this is roughly equal to 2.25 hours of work per module. The chart above shows this breakdown.

The total VLS capacity is 7,232 cases for all 32 units. This can be considered the maximum wave size for the system. This means that 4,000 to 6,000 case pick waves will be typical in this system. These large pick waves allow the rest of the system to operate at exceptionally high rates.
Total System Capacity

The charts below show the total system storage capacity in pallets, cases, and locations. The second chart shows this broken down further by SKU classification.

Total Capacity

<table>
<thead>
<tr>
<th>Storage Method</th>
<th>Pallets</th>
<th>Cases per Pallet</th>
<th>Total Cases</th>
<th>Total Locations</th>
</tr>
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<tbody>
<tr>
<td>Reserve Rack</td>
<td>23,160</td>
<td>56</td>
<td>1,296,960</td>
<td>23,160</td>
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<tr>
<td>Pick Modules</td>
<td>2,538</td>
<td>56</td>
<td>142,128</td>
<td>846</td>
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<tr>
<td>Carousel Case Pick</td>
<td>-</td>
<td>-</td>
<td>21,120</td>
<td>21,120</td>
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<tr>
<td>Bottle System</td>
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<tr>
<td><strong>Totals</strong></td>
<td>25,698</td>
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<td>1,462,980</td>
<td>47,898</td>
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</table>

Breakdown by SKU Type

<table>
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<tr>
<th>Storage Method</th>
<th>% of cases on hand</th>
<th>Total Cases</th>
<th>Cases in SKU Type</th>
<th>Pallets in class</th>
<th>Total Locations</th>
<th>SKUS per SKU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserve Rack - Fast SKUs</td>
<td>58%</td>
<td>1,296,960</td>
<td>752,237</td>
<td>13,433</td>
<td>846</td>
<td>16</td>
</tr>
<tr>
<td>Reserve Rack - Slow SKUs</td>
<td>42%</td>
<td>1,296,960</td>
<td>544,723</td>
<td>9,727</td>
<td>7,942</td>
<td>1.22</td>
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<tr>
<td>Pick Modules - Fast SKUs</td>
<td>100%</td>
<td>142,128</td>
<td>142,128</td>
<td>2,538</td>
<td>846</td>
<td>846</td>
</tr>
<tr>
<td>Carousels - Slow SKUs</td>
<td>100%</td>
<td>21,120</td>
<td>21,120</td>
<td>21,120</td>
<td>21,120</td>
<td>7,942</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
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<td><strong>1,460,208</strong></td>
<td><strong>25,698</strong></td>
<td><strong>45,126</strong></td>
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</tbody>
</table>

Notes

The breakdown of the SKU types comes from SKU data from 2009. This was combined SKU data from both Law Warehouses and the Concord operation. This data gave us cases and pallets on hand for all SKUs.

- 58% of all cases on hand were for the top 846 SKUs (Fast SKUs).
- 42% of all cases on hand were for the remaining 7,942 SKUs (Slow SKUs)

This breakdown was applied to the capacities for the new system design. This gives us planning totals for SKU classifications and shows the range of locations available by SKU type. The actual breakdown varies depending on inventory levels and seasonality but it will not change dramatically from the percentage shown here.
2.9 Case Sizes

### Case Sizes for:

- **Pick Modules**
- **Conveyor**
- **VLS Units**

<table>
<thead>
<tr>
<th>Case Sizes for:</th>
<th>Pick Modules</th>
<th>Conveyor</th>
<th>VLS Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Min</strong></td>
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</tr>
<tr>
<td>Length</td>
<td>6&quot;</td>
<td>9&quot;</td>
<td>9&quot;</td>
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<tr>
<td>Width</td>
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<tr>
<td>Height</td>
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<td>6&quot;</td>
<td>15.75&quot;</td>
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<tr>
<td><strong>Max</strong></td>
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<td>21&quot;</td>
<td>23.6&quot;</td>
</tr>
</tbody>
</table>

The controlling case dimensions are highlighted in yellow for this section of the system. The conveyor determines the minimum and maximum case length and width for this section of the system. The VLS determines the maximum height. The minimum height is dictated by the conveyor guard rails.

### Case Sizes for:

- **Carousels**

<table>
<thead>
<tr>
<th>Case Sizes for:</th>
<th>Carousels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Min</strong></td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>6&quot;</td>
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<tr>
<td>Width</td>
<td>6&quot;</td>
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<tr>
<td>Height</td>
<td>6&quot;</td>
</tr>
<tr>
<td><strong>Max</strong></td>
<td>21&quot;</td>
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<tr>
<td>Length</td>
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<tr>
<td>Width</td>
<td>17&quot;</td>
</tr>
<tr>
<td>Height</td>
<td>15.75&quot;</td>
</tr>
</tbody>
</table>

The controlling case dimensions are highlighted in yellow for this part of the system. The carousel bin design determines the minimum and maximum case length and width for this section of the system. The bin shelf spacing matches the VLS maximum height. The minimum height is dictated by the contact space on the side of the case needed for the extractor gripper pads.

### Equipment Sizing

The automated part of the system is designed to handle 98% of all case sizes. The conveyor, VLS, and carousel equipment is designed to use the smallest space possible for the greatest
volume of cases. We chose the most efficient location sizes to maximize the storage space and wave capacity. Making these locations any larger gave us minimal added case sizes and decreased the storage capacity and wave size significantly. This sizing also fit well within the normal operating ranges of all the equipment chosen.

### Case Sizes

#### Cases out of size ranges

We project just over 180 case sizes will fall outside of the size ranges for the automated system. These cases will be picked in the special sizes zone. This will be done with a VNA man up truck picking to pallets. Data analysis shows that an average of 174 cases will be picked per day for these SKUs.

Many of these case sizes fall just out of the ranges set for the system. Many of these cases should be tested for transport during the testing phase of the system to see if they can in fact be handled on the system. Please note that many of these cases are excluded because one dimension fell just short or slightly above the cutoff point. For example a 21.5” long case that is 12” wide by 9” tall would have been excluded in our calculations but would be easily handled by the system if it does not go into the carousels. In addition 45 of these SKUs are on this list because they fell under the 6” height. Many of these cases may be able to go through the system on the conveyor without going through the carousels. This would move them out of the special sizes pick zone. A final review of all the cases needs to be done when all dimensions are available.

#### Turned Cases

There are a small number of cases that have heights disproportionate to the length and width. These cases typically have 3 or 6 unique size bottles in them. Many of these cases can be
handled by the system if they are turned on their side for transport. They will run on the conveyor, the carousels, and through the VLS units with no problem. The only issue is that they cannot have cases stacked on top of them in the order pallet. 4 of the fast SKU's in the pick modules would be handled like this.

**Palletizer sequence**

Turned cases and other special cases can be set up by the Best Fit software to be put on the pallets only on the top layer. This prevents them from being stacked on and allows them to run through the system.

**Case Handling**

All pickers and case handlers should be taught the proper loading of cases on the conveyor. All cases should run down the conveyor with their length parallel with the direction of the conveyor and the width running across the conveyor. All cases should be transported with the bottles standing up vertical. This is critical for reliable stacking of pallets. The only exception to this is for turned cases. Locations where these cases are stored should be well marked so pickers recognize how they are to be loaded onto the conveyor. Over time the pickers automatically know how to load the system but they must be trained at the start. This is no different than the process being used now for building pallet manually.

**Notes**

We have listed all the major considerations regarding the case handling in the system. Recognize that there will be other issues that will come up that have not been listed here. All of these things will be dealt with during the final engineering phase of the project.
2.10 Slotting

There are 3 forward pick zones in the system. They are the pick modules, the carousels, and the bottle system. The pick modules have two zones (pick modules 1 and 2). The carousels are handled as 1 zone. The bottle system has two zones (pods 1 and 2). There are specific SKUs assigned to each of these zones.

There are seven different zones in the VNA rack. Zones 1, 4, and 7 hold SKUs for VNA case picking. Zones 2, 3, 5, and 6 hold full pallets for replenishment to the pick modules. There are specific SKUs assigned to location ranges in these racks.

This section lists each of the zones and describes the logic used for slotting the zones. In some cases we list the exact SKUs to be assigned to locations (such as the pick modules). In other cases we list the SKUs to be assigned to a range of locations (such as the reserve racks). This is because the FIFO nature of the location assignments will lead to a scattering of the locations. The goal is to keep them within the most efficient range of travel for the VNA trucks.
Pick Modules - slotting

The two pick modules are used for the top 846 fastest SKUs in the system. The chart above shows the top moving 846 SKUs sorted fast to slow. The bottom 212 SKUs account for 8% of the cases picked on the average day. These SKUs will be put on the top levels of the modules. This reduces the picking time for these SKUs and on slow days may allow the picking of multiple waves in one pass. The process listed below describes the logic for slotting the pick modules.

1. Sort the 846 SKUs by average cases per day (velocity) fastest to slowest
2. Divide the SKUs evenly between modules 1 and 2 (same average velocity per day)
3. Sort SKUs by velocity fastest to slowest within each module
4. For each module place the slowest SKUs on level 4
5. For each module divide the remaining SKUs (by velocity) evenly across levels 1, 2, and 3.
6. For each level divide the SKUs evenly (by velocity) between side 1 and side 2.
7. For each side on a level, spread the SKUs evenly across the length of the module
The following pages show the result of this formula and the SKUs assigned to the lanes in each module. These SKUs should be periodically checked every 6 months or so to make sure that the correct SKUs remain in the pick modules. SKUs that become slow should be replaced with faster moving SKUs. Because of the nature of these SKUs there should not be much change in any 6 month period.
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This table shows the average cases per day picked from each level in each module. Actual numbers will vary day by day but average should remain consistent over a period of months.
Pick Module 1 - slotting

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On each level the SKUs evenly divided (by case velocity) on each side. This means that there is roughly an equal amount of traffic on side 1 and side 2 on each level. This creates even storage and pallet traffic on each side of the pick module. It also determines the SKUs to be stored (by pallet) in each rack zone on each side of the module. It balances the VNA traffic across the rack system.
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This table shows the average cases per day picked from each level in each module. Actual numbers will vary day by day but average should remain consistent over a period of months.
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On each side the SKUs evenly spread across the length of the module. This means there are roughly an equal amount of picks across every 10 SKU positions. This creates an even flow of cases going onto the center conveyor and balances the storage and pallet traffic along the length of the module.
Carousels - slotting

The carousels will supply all the cases from the remaining SKUs not in the pick modules. This is roughly 90% of the SKUs. The chart above illustrates the strategy for SKU selection and storage in the carousels. The goal of this strategy is to keep the maximum amount of SKUs in the carousels at high enough storage levels that almost all cases needed for the day can be picked from carousels. Any cases for SKUs not in the carousels will be picked by the VNA man up trucks and put into the carousels before wave picking starts for the day. The second goal of this strategy is to minimize this quantity.

In the chart above the blue line shows the average usage per day for all the remaining SKUs. The red line shows the quantity of cases stored in the carousels. The blue line is a calculated number so it shows the average usage falling below 1 case for almost 6500 SKUs. In reality you cannot pick less than one case. Many of these slower SKUs are picked in 1 or 2 case quantities once every couple months. This is why we set a two case minimum for all SKUs in the carousels. The idea is to stay well above the average usage per day for all SKUs while still keeping enough empty locations for replenishment.
Carousels - slotting

SKU Classifications in the Carousels

1. The top 1,331 SKUs in the carousels average 1 to 4.5 cases per day. These SKUs were given 3 to 4 day supply in the carousels. This is a range of 5 to 14 cases per SKU. These are the SKUs that will be hit almost every day. These SKUs will occupy 8,090 carousel locations (38%).

2. 777 SKUs show an average usage of .5 to 1 case per day. This means they are picked every 2 days of so. These SKUs were given a supply equal to 25% of the month. There is a range of 4 to 5 cases per SKU in the carousels for this group. These SKUs will occupy 2,150 carousel locations (10%).

3. 1,168 SKU show an average of .2 to .5 cases per day. This means they are picked once or twice per week. These SKUs were given a supply equal to 50% of the month. This is a range of 2 to 4 cases per SKU in the carousels for this group. These SKUs will occupy 3,256 carousel locations (15%).

4. 923 SKU show an average of .1 to .2 cases per day. This means they are picked at a rate of 1 case every week or two. These SKUs were given a supply of 2 cases each or roughly a one month supply. These SKUs will occupy 1,846 carousel locations (9%).

5. The remaining 4,148 SKUs are picked at less than a case per month on the average. These SKUs make up only 2% of the daily volume picked and average only 85 cases per day. This group of SKUs will not be stored in the carousels. They will be picked out of the VNA racks and replenished to the carousels before wave picking starts. 2,383 locations are left open in the carousels for this group (11%).
Law Warehouses

Note that 11% of the carousel locations will be left empty. This is to provide enough locations for the slowest SKUs to be picked each day. This is also left open to provide enough empty locations for the system to operate efficiently during heavy or peak replenishment days.

This calculation also shows the average amount of SKUs that would be replenished each day. Note that the total of 972 assumes that all the 85 cases replenished would be different SKUs. This is more likely to be half that so it should be around 930 SKUs replenished per day. This should minimize the amount of stops that the man up will need to make during replenishment runs.

There are 8 stacks in the system. Inbound cases for all SKUs will be spread evenly across all stacks. This method brings all extractors into action for outbound picking. This is especially important to maximize the possible outbound rate.

Within each stack the cases will be evenly spread across the three carousels. This reduces carousel positioning time within the stack. Within a carousel it makes very little difference where the case is stored. No carousel location is any “closer” than another.
Reserve Rack – full pallet storage slotting

Approximately 50% of the total pallet locations in the reserve storage racks will be used for full pallet storage of the SKUs in the pick modules. All of these SKUs will be stored as full pallets and moved as full pallets into the pick modules.

There are 7 designated zones in the reserve rack. Zones 2, 3, 5, and 6 are used for full pallet storage of the fast SKUs. Each zone is located on one side of a pick module and holds all the SKUs for that side of the pick module. This confines the VNA travel to a small area for all movement of those SKUs. In these zones there are typically 5 rows of rack and 5 aisles. This means that a pallet in these zones will usually be limited a maximum distance moved of 1 aisle length and 5 cross aisles.

Within each rack zone the SKUs will be grouped into two vertical zones. Faster SKUs will be assigned to the lower 4 levels and slower SKUs will be assigned to the upper two levels. This will result in approximately 75% of the pallet moves being made on the lower 4 levels.
Reserve Rack – full pallet storage slotting

Within the two groups of locations (top and bottom) there will be no specific assignments of locations to SKUs. This is because of the random FIFO nature of the SKU receipts. Based on the SKU, pallets will be assigned to any empty location within the top or bottom range. This method will also keep an appropriate amount of empty storage locations available in each area (top or bottom). The following tables show the SKU assignments by zone. Keeping 75% of the pallet moves on the lower 4 levels should speed up the VNA transactions (higher locations take longer). The following charts show the initial breakdowns for each of the rack zones.

**Zone 2 – 212 SKUs**

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<thead>
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<th>Fast SKUs on lower 4 levels</th>
<th>82 SKUs</th>
<th>1742 available locations</th>
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<tbody>
<tr>
<td>42 pallets per day</td>
<td>274 empty locations</td>
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<td>1450 pallets in stock</td>
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<td>2557 cases per day</td>
<td>72% of pallet moves</td>
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<table>
<thead>
<tr>
<th>Slow SKUs on upper 2 levels</th>
<th>130 SKUs</th>
<th>862 available locations</th>
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<tbody>
<tr>
<td>16 pallets per day</td>
<td>125 empty locations</td>
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<td>737 pallets in stock</td>
<td>15% empty locations</td>
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<td>908 cases per day</td>
<td>28% of pallet moves</td>
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**Zone 3 – 211 SKUs**

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<th>1742 available locations</th>
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<tbody>
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<td>42 pallets per day</td>
<td>274 empty locations</td>
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<tr>
<td>1450 pallets in stock</td>
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<tr>
<td>2557 cases per day</td>
<td>72% of pallet moves</td>
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<th>Slow SKUs on upper 2 levels</th>
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<td>16 pallets per day</td>
<td>125 empty locations</td>
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<td>737 pallets in stock</td>
<td>15% empty locations</td>
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<td>908 cases per day</td>
<td>28% of pallet moves</td>
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## Reserve Rack – full pallet storage slotting

### Zone 5 – 212 SKUs

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<th>Fast SKUs on lower 4 levels</th>
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<td>43 pallets per day</td>
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<td>1634 pallets in stock</td>
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<td>2516 cases per day</td>
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<td>71% of pallet moves</td>
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<th>Slow SKUs on upper 2 levels</th>
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<td>962 cases per day</td>
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### Zone 6 – 211 SKUs

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<td>1216 pallets in stock</td>
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<td>2370 cases per day</td>
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<td>76% of pallet moves</td>
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<tr>
<td>729 cases per day</td>
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<td>24% of pallet moves</td>
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3. Description of Operation

3.1 Receiving

Dock Space

The receiving and shipping functions use the same dock space. The space is long enough and has enough dock doors so there will be no conflict in space or door availability. The entire length of the shipping dock space has been left open. This allows trucks to run the length of the space quickly and is the most flexible design since it allows any truck to move to any operation without impediments.

Cross Aisles

Four cross aisles connect the receiving dock to the main transport aisle behind the palletizers. These aisles are evenly spaced at about 100’ across the length of the receiving dock. Each cross aisle is wide enough for two way traffic. This allows great flexibility of movement for trucks moving between the receiving docks and transport aisle and removes potential points of congestion.

Empty Pallets

Cases are received floor loaded in trucks and must be put onto pallets for storage in the system. Empty pallets are required in receiving for this purpose. An average day of receipts will consume between 250 and 350 empty pallets. 40 stacks of empty pallets are stored next to the VLS units facing the receiving dock. This is a total of 400 empty pallets spread across the length of the dock. This supply must be maintained regularly.

Door Selection

Any door can be selected to receive product. Received cases will take up more than one door space since they must be loaded onto pallets for storage in the system. Doors should be chosen so they do not interfere with the movement of outbound pallets going to the trucks. Doors can also be chosen based on foreknowledge of what SKU is being
Receiving

The SKU content and quantities of each truck delivery are known ahead of time by the WMS. The WMS plans the pallet organization for the storage of all received SKUs. This is similar to the process used now. All received cases are taken off the trucks by slip sheet and then loaded onto pallets for storage. Depending on the SKU, there are three types of pallets they can be loaded on. This section describes the process for each one.

Single SKU – Full Pallet

This is for a full pallet of one SKU. These SKUs are stored and moved by the pallet. This is typically one of the fast moving SKUs that will be picked from the pallet pick modules. These pallets go to zones 2, 3, 5 and 6 in the reserve rack. These are on either side of the pick modules. The pallet goes into the system and does not come out until it is empty.

1. Cases are taken off the truck and moved onto the receiving dock. This is done by pulling groups of cases out of the truck on slip sheets. These cases are often stacked up to 5 levels high.

2. Based on the amount of cases a number of empty pallets are positioned on the floor next to the received cases.

3. Cases are taken from the slip sheet and stacked on the empty pallets. This can often be done by layer with a clamping truck. It is critical that the cases being stacked onto the new storage pallet don’t exceed the maximum dimensions for the storage loads (40” wide by 48” long by 64” tall).
4. The pallet is shrink wrapped. A pallet id label (bar code) is printed and placed on the pallet. This allows pallets to be moved around by different operators without losing track of it.

5. When a pallet is finished, the pallet id, SKU, and pallet quantity are entered into the WMS by hand scanner or on the fork truck mobile unit. This allows the WMS to assign a storage location if it has not already done so.

6. The WMS directs the fork truck to the drop off point for that pallet. This is based on the storage zone for that SKU. See additional notes on directed storage locations below.

7. The pallet is taken to the drop point and stored in one of the six pallet spaces at that drop point. Any space can be chosen since the pallet has an id label on it.

Directed Storage Location

Directing the intended storage aisle or location will make VNA travel more efficient since the pallet will always be positioned at the end of the aisle it will be stored in. At a minimum, the pallet must be directed to an aisle. This is especially critical for delivering pallets to the correct drop off point coming from receiving. The storage location for the pallet could be preassigned by the WMS in multiple ways.

- If the WMS assigns the pallet to just an aisle, then the VNA truck chooses an open location in that aisle and updates the WMS with the chosen storage location. This means the WMS knows before assigning the aisle that there are empty locations available in that aisle.

- If the WMS assigns the pallet to a specific location then the VNA truck takes the pallet to the assigned location and updates the WMS when it is stored.
Receiving

Multiple SKU – Full Pallet

This is for SKUs received in quantities that are less than one pallet. Very often these SKU are received in quantities of 5 to 10 cases. These SKUs can often be combined with other SKUs on one pallet and stored in the reserve rack for VNA case picking. These would be the medium to slow SKUs. These pallets go to zones 1, 4, and 7 in the reserve rack. These pallets can go into the system and remain long periods of time since they are depleted by case picking.

1. Cases are taken off the truck and moved onto the receiving dock. This is done by pulling groups of cases out of the truck on slip sheets. These cases are often stacked up to 5 levels high.

2. Based on the storage plan for the received SKUs a number of empty pallets are positioned on the floor next to the received cases.

3. SKU cases are scanned and directed to pallets based on the WMS storage plan for the delivery. Cases are taken from the slip sheet and stacked on the correct empty pallets. It is critical that the cases being stacked onto the new storage pallet don’t exceed the maximum dimensions for the storage loads (40” wide by 48” long by 64” tall).

4. The pallet is shrink wrapped. A pallet id label (bar code) is printed and placed on the pallet. This allows pallets to be moved around by different operators without losing track of it.

5. When a pallet is finished, the pallet id, SKU, and pallet quantity are entered into the WMS by hand scanner or on the fork truck mobile unit. This allows the WMS to assign a storage location if it has not already done so.
6. The WES directs the fork truck to the drop off point for that pallet. This is based on the storage zone for that SKU. See additional notes on directed storage locations below.

7. The pallet is taken to the drop point and stored in one of the six pallet spaces at that drop point. Any space can be chosen since the pallet has an id label on it.

**Directed Storage Location**

For these types of SKUs the WMS will assign a specific storage location. This is because this group of SKUs is often case picked by man up trucks in the VNA aisles. The WMS will assign a storage location to match the usage of the SKUs on the pallet. This location is often preassigned before the delivery is made.

Due to the low case quantity per SKU, these are often stored by half pallet loads.

**Receiving**

**Multiple SKU – Pallet Transport**

These SKUs are received in small quantities (1-10 cases) and have existing pallet locations in the reserve rack. These cases are loaded onto pallets for transport to the VNA man up trucks. The cases are taken off the pallet and transferred to the existing location in the VNA reserve rack. When this process is done the pallet is returned to be used again. These pallets will be loaded with SKUs that match up to specific aisles in order to minimize the VNA man up travel during put away. These cases will go to zones, 1, 4, and 7 in the reserve rack.

1. Cases are taken off the truck and moved onto the receiving dock. This is done by pulling groups of cases out of the truck on slip sheets. These cases are often stacked up to 5 levels high.
2. Based on the storage plan for the received SKUs a number of empty pallets are positioned on the floor next to the received cases.

3. SKU cases are scanned and directed to pallets based on the WMS storage plan for the delivery. Cases are taken from the slip sheet and stacked on the correct empty pallets. It is critical that the cases being stacked onto the new storage pallet don’t exceed the maximum dimensions for the storage loads (40” wide by 48” long by 64” tall).

4. The pallet is lightly shrink wrapped. A pallet id label (bar code) is printed and placed on the pallet. This allows pallets to be moved around by different operators without losing track of it.

5. When a pallet is finished, the pallet id, SKUs, and quantities are entered into the WMS by hand scanner or on the fork truck mobile unit.

6. The WES directs the fork truck to the drop off point for that pallet. This is based on the aisle with the storage locations for those SKUs. See additional notes on directed storage locations below.

7. The pallet is taken to the drop point and stored in one of the six pallet spaces at that drop point. Any space can be chosen since the pallet has an id label on it.

**Directed Storage Locations**

Each pallet of this type has multiple storage locations that it must go to. During put away, cases are taken of the pallet and placed in these locations. The WMS assigns the SKUs to these pallets by aisle in the reserve rack. This minimizes the VNA man up travel distance by confining it to a single aisle.
There will be an empty pallet when the put away process is completed. This pallet can be returned to the inbound empty pallet stacks staged for the palletizers.

**Receiving**

**Case Identification**

Throughout the system SKU cases are identified by the existing bar code label printed on the case itself. This label is present on almost every case in the system. Cases are identified by scan tunnels on the conveyor and are tracked throughout the system. This method eliminates placing id labels on SKU cases just for the purpose of tracking. Printing and placing an average of 20,000 labels a day is costly, not efficient in general operation, and becomes especially time consuming in the pick modules.

There are a few cases where there is no identifying label on the box. For these few cases an id label will be need to be placed on the case. The best place to do this is during the receiving process. This is the first best place to do this since every case is handled during the unloading process.

For many deliveries the WMS will know ahead of time that some SKUs will need case id labels. If this happens the labels will be printed during the scanning of SKU case during the loading process. In many cases these id labels could be preprinted and simply placed on the cases in the process of pallet loading.

Catching this in receiving will be the best way to optimize all other operations that follow.
Put Away

Put away is the process of putting the SKU into its storage location after it is received. The VNA trucks are responsible for doing all put aways in the system. All put aways go into the reserve rack area and are subsequently replenished to the picking zones later. There are two types of put aways in the system, pallet put away and case put away. Each process is described here.

Pallet Put away

Pallets are brought to the drop off stations at the end of the reserve racks along the main transport aisle. Pallets are directed to specific drop off points that match up to the aisle where the SKU is to be stored. This is necessary to minimize the travel time of the VNA truck. When a pallet is brought to a drop point the truck operator confirms to the system that it is in the drop off location.

1. The pallet and location then show up as an available put away on the mobile screens of the VNA trucks.
2. A VNA truck retrieves the pallet from the pick up point (same as drop off point). The operator scans or enters the pallet id.
3. The operator is directed to the location where the pallet is to be put away. The VNA truck moves the pallet down the aisle and puts it away in the directed location. The operator can override the directed location if this is required.
4. Steps 1 through 3 are repeated as pallets show up for put away.
Case Put away

This describes the process for pallets dropped off for case put aways by the VNA man up trucks.

1. The pallet and location then show up as an available put away on the mobile screens of the VNA man up trucks. They are the only truck that can process this type of put away.

2. A VNA truck retrieves the pallet from the pick up point (same as drop off point). The operator scans or enters the pallet id.

3. The operator is directed to the location where each case is to be put away. The VNA truck moves down the aisle in a preassigned sequence of locations based on the cases on the pallet. This sequence is designed for the most efficient movement of the truck.

4. When the truck arrives at location the operator confirms the location. The screen displays the SKUs (cases) to be put away at that location.

5. The operator places the cases on the pallet in the location. They confirm the transaction to the screen. The WES updates the system and directs the operator to the next put away location.

6. Steps 4 and 5 are repeated until all the cases are put away. The operator is now left with an empty pallet on board the VNA truck.

7. The empty pallet can be dropped off at the empty pallet stacks next to the main aisle or at the VNA case pick drop off. Steps 1 through 6 are repeated until all put aways are done.
3.2 Replenishment

Replenishment to Pick Modules

- **Main Transport Aisle**: 207 SKUs, 2,610 pallets
- **Cross Aisle**: 216 SKUs, 2,604 pallets

**VNA Aisle** (VNA trucks only)
- 207 SKUs / 216 SKUs per side

**Pick Module**
- 207 SKUs / 216 SKUs per side

**Reserve Rack**
- (pallet storage)
Replenishment to Pick Modules
The pick modules will pick an average of 72% of all the cases each day. This will be over 15,000 cases on a typical day. All of these cases will be picked from the SKU pallet directly to the conveyor line. All replenishments to the pick modules will be full pallet transfers from reserve storage to the pick module location. The average SKU pallet holds 56 cases. This means that an average of 270 pallets will be moved from reserve storage to the pick modules each day. This works out to be an average of 34 pallets moved per hour. Replenishment of the pick modules is the fastest and easiest of all replenishment operations in the system. More cases are moved per transaction than any other operation in the system.

Slotting
SKU pallets are slotted in the reserve rack to minimize the travel distance for the VNA trucks. Each pick module has approximately 210 SKU locations on each side. The SKU pallets for these SKUs will be stored in the reserve racks on the matching side of the pick module.

Flexible Movement
Along with cross aisles on both sides, there is also cross aisle running down the center of all the reserve racks. This effectively limits the travel distance down any VNA aisle to half the aisle length for any pallet move. This speeds up the transaction rate and gives the VNA trucks greater flexibility of movement.

Pallet Moves
1. The truck mobile computer receives a move transaction for a pallet from the WES. The screen will show the SKU and pallet location to be picked.

2. The VNA operator drives the truck to the location in the pallet rack.
3. The operator picks the pallet and confirms the transaction to the system.

4. The mobile computer tells the operator which location to put the pallet into in the pick module.

5. The operator drives the truck to the pick module location and places the pallet into the lane and confirms the transaction to the system.

**Pallet Put Aways**

1. The truck mobile computer receives a put away transaction for a pallet from the WES. The screen will show the SKU, pallet id, and the pick up location for the pallet.

2. The VNA operator drives the truck to the pick up location at the end of the aisle.

3. The operator picks the pallet from the drop location and confirms the transaction to the system.

4. The mobile computer tells the operator which location to store the pallet in the reserve rack.

5. The operator drives the truck to the reserve rack location and stores the pallet. If required, the operator may optionally and choose another location. The transaction is confirmed to the system.

**Notes**

The WES will be direct the locations for pallet storage and moves. The movement and control of the trucks will be under the control of the VNA supplier. The decision on the VNA supplier will be up to Law Warehouses. System Logistics will work with the chosen VNA supplier to engineer the system so everything works together.
Replenishment to Carousel Case Buffer

Conveyor to Carousels

Case Loading Zone (pallet stripping)

Full Pallets from VNA trucks

Empty Pallets

Transport Aisle

Pallet Drop Off and Pickup

Man up VNA Truck (case pick and putaway)

Reserve Rack (pallet storage)

VNA full pallet putaway

VNA Case Pick Aisle

Drop off Station → Main Aisle ←

Row numbers
Replenishment to Carousel Case Buffer

VNA Case Picking

Replenishment for the carousels system will be done by man up VNA trucks picking cases from pallet locations in the reserve racks.

Sequenced Picking

Pick list in this operation will be sequenced within an aisle for the most efficient movement of the man up truck from location to location. This gives us the fastest pick rates and keeps trucks separated in different aisles minimizing aisle congestion.

Case Picking

1. The WES organizes all case picks by aisles in the system. Picks within an aisle are split up into pallet quantities in the range of 40 to 50 cases (what fits on a pallet). This group of picks is called a “replenishment pallet”. All VNA case picks for the day are organized into replenishment pallets.

2. The truck operator retrieves an empty pallet from the pallet drop off area or from the P&D stations at the other end of the system. Empty pallets are kept in both places for easy access.

3. The truck mobile computer can access all available replenishment pallets. The screen will show the pallet id, the quantity of cases to pick, and the aisle number. The operator chooses the pallet to pick or takes the one with the highest priority.

4. The operator goes to the end of the aisle where the pallet is to be picked and enters the pick mode on his screen. This gives them the list of locations and quantities to pick for the pallet.

5. The screen tells the operator where to go to and the operator moves the truck to the location. The platform is moved to a height where cases can be picked from the intended location.
The exact height is at the operator’s discretion depending on the pallet load in the rack location.

6. The operator picks the quantity of cases for that location and confirms the transaction. This can be done on the screen or by scanning the case id.

7. The operator repeats steps 5 and 6 until the pallet is completed.

8. When the pallet is completed the operator drives the truck down the aisle and drops the pallet off at the case loading zone. This area is next to the conveyor and is designated by painted lines on the floor.

9. The operator repeats steps 2 through 8 until all replenishment pallets are finished.

10. All cases on the full pallets are loaded onto the conveyor and transported to the carousels. Full pallets are stripped of cases. The resulting empty pallets are stacked nearby for pick up by the VNA man up trucks. These pallets effectively operate in a closed loop.

**Pick to Pallets**

Pallets being used on the man up trucks operate in a closed loop. This means they can be modified to suit the case picking operation. For example they could be made larger to handle more cases per trip.
Replenishment to Carousel Case Buffer

Batching of Picks

The carousel system has a capacity that is 2 to 3 times larger than the average day’s picks for the SKUs in it. This means the case replenishment to the carousel system does not have to match the carousel outbound picks day by day or SKU by SKU. This allows the WES to batch picks over multiple days for the VNA case pick operation. This improves efficiency in two ways.

- For some SKUs it may be beneficial to collect picks for multiple days before doing a run of replenishment case picks on the man up trucks. This cuts down the amount of locations to hit for case picks per day, and increases the amount of cases picked per location.

- On slow days it may be beneficial to batch the picks for multiple days before doing case picks in the VNA system. This will have the same benefit. There will be fewer locations to hit and more cases to pick per location.

Flexible Movement

Along with cross aisles on both sides, there is also cross aisle running down the center of all the reserve racks. This allows the man up trucks a choice of multiple paths to the drop off zone if they finish a pallet in less than half an aisle. This gives the VNA trucks greater flexibility through the case pick zone and allows them to pick a pallet moving in the opposite direction and make a U turn if they choose to.

Slotting

The slotting of the SKUs in this section of reserve rack is critical for efficient operation of the case picking man up trucks. It is very important that these procedures be followed. The steps listed below should be applied to all VNA man up case picking zones. This is especially important for zone 1.
SKUs must be sorted by velocity (usage) fast to slow. The fast SKUs must be distributed evenly across all aisles in the zone. This spreads out truck traffic and stops congestion.

Within each aisle SKUs should be sorted fastest to slowest into thirds (corresponding to two levels of rack).

Within each third, fast SKUs should be sorted fastest to slowest. SKUs from this sort should be placed from the rear aisle (pallet drop off) toward the front aisle. The fastest SKU should be closest to the pallet drop off area.

Each third should be slotted fastest to slowest from the floor level up.

There are multiple other slotting options for this area such as half pallet locations and full pallet moves within the zone. This description is further illustrated in the slotting section of this proposal.

Notes

The VNA case picking operation is expected to hit an average 2,250 SKUs and 5,880 cases per day. This will fluctuate quite a bit depending on how heavy or slow the previous days were. This works out to 281 lines (location hit) and 735 cases per hour over an 8 hour day. Using 6 VNA trucks this puts us at an average of 47 lines and 123 cases per hour per truck. This is an aggressive rate and correct slotting of the SKUs is the key to achieving it.
Replenishment to Carousel Case Buffer

Slotting of VNA Case Pick Zones

The chart on the left below shows the location in zone 1 of the VNA case pick rack. Each row is numbered and the aisle number is shown on the third column. This shows the number of full pallet locations in each aisle and gives the total pallet locations at 6,198.

### Zone 1 VNA Case Pick

<table>
<thead>
<tr>
<th>Row</th>
<th>Locations in row</th>
<th>Locations in aisle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>246</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>336</td>
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<td>3</td>
<td>348</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
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</tr>
<tr>
<td>4</td>
<td>336</td>
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</tr>
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<tr>
<td>6</td>
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</tr>
<tr>
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<tr>
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<td>11</td>
</tr>
<tr>
<td>12</td>
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</tr>
<tr>
<td>Totals</td>
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<td>10</td>
</tr>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>% SKUs</th>
<th>SKUs</th>
<th>Cases</th>
<th>% Cases</th>
</tr>
</thead>
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<td>1,717</td>
<td>29%</td>
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<tr>
<td>10%</td>
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<tr>
<td>Totals</td>
<td>7,942</td>
<td>5,880</td>
<td>100%</td>
</tr>
</tbody>
</table>

The chart above shows the data for the SKUs going into the carousels. These are called the slows SKUs since they are all the SKUs not in the pick modules.

The top 20% of these SKUs account for 71% of the carousel picks and the top 50% cover 94% of them. These are the SKUs that should be slotted in zone 1 of the VNA case pick area. This keeps them closest to the conveyor drop off and minimizes the travel time for the VNA man up trucks.

3,971 of these SKUs show virtually no movement. These are the SKUs with 1 case in the carousel system.

Storing 2 pallets each of the top 1,000 SKUs from this group in zone 1 this would cover 56% of the SKU to be picked. The remaining 3,895 pallet locations could hold 1 pallet each of the remaining SKUs. This would allow zone 1 to handle 95% or more of all the picking needed to replenish the carousels.

This data was taken from the combined SKU data from 2009. It is important to note that a large percentage of the SKUs being assigned a full pallet do not have cases in stock that would fill the pallet. Many of these SKUs could easily be stored on half pallets. This means there is likely to be even more storage space (on the pallets) than these calculations shows.
Replenishment cases will be picked onto pallets from the VNA man up trucks. Cases will be picked onto pallets destined for either pod 1 or pod 2. A pallet will not have cases going to both pods. This allows the pallets to be dropped off at the correct loading point where all the cases will be stripped off and loaded onto the conveyor. There is enough space at the back of the system to stage up to 6 pallets in one line across the loading points. More pallets can be staged behind the first 6 if needed.

Operators will simply load cases from the pallets onto the conveyor going into the pods. The pod operators can do this since this is being done at different time than picking. Note that cases can be loaded and will accumulate on the inbound replenishment line for the floor level pod without interference to picking. Cases going to the upper level pod use the main conveyor line. This means that picking must be cleared before replenishment cases can be loaded for the upper level (pod 2).

Approximately 250 to 400 cases will be replenished per day into the bottle system. This would be equal to a range of 5 to 8 pallets per day (or 2 to 4 pallets per pod per day). Some of these cases will go to the flow rack. It should take one person 1 to 2 hours to load the cases from the pallets onto the conveyor. Pod operators should be in the pods at the same time during the loading process so the cases go through the system and into the pods as quickly as possible.
3.3 Order Picking

Pick Modules

Pickers can see all the picks on one level simply by looking down the aisle. This shows them how much work is there and where it is concentrated. It provides them with immediate status in one look and speeds up their pick paths. This allows pickers to make their own decisions about the most efficient movement in the pick modules.

Pick Zones

Pick zones are single aisle with picking locations on one side with the conveyor running the length of the aisle. There are two zones on each level and 8 zones in each module.

Multiple pick zones will typically be assigned to one operator. A picker can be assigned to every zone if volume requires this in the future but this would be an extreme condition. Multiple combinations of pick zones would be assigned to individual pickers (by the supervisor) based on daily volumes. It will typically be staffed by 1 picker on each level picking from 2 zones.

Visual Operation

Pickers can see all the picks on one level simply by looking down the aisle. This shows them how much work is there and where it is concentrated. It provides them with immediate status in one look and speeds up their pick paths. This allows pickers to make their own decisions about the most efficient movement in the pick modules.

Conveyor Operation

A single line of transport conveyor runs the length of the zone on each level. This conveyor transports all cases picked in the module and delivers them to the main sorter. Two separate lines of conveyor run out of each module. Each line runs through two levels. This reduces the transport time for a case coming out of the module. No case can go further than two module lengths before exiting the pick module.

Empty Pallet Return Lanes

Each pick zone has four empty pallet return lanes for stacking empty pallets and pushing them back out in the opposite direction. They are picked up by fork trucks on the back side. The empty pallet return lanes are evenly spread across each zone.

The empty pallet return lines will be operated with a release in the first position. This allows the stacking of multiple pallets on the pick aisle side prior to release to the back side for fork truck pick up. This creates fewer trips for the fork trucks and more efficient trips with multiple pallets.

Replenishment

Fork truck replenishment aisles run the full length of the pick module on each side. This allows full pallet replenishment from the rear of the pallet flow lane. This design allows replenishment operators (fork truck) to easily drive the entire length of the module to respond to empty spaces in the pallet flow lanes. The system is visually simple to respond to in replenishment mode. Replenishment pallets will be directed by the WMS.

Capacities

Every SKU location can hold 3 pallets. Across 804 SKUs this gives us a total capacity of 2,412 pallets. Pallet consumption per lane will range from 4.6 pallets per day down to 1 pallets per day. 3 Pallets can be in the lanes for a range of 1 to 30 days depending on the SKU. Both modules will consume an average of 259 pallets per day (130 pallets per module per day).
Pick Modules

Operation

The fastest moving 804 SKUs (fast SKUs) are picked from two case pick modules. Cases are picked directly from the pallets. This allows us to bring a large quantity of cases directly into a forward pick zone. Some SKUs can be assigned multiple lanes which further increases the per SKU case quantity in the forward zone. The case pick modules will pick approximately 72% of all the cases picked per day.

The entire zone will be light directed. There will be a light display over each location indicating the quantity to pick for each SKU. It is likely that a wave of multiple orders will need picks from every picking zone. This is because a typical order has over 200 cases and over 150 SKUs. With 70% of the picking coming from these modules, they will typically operate throughout the day.

Wave Size

The pick module is designed to support large waves of work. Waves need to be large enough that there are cases to pick from nearly every SKU position. This minimizes the amount of trips down the pick aisles and maximizes the pick rate. Each wave is equivalent to one walk past every SKU position in the pick module.

There should be an average range of 3.5 to 6 cases per SKU per wave. This would be a pick wave of between 3,000 to 5,000 cases for both modules. The pick rate in the modules is directly tied to the size of the downloaded wave of picks.

Pick Paths

The pickers path usually be to walk from one location to the next picking the amount of cases on each display. Because of the large wave size there will be picks at almost every display. This is the most efficient pick path possible in a system of this type.
Pick Rate

The module is designed to hold the fastest moving SKUs in the system. The top 846 SKUs account for 72% of all cases picked. This average will fluctuate slightly day by day but it is consistent through the year. This means the pick modules will pick the following range of cases.

- Avg day 21,000 cases = 15,120 from pick modules
- Heavy day 30,000 cases = 21,600 pick modules
- Peak day 40,000 cases = 28,800 from modules

With 4 to 6 waves per day the typical wave size would be between 3,800 and 4,800. This would give us an average range of 4.5 to 5.7 cases per SKU per wave. This is high enough to give us pick rates that range between 300 and 400 cases per hour per picker. Please note that wave sizes must be kept large enough to support this. Pick rates can easily drop below these planning levels if the pick wave gets too small.
Pick Modules

Clear Height
Ceiling clearance is shown at the lowest level of 37' at the sides of the building and at the highest level (40') in the center.

Rack Supported
The entire main pick module will be a rack supported structure. This is a typical cost effective design for a multiple tiered picking system.

Pick Aisle
Full cases of SKUs are picked directly to a powered belt conveyor from the pallet locations. Pickers move down the pick aisle from pallet to pallet.

Pallet Flow
Each picking location holds three pallets that flow down to the front pick position. These pallets would all be holding the same SKU. Pallets would be picked clean as full cases.

Pallet Uprights
Pallet uprights are used for structural support throughout the pick module. They run down each side of the aisle space in the modules. These can be used for overhead storage or adding flow lanes. Since they are spaced to match the pallet positions, any number or lanes can be added by simply adding more rack crossbeams.

Ventilation
The line of pallets and the decking on each level create a tunnel of airspace. Fans can be mounted below each deck to blow down the length of the aisle. This is an inexpensive and efficient way to create air circulation in the modules. This will be especially important on the upper levels in the summer months.

Notes
The exact configuration of the zones will be determined during the engineering phase of the project. Details such as computer locations, conveyor crossovers, etc. will be finalized during this phase. Detailed drawings will be produced for review and approval by Law Warehouses.
Pick Modules

Module Design

Electronic picks for a wave of orders will be downloaded to the system by the Law WMS. This is expected to be a range of 3,000 and 6,000 cases per wave. These picks will be hitting 804 SKUs in the case pick modules. This means that each SKU position will have about 6 cases to pick in any given wave. This level of pick density in the pick modules minimizes the walking between picks. This should create a high pick rate for pickers in the modules.

Visibility

Pickers in the modules should be able to look down the aisles and see all positions needing picks at a glance. This allows quick visual judgment for choosing the most efficient route between picks. In short, they can see everywhere they need to go by looking down the lights.
Light Display Location

Light displays for the pallet lanes will be placed on a single rail running above the pallets across all the pick zones. This places all the displays at the same height so operators can see them all and it keeps the displays spaced out directly over their pick location.

These displays will be placed just above the working height required to pick from a pallet. This will be about 2 meters. This keeps them out of the way of the operator but still easy to see and reach for picking. It also simplifies the installation of the displays since a single rail is used across all the locations. This uses the least amount of connectors and increases the overall reliability of the displays.

Pick Modules

Description of Operation

Order Download

Orders are transmitted from the WMS to the WES. WES distributes the required picks to the DirectPick system controller. This is expected to be a range of 3,000 and 6,000 cases per wave for multiple orders. The information passed from the WMS consists minimally of the following: Order number, SKU, location for each pick; and the quantity to pick. This is the same order information required for the other pick zones. The pickers will only be seeing the quantity displayed over each SKU location.

Picker Login:

Pickers are tracked throughout the DirectPick system by logging in and out of zones. They can log on by scanning an employee bar coded ID or keying the ID in through the keyboard on the
scanner itself or assigning the picker through the console of the system. DirectPick tracks individual pickers' pick rates by zone as well as by employee to help the zone balancing process.

**Order Induction:**

There is no formal “Induction” of orders in these pick zones. Multiple orders are grouped together in a wave and all the picks for that wave are displayed on the lights in the modules. Pickers simply pick the cases and put them on the conveyor. There is no complexity in this operation (labeling, sequencing, etc.)

**Wave Picking**

1. The first bay controller in the pick zone that has picks will flash “start” on its display. When the operator sees this they can begin picking. Multiple bay controllers are used in the system (about every 10 lanes). Pickers will be using only the SKU lights during normal operation.

2. All the required SKU locations light up displaying the quantity of picks for that wave (multiple orders) in that zone. Task complete buttons are flashing on the lighted locations.

3. The operator picks the cases from the location in the quantities indicated on the light and places the cases onto the conveyor. They hit the flashing button on the location light changing the display to “done” and the light goes out. This button operation also serves as the verification since the correct SKU location light must be hit.

4. Once all displays have been picked in a bay, the bay controller sounds a single audible beep, indicating picks are completed in that bay and the bay controller beacon changes from blinking to a steady light.
5. Once all picks are completed within a zone, the picker gets an audible two beep acknowledgement and a message “Complete XX” in each of the bay controllers. This lets the picker know the wave of orders is finished in that zone.

6. All picked cases are transported out of the picking modules by the conveyor. The operator then repeats steps 2 through 4 until all waves of orders for the pick zone are done.

**Pick Modules**

**Shorts**

If at any time the required quantity in the display is greater than the amount available to pick, the operator will use the shorting keys to decrement the quantity shown in the display to the amount remaining and then push the beacon to acknowledge the pick. This information is uploaded to the systems controller and ultimately to the WMS.

**Capacities**

In general the pick modules should be kept full simply to maximize storage capacity. If a SKU lane uses a pallet then a new pallet should be put into the lane quickly. This opens up a storage slot in the reserve racks and it maximizes the storage capacity of the module. It also insures that shorts in these pick modules should be a very rare occurrence.

**Notes**

This is the same software currently being used in the bottle picking system for picking single orders. This operation is much simpler since it only involves picking cases and putting them onto a conveyor. All the features for picking individual orders and are still present in this software.
Carousel System

Basic Operation

The carousel case buffer is used to pick cases for the remaining 7,940 SKUs in the system. This represents 91% of the SKUs in the system and will pick an average of 28% of the cases each day. This method allows a very fast pick rate over a large amount of SKUs and consumes a minimum amount of floor space.

The remaining 7,940 SKUs are stored in the carousel buffer. Each SKU has approximately 3 days’ worth of picking volume stored in the carousels. Cases are automatically picked by the system as they are downloaded by the WES and sent to the palletizers as required. This allows very fast automated picking across a large amount of SKUs. No labor required for order picking no matter how many SKUs are needed in a wave.
Carousel System

The system is set up with 8 stacks. Each stack has 3 carousels and one extractor. Each carousel has 110 bins. Each bin has 8 shelf locations that hold one case per shelf. The extractor picks and stores cases into and out of the carousel bins on all three levels of carousels.

Transaction rate is determined by the amount of stacks in the system. Each stack has one extractor. Each extractor has access to three carousels with 880 locations in each carousel. Each stack has 2,640 storage locations. System rate calculations are included later in this section.

Capacity

<table>
<thead>
<tr>
<th>Stack</th>
<th>carousels</th>
<th>bins</th>
<th>Bins per shelf</th>
<th>Shelves per carousel</th>
<th>Shelves per stack</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>110</td>
<td>8</td>
<td>880</td>
<td>2,640</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>110</td>
<td>8</td>
<td>880</td>
<td>2,640</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>110</td>
<td>8</td>
<td>880</td>
<td>2,640</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>110</td>
<td>8</td>
<td>880</td>
<td>2,640</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>110</td>
<td>8</td>
<td>880</td>
<td>2,640</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>110</td>
<td>8</td>
<td>880</td>
<td>2,640</td>
</tr>
<tr>
<td>7</td>
<td>3</td>
<td>110</td>
<td>8</td>
<td>880</td>
<td>2,640</td>
</tr>
<tr>
<td>8</td>
<td>24</td>
<td>2,640</td>
<td>8</td>
<td>880</td>
<td>21,120</td>
</tr>
</tbody>
</table>

System Height

The system is designed to maximize the cube used inside the building. The clearance under the beams in the building ranges between 38’-6” to almost 40’. The carousels will be sized to maximize the height used under this clearance. Right now the system is tentatively set for a
height of 37 feet. This will leave a range of 18” to 30” of clearance. Exact measurements will be taken during the engineering phase of the project.

Carousel System

Conveyor

Cases are transported to and from the carousel system by conveyor. The conveyor system is positioned on a mezzanine in front of the extractor stacks (see graphic). The conveyors are located close to the center of the vertical travel of the extractors. This minimizes vertical travel for the extractors (improving rate) and clears the floor space below for fork truck movement.

Inbound

Inbound cases are unloaded onto the inbound conveyor from pallets coming out of the VNA system. These cases move onto the inbound sorter in front of the carousel stacks. The inbound sorter distributes the cases across the stacks onto the inbound spurs. Cases that cannot be diverted to a stack are recirculated on the loop and sorted again when they come back around. A more detailed description of this conveyor operation is included in the conveyor section of this proposal.

Outbound

Outbound cases coming out of the extractors are placed on the merge spurs coming out of each extractor stack. These spurs merge onto a common outbound line that runs directly over the sorter and then out to the palletizers in shipping. All the cases coming out of the carousel stacks are picked cases for outbound orders.
Access

With 8 merge points and 8 sorter diverts both general and maintenance access will be needed for the conveyor system in this area. Access to the conveyor system is provided by two stairways up to the mezzanine from floor level. One set goes up to the induction area in front of the sorter allowing access to the scanner and induction belts. The other set goes up to the area in front of the sorter and merge lines and allows access to all inbound and outbound spurs.

Future Expansion

Both case volume and SKU volume can increases in the future. In both situations the most likely area of the system to need expansion will be the case buffer. Space for 6 additional stacks has been designed into the layout. This allows for a 75% increase in the automated case picking part of the system.
Carousel System

Bin Design

The graphic above shows the carousel bin and shelf concept for holding the cases. Due to the wide range of case sizes there will be two different bin sizes. Seven stacks will use bin A and one stack will use bin B. Shelves for bin A will all be 15” deep and shelves for bin B will be 21” deep.

The side vertical components of the bin will be made of heavy gauge sheet metal. The shelves will be made of heavy gauge wire bolted to the metal side sections. Both the wire and side flanges provide a strong and reliable shelf structure for holding cases in a repeatable position for the extractor. The bin backs are open to allow sprinkler access through the bin from the center of the carousels.

Exact bin dimensions will be finalized during system engineering.

Bin Details

<table>
<thead>
<tr>
<th>Description</th>
<th>Bin A</th>
<th>Bin B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelf depth</td>
<td>15”</td>
<td>21”</td>
</tr>
<tr>
<td>Max case length</td>
<td>15”</td>
<td>21”</td>
</tr>
<tr>
<td>Min case length</td>
<td>9”</td>
<td>15”</td>
</tr>
<tr>
<td>Max case width</td>
<td>15”</td>
<td>16”</td>
</tr>
<tr>
<td>Min case width</td>
<td>6”</td>
<td>6”</td>
</tr>
<tr>
<td>Min case height (all shelves)</td>
<td>6”</td>
<td>6”</td>
</tr>
<tr>
<td>Shelf 1 spacing</td>
<td>16”</td>
<td>16”</td>
</tr>
<tr>
<td>Shelf 1 max case height</td>
<td>14”</td>
<td>14”</td>
</tr>
<tr>
<td>Shelf 2 spacing</td>
<td>18”</td>
<td>18”</td>
</tr>
<tr>
<td>Shelf 2 max case height</td>
<td>16”</td>
<td>16”</td>
</tr>
</tbody>
</table>
Carousel System

Case Size Breakdown

We received case dimensions for over 6,000 SKUS. We could match 3,413 of these to the existing SKU data for the carousels (43%). The SKU breakdown of the shelf sizing for that sample is shown in the following table:

<table>
<thead>
<tr>
<th>SKUs</th>
<th>Shelf</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,885</td>
<td>A1</td>
<td>84.5%</td>
</tr>
<tr>
<td>52</td>
<td>A2</td>
<td>1.5%</td>
</tr>
<tr>
<td>383</td>
<td>B1</td>
<td>11.2%</td>
</tr>
<tr>
<td>5</td>
<td>B2</td>
<td>0.15%</td>
</tr>
<tr>
<td>88</td>
<td>Do not fit</td>
<td>2.6%</td>
</tr>
<tr>
<td>3,413</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

We extrapolated these percentages across 7,942 SKUs that we planned the carousel system for. This is a safe assumption since we had a large quantity of case dimensions to go by.

Notes

88 SKUs (2.6%) did not meet the size limits for the carousels. They were either too small or too big in one or more dimensions. This would be about 206 SKUs in the full system. These have been taken out of the carousel calculations.

It is important to recognize that the SKUs will be different by the time the system is installed a year from now. Percentages and volumes will change for these classifications. The important thing is to choose a reasonable break point for sizing that will work for the most likely combination of SKUs in the future.
Carousel System
Dedicated Stacks

The WES will recognize the SKU label at the scan tunnel and automatically sort the case to the correct group of stacks (A or B). Since only one stack is sized differently the system retains a high degree of flexibility for picking outbound cases. 86% of the SKUs in the system use the A bin size. This means that the bulk of the outbound picking can bring the rate of 7 stacks to bear during a wave. This same flexibility is retained for inbound cases as well.

Inbound cases heading to the B stack will have less flexibility since they must accumulate on one spur. If this spur is full then excess cases will hit the recirc loop on the carousel conveyor. This will not be a problem since there is considerable room for cases on the recirc loop and the inbound volume coming to this stack has all day to get there. It is not tied to any pick wave.

Bypassing

On some days there may be some SKUs needed for orders that do not have enough cases in the carousel system. This would typically be a small amount of cases. When this happens these cases will need to be picked by a VNA man up truck. These cases will be sent into the carousels to be held until their pick wave comes up. There may be times when they should bypass the carousels and go directly into the VLS units for the current pick wave. There are multiple ways to do this.

1. A bypass divert could be added to the carousel sorter at the very end of the sorter. This would route the cases directly onto the outbound line. This would require added space and would a future carousel stack position would be lost.
2. The cases can be loaded on the conveyor and sent to the carousel system. They would be sent to the first divert where the extractor takes the case from the inbound line and place it directly on the outbound line. If the volume is small this will have no effect on the overall system operation. It would also not require the loss of a future stack position to add a bypass divert.

Note

It is important to note that both solutions here require induction to the sorter. The case must pass through the scan tunnel before either of these solutions is possible. This is the only way the case can be identified for a sorting decision.
Carousel System
Rate Calculations
Extractor Rates

A transaction is either a pick or a store. Since the software and controls are optimized to do both at the same time we use this method for rate calculations because it more accurately reflects the true operation of the system. There are two rates to be reviewed when designing a system like this one. Machine rate and system rate are two different calculations and both figure into the system design.

Machine Rate

Machine rate is the “pure” rate of the machine with no interruptions or delays. Our carousel / extractor combination is the fastest product of its type in the industry. For a system of this configuration the maximum machine rate of the extractor would be about 6 transactions per minute. This is equal to doing a pick and a store every 10 seconds. To achieve a pure machine rate means there can be no wait time for the extractor ever. This means there would never be any carousel wait time, there would be an inbound case to store every time a pick was completed, and there would be a clear outbound conveyor every time a pick was made from the carousel. In order to reach a pure machine rate on a continuing basis, the stack would have to run like this every minute of every hour of every day.

System Rate

System rate is the true rate you expect the extractor operate over the course of the whole day. This takes into account the likely things that will happen to slow the stack down from the pure machine rate. Inbound cases will not show up in a perfect continuing stream at every stack and the wave of picks will not always be constant.
System Rate

The chart above shows the calculations for the number of stacks in the initial system with different system planning rates. Even though the extractor can approach rates of 6 transactions per minute the rest of the system will not be able to support it. An aggressive system planning rate would be in the range of 3.5 to 5 transactions per minute. With the exceptionally large pick waves this system should be pushing the higher end of this rate chart.

Carousel System

Carousel Rates

What makes a carousel system efficient is handling multiple picks on a single stack. As picks are available to the carousel software they are continuously sequenced in the optimal order for minimizing bin movement. In short the system works best when it is given a lot of work to do. The chart below demonstrates this principle.

Total picks for the system are shown in the first column. Picks are divided by the number of stacks, carousels, and bins per carousel, to get the average picks per carousel. This figure is divided by 3 to get the average picks per carousel within a stack. The total amount of bins in the carousel (110 bins) is divided by the average number of picks per carousel. This gives you the
average amount of bins the carousel has to move to get to the next pick. This amount of bins is converted to a travel time with acceleration and slow down time added to get the estimated travel time. This is shown in seconds in the last column. These numbers are based on averages. A stack may be more or less efficient at any given moment in time. In the course of the day it would be close to the averages shown here.

<table>
<thead>
<tr>
<th>Batch Size</th>
<th>Stacks</th>
<th>bins per carousel</th>
<th>carousels per stack</th>
<th>picks per carousel</th>
<th>avg carousel bin moves per pick</th>
<th>avg dist moved in bins per car</th>
<th>estimated time to move carousel (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>8</td>
<td>110</td>
<td>3</td>
<td>10.4</td>
<td>10.56</td>
<td>3.52</td>
<td>10.7</td>
</tr>
<tr>
<td>500</td>
<td>8</td>
<td>110</td>
<td>3</td>
<td>20.8</td>
<td>5.28</td>
<td>1.76</td>
<td>7.3</td>
</tr>
<tr>
<td>750</td>
<td>8</td>
<td>110</td>
<td>3</td>
<td>31.3</td>
<td>3.52</td>
<td>1.17</td>
<td>6.2</td>
</tr>
<tr>
<td>1000</td>
<td>8</td>
<td>110</td>
<td>3</td>
<td>41.7</td>
<td>2.64</td>
<td>0.88</td>
<td>5.7</td>
</tr>
<tr>
<td>1250</td>
<td>8</td>
<td>110</td>
<td>3</td>
<td>52.1</td>
<td>2.11</td>
<td>0.70</td>
<td>5.3</td>
</tr>
<tr>
<td>1500</td>
<td>8</td>
<td>110</td>
<td>3</td>
<td>62.5</td>
<td>1.76</td>
<td>0.59</td>
<td>5.1</td>
</tr>
<tr>
<td>1750</td>
<td>8</td>
<td>110</td>
<td>3</td>
<td>72.9</td>
<td>1.51</td>
<td>0.50</td>
<td>5.0</td>
</tr>
<tr>
<td>2000</td>
<td>8</td>
<td>110</td>
<td>3</td>
<td>83.3</td>
<td>1.32</td>
<td>0.44</td>
<td>4.8</td>
</tr>
</tbody>
</table>

Note the rapidly dropping movement distances as the total quantity of picks increases. From this chart you can see that the carousels benefits from having as many pick requests as possible at any one time. The goal should be to have enough picks so that the extractor never has to wait on a carousel to get into position.

**Wave Sizes**

The numbers highlighted in orange on the charts show the minimum range you would want the wave size to drop down to. We recommend that you make the wave size as large as possible. This takes the carousel wait time completely out of the picture as a factor in system rate. With the large capacities in the VLS units it should be possible to be operating with waves of well over a 1000 picks at any one time. This will be a perfect environment for a carousel buffer system like this.
Note

With such large wave sizes this system should be able to outperform these calculations. In addition if there are no outbound cases available to store, the system picks outbound cases even faster. This can add significant additional outbound rate capacity for peaks and future expansions. Recognize that it is critically important to send the system larger amounts of work. The carousel system becomes faster and more efficient as the wave of work gets larger.
Carousel System - Inbound

Inbound Description

This section describes the inbound cases coming into the carousel system. The graphic shows only the carousel stacks and conveyor interface. A detailed description of the VNA picking and loading of the cases onto the conveyor is included in the next section. This is a general description of operation for the carousel / extractor stack. This describes how a single stack operates. All stacks in the buffer would operate this way.
Carousel System - Inbound

1. Inbound cases are placed on the conveyor at the ground level. These cases are unloaded from pallets and should be placed on the conveyor with the width across the conveyor and the longer side of the case (length) parallel to the conveyor. The SKU label could be on any of the five visible sides of the box. This area is not shown on the graphic.

2. The case travels down the conveyor and up the incline to the inbound sorter on the mezzanine. The case enters the induction area on the sorter. Cases will be arriving in random order.

3. The SKU label on the case is read by the scanner at the induction point of the sorter. Based on the case id the WES software chooses a destination carousel stack.

4. The sorter moves the box down the sorter and diverts it onto the inbound spur for the selected stack. The software tracks the box into the divert for the selected carousel stack. Each inbound spur can hold up to three boxes in front of the extractor.

5. The inbound case id is passed to AutoPick by the WES. AutoPick will select the most time efficient carousel locations to store the inbound case. Typically it stores the inbound case in the space just vacated by the previous pick. This minimizes the potential carousel movement.

6. If the inbound case id is needed as a pick in the current wave of picks the extractor (C) take the case from the inbound conveyor and moves it directly to the outbound conveyor. This should be a very rare event since the system holds three days’ worth of cases.

7. The extractor (C) moves into position at the inbound conveyor. The stop at the end of the conveyor is dropped and the case is moved onto the extractor bed.

8. The carousel (D) is moving into position at the same time. A bin with an empty location is positioned in front of the extractor.
9. The extractor (C) moves up or down into the correct position to store the case. The extractor stores the case into the carousel bin location. The system records the case ID and its carousel location. The storage date and time are also recorded by AutoPick.

No Reads

If the inbound case cannot be read by the induction scanner on the sorter then it is classified as a “no read”. If there is a no read then the case is diverted onto the first divert on the sorter designated the “no read” line. Cases sent to the no read line will be checked and fixed (usually damaged labels). Once this is done then the cases can be reintroduced into the system at any point on the conveyor.
Carousel System - Outbound

Picking

1. Pick requests are sent in waves by the WMS. These requests are sent to the WES and passed to the carousel system electronically. Multiple case requests (larger waves) allow the carousel system to operate most efficiently (see previous section).

2. AutoPick software optimizes the order of the cases into the fastest carousel travel times.
3. The carousel (D) spins to the correct bin and the extractor (C) picks the required case. This process repeats itself until all the requested cases are picked.

4. Cases are placed onto the outbound conveyor spur (E) by the extractor. Outbound case ids will be recorded as each transaction occurs. AutoPick deletes the case id from its carousel record after the case is placed on the outbound conveyor.

5. The case is transported by the outbound conveyor to the main sorter and palletizers. All cases going to palletized orders will follow this route.

6. A hot pick can be entered manually on a computer if it is part of the network.

7. If a “hot pick” is made the software immediately moves this pick to the front of the existing picking requests. The carousel will move to the correct bin and the extractor will pick the correct case and put it onto the outbound conveyor.

Note

The process of picking and storage occurs simultaneously. The software looks for an inbound case immediately after it has picked an outbound one. If one is present, the system will always store the inbound case in the location just vacated by the last outbound one. The carousels are also positioning independently for the next transaction. The exact sequence of picks and stores is being determined by the software dynamically as the system is running. See attached standard software documentation for more detailed descriptions.

Important Note

If there is no inbound case the system will immediately move onto the next pick. In effect the system fills in all excess time with picks if they are available. This means the system can shift to even higher outbound rates if there are no inbound cases available.
Hot Picks

1. An operator may occasionally need to request a “hot pick”.

2. When a hot pick is necessary an operator manually enters the pick in AutoPick or the WES. There are multiple ways to query the AutoPick software to get specific case id or location information.

3. The carousel system then follows the same methods to pick the specific case.
Since the bottle picking system operation is already known in detail this section will focus on describing only the parts that will be changed.

The bottle picking operation will use the same equipment in the current bottle picking system in Nashua. The flow of the system will be modified slightly but the basic operation will be the same. The carousel pods and the flow rack will be used in the same configuration. The conveyor system will be modified slightly so the flow goes from the bottom to the top pods and then out to shipping. The system will be disassembled, moved to the new site, and then installed in the new configuration.

The system flow starts at pod 1. From pod 1 orders can go the flow rack zone, or pod 2 or straight out to shipping. All orders will be picked in this sequence (pod 1, flow rack, pod 2).
Orders can start in the flow rack and go to pod 2 but they cannot go backwards to pod 1. This is the same linear flow as the current system just reversed. Orders can start in any zone so order boxes are available in all zones.

The main difference in the bottle pick system will be the introduction of standard order boxes for picking bottles into. This is necessary so that the boxes coming from the bottle system will have consistent and square dimensions. This is needed so the best fit software can place the boxes properly into the outbound pallets. These boxes will be configured for 3, 6, and 12 bottle quantities.
The graphic above shows the bottle system at the floor level. Pod 1 and the flow rack are on the floor level. Orders starting on pod 1 will move down the powered conveyor and can be diverted to the flow rack at the transfer zone or continue up to pod 2 on the upper level.

Replenishments to the pods will be by conveyor (loaded at the floor level). Replenishments to the flow rack will be loaded from pallets at the back of the flow rack. These replenishments will be brought by pallet from the VNA trucks and placed in the loading zones at the back of the system. Replenishment pallets will be picked by pod (pod 1 or 2) or for the flow rack zone. This makes loading them at the conveyors very simple.
A large supply of empty order boxes must be available at each pick zone. These boxes will be brought in on pallets with the boxes stored in knocked down form. A ready supply will be needed at all zones and they must be close by the operator so they are easily moved into the picking area. There is space for up to 8 pallets next to pod 1 and 6 pallets on either side of the flow rack. All of these pallets can easily be dropped off by fork truck. These pallets will contain a selection of box sizes for the pickers to choose from. Space is also provided in the access aisles for the pickers to pre build some of the boxes if they choose. This is a likely process as they become more familiar with the system. Note the collection of existing empty boxes in the current system.
The graphic above shows the upper level pod and mezzanine. Orders coming to pod 2 will move up the incline conveyor and be diverted at the transfer into the accumulation line for pod 2. If they do not need to go into pod 2 they will continue on the same line and go to shipping. Completed orders from pod 2 will be pushed out on the outbound line and go to shipping.

Order boxes are stage on pallets in the same way they as the lower level. Pallets of empty boxes are brought up to the mezzanine level by forklift. This is quite similar to the operation in the current system. Note the mezzanine must be large enough to clear the flow racks below. This creates extra space on the mezzanine. This can be used for storage of additional pallets of empty boxes and for staging of prebuilt boxes at the pickers discretion. This mezzanine will be
expanded from the current configuration. The stair sections and pallet drop gates will be move
to the new positions.

Pod 1 on the floor level has a dedicated conveyor for replenishment cases. Note that
replenishments for the upper pod use the same conveyor used for outbound orders. This means
that replenishments for pod should be done during a dedicated “replenishment time”. This clears
the conveyor for subsequent order traffic during picking.
All the orders and picks for a wave are downloaded electronically into the system by the WMS. A box selection (box 1, 2, or 3) is included with each order. This selection is based on the number of bottles in the order. The box number is shown on the computer when an order is registered to a batch location.

1. The operator stages a selection of prebuilt empty boxes under the conveyor and workstation for ready use. There would be space for about 30 prebuilt boxes on the floor around the pod.

2. The operator enters the pick mode on keyboard of the workstation computer.
3. The operator registers the locations in the active batch to the 10 sort bar positions with a handheld scanner. The software displays the box type (1, 2, 3) for each location. The operator places the correct box in each batch location.

4. The operator places order id (bar code) labels on each new box in the active batch. These labels are taken from a roll at the pod workstation. The operator then scans the bar code ids on each box to the sort bar location. This confirms the box id to the correct order box for the system.

5. The operator completes the registration process on the computer (enter key).

6. The carousel software sorts the pending picks in optimized bin sequence and rotates all carousels to the first "pick from" location.

7. When the carousels stop at the correct location the light tree indicates the quantity to pick from the location presented. At the same time the workstation sort bar lights the "put to" locations with the quantity to be put into each order box.

8. The operator picks the SKUs (bottles) from the carousels where the light tree indicates.

9. The puts the picked bottles into the order boxes on the workstation where the sort bar indicates.

10. The operator hits the task complete button on the sort bar to tell the system the pick is completed.

11. The operator turns back to the carousels and repeats step 8 (picks SKUs)

12. The picking process (steps 8-10) is repeated until all the order boxes are completed (in that pod).

13. The sort bar indicates when an order box is completed with a “done” message. This allows the operator to tape the box closed and push any single box onto the conveyor immediately upon its completion.

14. The outbound conveyor takes the completed box away.
15. The operator can place an empty box into the empty position in the active batch or can finish the entire batch if they choose. In either case the operator pushes completed boxes out as soon as they are done. If an order is completed in the pod and the box is partially full then the sort bar displays “pass”. The operator then pushes the partially full box out onto the takeaway conveyor. Boxes that are to be passed do not get taped.

16. If the box is full and the order is not done in the pod the operator will tape the box closed and push it out onto the conveyor. They will start another box with a new label and continue picking the order.

**Dynamic Batching**

This system was designed to support the ability to continuously "roll" dynamically batched orders. The operator can push a completed order out onto the conveyor as soon it is completed. Empty boxes can be replaced and scanned into the batch immediately. Note that the software would still indicate the box type to be used whenever a new location on the sort bar is registered. The operator can always maintain a full batch of boxes in front of him to sort into. He will never have to wait to finish picking all the other orders before he can send a completed order on it's way ("end of batch syndrome").

In practice operators typically wait till multiple orders are completed before they scan new boxes into the batch. This cuts scanning time down to a few seconds in between constant picking. The rolling batch typically keeps 50-100% of the batch active at any one time. The operator never has to wait for a carousel bin at the end of a batch. There is always a new carousel bin already in position or on its way.
Interleaved Replenishment

Replenishing during the picking process detracts from the time spent picking. If there is too much replenishment going on it blocks orders and significantly impact the pick rate. Even though the software supports this process, interleaved replenishment should be done in batches and not during peak picking times unless there is an emergency requirement.

Box Taping

Full order boxes must be taped shut before they are pushed out to the outbound conveyor. This is necessary since all boxes must be closed before entering the palletizers.

Bottle System Box Types

There will be 3 box types outbound from the bottle picking system. These are based on bottle quantities. The goal of this method is to create outbound boxes from the bottle system that have reliable square dimensions. This is necessary for the pallet building software to be able to integrate these boxes into the pallets built for shipping.

Box 1

Box 1 will hold the standard twelve bottles. It will be sized to handle the typical bottle diameter and to handle the tallest bottle in the bottle system. Bottles going into this box will typically be multiple different SKUs so there will usually be multiple bottle heights. This box will be stored in the pallet with the bottles standing vertically. This is the same as any other case in the system. This box will be made of sturdy cardboard with dividers so that the box itself can support other boxes stacked on top of it.

Box 2

Box 2 will hold 6 bottles. It will be sized to handle the typical bottle diameter and to handle the tallest bottle in the bottle system. Bottles going into this box will typically be multiple different
SKUs so there will usually be multiple bottle heights. This box will be longest along the height of the bottle. This means the box will move on the conveyor with the bottles resting horizontally. The box will have dividers in it between the bottles. This box will also be stored on the top layer of the outbound pallets. This insures that no boxes will be stacked on top of it.

**Box 3**

Box 3 will hold 3 bottles. It will be sized to handle the typical bottle diameter and to handle the tallest bottle in the bottle system. Bottles going into this box will typically be multiple different SKUs so there will usually be multiple bottle heights. This box will also be longest along the height of the bottle. This means the box will move on the conveyor with the bottles resting horizontally. The box will have dividers in it between the bottles. This box will also be stored on the top layer of the outbound pallets. This insures that no boxes will be stacked on top of it.

**Notes**

All the boxes coming from the bottle system will have an id label on them. This allows the scanners on the conveyor to recognize the box and route it correctly. This label also is used by the scanners at the auto labelers to print the order label.
Special Case Pick

Picking Odd Size Cases

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shorter than 9” long</td>
<td>7</td>
</tr>
<tr>
<td>Shorter than 6” wide</td>
<td>28</td>
</tr>
<tr>
<td>Lower than 6” tall</td>
<td>45</td>
</tr>
<tr>
<td>Longer than 21”</td>
<td>24</td>
</tr>
<tr>
<td>Wider than 17”</td>
<td>2</td>
</tr>
<tr>
<td>Taller than 15.75”</td>
<td>3</td>
</tr>
<tr>
<td>Total in calculation</td>
<td>109</td>
</tr>
<tr>
<td>repeated cases</td>
<td>21</td>
</tr>
<tr>
<td>Total outsize cases</td>
<td>88</td>
</tr>
</tbody>
</table>

This total of 88 was taken from the sample of 4,105 cases we matched up to the existing SKU records. 2.1% of the total are outside dimensional specifications.

The calculated volume for these SKUs is about 83 cases per day.

2.1% of the total of 8,788 SKUs works out to 184 SKUs that will have odd sizes.

The calculated volume for these SKUs would be about 174 cases per day or 4 pallets.

Note

Because of the small quantity of SKUs it is possible to fit all of these SKUs into a single aisle. This will make picking much faster and the same VNA trucks can be used. Most of these SKUs will fit on the bottom two levels of the aisle.
Picking Odd Size Cases

Cases that cannot be run through the automated system (odd size cases) will be done by man up VNA trucks picking cases from pallet locations in the reserve racks. The pick list in this operation will be sequenced within the aisle for the most efficient movement of the man up truck from location to location. This is similar to the case picking operation for replenishing the carousels. It is expected that all the SKUs for these cases will fit on the bottom two levels of one half of a VNA aisle.

Case Picking

1. The WES organizes all case picks by wave. Each wave will be picked onto a dedicated pallet. Because of the small volume of picks for these SKUs we expect that each wave will easily fit onto one pallet. This zone will pick a range of 50 to 100 cases per day.

2. The truck operator retrieves an empty pallet from the pallet drop off area or from the P&D stations at the other end of the system. Empty pallets are kept in both places for easy access.

3. The truck mobile computer can show the available wave pallets to be picked. They will usually match the amount of waves per day. The operator chooses the next pallet to be picked for an upcoming wave.

4. The operator goes to the end of the aisle and enters the pick mode on his screen. This gives them the list of locations and quantities to pick for the wave pallet.
5. The screen tells the operator where to go to and the operator moves the truck to the location. The platform is moved to a height where cases can be picked from the intended location. The exact height is at the operator’s discretion depending on the pallet load in the rack location.

6. The operator picks the quantity of cases for that location and confirms the transaction. An order label is placed on each case picked. This label is printed on a mobile printer carried by the truck operator. This is required since the case cannot be labeled like others going through the system.

7. The operator repeats steps 5 and 6 until the pallet is completed.

8. When the pallet is completed the operator drives the truck down the aisle and drops the pallet off at the drop station.

9. The operator repeats steps 2 through 8 until all wave pallets are finished.

10. These pallets are picked up and brought to the shipping docks. Cases are then distributed to their dock locations during the wave. These cases will have to be manually loaded on the trucks with the rest of the pallets for the order.

**Locations**

Pallet locations for these SKUs should be kept as small as is reasonably possible. The smaller the locations the shorter the aisle will be for this zone. The picker will be able to cover more picks in a shorter distance. This speeds up picking.
3.4 Palletizing Operation

The palletizing operation is the heart of the system. It determines the overall outbound rate of the system and drives the volume of work in the picking zones. The routing of all cases coming from the pick zones is determined by the palletizing system. All the supporting conveyor systems (case and pallet) are designed to insure that the palletizing system can run at full speed. This section describes the operation of a single palletizing module.

Best Fit Software

The “Best Fit Software” drives the palletizing module. The Best Fit software examines each order and determines the make up of cases for each pallet in that order. This means it also determines the exact sequence of cases needed to build each pallet. This sequence determines the routing of all inbound cases into the VLS units.

The Best Fit software can be configured to apply multiple priorities and rules for building the pallets. A description is included in the WES section of this document. A detailed description is in appendix A of this proposal as it is too long to show here.
Palletizer Configuration

The system is designed with 4 palletizing modules. Each module can build pallets at a maximum rate of 800 cases per hour. This would be equal to 16 pallets of 50 cases each. 4 modules running at the same time can produce up to 3200 cases per hour. Each module is made up of:

- 8 VLS units (storing 228 cases each with a total of 1,824 cases per module)
- 2 Palletizing robots (building 2 pallets simultaneously)
- Inbound case conveyor system
- Outbound case conveyor system
- Inbound conveyor for empty pallets
- Outbound conveyor for empty pallets

VLS Units

The Vertical Lift Storage unit (VLS) is an automated storage machine that stores up to 228 cases. Each machine can pick and store 2 cases per minute (2 in and 2 out per minute). Cases are stored on 19 possible shelf levels. An automated extractor device moves vertically between the shelves and picking and storing cases. Cases are brought to and taken away from the VLS by conveyor. There are 8 VLS units in each palletizing module. This gives each module a capacity of 1,824 cases. This means each module can hold approximately 36 pallets @ 50 cases each.

The palletizers run at 800 cases per hour and require an average of 13.3 cases per minute. 8 VLS units can reach an upper rate of 16 cases per minute. Since not every VLS gets a case for every pallet in a sequence, the VLS units are designed for a slightly higher rate (20%) than the palletizers. This also allows for an increase in palletizer rate if equipment upgrades are made in the future.
Waves and Routing

Each palletizing module can hold up to 1,824 cases in 8 VLS units. All four palletizing modules can hold up to 7,296 cases in 32 VLS units. This would be roughly equal to 24 orders of 300 cases each. The total capacity of cases in the combined VLS units determines the maximum size of the pick wave the WES can send to the pick modules.

The WES selects combinations of orders that are close to the maximum wave size in combined cases (for all Palletizer modules). This process is described in greater detail in the WES section of this document. Case makeup and building sequence for each pallet in these orders are determined by the Best Fit Software prior to the wave being sent. This build sequence then determines which palletizing module and which VLS units that each case can be sent to. This sequence is turned into conveyor routing destinations by the WES. The WES uses these routes to sort the cases to the correct diverts on the main sorter. There is a divert off the sorter for each of the 32 VLS units.
Inbound Sorter

The inbound sorter brings all the cases to the palletizing module. The sorter runs down both sides (left / right sides) of the module and diverts cases into the VLS units.

Outbound Conveyor

The outbound conveyor runs down the center of the module. All VLS units feed outbound cases onto the main outbound line. This line takes cases to the palletizer.

Palletizer

The palletizer takes the inbound cases and builds order pallets with them. The palletizer uses two robots and builds pallets in two positions. This allows the robots to continue building pallets without losing time when a completed pallet is switched out for an empty. Completed pallets drop down to the floor level for transport to the shipping dock.
Palletizer Configuration

Inbound cases come into the VLS modules from the inbound sorters (left or right). The inbound sorters are supported by the mezzanine at an elevation of 18’-6”. This allows the sorter and related saw tooth conveyor sections to operate on one level. This simplifies the conveyor layout and general access.

Palletizer Mezzanine

The outbound case conveyor and palletizer are supported by the palletizer mezzanine at an elevation of 13’. This allows complete access around the palletizing robots and inbound case conveyor with no interference with the inbound sorter above. This also provides single level access to all outbound cases coming out of the VLS into the palletizer robots.

Pallet Building Positions

The pallet building positions move vertically from top to bottom as the pallet is built. When the pallet is completed it is shrink wrapped on its way to the bottom level. At the bottom level the pallet is taken away by fork truck.

Floor Level

Empty pallets and completed full pallets move in and out of the palletizer on the floor level. This allows them to be resupplied by fork trucks both coming to the system from one side and going out on the other.

Pallet Conveyors

Pallet conveyors are used to deliver empty pallets to the palletizer and take completed full pallets away from it. A pallet destacking machine is used to singulate inbound pallets to the palletizer.
Palletizer Module – Inbound Cases

VLS destinations are determined for all inbound cases prior to the pick wave being sent to the pick modules. Inbound cases coming out of the pick modules are first diverted to the left side or right side sorter depending on which side the destination VLS is. Destinations are determined by the case id (SKU id) which is read in the scan tunnel at main sorter induction. This happens before the case gets to the either sorter.

1. SKU id is read on the case at sorter induction
2. WES determines the VLS the case will be sent to
3. The case is diverted to the left or right side sorter
4. The case travels down the sorter to the correct divert
5. The sorter diverts the case to the correct VLS (1 of 8 in the palletizing module)
6. The case moves to the end of the conveyor divert into the pick up position
7. The VLS picks up the case off the pick up position and moves it into the VLS
8. The VLS puts the case away in the nearest empty position in the VLS
9. The case id and VLS location are recorded by the Best Fit Software and WES
10. Steps 1 through 9 are repeated for all inbound cases.

Case Tracking

All inbound cases are tracked on the sorter and VLS using sensors. The case id is only read at the sorter induction point. If the case is recirculated it must pass through the scan tunnel again. Case ids and locations in each VLS are held in the WES and Best Fit software. This allows real time status through the WES at any time for a supervisor.
Outbound Cases

When building an order pallet the Best Fit software will direct the VLS units to pick the correct cases for that pallet. The cases must come to the pallet building robot in the sequence they must be built on the pallet. Cases arrive at the VLS units in random order from the pick modules. With a capacity of 1,824 cases, each module can hold up to 36 order pallets.

1. The Best Fit Software recognizes that all the cases for an order pallet have arrived in the VLS units of the palletizer module.

2. An empty pallet is positioned in one of the two build positions (this goes on concurrently)

3. The Software signals the VLS units to pick the first 8 cases for the pallet.

4. Each VLS retrieves the correct case and places it onto the outbound feed spur (see graphic)

5. Each case is moved to the end of the feed spur. The VLS units repeat step 4 at this time placing another case immediately behind the case on the feed spur.
6. All 8 cases are simultaneously moved onto the main outbound line from each feed spur. This forms the exact sequence of 8 needed to build the pallet.

7. All 8 cases are moved down the main outbound line to the pallet building positions.

8. As soon as the last case of the first 8 clears the last feed spur the system repeats steps 6 and 7. This keeps a constant stream of cases at the pallet build positions.

9. Each case is automatically labeled just prior to entering the pallet build positions

10. Cases are picked up by the robots and place on the correct pallets.

11. Steps 3 through 9 are repeated until the order pallet is completed. The full pallet is dropped down to the lower level and a new pallet is moved into the build position.

12. After a pallet is completed steps 1 through 11 are repeated until the wave of work is completed.

Palletizer Module – Outbound Cases

Pallet Building Sequence

A pick wave is a group of orders that will be picked from the system and sent to the palletizing modules. Within the wave, the WES selects orders and pallets to be sent to each palletizing module. The Best Fit software determines the pallet building sequence for each pallet to be built in the module. This sequence determines the VLS destination for every inbound case. At 1,824 cases each module can build up to 36 pallets (50 per pallet). The Best Fit software will build the first pallet available in the system and continue at full speed until the wave is done. This means that completed pallets will be coming out of the palletizing module in random order within the wave. This keeps the system running as fast as possible.
Important Notes

Maintain High Rates

To keep building pallets at the fastest possible rate it is critical that the system have the widest range of cases to choose from in the available in the VLS units. In short the system needs the freedom to build the first pallets available. This method keeps the system running fast and insures there are no delays waiting to build specific pallets if the cases are not all there yet.

Larger Waves

It is equally important for the system to process the largest waves possible. This insures the maximum amount of pallets in each module and increases the probability of pallets being available in the modules more quickly. Larger waves have positive impacts on the system in multiple other areas. This is further described in the WES section of this document.
General Description

The palletizer takes the inbound cases and builds the pallets in predetermined sequence. There are two robots with 2 separate heads that pickup cases from the inbound conveyor and place them on a pallet. Both robots work on one pallet at a time. The control system coordinates the movement of the two heads so they work together efficiently.

Robots

Each robot has a different range of movement but can reach any space on both pallets. Each robot has a dedicated pickup point on the inbound conveyor. The graphic above shows the range of movement.
Palletizing Robots

Palletizer Operation

The goal of this design is to keep the pallet stacking operation moving without interruption. This is why there are two operating positions on most parts of the palletizing system. There are two pickup positions on the conveyor so both robot heads can work at the same time. There are two robot heads to maintain a constant high rate of case stacking. There are two pallet build positions so no time is lost to switching out full pallets for empty ones. This description of operation goes sequentially through the pallet building process. In a two head robotic palletizer there are multiple operations happening simultaneously.

1. Cases arrive in streams of 8 on the outbound conveyor.
2. Each case is labeled with a unique order label by the automatic labeler.
3. Cases arrive on the inbound conveyor in alternating head sequence (1,2,1,2,1,2,1,2)
4. Case 1 moves to the pickup point for head 1 at the end of the conveyor. Simultaneously case 2 is transferred to the pickup point for head 2.
5. The next two cases move to their respective queue positions (case 1 and 2).
6. Robot 1 picks up the case in pickup point 1 and places it on the pallet in position (A).
7. Robot 2 picks up the case in pickup point 2 and places it on the same pallet (A). Steps 6 and 7 operate at the same time but follow independent paths.
8. Cases in the queue positions move up along with the cases behind them. This happens concurrently with steps 6 and 7.
9. Steps 3 through 8 repeat until pallet A is completed.
10. When completed pallet A is dropped down to the floor level, shrink wrapped, and moved to the outbound pallet conveyor.

11. When pallet A is moved out an empty pallet is moved into its place and raised back up into position A.

12. Immediately after step 9 the robots start building pallet (B). This happens at the same time as steps 10 and 11 are taking place.

13. When pallet (B) is completed the robots switch to pallet (A) and steps 6 through 9 are repeated.

Order Labeling

Each case is labeled with a specific order label prior to entering the palletizers. The outbound case sequence is known. The cases are tracked down the conveyor so the labeler places the correct order label on each case. Note that the automatic labeler is placed in an area easy to access. This allows operators to get to it easily for roll replacement or troubleshooting.

Robot Design

Improvements for speed and reliability are constantly being made in the robotic configuration of the palletizer unit. The robotic design for this system may be different than the graphics shown.
Inbound Pallets

Inbound Empty Pallet Stacks
Inbound empty pallets will be coming from the pick modules and reserve storage in the main transport aisle. These will be staged in stacks of 10 pallets along the VLS units in front of the inbound pallet conveyor. They will be loaded onto the inbound pallet conveyor as space becomes available.

Inbound Pallet Conveyor
The inbound pallet conveyor supplies empty pallets for the palletizers. There is queue space for 6 stacks of pallets (60 pallets). The destacker takes a stack of 10 pallets in one side and dispenses them out one at a time on the other side. Single pallets are queued up to feed both pallet building positions at the floor level

- 16 pallets per hour (@ 800 cases per hour and 50 cases per pallet)
- 1 pallet every 3.75 minutes (3 minutes 45 seconds)
- 60 pallets in queue @ 3.75 minutes per = 225 minutes
- 3.75 hours supply of empty pallets on the inbound conveyor

The inbound pallet conveyor must be kept constantly full to keep the palletizers supplied. This means the inbound pallet conveyor must be loaded with 6 stacks of empty pallets every 3 hours or so. This in turns means there must be stacks of empty pallets staged for loading.

Operators should continually keep these conveyor queues full with empty pallets in the course of the day. This process is visually simple since operators can easily see and react to the inbound pallet conveyors along the main aisle. This status is also available on the WES screens as well.

**Inbound Pallets**

**Inbound Pallet Conveyor**

1. Truck operators load stacks of empty pallets onto the end of the inbound pallet conveyor.
   
   Each stack has 10 empty pallets.

2. Stacks of pallets are moved to the pallet destacker. A stack of pallets is moved into the destacker. All the stacks in queue move up one position on the pallet conveyor.

3. The destacker dispenses one pallet at a time onto the pallet conveyor on the other side.

   This conveyor takes the pallets into the two build positions. The pallet conveyor can queue up 5 empty single pallets prior to the two build positions.

4. When a pallet is completed it moves to the lower level and moves off the build position.
5. An empty single pallet moves into its place and other pallets behind it in queue move up one position. This operation will happen approximately every 3 minutes and 45 seconds.

**Completed Pallets**

Completed pallets come down to the floor level at two positions. The pallets are moved by the outbound pallet conveyor onto a shared line where they are queued up for transport to the shipping dock. They move to a pick up point at the end of the conveyor.

1. The completed pallet is lowered from the upper level and is shrink wrapped on the way down to the lower level position (directly under the build position).

2. The completed pallet moves off the build position onto the outbound conveyor. Both positions make two 90 degree transfers right.

3. The completed pallet moves to the end of the conveyor and stops at the pallet pick up point.

4. Completed pallets coming behind it queue up on the pallet conveyor. There are 6 queue positions for completed pallets.

5. The pallet is taken off the pickup position by fork truck. All pallets behind it move up one position.

There is space for six completed pallets on the outbound pallet conveyor. At 3.75 minutes per pallet this means the outbound line fills up every 22 minutes. Truck operators at the shipping dock must keep up with the outbound rate of completed pallets and remove them from the conveyor at regular intervals (10 to 15 minutes). Otherwise the palletizers must stop.

**Note**
There is no limitation in assigning dock doors to any order in the system. It is recommended that the dock door assignments be set reasonably close to the palletizing module building that order. This minimizes the travel time for moving pallets to the dock doors.

**Inbound Pallets**

**Status Screen**

The status screen shows the truck operators which pallets are completed and what dock door to take them to. This is a large screen mounted above the pallets at the pallet pickup point. This is critical to know since the completed pallets will be coming off the palletizer in a random sequence. This also becomes an easy and visible way for anyone on the dock to instantly see the status of outbound pallets at any module. This data is also visible on the mobile screens of the trucks. At a minimum, for each position it will show.

- Order ID
- Order Status (2 of 6 pallets etc.)
- Dock door assignment

During the engineering phase we may decide to make more information available on this screen (module status etc.) This will be worked out in cooperation with Law during the engineering phase.

**Manual Pickup**

Currently every outbound case goes on a pallet. The system is designed to support this process. Two of the palletizing modules have a bypass divert and a manual pickup line. This allows a case to go through the main sorter, bypass the palletizes, and be diverted directly down to the
shipping dock. This will be necessary from time to time for broken or miscellaneous cases that simply need to get to the dock without going through the VLS units and into a pallet.

This is also necessary to provide some flexibility in the system. There may be times when cases are required that don’t need to be part of a pallet. We should not design the system so that every case must pass through the palletizers. While this feature is included on two modules, it can be added to all 4 modules in the future.
3.5 Shipping

Sample Wave

<table>
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<tr>
<th>Palletize Module</th>
<th>Truck</th>
<th>Order</th>
<th>Cases in Module</th>
<th>Pallets</th>
<th>Pallets on truck</th>
</tr>
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<tr>
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The bottom row shows the totals for orders, cases, and pallets across all palletizers and all trucks.

Description

The chart on the left is the wave that corresponds to the graphic on the following page. This wave will be a typical size wave on an average day of 21,000 cases. The columns are explained below.

1. Column 1 shows the palletizer the orders would be assigned to.

2. Column 2 lists the trucks assigned to the orders for that palletizer.

3. Column 3 shows the orders assigned to each truck (to be built in that palletizer).

4. Column 4 shows the cases in each order.

5. Column 5 shows the total cases for each palletizer (sum of the cases in the orders).

6. Column 6 shows the quantity of pallets to be built for each order.

7. Column 7 shows the quantity of pallets going onto each truck from the palletizer.

Work Wave

All shipping operations depend on the make up of the wave of work coming to the palletizers. The wave is a selection of orders that will be going out on a specific group of trucks. It is determined by the WES prior to any work being sent into the pick zones. Waves must be large enough to fill the palletizers with enough work that they can run without interruption. They will typically have between 5,000 to 7,000 cases. This means they will fill a range of 100 to 150 pallets and go into 5 to 10 trucks per wave.

Pallet Building Sequence

To get the fastest pick rates the wave is sent as a single block of work into the pick zones. It comes from all pick zones, through the conveyor system and is sorted into the palletizer modules. It arrives at the palletizers in a random sequence of cases across all orders. The palletizers start building pallets as soon as all the cases for a pallet arrive in the VLS units. This means the palletizers build the pallets assigned to them in a random sequence. This is absolutely necessary in order to maintain maximum rates.
Shipping

Wave Configuration

The wave cannot be larger than the total amount of cases than the 4 palletizer modules can process. Within the wave each palletizer module cannot be given more cases than it can process.

Other than total case quantities listed above, there is no limitation on the amount of orders within a wave. There is no limitation to the amount of trucks used to ship the wave either.

Orders can be assigned to one or multiple palletizers depending on order size. Any combination of trucks can be assigned for shipping orders as well.

Door Selection

Any door can be selected for truck loading. It makes sense to assign doors close to the palletizers building the orders for those trucks. This minimizes travel time between the pallet pick up point and the dock door.

When trucks are in place, space on the dock should be allowed on each side of a truck for staging pallets that can’t go directly onto the truck. This is likely to happen for trucks making multiple stops since pallets do not come out in stop sequence. This is not needed for trucks making a single stop.

Pallet Staging

There will be times when pallets are being built for shipping and the trucks are not in place at the dock. There is 50’ of space between the docks and the pallet pickup points for this reason. This allows multiple spaces for staging pallets for truck pickup.

Lines will be painted on the floor to match the outlines of the trailers. These spaces will be subdivided by lines dividing the truck into multiple spaces (3 or 4 spaces). The status screen directs the truck operator to the space where the pallet is to be dropped off. This allows operators to place every pallet coming off the palletizers into the exact space it needs to be.

Status Screens

The status screen at the pick up points shows the truck operators which pallets are completed and what dock door to take them to. This is critical to know since the completed pallets will be coming off the palletizer in a random sequence.

- Order ID
- Order Status (2 of 6 pallets etc.)
- Dock door assignment
- Truck load position
Shipping

This section describes the process for operators moving pallets from the palletizers to the shipping docks.

Truck Loading

1. The palletizers place a pallet on the outbound pallet conveyor at the floor level. This pallet is moved to the end of the conveyor at the pick up position. The pallet conveyor can hold up to 6 pallets in queue.

2. The status screen shows the destination for the pickup pallet. It also shows the same information for all pallets in queue at the pallet conveyor. This gives the operators advance knowledge of what is coming and where it will be going.

3. The truck operator picks up the pallet at the end of the pick up position (end of the pallet conveyor). The status screen tells them the dock door destination and load sequence. The operator enters the pickup on the mobile unit on his truck. This unit carries the same information as the status screen.

4. The operator moves the pallet to the truck or dock loading point indicated on the screen. The pallet status is again updated on the mobile screen which also updates the WES.

5. The operator repeats steps 3 and 4 until all pallets are taken off the inbound conveyor.

Pallet Staging

If pallets are being staged on the dock operators will complete the staging process with no truck in place. When a truck is in place operators will move the pallets from the staging space to the truck. Pallet status will then be updated.
Pallet Tracking and Identification

The system knows which pallet is being built so the movement is tracked on the outbound conveyor to the pickup point. From the pickup point the pallet can be tracked from its pick up entry on the truck mobile unit. If a pallet needs to be identified at any point, the order label on any case on the pallet can be scanned. The WES system knows which cases are on which pallets so the pallet can be identified.

Notes on Procedure

There are multiple methods for setting up the shipping process. The procedure described here is preliminary. Law Warehouses may want to set this process up differently. The exact procedures used on the shipping dock will be worked out in cooperation with Law Warehouses during the engineering phase of the project.
3.6 Conveyor System

Carousel System

Recirculation Loop
The carousel conveyor system is designed as a single loop with cases entering at the loading area and exiting onto the diverts for the carousel stacks. This design enables the system to handle surges of hundreds of inbound cases and continue to present a steady flow to all the carousel stacks. Each divert can handle up to 3 cases in accumulation in front of the extractor. This means the conveyor system can absorb 24 inbound cases immediately without having to recirculate any. At normal system rates the extractors will continually store a range of 16 to 20 cases per minute. This means the conveyor system can absorb a steady rate of 960 to 1200 cases per hour. This would be 19 to 24 inbound pallet loads at the pallet stripping area.

Future Expansion
The inbound sorter is designed to handle future expansion to 14 carousel stacks. Future sort points will be built into the sorter that will allow these carousel stacks to be added without having to reconfigure the conveyor system. The sorter itself will be a shoe sorter so it can handle the future expanded rate. This is the same type used in the main sorter at the palletizer modules.

The outbound conveyor also will have future merge points built into it to accommodate the expanded system. This also allows stacks to be added without interrupting the operation in the future.
Carousel System – Inbound Cases

1. Cases are loaded onto the conveyor at the floor level in the pallet stripping aisle (A). Cases will be loaded in groups of 50 or so since whole pallets will be dropped off to be sent to the carousels.

2. Cases go up the incline conveyor (B) reaching the mezzanine height and run into the sorter induction area (C).

3. Cases are spaced out at the sorter induction area (C) and pass through the scan tunnel (D). The case id (SKU) is scanned at the scan tunnel. Tracking of cases begins when the case comes out of the scan tunnel.

4. The WES selects a carousel stack to route the case to.

5. The case enters the inbound sorter (E) and is diverted to the chosen carousel stack on an inbound diverts (F).

6. The inbound diverts (F) can accumulate up to 3 cases in front of the extractor. Cases are indexed onto the extractor as needed.

7. The case is moved onto the extractor (G) and stored in the carousel stack.

8. If the case cannot be diverted then it runs off the end of the sorter onto the recirc loop (H). Tracking of the case ends when it runs off the sorter and enters the recirc loop.

9. The recirc loop (H) brings the case back around to the end of the belt conveyor on the floor passing through the pallet stripping area (A). Steps 2 through 6 are repeated until the case is diverted.

10. If the case label cannot be read at the scan tunnel it is diverted onto the no read line (I). The case is taken to the floor level where it can be manually examined and the label fixed. These cases can then be sent back into the system at case loading area.
Routing

The routing of the cases is determined by the WES. There are a series of routing priorities for different SKUs going into the carousel system. This routing process is described in more detail in the WES section of this document.

Case Loading

The belt conveyor at the floor level extends across multiple aisles of the VNA system to allow multiple pallets to be dropped off in this area at the same time. Whole pallets will be stripped and loaded onto the conveyor at this point. This means cases will enter the system in groups of 50 or so in a short window of time. The system is designed to handle these surges of inbound cases.

No Read Line

The no read line runs from the sorter on the mezzanine along the side of the carousel stacks down to the floor level at the end of the carousel stacks (about 100 feet long). The full distance is not shown on this graphic. No read cases are moved down to the floor level on this line since they must reenter the system at the floor level over at the loading area. Cases will be manually examined and the labels will be fixed at the floor level. If a case must be removed then the operator will enter it in the WES and call for another case.

Inbound to Bottle Pick

Sections for the bottle system have not been finished yet. They will be added to this document as soon as they are completed.
Outbound from Picking

Transport Speed
The goal for this part of the conveyor system is to get the cases from the pick zones to the palletizers as fast as possible without damage or hangups. Speeds for individual sections of conveyor will be set during the testing phase of the project.

Conveyor Support
The conveyor is supported by dedicated mezzanines and decks in the pick modules and at the carousels. It is hung from the sorter mezzanine in two places. It is supported by the palletizer mezzanine before crossing into shipping. In the shipping area the conveyor is supported by an open frame structure on the floor. Catwalks next to the conveyors are used for maintenance access in shipping (not shown).

Inbound Traffic
Inbound cases will typically be spread out across the 5 input lines for carousels, and the pick modules. The average split will be 28% from the carousels and 18% on each pick module line. This will vary wave to wave and at different times of the day.

Conveyor Paths
The conveyors cross the palletizer mezzanine at breaks between the palletizer robot and the VLS units of the adjacent module. This is the only place in the system layout where the lines can run east to the shipping area. This is why the lines from the pick modules turn right after coming out of the modules.

Palletizer Mezzanine
The exact configuration of the palletizer mezzanine can be seen in this graphic. This mezzanine section may be hung from the adjacent sorter mezzanine and supported by the frames of the VLS units. This decision will be made during the engineering phase of the project.
Outbound from Picking

1. Cases will simultaneously come from the carousel system (A), the bottle system (B), and both pick modules (C) and (D). All of these cases will be put onto the conveyor lines to be taken to the sorter. This process will be ongoing on all conveyor lines at the same time during a pick wave.

Pick Modules

2. Each pick module has 4 levels with a belt conveyor line on each level. Cases can enter the conveyor system at any of the four levels in the pick module. With pickers on all levels this will be happening at the same time on all levels.

3. In each module there are two separate conveyor lines. Levels 1 and 2 use one conveyor line and levels 3 and 4 use another one. Each conveyor line runs separately to the saw tooth merge. These lines run parallel to each other and follow the same path through the system.

4. Case on all the conveyor lines coming from the pick modules run on the belt conveyor up to the accumulation zones (H) in front of the saw tooth merge.

Carousel and Bottle Systems

5. Cases coming out of the carousel system (A) will be placed on individual spurs coming off the extractors. Each spur can hold 2 cases. One in the feed position and one in queue.

6. Cases are fed onto the merge line running across the carousel extractors. Multiple spurs are feeding cases onto the merge line at the same time. The control system manages the timing and case traffic.

7. Cases move onto the belt conveyor and run up to the accumulation zones (H) in front of the saw tooth merge.
8. Cases coming from the bottle system (B) come off the carousel pod and run on a dedicated belt conveyor line up to the saw tooth merge (H).

Saw Tooth Merge

9. Cases accumulate on each line going into the saw tooth merge independently. When the cases on a line accumulate to a set level, the control system releases the slug of cases onto the saw tooth merge. Cases can also be released at any time based on the open capacity on the sorter. These settings will be made configurable in the control system.

Notes

The belt conveyor lines for each area will be set at the highest speeds possible without endangering the safe transport of the cases. This will be determined during the testing phase of the project.

All conveyors will be 24” wide with guardrails independently set. The accumulation zones will be 24” long. The maximum case size that can be put onto the conveyor is 21” long by 17” wide by 6” tall. Any wider than this and the cases will get caught up on the curve sections. The 21” long case leaves a maximum of 1.5” of clear space to the case in the next accumulation zone.
Sorter Operation

A shoe sorter will be used for the sorting of cases into the VLS units. This is the best choice for diverting cases of liquor. It can run at high speed yet moves the case smoothly onto the divert spurs. It has a high sorting rate and can handle a wide range of case sizes. Shoe sorters have a long and reliable history moving this type of case load. The sorter is designed to process cases at 75 per minute and handle surges up to 90 per minute.

Conveyor Design

Belt conveyor is used wherever a controlled speed is required on the conveyor system. This is especially important whenever cases are being tracked. It is used on the induction line, in between the sorters and on the divert spurs.

Live roller conveyor is used whenever cases need to be slowed down, accumulated, and on curves. This method also has a long history of success with this type of case load.

Equipment selection

Final equipment selections will be made during the system engineering phase of the project. Some alterations may be made based on changes in dimension, speed, or function.

Sorter Divert Design

Cases will come off the sorter and onto the divert at approximately 250 feet per minute. Cases need to be slowed down and moved one at a time into the VLS transfer without damaging, tipping, or hitting each other. This must be done with multiple cases being diverted consecutively down a single divert since this is a possibility when sorting a wave.

1. A case come off the sorter onto the powered roller section of the divert. This clears the case off the sorter quickly.
2. The case move onto the belt conveyor which slows it down to a controlled speed for entry onto the accumulation zones. The belt conveyor moves at a variable speed. It takes the inbound case at the sorter speed at one end and slows it down to roughly 100 feet per minute on the other. It can do this with consecutive cases.
3. Cases move onto the accumulation zones and are indexed toward the VLS transfer. Each accumulation zone is an independently powered section of belts over rollers. This insures exact positioning (spacing) of the cases as they advance to the VLS transfer point.
4. Cases are transferred into the VLS by an arm which moves on a track. This arm moves the case into the VLS for pickup and storage.

The VLS transfer is part of the VLS machine. This section sits outside the VLS and receives cases from the conveyor (divert). The moving arm is mounted to a fixed track that runs into the VLS. This arm sweeps the case onto a pickup section that is integrated with the “fingers” of the VLS storage shelf. This places the case into a position where it can be picked up by the vertical carriage of the VLS.
Sorter Operation

1. Cases accumulate on the lines coming from the picking areas. Cases enter the saw tooth merge (A) in slugs and run onto live roller accumulation conveyor line.

2. Cases move into the induction line (B) where they are spaced out by a series of belt conveyors. This spaces them out for the sorter.

3. Cases enter the scan tunnel (C) where the SKU id is assigned to each case passing through.

4. When the cases enter the sorter immediately after the scan tunnel (C) the system begins tracking the cases as they move down the sorter on the left and right side.

5. Depending on the case id the system may divert the case onto the right side sorter at the sorter split (D). The cases going into the sorter will be split in approximately in half between the left side (E) and right side sorter (F).

6. If the case label cannot be read (no read) the case is diverted down the no read line on the left side sorter. At the end of this line the case is manually examined and the label is fixed. The case is then put onto the adjacent recirc line going back into the saw tooth merge.

7. Almost all cases going down the sorter will be diverted to one of the VLS units on one of the 32 sorter diverts (G). Each divert can hold up to 4 cases in queue. This allows multiple cases to go down single diverts when necessary and greatly reduces the recirculation of cases.

8. When cases reach the end of the sorter (H) the system stops tracking them.

9. Cases that reach the end of the sorter on either side run onto the recirc lines (I). At this point they must go back through the scan tunnel to go back onto the sorter.
10. The recirc lines merge into a single line (J) which goes back to the saw tooth merge (A).

When the case reaches the saw tooth merge steps 1 through 8 are repeated.

**WES Routing**

The routing of the cases is predetermined by the WES using the Best Fit software. What this means is that specific SKUs are to be sent to specific VLS units, not specific cases. When a slug of cases of the same SKU enters the sorter, the WES can choose which VLS to send each case to. They will eventually all end up in the correct VLS units but the sequence they are sorted in is up to the WES. This gives the WES the flexibility to route cases on the sorter in a way that spreads cases evenly across all diverts, prevents backups at diverts, and reduces recirculation of cases. The most important reason to do this is to keep all palletizing modules working evenly through the course of a wave. This routing process is described in more detail in the WES section of this document.

**Bypass Diverts**

There are two diverts on the left side sorter that bypass the VLS units and go directly down to the shipping level. These diverts are there for any cases that need special handling or that do not need to be palletized. These diverts are in palletizer modules 1 and 4 at both ends of the system. Modules 2 and 3 have divert points built into the sorter so they can be added in the future if required.
Outbound from VLS Units

**Outbound Cases to Palletizers**

1. Cases are put out in groups of 8 at a time (1 from each VLS) to match the sequence needed to build the pallet that is in the palletizer. The conveyor system is designed to support this movement of 8 cases simultaneously.

2. Each VLS picks a case out of storage and places it on the queue position (A). Tracking of cases begins at this point.

3. Cases are moved from the queue position (A) to the outbound feed position (B).

4. When all outbound feed positions have a case then all outbound feed positions (B) move the case onto the main outbound line (C) at the same time.

5. The eight cases move down the outbound line (C) and pass the auto labeler (D).

6. The auto labeler (D) places the order label on the case as it goes by.

7. Cases are fed into the palletizer unit (E). A detailed description of the case movement within this unit is included in the palletizer description of operation.

8. When all eight cases pass the last outbound feed position (closest to the auto labeler) then steps 4 through 7 are repeated. Cases are continually coming out onto the queue positions (A) and feed positions (B) while the previous group of 8 is moving down the main outbound line (C).

9. Tracking on the conveyor ends when the cases are placed on the pallet.

**Note**

The system must simultaneously pick and move 8 cases at a time due to the tight space windows on the conveyor. The system can process less than eight cases at a time however the process still takes the same amount of time as it does for a group of 8.
Configuration

The pallet conveyor is located on the floor directly below the palletizer robots. The goal of the pallet conveyor is:

- Queue up and supply empty pallets to the palletizer robots
- Remove full pallets from the robots and queue them up for transport to shipping.

At full speed the palletizing robots can build a pallet every 3.75 minutes. This means the system will need an empty pallet and discharge a full pallet every 3 minutes and 45 seconds. Both empty and full pallets are moved by fork truck to and from the pallet conveyor. This requires a large enough inbound queue space so that the fork trucks are not consumed with transporting empty pallets. It also means that there must be adequate outbound queue space on the outbound side to allow trucks to leave the palletizer module briefly for other tasks on the shipping dock.
The system is designed so trucks can stock the system with over 3 hours of empty pallets. This allows the system to work without interruption and frees up trucks for other tasks.

Pallet Conveyor

1. Empty pallets will be staged on the floor next to the system in stacks of 10. There is space for 8 to 10 stacks of pallets next to the inbound conveyor.

2. Fork trucks load stacks of empty pallets (10 per stack) onto the inbound load position (A).

3. Stacks of empty pallets are moved down the inbound pallet conveyor (B) towards the destacker unit (C). There is space for 6 stacks of empty pallets on the conveyor and 1 in the destacker. At 3.75 minutes per pallet these 6 stacks represent 3 hours and 45 minutes of palletizer operation at maximum speed.

4. A stack of empty pallets moves from the pallet conveyor (B) into the pallet destacker unit (C).

5. The pallet destacker unit puts 1 pallet at a time onto the pallet conveyor (D) on the other side. The unit looks for any empty space immediately on the other side. If there is an empty space then a single empty pallet is placed there.

6. Single pallets move down the pallet conveyor (D) and are fed onto the two feed lines for each build position (E). There are 2 pallets in queue for position 2 and 3 pallets in queue for position 1. Regardless of position, an empty pallet will be advanced to fill any open position created.

7. When a full pallet is discharged of either build position (1 or 2) an empty pallet is moved in to take its place on the pallet build position (F).
8. Pallets are built in positions 1 or 2 in alternation sequence. This means a pallet is built in position 1 then 2, and then back to 1 (1,2,1,2 etc.)

9. When a pallet is done it is lowered to the floor level and discharged onto the outbound pallet conveyor (G). There is a separate discharge lane for each build position. Tracking on the conveyor begins at this point for the WES.

10. The full pallet is moved down the outbound pallet conveyor (G) and makes a right turn.

11. Full pallets can accumulate in the queue positions (H). There are 7 queue positions for full pallets on the outbound conveyor (G).

12. Full pallets are taken off the conveyor (G) by fork truck at the pallet pickup point (I). The status screen give the information (pallet, order, dock destination, etc.) at the pickup point. This is further described in the shipping section. The tracking on the conveyor allows the WES to know which pallets or on the outbound pallet conveyor.

13. When a pallet is taken from the pickup point, all pallets behind it move up one space.

14. The conveyor tracking ends when the pallet is picked up off the conveyor. The WES still knows where the pallet is though.

Notes

At 3.75 minutes per pallet the outbound pallet conveyor can accumulate 26 minutes of full pallets on the outbound conveyor at each module. Trucks on the shipping dock must keep up with this outbound flow of full pallets. If they don’t, the palletizing robots will stop because there is not space to put full pallets. In practice this means the trucks on the shipping docks must stay there continuously when the palletizers are operating.
3.7 Network

System Network
The graphic on the following page shows a conceptual view of the network for this system. The exact configuration will be developed in cooperation with Law Warehouses. System Logistics will be supplying the computer hardware and Law Warehouses will supply the network. This makes sense since the building network will be integrated with the Law Warehouses offices and other Law Warehouses operations. It is typical for the customer to buy the computer hardware directly since this is more cost effective.

Additional stations may be added or changed during the engineering phase of the project. A network plan should be developed for the system that supports all Law Warehouses current requirements and can easily be expanded as the system changes or expands.

Connections
This graphic shows the organization and components of the network controlling the system. Actual network connections (shown in lines on the graphic) can be hard wired or wireless. Due to the physical size of this system it is likely that much or this network will be wireless. This will be determined during the engineering phase of the project.

Hardware List

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</tr>
<tr>
<td>9</td>
<td>Workstation computer (carousel pods)</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>Hand Held Laser Scanners and Wedges (bottle system)</td>
<td>3</td>
</tr>
<tr>
<td>11</td>
<td>Laser printer (bottle system)</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Pod Cabling Kits (bottle system)</td>
<td>2</td>
</tr>
</tbody>
</table>

Actual quantities and physical positions will be worked out in cooperation with Law Warehouses. It is likely that we will work up standard configurations (such as for the trucks and monitors) and Law Warehouses will decide how many they would like and where to put them in the system.
Network

Servers
A server for a standard pc network would be required for the WES. A backup system would be needed to ensure continued system operation.

System Monitors
The system monitors allow supervisors and operators to see all areas of the system with real time status (dashboards). All system monitors have the same data available.

Due to the distance between areas, monitors are placed in multiple places in the system.

CANbus network
The CANbus network that controls the light system in the picking modules would be not directly from the System logistics server.

Shipping Screens
Large screens will be placed above the full pallet takeaway lines in each palletizing module. Shipping data (stock start and order data) will be easily visible on these screens. This gives any operator direction on the order status and where to move the pallet.

Conveyor Controls
The conveyor controls would be located in a control cabinet near the carousel system. The system is designed so that the conveyor will be connected to the control panel through the network.

Due to the physical size it is likely there will be multiple control panels for the conveyor system. The exact number will be worked out during the design engineering phase of the project.

All trucks in the system will be directed by mobile units or the trucks. This method will be used on the VNA trucks and transport trucks.

The hand held mobiles would only be used for manually checking cases that needed to be checked at miscellaneous places like the no read line.
4. Warehouse Execution System

4.1 Introduction

WES

The Warehouse Execution System is a customized software package designed to operate the warehouse at the direction of the WMS. It fills in many of the complex functions between the inventory management functions of the WMS and the standard warehouse operations such as receiving, put away, picking, palletizing etc.

In traditional automated material handling systems designs, many of the standard operations are such as batch picking, pick to light, and palletizing, are handled by standard software packages. These are often supplied on a stand-alone basis. Standard packages on this system would be, Best Fit, PowerPick, AutoPick, and DirectPick. All of these software packages can work directly with a WMS however this would not give us a good working system in this operation.

The WES manages the efficient direction of these sub-system operations, as well as covering such material flow necessities such as routing, wave management, work metering, order consolidation, and conveyor operation. These types of operations are different for every system and often have to be custom designed for each operation. By implementing WES, the overall system works in an integrated and optimized basis and costly changes to the WMS are minimized. The WES is made up of a series of modules with different functions. These software modules are described in the following sections.

WMS

The graphic on the following page shows the split between WMS functions and those of the WES. The principle goal is to minimize any changes to the WMS and keep this operating in much the same way as it does now. The WES is used to handle any operations that the WMS is
not capable of. These are listed on the right side of the graphic. The WMS will have to handle the operations described on the left side of the graphic.

System Logistics can handle the WMS side of this operation if required. We have a WMS that has been implemented at multiple sites and can easily implement it here if Law Warehouses needs us to. This will vastly reduce system interface problems with the WES and minimizes installation risk for Law Warehouses.
Warehouse Execution System

Law Warehouses

System Logistics

Warehouse Execution System

Stores

Interface

Work Planning

Order Processing

PowerPick software

Order Picking

Convex sort processing

Transaction processing

Palletizing

Best Fit Software

Pallet load calculations

Conveyor System

DirectPick software

Conveyor sort processing

Conveyor loading

Order data for the order picker

PowerPick software controls the conveyor paths

Conveyor unloading

Case routing

Pick Module Locations

Controls light displays in pick modules

Transaction data for order picking

Registering carton ids (dual pick pods)

System Monitoring

Carton diagnosis and testing

AutoPick controls the carousel / extractor stacks

The WES will direct all VNA man up picking and all pallet movement throughout the system. This allows all the moves to be batched and then sequenced for the most efficient picking and truck movement. Picks for the VNA man ups will originate at the WMS.

The WES constantly monitors the system and is capable of predicting system capability. In addition to order data, administrative and transaction data is easily visible and constantly being sent back to the WMS. All equipment and data is clearly visible on the screen for real time status and history.

The WES will direct all VNA rear up picking and all pallet movement throughout the system. This allows all the moves to be batched and then sequenced for the most efficient picking and truck movement. Picks for the VNA man ups will originate at the WMS.

The WES will direct all dock doors for orders (automatically or manually). This will be based on available doors, selected palletizer modules.

The WES will track all order cases moving throughout the system. We will know what cases are in which conveyor sections, palletizer modules, VLS, and order pallet. This allows real time forecasting for order status and completion.

The WES is responsible for the movement of pallets from receiving to the VNA drop stations and from the reserve rack to the pick modules. Locations will come from the WMS. The WES collects these locations and directs the moves to the correct zone or location.

Shipping

The WES will direct the shipping of pallets into the correct zone of the reserve racks. This specific information is designed to meet the needs of the WMS. This will be done by the WES and turned into pick zone request by each for efficient truck movement and loading.

Wholesale

The WES will direct the movement of pallets from receiving to the VNA step stations and then to the reserve rack in the pick zones. Locations will come from the WMS. The WES collects these locations and directs the moves to the correct zone or location.

Operating Screens

"Dashboard" operating screens will be used to operate and monitor the system. These allow supervisors to "see" the whole system on one screen. This allows quick supervisory, equipment, and diagnostic decisions to be made.

Administrative Data

The WES constantly monitors the system and is capable of predicting system capability. In addition to order data, administrative and transaction data is easily visible and constantly being sent back to the WMS. All equipment and data is clearly visible on the screen for real time status and history.

Reserve Storage Locations

The WES will direct the movement of pallets from receiving to the VNA step stations and then to the reserve rack in the pick zones. Locations will come from the WMS. The WES collects these locations and directs the moves to the correct zone or location.

Dock Assignment

The WES will assign dock doors for orders (automatically or manually). This will be based on available doors, selected palletizer modules. This allows for both the ability of batched order picking at specific pick locations.

Replenishment

"Dashboard" operating screens will be used to operate and monitor the system. These allow supervisors to "see" the whole system on one screen. This allows quick supervisory, equipment, and diagnostic decisions to be made.

Palletizing

The Best Fit software determines which cases will go onto specific pallets for an order. It also determines what the load sequence for loading the pallets will be. Cases are available in VLS (palletizing module) Best Fit confirms transaction data back to WES for order tracking.

The WES will meter work into the system at appropriate levels to keep pick zones busy and work balanced. Work will be sent to the WES the same way they are now.

The WES will collect these locations. The WES will track all order cases moving throughout the system. We will know what cases are in which conveyor sections, potential pallets, VLS, and order pallet. This allows real time forecasting for order status and completion.

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4.2 Work Planning

The WES starts the day with approximately 100% of all the orders. This visibility allows the WES to plan the blocks of work to be sent into the system. These blocks of work are called waves. The quantity and organization of these waves are the key to operating the system effectively. The waves drive the pick modules, VNA case picking, carousel picking, the sorters, and palletizers. In short they are at the heart of the system and determine the efficiency of all parts of the system.

Goals

The goals for setting up the waves are listed by priority.

1. Break up the day into as few waves as possible. This means the waves will be as large as possible within the maximum limits. This increases the pick rate in the modules by cutting down the number of trip through the pick modules. The same is true for the carousel case picking.

2. Plan the waves to be roughly equal in size. This allows flexibility in work metering since each wave should finish in roughly the same amount of time.

3. Within each wave, distribute the work evenly between all palletizer modules. This keeps all palletizers operating and finishes all available work more quickly.

4. Within each wave plan the work going to each palletizer to match up to the planned truck routes. This keeps trucks close to the palletizer and limits the truck loading traffic on the shipping dock.

5. Whenever possible, plan waves to combine small orders together that can go onto single pallets. This is more efficient for all parts of the system.
6. Plan the wave of picks for the VNA case picking operation to maximize the amount of cases picked per location visited. This is done by batching picks across multiple days.

**Functions**

1. The WES is sent all the work to be done in the day well before the work day starts. Work can be added in the course of the day but it will be added to an upcoming wave. If there is enough work to be added the WES may alter multiple upcoming waves to handle it. This can only be done before a wave is sent into the system. It cannot be done after a wave has started.

2. The WES breaks all the work for the day into a fixed amount of waves. The following elements are considered:
   - Total quantity of cases for all orders in the day
   - Total quantity of orders in the day
   - Order priority or specific shipping times for any orders if required

3. After the initial breakdown of waves is decided, then the WES must configure each individual wave and assign groups of orders to each palletizer module. Within a wave, the WES looks at the following elements:
   - Total case quantity for all orders in the wave
   - Total quantity of orders in the wave
   - Case quantity for each order
   - Truck assignment for each order
   - Loading sequence in the truck (route stop sequence)
Work Planning

4. After the group of orders is assigned to a palletizer module the WES passes the order information to the Best Fit software. The Best Fit software checks the SKU data and case quantities for each order and determines the amount of pallets for that order and the individual case makeup for each pallet. This information is sent back to the WES for use in other system functions.

5. The pallet building plan from the Best Fit software allows the WES to determine which VLS unit each case must be sent into in each palletizing module. The WES translates this data into routing destinations for each case in the wave. This is known before any cases are even picked.

6. The work metering module handles the waves for the VNA case picking (carousel replenishment) differently. These picks will be sent to the system as one large wave for the day. This wave is optimized by the WES to create efficient picking for the man up trucks. This optimization process includes:
   - Batching picks across multiple days to increase the cases picked per location
   - Picking additional cases per location visit to clear a location or to get ahead in the carousel storage. (this will be common in higher volume SKUs)
   - Picking additional cases per location to move the pallet out.

Notes

It is critically important that the WES have as many orders as possible before the work day begins. There must be enough work to keep the pick zones and palletizers busy. In short the
system works best if there is a lot work to optimize. It gets less efficient if the system is starved for work.

**Possible Conditions**

**Very Large Orders**

Some orders may be large enough that it makes sense to use two or more palletizer modules to process them. Trigger settings for case quantity will be set up in the work planning module to determine when the system assigns multiple palletizers to one order. In addition the WES will assign this order to two adjacent palletizing modules. This will minimize the truck traffic on the shipping dock since they are both likely to be supplying pallets to a single truck.

**Special Waves**

The fourth level of the pick modules may be slotted for slower moving SKUs in order to concentrate work in the lower three levels. Depending on the total work for the day the WES may send a special wave out for all the picks on the fourth level for multiple waves. This may eliminate some trips to the fourth level by consolidating picks for multiple waves. This is only likely to happen on days that are slower and when there is excess capacity in the VLS units.

Other special waves can include emergency orders that are sent into the system or added to existing waves that may not have been picked yet.
4.3 Work Metering

The quantity and configuration of the waves are determined at the beginning of the day. The WES monitors the progress of each wave as it is processed through the system. Each wave is likely to take between 60 and 90 minutes in any given area. As this wave passes through the system the WES automatically determines when to drop the next wave. The timing of this action takes into account the picking rates for both the pick modules and carousels, conveyor travel times, and case accumulation time for pallet building. This process is called metering. In this system there will be 3 to 5 waves to drop on a typical day.

Goals

The goals for metering work are listed by priority.

1. The most important goal is to keep the palletizers working continuously. This is done by keeping the VLS units from running out of cases. This is the primary trigger for dropping the next wave.

2. Keep the pickers in the pick modules working continuously. This is an extension of the first goal. As the VLS units run low the next wave will be sent into the system.

3. Time the dropping of the waves so they do not interfere with the completion of the previous wave. This is especially important for the carousel system.

Functions

Work Metering

1. The WES tracks the progress of the wave as it goes through the system. The metering module may cause some areas to wait until others are far enough along so the next wave can be sent. This is most likely to happen on different levels of the pick modules.
Regardless of the timing, pickers in the modules must finish their pick loops from the previous wave, even if the next wave is sent into the system on top of the previous one.

2. The carousels may finish a wave faster or slower than the pick modules. The metering module may send the wave to the carousels early or delay it depending on the size of the wave and the amount of picks coming from the carousels.

3. Carousels must finish picking the previous wave before the next wave is sent. This is so picks from the previous wave do not get lost in the optimization of the new wave. This process can be isolated down to the stack level in order to keep all stacks picking.

4. The WES monitors total volume on the system. If there are backups on the conveyor system the WES will automatically restrict or even shut down the picking modules and carousel stacks until the system clears.

5. The metering module will match any special waves or picking to the current waves of work so the cases get to the palletizing modules or shipping dock at the correct times.

6. The metering module controls the pick wave sent to the VNA case pick modules. This is likely to be one single wave for the day but it can also be broken into smaller waves if required.

4.4 Wave Processing (picking)

All order picking tasks are passed from the WMS to the WES. The WES directs all order picking in each zone and confirms the transactions back to the WMS. The WMS passes all order information to the WES. This includes but is not limited to:

- The order number (store number)
- SKUs to pick
- Locations to pick from
- Quantities to pick (per SKU)
- Priority
- Shipping requirements

The WES batches multiple orders together to create pick waves. This process is described in the work planning section (4.2) of this document. After all the picks in the wave are batched, the WES separates the picks for each picking area. This means that each location will be given the collected picks for multiple orders in the wave. This creates the picking efficiency in the system.

This information is distributed to the pick modules, carousel system, and bottle system. Each of these subsystems use existing software with standard interfaces. DirectPick controls picking in the pick modules (light displays). AutoPick controls picking in the carousels stacks. PowerPick directs picking in the bottle system. Law is familiar with both PowerPick and DirectPick since they are both in use in the existing bottle picking system in Nashua.

**Goals**

The goals this module are listed by priority.

1. Distribute the picks in the wave to each picking zone in the system.

2. Process all picking in the different zones.

3. Update the WMS with completed transactions in the picking zones.
Functions

Wave Processing

1. Within the pick modules, the picks for wave are broken into the picks for each location in the modules. These picks are further divided into the picks for each zone occupied by a picker (this is most often the different levels of the module). These groups of picks are sent into the system when the WES determines the optimal time for release (see section 4.3 on metering).

2. Within the carousel system, the picks for a wave are broken into the picks for each stack. These picks are sent into the system when the WES determines the optimal time. This is done on a stack by stack basis. This means some stacks may wait for others to finish a wave and others may be picking ahead on the next wave. This determination is made by the metering module but the picks in the wave must be subdivided by stack before this is possible.

3. Within the bottle system, the picks for a wave are broken into the picks for each zone in the system (2 pods, and flow rack). These groups of picks are sent into the system at the discretion of the WES. Due to low daily volume it is highly likely that picks for multiple waves may be combined into single waves in the bottle system.

4. All picking transactions are updated to the WMS at regular intervals throughout the day. The WMS uses this data to trigger replenishments to locations that become depleted.

5. The carousel inventory is treated differently from the pick modules. The WES (through AutoPick) manages the individual locations in the carousel stacks. AutoPick tracks the SKU and location throughout the carousel system. The WMS does not know (or care
about the exact location of a case in the carousel system. It just knows that it is in the carousel system.

The WES will update the WMS with location information for inventory purposes. Locations are not needed to pick a wave, only the SKU and quantities required. Picking transactions are updated to the WMS so replenishment decisions can be made for the carousel system. The actual storage location within the stacks is up to the WES.

4.5 Replenishment

All replenishments in the system originate with the WMS. The WMS sends replenishment tasks to the WES based on picking transactions coming back from the WES for each area. The vast majority of the replenishments in the system will start at the VNA trucks with either full pallet moves or case picking from pallets in reserve locations.

It is important to recognize that replenishments do not reflect the exact quantities and SKUS picked for the previous day’s orders. Due to the capacities and slotting of the picking areas the WES has the flexibility to batch and organize the replenishments to reflect the physical layout of the system. In short it means the WES can optimize the replenishments for efficient VNA truck movement.

Unlike picking, most replenishments can be sent into the system as one big wave. Due to stocking levels in the pick modules most replenishments are not time critical in any given day.
Goals

1. Batch pallet moves from the reserve locations to the pick modules for efficient truck movement

2. Batch VNA case picks to single aisles and sequence those picks for efficient pick paths.

3. Balance inbound replenishment cases across all stacks in the carousel system.

Functions

Work Processing

1. Replenishment to the pick modules is by full pallet. Each location in the pick modules has 3 pallets. When a replenishment pallet is needed there are often 2 pallets ahead of it. This means that the timing of the pallet delivery can be flexible over several hours or even days.

   The WES will batch pallet moves to the pick modules over longer periods of time (4 hours would be typical). This allows the WES to accumulate enough moves in a batch that it can set up the most efficient sequence of pallet moves on each side of a pick module. The WES would send these replenishment waves in and direct the trucks based on their real time work levels.

2. Replenishments to the carousels start out as case picks from the VNA man up trucks. The WES will batch these picks across the whole day and divide them up by picking aisle. The picks in the aisle may be further divided up by pallet load. These aisle picks will be sequenced in the most efficient travels path for that aisle. Some of these picks (by aisle) may be prioritized over others but this will not be frequent requirement.
3. Replenishments to the carousels end up as cases coming down the inbound conveyor to the carousel sorter. These cases will be distributed evenly across all stacks. This allows all stacks to be optimally busy when the cases are picked for outbound waves.

4. Replenishments to the bottle system start out as case picks from the VNA man up trucks. These picks will be picked to a pallet and delivered to the replenishment point of the bottle pick system. This follows the same method as the carousels but the pallet is dropped off in a different place.

Due to low case volume the replenishments to the bottle system may have some replenishment pallets may be picked across multiple aisles in the VNA system. The same aisle optimization process will still be used.

Replenishment

High Priority Replenishments

There will be some replenishments that are needed for picking that same day. This is most likely to happen on the slowest SKUs stored in the carousel system. The stocking level in the carousels for many these slow SKUs is one case. Some orders for these SKUs may exceed the one case in the carousel system. This can be expected to happen every day.

When this happens the WMS identifies any picks that exceed the stocking levels in the picking areas and creates an individual list of cases to pick. This becomes a high priority pick list for the WES. This pick list is assigned to a VNA man up truck and is the first group of picks made that day. These picks are put into the carousel system where they can be picked later in the day when their assigned wave comes up.
Stock Levels

The WMS tracks all inventory levels in the reserve rack. The WES does not keep track of the inventory in these zones. The WMS updates inventory records based on transaction data coming back from the WES. The WMS may decide to pick more of a particular SKU based on stocking levels for that location. This could be done for multiple reasons:

- Picking a few cases left to clear the pallet location
- Picking a few more cases to clear a pallet layer
- Picking a few more cases to finish off the SKU or partial pallet location

Multiple Day Batches

The carousel system is designed to have approximately 3 days’ worth of stock for the SKUs in storage. Picks for some days may not reach levels for some SKUs that require a replenishment trip into the VNA aisle every day. This will be very common on slower days. The WMS should set trigger levels by SKU for replenishment into the carousel system. This will limit the amount of locations to visit in the VNA case picking system on a daily basis. It will also maximize the amount of cases to pick when a location is visited. Ultimately all cases going out will have to go back in. It just allows the WMS to choose the optimal sequence to pick each day.

4.6 Put Away

Put away is defined the process of taking newly received cases and putting them away in the reserve storage locations. Because SKUs are stored in specific areas of this system the process of choosing storage locations for SKUs must be directed by the WES. The WMS determines the area, aisle, and location that a SKU is to be stored. The WES executes this transaction in the most efficient possible way.
There are two stages to the put away process. The first is handling the SKUs in receiving and delivering them to the drop off location for VNA pickup. The second is the storage of the pallet in the VNA rack location. Different trucks are used at each stage so both processes need to be optimized.

**Goals**

1. Plan the receiving and transport process for efficient truck movement.

2. Execute the put away process within the VNA racks to minimize truck movement.

**Functions**

**Work Processing**

1. The WMS drives the receiving process. It chooses the SKUs and quantities to be received by selecting which truck to unload. The SKUs and quantities are known ahead of time by the WMS. This allows the WMS to direct the specific storage location for each received item well before it arrives on the dock. The WMS plans the pallet organization for all received SKUs. After a SKU pallet is built in receiving the WMS sends the pallet id, the SKU, and intended storage location to the WES. Based on the intended storage location (which included the aisle number), the WES directs the fork truck to drop off the pallet at the drop station for that aisle. The pallet id and drop station are recorded by the WES.

2. The WMS also directs the pallet organization for SKUs that will be put away in the VNA case pick locations. These will always be cases put away to pallet locations in the VNA rack by the man up trucks. Pallets for this purpose hold multiple SKUs and will be...
organized by aisle. The goal is to minimize the amount of aisles that a pallet must go through to complete the put aways. After a pallet is completed for put away the WMS sends the pallet id, the SKUs, case quantities, and their storage locations to the WES. Based on the intended storage locations (which included the aisle number), the WES directs the fork truck to drop off the pallet at the drop station for that aisle. The pallet id and drop station are recorded by the WES.

3. The WES keeps a running record of all pallets in drop stations. This is accessed by the VNA trucks doing put aways. This allows the WES to direct them to the nearest pallets for pickup. When possible, the WES may allow multiple pallets to accumulate at one drop station in order to batch the put aways in one aisle for a VNA truck.

4. The WES directs the movement of the VNA trucks doing put aways. This is quite simple for full pallet put aways since it is one move and store. The WES directs the sequence of the put aways for multiple SKU pallets to match the location sequence in the aisle.

5. Moves of pallets from location to location within the VNA rack is directed by the WMS. The move is handled in the same way as a replenishment except the destination location is still in the reserve rack.
4.7 Palletizing Operation

The Best Fit software is responsible for planning the case sequence for building the order pallets. The palletizer robots follow this sequence to build the pallets. The WES is responsible for bringing the cases to the palletizer robots in the correct sequence. The process is listed below describes the data flow for a single wave of work. This process is repeated for each wave.

1. The WES decides what orders in a wave go into which palletizer modules. The work planning section describes this process.

2. This information is passed to the Best Fit software in each palletizer module.

3. Best Fit software decides how to build the pallets for the orders within each module.

4. Best Fit software passes the pallet build plans back to the WES and the palletizer controllers.

5. The WES translates the pallet build plans to sorting routes for all cases in the wave.

6. The WES routes cases on the main sorter to the correct VLS units in all palletizer modules.

7. The WES stores the cases in the VLS units and records the case id and location.

8. When all cases for a pallet are in the VLS units of a palletizer module, the WES can select that pallet to be built. When multiple pallets are present the WES picks the pallet with the highest priority in the wave. Otherwise it will select the first pallet available.

9. The WES passes the pallet id to be built to the palletizer robot controller.
10. The WES picks cases out of VLS units in the correct sequence to match pallet build plan. Cases are placed on the conveyor in groups matching the sequence (8 at a time).

11. The WES moves cases down the conveyor and labels each case going into palletizer.

12. The palletizer robots build the pallet according to the Best Fit software builds plan.

13. The palletizer controller passes pallet contents (case ids) to WES after pallet is built.

14. WES directs the finished pallet to the correct shipping dock.

Goals

1. Build the order pallets as fast as possible

2. When selection is possible build the order pallets in prioritized sequence

3. Make real time records of palletizer operation available to WES.

Notes

The process described here may change during the final engineering of the system. Regardless of any changes made the system will still follow the goals listed. The exact process for prioritizing pallets based on truck routes will be worked out in cooperation with Law Warehouses.
Palletizing Operation

Functions

Palletizing

1. The WES will be tracking cases throughout the palletizing process. Case must be tracked from when they hit the main sorter all the way through to the palletizing robots. Knowledge of all cases in the VLS units is critical to run the system effectively. Absolute accuracy is needed or the pallets cannot be built correctly.

2. Within the VLS units of every palletizer module there will be multiple cases of the same SKU. In fact there may be multiple cases of the same SKU within one VLS unit. The WES can pick any case that matches the SKU for a pallet to be built. This allows the WES the flexibility to pick any SKU case from a VLS location to build a pallet earlier and replace the case with another one coming in later. This will be a very common occurrence since 450 SKUs account for 60% of the cases picked per day. This process allows pallets to be started earlier and keeps the palletizers running longer.

3. Pallets with higher priorities are pallets that should be loaded into the trucks first. This would be preferable on trucks making multiple stops. During the second half of a wave the there may be multiple pallets available to be built in a palletizer module. When this is possible the WES will choose pallets that would be loaded into a truck first. If no pallets are available the WES will choose the first pallet available to be built regardless of its position in the truck.

4. There will be no specific pallet id label on the finished order pallets. The WES tracks all cases going to the palletizer robots. This means that any pallet can be identified by simply scanning any case order label on the pallet.
4.8 Case Routing

There are two places in the system where the WES makes routes cases to specific destinations. These are the sorting of inbound cases going into the carousel stacks (carousel sorter), and the sorting of cases going into the VLS units of the palletizer modules (main sorter). The goals and logic used for each of these sorting operations are listed below.

Goals for carousel sorter

The carousel sorter takes inbound cases coming from the VNA case pick modules and sorts them into the 8 carousel stacks. The number of sort points matches the number of carousel stacks. All of these cases are inbound to the carousel system as replenishments. It is important to note that within the carousel system, no location (carousel shelf) is any more efficient than another. In short the shelf position does not matter. The stack location is most important thing.

Due to the difference in case sizes, there will be two different location sizes in the carousel system. One group of stacks will be sized for cases 9” to 15” long. The other group of stacks will be sized for cases 15” to 21” long. This is necessary for reliable case storage and extraction. The list of goals describe here applies to both stack configurations. The goals for routing of cases into the carousels are:

1. Within size classification, distribute each group of SKUs across the carousel stacks evenly. This means that all stacks will be operating evenly during the picking process. This gets the best possible rate out of the system.

2. Within size classification, distribute the fast moving SKUs (cases) across all stacks evenly. This is the most critical element for maximizing outbound rate during pick waves.
3. Within size classification, distribute the slowest moving SKUs (cases) across all stacks evenly. This will have no effect on rate but it keeps an even number of locations open in each stack for the faster moving SKUs.

Functions

Carousel Sorter

1. The WES keeps a real time inventory of the carousel stacks at all times. This includes SKU id, stack number, carousel, bin, and shelf location. This allows the WES to know if a stack is running above or below the others in capacity for each SKU classification (fast and slow).

2. The WES uses the carousel inventory to make routing decisions for each inbound case. For example if stack 4 has 100 more fast SKU cases than the other stacks, then the WES will route the next fast SKU cases coming onto the sorter to the other stacks until the levels even out across all stacks. In effect the WES is constantly trying to keep all stacks equal.

3. Routing decisions are made after the case is scanned at the scan tunnel. Even though we know the cases coming from the VNA system ahead of time, case destinations are not predetermined. This is because the WES needs to spread inbound work across all stacks on a continuous basis. This keeps the sorter and the stacks all operating evenly.

4. The simple practice of spreading inbound traffic across all stacks will likely result in an even volume outbound from all stacks. Knowing this is true, the system must still be able to balance itself if things get out of whack in the stack capacities.
Case Routing

Goals for the Main Sorter

The main sorter is taking all the cases coming from the carousels and the pick modules and sorting them to the correct VLS units assigned for that picking wave. This sorter handles all the outbound cases picked for all the orders every day.

The routing of the cases on the main sorter is predetermined by the WES using the Best Fit software. What this means is that specific SKUs are to be sent to specific VLS units, not specific cases. When a slug of cases of the same SKU enters the sorter, the WES can choose which VLS to send each case to. Within the wave, they will eventually all end up in the correct VLS units but the sequence they are sorted in is up to the WES. The routing goals of the main sorter are:

1. The most important goal in sorting the cases within a wave, is to keep all palletizing modules working evenly and at full speed through the course of a wave.

2. Spread cases evenly across all diverts continuously. This prevents backups at diverts, and reduces recirculation of cases. It also results in the palletizer modules all working evenly as well.

3. Sort the cases on the first pass on the sorter as much as possible. Every recirculated case delays the building of a pallet in one of the palletizer modules. In effect it can hold up 50 other cases.
Functions

Main Sorter

1. The WES will make routing choices for each case immediately after it exits the scan tunnel. This provides the maximum flexibility to route cases to the best possible destinations. Many cases will have only one destination VLS. These cases have no routing flexibility. Faster moving SKU will have multiple cases that could go to multiple different locations at different times.

2. Multiple cases of a single SKU may enter the sorter in a slug. This could easily happen for fast moving SKUs coming from the pick modules. The WES spreads these SKUs out across multiple modules and multiple VLS units. The idea is not to cause a backup at one divert or palletizer module. Ultimately every SKU case will arrive at the correct destination during the wave.

3. Routing flexibility is highest at the beginning of a wave when most destinations in the VLS units are not filled. As the VLS units fill up more and more cases will have to be sent to specific destinations. This is why the overall filling of the VLS destinations should proceed evenly. It keeps the maximum number of sorter diverts open for the longest possible time during a wave.

4. There will be times when a wave is released for picking before the previous wave is completed at the sorter. This will be a common method of operation since we do not want the palletizers to run out of cases. When this happens the WES will always choose to route cases to finish a previous wave instead of the newer one.
5. If any cases for a wave are not sorted within a set amount of time or cases with SKUs have gotten “lost” the WES will signal the picking zones for a hot pick of the missing SKUs. It is important to finish these picks as quickly as possible since they may be holding up as many as 50 cases for an outbound pallet in the VLS modules.

4.9 Case Tracking

The WES will track cases moving throughout the system. We will know what cases are on the different conveyor sections, the VLS units, the palletizers, and the completed pallets. This is a necessary function so the WES knows the quantity and location of all cases that are in process at any point in time. This allows the system to time out expected cases, issue hot picks for missing ones, check the status for pallet building, and give real time status on the progress of orders in each wave. This also governs when the next wave is sent into the system.

Goals

1. Track the quantity and id (SKU) of picked cases in process in the following areas of the system:
   - The picking zones (pick modules and carousels)
   - On the transport conveyor
   - On the sorter loop
   - In the palletizer modules
   - On the inbound carousel conveyor (cases coming from VNA case pick area)

2. Insure that order cases arrive at their destinations in a timely manner. If they do not arrive when they are expected they are considered “lost”. This is necessary to ensure that a palletizer is not waiting indefinitely on a no-read or lost case.
Functions

Tracking Process

Cases are tracked in multiple different areas including the pick zones, in transit on the conveyor, and in the palletizer modules. A case is moved to each tracking classification when it leaves the previous zone. There are no individual case ids. Cases simply change classifications and the WES monitors the quantities and timing between tracking points.

1. The tracking module begins tracking picked cases in the pick zones when a wave is sent into the system. Each task complete at a SKU location in the pick modules registers the quantity of that SKU as “on transport conveyor” with the WES. The same thing happens when a case is picked by the carousel system. The WES is updated immediately after the pick is completed.

2. When a case is picked by the carousel system the extractor deposits the case onto the outbound conveyor spur. When the transaction is completed the WES registers the case as “on transport conveyor”.

3. When the cases hit the scan tunnel at the main sorter the WES changes the classification to “on sorter”. This classification lasts until the case is diverted or hits the recirc line.

4. When a case is diverted the WES updates the classification to “diverted”.

5. If the case is not diverted (missed expected divert) then it is classified as “in recirc”.

6. When the VLS stores a case the SKU and VLS location are recorded and the WES is updated. The case is now classified as “in module”.

7. When a case is pulled out of the VLS the transaction is recorded, the WES is updated, and it is classified as “on pallet”.

System Design
8. When a pallet is completed the case and pallet are classified as “in shipping”. This classification can be further broken down to “on dock” and “on truck”.

Case Tracking

Method

It is important to recognize that cases are tracked by area. In most instances the exact position of the case within that area is not known. Cases are tracked by updating their classification when they trigger a transaction or scanner entering another area.

Timers are set between update points in different areas. This is especially predictable with conveyor transport. If too much time passes between one update point and another it indicates there is problem with the case. The case is then considered “lost” or is now missing. Appropriate action should be taken to find the case or issue a hot pick and get another one picked and moving on the system.

In a system such as this time lost to finding individual cases cannot be allowed to slow the entire system down. It may often be better to pick another case to finish the wave and resolve the “lost” case later after the wave is completed.

Replenishment Tracking Process (from VNA case pick)

This describes the case tracking process for cases picked by the VNA man up trucks and sent into the carousel system.

1. The tracking module begins tracking picked cases in the VNA case pick zones when the case is picked by the picker. As soon as the transaction is recorded as complete the WES classifies the case as “on pallet”.
2. When these cases hit the scan tunnel at the carousel inbound sorter the WES changes the classification to “on carousel sorter”. This classification lasts until the case is diverted or hits the recirc line.

3. When a case is diverted the WES updates the classification to “diverted to carousels”.

4. If the case is not diverted (missed expected divert) then it is classified as “in recirc”.

5. When the extractor stores the case the SKU, and carousel location are recorded. The WES is updated and the case is no longer being tracked as a moving case on the system.

**Tracking Data**

Real time tracking of cases through the system is particularly important for this system operation. The metering module which times the waves entering the system is dependent on the tracking data. Pick waves will often be sent into different areas at different times. This will be common in different levels of the pick modules and the carousel system. The tracking data allows the metering module to determine when and where it can drop the next pick wave.

This data is also critical for general management of the system. It will be used constantly for troubleshooting, and operational decisions during the day. It also makes up the bulk of the data feeding the WES dashboard management screen described in section 4.11.

**4.10 Shipping**

All pallets in the wave are assigned to trucks at the start of the wave. Some pallets are assigned specific loading sequences within the trucks doing multiple stops. The shipping module of the WES assigns the dock doors and directs the movement and loading of pallets into the trucks.
Goals

1. Automatically determine the loading plan for each truck

2. Assign dock doors automatically based on Palletizer module

3. Process pallets coming off palletizer modules as quickly as possible

4. Insure all cases and pallets get to the correct trucks by directing pallet transport.

Functions

Shipping

1. The wave plan sets up the orders going into each palletizer module. These orders all have truck assignments. The WES takes the truck assignments and assigns dock doors for those trucks. Doors closest to the assigned palletizer module will be chosen first. This will be known well before the wave starts in the system. Doors can also be reassigned as needed.

2. Dock door assignments will also take into account doors that are already assigned for receiving or previous waves.

3. Each truck will have specific routes assigned to it based on the orders it will be carrying. Pallets must be loaded in the sequence that matches the route and stops the truck will make. The WES will determine the pallet loading plan for each truck based on the orders assigned to that truck.

4. Fork trucks will be used to move pallets from the palletizing modules to the dock doors. Within a wave pallets will come off the palletizers in random order. The trucks in shipping must be directed to the dock doors on a pallet by pallet basis. The WES will
direct the fork trucks on the shipping docks based on the pallet id. Pallet moves will be confirmed to the WES for updates to the control screens.

5. There will be some cases delivered to the shipping dock that do not arrive through the palletizers. Some cases may be diverted on the bypass lines. Some oversize / undersize cases will be picked from the special case pick zone. These cases will arrive on pallets for each wave. These cases will have to be sorted and manually brought to their assigned trucks. These cases will have their order labels already on them. This makes them easy to sort and identify at the shipping dock.

4.11 Operations Screens

In a system this large it is necessary to track key data in multiple areas of the system. This includes the pick modules, carousels, the conveyor, the sorters, the VLS units, and the shipping area. All of these areas can affect the others. Operational decisions often must be made in one area that will immediately affect other areas that are not visible to the person making the decision. There are three things the operation screens must do.

- Create a single control point where all important real time data is visible in one place. This allows one person to make intelligent operational decisions because they can “see” the whole system.

- Provide equipment status at a single control point. This can visually indicate where there is a problem on the system. This is extremely important on a system of this size.

- Maximize data visibility all around the system. This helps all operators working in the system.
Control Point

Due to the size of the layout it cannot be managed visually. It will be necessary to manage this system from a single point of control. This control point must have real time access to all key data in the system. This includes all the pick zones, the conveyor, and the palletizer modules. The supervisor managing the system must have this data in front of them on a constant basis. This allows quick and efficient decisions for where to move labor, change assignments, and react to problems.

Equipment Status

All the equipment can be monitored from a single point by showing a graphic showing the whole system. Different parts of the system indicate status or error conditions by changing color. This section can be broken down into subsystems and even to the individual device level right at the screen.

Data Visibility

Key data must be visible to supervisors at multiple points in the system. This allows quick decisions not only at the system level but the individual zone level as well. It is also valuable for individual operators to have forward visibility to coming work not only in their zones but for other areas of the system. Supervisors and operators can immediately know what the rest of the system is doing.
Goals

Goals for the operations screens are listed by priority:

1. Provide real time data for all areas at a single control point so overall system operations can be monitored and decisions can be made quickly enough.

2. Provide real time status of all equipment used in the system. System controllers need to know exactly where and what a problem is as soon as possible.

3. Provide key real time data to individual areas so local supervisors and operators can react effectively.

4. Provide an effective means of communication to keep everyone in the system knowledgeable about what is happening in other areas that affect them.

Operations Screens

Functions

Control Point

The master control screen describes the minimum status data that should be available real time. This amount of data and the screen configuration will likely change during the engineering phase of the project. Other changes may be made after the system is running if it found that they are needed. This is common for system operations of this size.

Communication

The supervisor at the control point must be able to communicate with all the people working in the system on a real time basis. Data moves too fast and the system is too large for someone to walk from single point and cover all areas. We recommend a simple hand held radio system (walkie talkie type). This allows the control person to immediately talk to everyone they need to.
This is especially important in the pick modules and for truck operators. In effect it becomes the communication network for dynamic labor assignments through the day. During the engineering phase, we will work with Law Warehouses to develop a simple inexpensive method to do this.
Operations Screens

Master Screen

The master control screen will show the key data for all the important parts of the system. This screen should be constantly monitored by the “control person”. This allows the control person to “see” the whole system from one spot. The list below is a preliminary description of the items that would be on the master control screen. This screen organization is preliminary and will be finalized during the functional spec phase of the project. The organization and arrangement of the screen will be a reflection of the final organization of the WES software.

Operation

The control person (supervisor) monitors the screen during the day. This allows someone to monitor a pick wave as it passes through the system and react quickly to changes in equipment or pick waves. The control person monitors such things as:

- Pick zone imbalances and labor assignments
Law Warehouses

System Design

- Carousel status
- Conveyor sorter and recirc volume
- Replenishment status and timing
- Conveyor status
- VLS and palletizer status

Not only can the control person monitor the system, they can change assignments, redirect case flow, and with the proper communication system they can move operators on the system as required.

Operations Screens

The list below is a preliminary description of the items that would be on the master control screen. This information would be shown on a “by wave basis” since everything in the system is set up to operate by wave. This list will be finalized during the functional spec phase of the project. It is highly likely that the configuration of this screen and the organization of the information will be modified as the WES software is completed. Further modifications may be made during the testing phase and during early operation.

For Each Palletizer Module (4 blocks like this one)

<table>
<thead>
<tr>
<th>• Total cases in wave</th>
<th>• Total cases in module</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Total orders in wave</td>
<td>• Orders in module</td>
</tr>
<tr>
<td>• Total pallets in wave</td>
<td>• Pallets in module</td>
</tr>
<tr>
<td>• Pallets built</td>
<td>• Trucks in wave</td>
</tr>
<tr>
<td>• Outbound case rate</td>
<td>•</td>
</tr>
</tbody>
</table>

For Main Sorter (1 block)

<table>
<thead>
<tr>
<th>• Total cases in wave</th>
<th>• Cases diverted</th>
<th>• Cases on sorter</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cases in recirc</td>
<td>• Case rate</td>
<td>• No reads</td>
</tr>
</tbody>
</table>

For Transport Conveyor (1 block)

<table>
<thead>
<tr>
<th>• Pick module 1 – line 1</th>
<th>• Cases in process</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Pick module 1 – line 2</td>
<td>• Cases in process</td>
</tr>
<tr>
<td>• Pick module 2 – line 3</td>
<td>• Cases in process</td>
</tr>
<tr>
<td>• Pick module 2 – line 4</td>
<td>• Cases in process</td>
</tr>
<tr>
<td>• Carousel stacks – line 5</td>
<td>• Cases in process</td>
</tr>
<tr>
<td>• Bottle system – line 6</td>
<td>• Cases in process</td>
</tr>
</tbody>
</table>
For Pick Module 1 and 2 (1 block for each)

- Cases in wave level 1  •  Cases picked  •  Case rate
- Cases in wave level 2  •  Cases picked  •  Case rate
- Cases in wave level 3  •  Cases picked  •  Case rate
- Cases in wave level 4  •  Cases picked  •  Case rate

For Carousel Stacks (1 block)

- Cases in wave for stack 1  •  Cases picked  •  Case rate
- Cases in wave for stack 2  •  Cases picked  •  Case rate
- Cases in wave for stack 3  •  Cases picked  •  Case rate
- Cases in wave for stack 4  •  Cases picked  •  Case rate
- Cases in wave for stack 5  •  Cases picked  •  Case rate
- Cases in wave for stack 6  •  Cases picked  •  Case rate
- Cases in wave for stack 7  •  Cases picked  •  Case rate
- Cases in wave for stack 8  •  Cases picked  •  Case rate

Operations Screens

For Carousel Sorter (1 block)

- Total cases in wave  •  Cases diverted  •  Cases on sorter
- Cases in recirc  •  Case rate  •  No reads

For VNA Pallet Trucks (1 block)

- Pallets to replenish  •  Pallets replenished  •  Rate in pallets
- pallets to put away  •  pallets put away  •  rate in pallets

For VNA Man Up Trucks (1 block)

- Cases to pick  •  cases picked  •  case pick rate
- Pallets to pick  •  Pallets picked  •  Pallet pick rate
- Locations to pick from  •  Locations hit  •  Location pick rate (lines)

For Shipping (1 block)

- Total cases in wave  •  Cases processed  •  rate
- Total orders  •  Orders processed  •  rate
- Total pallets  •  Pallets processed  •  rate
- Trucks to load  •  Trucks loading *  •  
- Breakout by truck  •  

Notes

All of this information would be displayed by wave. After a wave is completed the screen would reset all quantities and start over on another wave. This does not mean that a wave cannot be started ahead of time. It just means the screen will catch up after the previous wave is completed.
Another possibility is to attach wave numbers to all data shown. Again, the exact details will be worked out in cooperation Law Warehouses and our software group.

**Screen Locations**

The master control screen can be located anywhere in the building. It could be out on the operations floor or in the offices or in multiple places. We recommend that it be located somewhere on the palletizer mezzanine where the shipping docks are easily visible. The information on this screen is also valuable to others in the offices and could easily be set up at other supervisory or management stations if required.

**Operations Screens**

**Equipment Status**
Equipment Status

All the equipment can be monitored from a single point by showing a graphic showing the whole system. Different parts of the system indicate status or error conditions by changing color. This section can be broken down into subsystems and even to the individual device level right at the screen.

This screen will visually indicate any problems with any equipment in the system. Its primary value is for showing conveyor problems that would not be visible to anyone in this system. This is because large sections of conveyor are not readily visible to workers in this system. After detailed system engineering the breakdown will most certainly be changed to match the final system design. Sections that will be shown are:

- Conveyor transport sections
- Conveyor feed spurs
- Conveyor spirals
- Conveyor accumulation zones
- Sorters and diverts
- Conveyor recirc lines
- Carousel stacks
- VLS units and transfers
- Palletizers
- Pallet conveyor sections

Individual breakouts of each of these sections will be made if further detail is needed. Drill down to specific devices will also be available from this screen.
Data status screens are used in visible areas to allow operators to know what the current status is on the system. The two areas where this is most valuable are the pick modules and at the shipping dock. These are the two places where labor is concentrated.

**Pick Modules**

The pick module screens should be located on one level of each module. This will be convenient both for the pickers and supervisors because it gives them local visibility to what is coming for that module both for the current and upcoming waves. This allows them to anticipate heavy or lighter volumes and take the necessary steps to prepare.

**Shipping Docks**

The status screens in the shipping docks are located at the pickup points for outbound pallets in each palletizer module. These screens can be easily seen by fork truck drivers taking pallets off the conveyor. They not only give direction for the pallet to be moved but show the status of the
wave for that palletizer. This gives them ongoing visibility to the amount of pallets coming and where they are going.

Notes

The availability of data in these areas is critical. It allows supervisors or operators to see what is coming and how they are doing (getting ahead or falling behind). It also allows operators themselves to take initiative and handle upcoming situations when they see them.

4.12 System Software
System Software
DirectPick
Pick Modules and Bottle System

This software will be used to drive the light displays in the pick modules and the flow racks in the bottle system. It is already in use at Law Warehouses in the existing bottle system in Nashua.

DirectPick is a software product, originally developed by Diamond Phoenix. It is now managed and supported as a System Logistics product. It operates on a Windows platform using a standard computer network. It functions as a transaction processor for a host system.
System Software

PowerPick

Carousel Picking in the Bottle System

This software will be used to drive the carousels and light displays in the bottle system. It is already in use at Law Warehouses in the existing bottle system in Nashua.

PowerPick is a software product, originally developed by Diamond Phoenix. It is now managed and supported as a System Logistics product. It operates on a Windows platform using a standard computer network. It functions as a transaction processor for a host system. It enhances the capabilities of a warehouse management system while managing the details of the carousel picking zones. It provides fast transaction feedback to the host system and a wealth of administrative information for managing the system.
System Software

AutoPick

This software will be used to drive the carousel stacks and extractors in the carousel case pick system.

AutoPick is a software product, originally developed by Diamond Phoenix. It is now managed and supported as a System Logistics product. AutoPick was specifically designed to support large multiple stack carousel systems such as this one. The operating system, organization, and features of this software are geared for large scale buffer operations moving at high speeds. This is the most advanced, reliable, and simple software product in the industry.

The features and documentation of AutoPick take up too much space to be included in this proposal. Please consult the separate documentation package. This includes:

- Functional Specification
- Host Interface
- Control System
- User Guide
- Control System (conveyor)
System Software

Best Fit

Pallet Build Planning

The Best Fit software plans the pallet building for all orders in the system. It drives the configuration of the waves by the WES and all the routing of cases on the main sorter. It sets the plan for all cases pulled from the VLS units and the operation of the palletizer robots. In a wave, everything the WES does from the main sorter forward is a response to the pallet build plans made by the Best Fit software.
The Best Fit software is a product developed by System Logistics. It is specifically designed for building pallets in beverage distribution. It is one of the most powerful products in the industry and it is extremely well suited for this application.

This section describes the organization of the software. Capabilities that are particularly important for Law Warehouses are described in more detail. This process is described in much greater detail in the attachment 3.

System Software

Process

The process happens in two steps. Step 1 splits the order into the number of pallets to be built. Step 2 calculates the sequence for building the pallets created in step 1. There are multiple goals, constraints, and rules for each step.

Split Phase

The splitting phase calculates the number of pallets to be built for an order and which SKUs and cases quantities go onto each pallet. There are two goals in this process. They are:

- Make minimum number of pallets considering volume and weight
- Within the first goal, assign specific SKUs to pallets. Some considerations are:
  - Keep compatible SKUs together. This could be food types, products, or in this operation, specific liquor types.
  - Keep SKU package types together such as cans, trays, crates etc.
• Keep same size and type together. This will figure heavily in this system since many cases fall into the same size ranges and it has a big effect on pallet stackability.

• Keep same SKU together. This not only helps stacking but makes the stocking process at the store much easier as well.

**Best Fit Phase**

The best fit phase decides the exact sequence to build each pallet in after the SKUs and case quantities have been assigned to pallets in the split phase. There are 4 goals in this process. There are:

• Make solid pallets with minimum empty space and no unstable cases.

• Keep same SKUs close together. This can be done by layer or column.

• Keep within height limits of the pallet and keep overall height as low as possible.

• Adjust sequence for 1 or 2 robot operation if required.

Within best fit phase the system considers constraints for each SKU. This insures that the system will consistently build stable pallets for all order combinations.

• The stackability of each SKU is rated. Some SKUs are more fragile than others so each SKU is rated for where it can go in a pallet. This is where SKUs that must be turned (bottles moving horizontally) would be classified as non stackable. This insures they will be on the top layer of a pallet. In effect Law Warehouses can set this up so that any specific SKUs can be stacked in any sequence required on a pallet.

• The physical shape of the SKU can also dictate its stackability rating.
• Size limitations of some SKUs will determine where they must go in a pallet.

• Some SKUs can be used to bridge across cases in a pallet while others can’t. This also becomes a consideration when setting up the stacking sequence for some pallets.

Handling Capability

The Best Fit software is designed to handle multiple types of container and palletize them together. These are all the common types found in the beverage distribution industry. These are:

- Generic box
- Crate
- Pet
- Tray

The current inventory in Law Warehouses is almost 100% generic boxes. Over the next 15 years this may change as liquor suppliers modify or change their packaging methods. Law may also want to expand into different beverage distribution for other customers. The picking, transport, and palletizing parts of this system are designed to support any of these packaging changes.

Pallet Constraints

There are some constraints on the building of pallets also. These are affected by the constraints of the SKU type but also for how the pallet is to be divided up. There are two types of constraints. They are:

• SKU constraints such as case stackability, type, bridgeability, or physical shape

• Pallet divisions such as requirements to stack by layer, columns, or order. Note that the ability to stack a pallet by order would allow Law Warehouses to combine multiple
small orders (5 to 10 cases) for a single route truck and put them onto a pallet in such a way as they can be easily pulled off for each stop.

There is a user interface in the software that allows operators to individually control features of each pallet. These include:

- Viewing the pallet on screen and seeing all dimensions quantities
- Viewing the construction sequence listed by case and order
- Changing the constraints and recalculating the pallet sequence

5. Scope of Work

5.1 Introduction

A complete listing of all the equipment, software, and services for this project will be put together on a separate document. This document will list everything by item and quantity. Relevant vendor details for each piece of equipment will be included.

5.2 Bill of Materials

A separate scope of work document is included on a separate section in attachment 1.
6. Project Implementation

6.1 Project Plan

The System Logistics Project Manager is the focal point for system engineering, manufacturing, installation, startup, training, testing and system support. Site managers report to the project manager. From the start of installation through acceptance testing and training, the System Logistics site managers will maintain a regular and scheduled presence and will be in regular contact with Law Warehouses. All subcontracted equipment and service providers’ representatives will report directly to the System Logistics site managers.

System Logistics will begin the project startup promptly after a signed contract is received or authorization to start the project. The initial activities include:

- Assign the project team members
- Review the system with the project team members
- Establish the project reporting structure
- Select subcontracted vendors and finalize their contracts and schedule requirements
- Refine and distribute the project schedule per appropriate discipline (internal and subcontractors)
- Create a mobilization plan to site

Project Kickoff Meeting

A project kickoff meeting to review all the key elements will be scheduled by the project manager. System Logistics will review the system design and project plan with Law Warehouses. This includes all deliverables and contract requirements. The result of the kickoff meeting is a project specific action list.
System Design

Immediately after contract award, the system design is completed. Law Warehouses will be sent detailed engineered drawings and a system design document for approval. This proposal is the system design document. Law Warehouses approval of the design document and drawings allows detailed equipment engineering to begin. This process has been ongoing for some months so this should move quickly.

System Functional Specification:

The system functional specification describes the operation of the software running the system. This document will describe in detail all data flow, material flow, operations logic, procedures, operator interfaces, controls, and other relevant guidelines for system operation. The functional spec closely follows the process described in the design document. This becomes the plan for all software code to be developed for the system.

In addition to internal review by Law Warehouses, there will be a meeting between the Law Warehouses team and the System Logistics team (project manager, systems design engineer, lead software engineer) to work out all the final details of the system operation. The result of this meeting will be the functional specification document for Law Warehouses to review and approve. Expect this meeting to take at least 5 days since every operational detail of the system must be reviewed.

Project Implementation

System Engineering:

Upon approval of the system design document and system design drawings, system engineering will start. There will be multiple system engineering efforts going on simultaneously. This is because there are multiple subsystems and multiple suppliers involved. System engineering
efforts will be coordinated by the Systems Logistics staff located in Lewiston Maine.

Subsystems include:

- Conveyor system
- Carousel system
- Palletizers and VLS units
- Pick modules
- Pallet rack and VNA system
- Mezzanines

**Manufacturing:**

Manufacturing will start after the detail design is completed and approved. For each subsystem this includes:

- Procurement
- Fabrication and machining of components
- Final assembly
- Factory testing

**Installation:**

There will be multiple subsystems being installed simultaneously at this site. It is likely there will be multiple site managers (directing different teams) on the site at the same time. All site managers report to the project manager. All site managers will work in cooperation with each other and coordinate their teams on site. One lead site manager will be designated as the contact person for the site operations.
Documentation

The following documents will be developed during the course of the project. Those for review and/or acceptance are so noted.

- **System Functional Description** This is a review and approval document
- **Controls Protocol Document** This is a review and approval document.
- **Software Functional Specification** This is a review and approval document.
- **Host Interface Specification** This is a review and approval document.
- **Conveyor Controls Descriptions of Operation**
- **System Integration and Acceptance Test Plan** Defines testing requirements of each of the subsystems. This document also describes the requirements for each of the tests such as personnel, equipment, and test loads. The acceptance criteria for each test are also defined. This is a review and approval document.
- **Operation and Maintenance Manuals** - Manuals provide the information necessary for trained personnel to maintain the equipment. Information includes troubleshooting, lubrication, repair, replacement, adjustment, alarm messages, diagnostic routines, and drawings, as applicable. Operations manuals will be included for the computer system elements.

Project Implementation

Acceptance Testing

A comprehensive testing plan will be developed during the course of the project. System Logistics will demonstrate the equipment features and functions during multiple levels of
acceptance testing. Important safety and operation features will be demonstrated to ensure the quality and functionality of the installation.

The system logistics project manager, site managers, and engineering staff has overall responsibility for assuring that the system acceptance test plan is developed and carried out. The test plan defines a systematic approach for each level of required subsystem testing, and the expectations of the specific tests. The test plan additionally defines the time periods, personnel, equipment, and test loads that are required for each test. A tests plan is described in section 7 of this document.

6.2 Commissioning

After the equipment has been installed, technicians will start the on-site checkout of the equipment in various modes of operation. These checkout procedures will include both a visual and functional inspection to ensure a quality installation. The commissioning process ensures the following:

- All components and subsystems have been installed according to the contract.
- All components and subsystems are operational according to the contract.
- All subsystems and components are properly integrated to operate as a system.

Mechanical Commissioning

The mechanical commissioning is a “static” check and a “run” check. The static check is visual and verifies the equipment is installed properly and ready to operate. The run check verifies operates the equipment and checks product handling and positioning.
Electrical Commissioning

The electrical commissioning is a field wiring and control panel check to verify the electrical installation has been completed in accordance with the drawings and contract. Following that, a continuity check is performed; and the control devices are tested to ensure their I/O points are correct.

Control System Commissioning:

This is a checkout of equipment controls and the testing of the software. During the controls check, all aspects of the equipment level controls are tested to verify the functions as required by the contract. The operating software testing includes communications testing with a “host” system and interface testing with the equipment.

6.3 Site Support – Installation and Commissioning

System Logistics is committed to providing a comprehensive site system support program to ensure a successful installation, testing and operational turnover. One or more System Logistics site managers will be on site extensively from the commencement of installation through acceptance testing.

The project manager will make trips to site regularly to ensure the project is on schedule and the highest quality standards are maintained. The project manager and required site managers will be on site during acceptance testing.
6.4 Customer Responsibilities

System Logistics is responsible for the following as described in this proposal:

- Palletizer robots
- VLS modules
- Mezzanines
- Pallet racks
- Pick modules
- Carousels
- Extractors
- Moving the bottle system
- Case conveyor system
- Pallet conveyor system
- Control Panels
- Equipment installation
- Computer hardware
- System software
- Conveyor controls
- System engineering
- Installation supervision
- Project management
- Acceptance testing
- Equipment / software training
- Service and support (first year)

Law Warehouses is responsible to configure their host software around the capabilities and capacities of the software and equipment listed in the system design. There is a fixed amount of space with a fixed capacity for the pallet racking, pick modules, conveyor, and floor space. There are fixed speed ranges for the conveyor system. In designing its other systems, it becomes the customer’s responsibility not to exceed the capabilities of the material handling system. The following is a list of our standard customer responsibilities.

CUSTOMER RESPONSIBILITIES

1. Prepare the work site to permit the unloading, staging, installation, testing, of the equipment.

2. Insure the structural strength and soundness of the building structure and floor matches the drawings we have been given.

3. Insure that the concrete floor matches the building drawings we have been given.

4. Any voids under the existing concrete flooring are the responsibility of the customer.

5. Remove and/or relocate any building obstructions, such as ducting, lighting fixtures and wiring, drains, piping, structural steel, electrical wiring, conduit, etc. which interfere with the equipment clearances.
6. Perform and accept responsibility for all excavations, drainage, pilings, foundations, masonry, and concrete work, concrete lining, steel, and other building modifications, which may be deemed necessary for the proper installation of the equipment.

7. Provide a static and clean electrical environment, to insure proper operation of controllers and electronic devices.

8. Provide a free and clear work and installation area, with all existing equipment and inventory moved out of the way of the working area.

9. Maintain the work site in a watertight condition, and orderly state; free of debris and obstructions.

10. The customer is responsible to provide a dumpster for the removal of crating material from the installation area. System Logistics is responsible to maintain a clean work area and place trash in the customer provided containers.

11. Insure free and clear access for moving equipment from the receiving docks to the installation area.

12. Provide access to and use of facilities, such as washrooms, lunchroom/cafeteria, telephones, copiers, and internet.

13. Provide suitable electric current, lighting, compressed air, water, and heat, as required for the installation, testing, acceptance, and operation of the system. Precise power, air drop locations, and sizing details are to be provided by System Logistics on the detailed system design drawings. The customer is responsible for bringing power to the panels and air drops where required. System Logistics is responsible for all wiring going from the panels to the installed equipment.

14. Insure that voltage supplies for the system’s hardware and control devices (photo eyes, limit switches, solenoids, etc.) not vary more than +/- 10%. Frequency variation must not exceed +/-
1%. Voltage supplies for the system’s logic control hardware and software must be further refined by line conditioning. Unless otherwise provided for in the proposal, the customer is responsible for supplying clean and conditioned power to the previously listed logic controls equipment at +/- 5%. Frequency variations are not to exceed +/- 1%. Clean and conditioned power will insure proper system operation and prevent the loss of data.

15. Provide and install the computer network (wired and wireless) as required for the WMS and System Logistics servers and work stations to the customer Host Computer.

16. Provide all fork trucks in the system (VNA and standard) along with associated installation.

17. Sprinkler and fire safety devices are the responsibility of the customer or its contractor including the sprinkler design and mounting hardware for connection to carousel framework.

18. Provide any lighting fixtures and wiring, as required.

19. Provide all 110 volt electrical utility outlets and wiring, as required.

20. Provide for the physical loading of inventory into the system, stock counting, building the inventory database, and back-up systems and procedures for use in integrating the system into the existing operation.

21. Insure that the customer personnel participating in training sessions are in attendance for scheduled training sessions.

22. Provide VPN access to system and dedicated analog phone lines for on site management and engineers use.
Power Requirements

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit qty</th>
<th>motors per unit</th>
<th>amps per motor</th>
<th>Voltage</th>
<th>total amps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conveyor system</td>
<td>1</td>
<td>422</td>
<td>2</td>
<td>480V</td>
<td>844</td>
</tr>
<tr>
<td>carousels (case pick)</td>
<td>24</td>
<td>2</td>
<td>13</td>
<td>480V</td>
<td>624 *</td>
</tr>
<tr>
<td>extractors</td>
<td>8</td>
<td>1</td>
<td>32</td>
<td>480V</td>
<td>256</td>
</tr>
<tr>
<td>VLS units</td>
<td>32</td>
<td>1</td>
<td>30</td>
<td>480V</td>
<td>960</td>
</tr>
<tr>
<td>Palletizer robots</td>
<td>16</td>
<td>1</td>
<td>30</td>
<td>480V</td>
<td>480</td>
</tr>
<tr>
<td>carousels (bottle system)</td>
<td>16</td>
<td>1</td>
<td>30</td>
<td>480V</td>
<td>480</td>
</tr>
<tr>
<td>Misc items (add 10%)</td>
<td>1</td>
<td></td>
<td></td>
<td>480V</td>
<td>308</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>3388</strong></td>
</tr>
</tbody>
</table>

**Future Expansion**

<table>
<thead>
<tr>
<th>Item</th>
<th>Unit qty</th>
<th>motors per unit</th>
<th>amps per motor</th>
<th>Voltage</th>
<th>total amps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conveyor system</td>
<td>1</td>
<td>100</td>
<td>2</td>
<td>480V</td>
<td>200</td>
</tr>
<tr>
<td>carousels (case pick)</td>
<td>18</td>
<td>2</td>
<td>13</td>
<td>480V</td>
<td>468 *</td>
</tr>
<tr>
<td>extractors</td>
<td>6</td>
<td>1</td>
<td>32</td>
<td>480V</td>
<td>192</td>
</tr>
<tr>
<td>VLS units</td>
<td>16</td>
<td>1</td>
<td>30</td>
<td>480V</td>
<td>480</td>
</tr>
<tr>
<td>Palletizer robots</td>
<td>4</td>
<td>1</td>
<td>30</td>
<td>480V</td>
<td>120</td>
</tr>
<tr>
<td>carousels (bottle system)</td>
<td>6</td>
<td>2</td>
<td>13</td>
<td>480V</td>
<td>156</td>
</tr>
<tr>
<td>Misc items</td>
<td>1</td>
<td></td>
<td></td>
<td>480V</td>
<td>162</td>
</tr>
<tr>
<td><strong>Future Totals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>1778</strong></td>
</tr>
<tr>
<td><strong>Total possible in future</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>5166</strong></td>
</tr>
</tbody>
</table>

This is a preliminary power requirements list. It is based on the total amount of motors and calculated based on an amperage per motor. To use this total amperage every motor in the system would have to be running at the same time.

The carousel stacks are shown with an asterisk. This is because all carousels running at once is highly unlikely. During normal operation the extractors would be stopped at one carousel each so the most that could be running at one time would be 16 carousels. The one exception to this is at the start of a wave. This can be set up for a staggered start so the power is not spiked in the system.

Other equipment in the system such as the extractors, VLS units, palletizers, and conveyor will indeed be running on a constant basis.
Note

This list does not include recharging units for the VNA trucks or other fork trucks. It does not include misc 110 V items for computers and other peripheral items. A total list should be created during the detailed engineering phase of the project.

7. Testing

Testing for this system will require extensive and detailed planning. This is absolutely critical to maintain the project schedule and for a successful system. There are no shortcuts. Law Warehouses is in a unique position to execute this plan. The sheer volume and case requirements alone would be nearly impossible for any other company. Law Warehouses would be the only organization with the liquor storage and transport knowledge to make this possible.

Listed below are some key elements to be considered for testing.

Quantity of Cases and SKUs

- Between 10,000 and 20,000 real cases will be needed to run subsystem tests. One wave would be about 6,000 cases alone. These cases will often pass through one palletizer in groups of 1,200 at a time for a test. All of them must be put back into the system while other testing continues. In short you will need a lot of cases.

- All 8,788 different SKUs would be required for testing the palletizers and Best Fit software for different pallet building combinations. This may not be possible however we should try to get as large a percentage as possible.
Real Cases are required

- The stacking of cases onto the pallets makes it mandatory that the real cases be used for testing. Cases cannot be stacked on top of others in an automated system without the bottles extending to the top of the case. This is needed to support the cases stacked on top. There is no other way to do this.

- Real cases are also required in the carousels for testing the extractor. Bottles must fill out the case from side to side for the grippers on the extractor to work properly. Real case sizes and weights are required for testing the movement in and out of the carousel shelves.

- Real cases are required for testing the conveyor system. All tracking on the sorters and diverts requires the real case sizes and weights. The sorter touches nearly every case in the system so it must be thoroughly tested with multiple combinations of real cases.

Dedicated Testing Time

- All system testing must be done separately from real shipping of orders. Testing and troubleshooting require time and space on the equipment. Equipment and software need to be constantly adjusted and changed during the testing process. It is impossible to do this if you are using the same equipment to ship real orders.

- Law Warehouses is in the unique position of being able to continue shipping out of Nashua while testing the system in Seabrooke. Law is the only company in a position to guarantee that no shipping days will be lost to switching over systems. They can fall back on Nashua for as long as needed to bring the new system up.
Testing Labor

- During the later phases of testing the system can easily go through up to 4,000 of cases in an hour. This would only be just over an hour on the sorter and palletizer modules. All of these cases go through the palletizer and are stacked on pallets. These cases must be unpacked and put back into the system for continued testing. This requires some steady labor to be available on a daily basis during these phases of testing.

- This labor requirement provides an opportunity to train people in the system operation in places like picking in modules, conveyor loading, VNA operation, palletizers and WES software. Since these cases will essentially be following a closed loop through the system it creates a training opportunity for Law.

Choosing SKUs

- Fast SKUs will be needed for testing the pick modules. These are the SKUs that Law has the largest quantities of full pallets on hand for. There are often 10 to 20 pallets on hand for these SKUs. 1 or 2 pallets of these can be sent over for testing without creating stress at Nashua.

- Medium SKUs are the cases that would go into the carousels. These are the cases that are used in sufficient quantities that there may be 1 to 2 pallets in stock. 1 to 5 cases of these SKUs can be taken from stock and moved for testing. These SKUs will require the most careful selection since they have the lowest stock levels combined with regular movement.

- Slow SKUs will be the easiest to send to Seabrooke since many do not move at all. Many of these SKUs have as much as a full pallet in stock and move just a few cases per
year. These are ideal cases to send to Seabrooke for testing since they will not be missed in Nashua at all.

Testing
This is a proposed acceptance test plan for this project. Law Warehouses and System Logistics can work together to modify this plan in the course of the project. The duration of the test will also be subject to limitations such as available personnel and cases to be used for the system. Acceptance testing will be done in three stages. Each section is part of a different stage listed below.

Stage 1 – Equipment Testing
This stage tests for all the general elements of the system. It insures that all the basic parts are checked off before operational testing begins.

- General system elements
- Acceptance checklist
- Mechanical inspection
- Electrical inspection

Stage 2 – System Testing
This stage tests the operation of each part of the system separately. The software is typically in place and operating for this stage of testing

- Operations testing
- Subsystems testing

Stage 3 – Integrated System Test
This stage tests all parts of the system operating together. The WES and all other software is in place and operating for this stage of testing.

- Integrated systems test

### 7.1 Equipment Testing

#### Applicable Documents

Applicable documents will be the project design document (this one), the functional specification, engineered drawings, and modified descriptions of operation; submitted and approved by the customer at the beginning of the project. All documents will be signed off by the customer well in advance of the testing phase.

#### Acceptance Checklist

System Logistics will develop a comprehensive checklist that goes through each physical element of the system. The acceptance checklist identifies items to check for installation completeness, as well as equipment and controls check lists to ensure that all product mechanical and local control elements are working according to specifications.

#### Testing

#### General System Elements

- 2 pick modules with 4 levels each, 848 total pallet lanes, 2,538 total pallets
- Light displays on all 848 locations in the pick modules
- Pallet rack arranged in 42 rows, 6 levels per bay, 2,078 bays, 23,160 pallet locations
- 8 carousel stacks, 8 extractors, 24 carousels, 2,640 bins, 21,120 total shelves
- Sorter mezzanine, palletizer mezzanine, carousel mezzanine
• Conveyor system

• 32 VLS units with 226 cases each and 7,232 cases in total

• 4 palletizer modules, 2 pallet build spots and 2 robots in each module.

• Pallet conveyor to and from the palletizer robots

• Integrated bottle system (existing one is moved)

• Computer Hardware and Network

General Mechanical Inspection

This checklist is used as the basis for a complete mechanical inspection of the entire system to ensure proper installation and the working nature of the equipment. This checklist will be applied to all the items listed above. Please note that some of the items listed are quite large and will require independent lists for inspection. The conveyor system would be inspected like this.

General Electrical Inspection

This checklist is used as the basis for a complete electrical inspection of the entire system to ensure proper installation of the equipment. Items such as connectors/wire ends, cable/wire condition, proper installation of conduit, wire way, cabinets, and boxes, proper grounding, proper safety labels, etc. are all inspected for completion.
Testing

7.2 System Testing

The objective of this test is to demonstrate that each part of the system operates correctly when driven by the WMS and System Logistics software. The testing will be done for each subsystem.

This Testing will be done prior to actual operation. Real cases, test data, and orders will be used. Each individual test will be done to mimic a single wave and should take between 1 and two hours. Subsystems to test are:

- Pick module picking (lights)
- Conveyor replenishment to carousels
- Carousel picking and storing
- Conveyor sorting to VLS units
- Conveyor sorting to carousel stacks
- Palletizer modules
- Conveyor transport from picking
- Conveyor merging at saw tooth
- Pallet conveyors with empty pallets
- Pallet conveyors with full pallets
- Bottle system picking and conveyor
- Bottle system replenishment and conveyor

Each subsystem will be tested with the applicable software used to run it in the system. After sub-system controls are shown to be operationally correct, a complete test of the WES system will be performed.

The precise details of how each area is to function will be listed in the applicable software document from Diamond Phoenix. This functionality will be reviewed, approved, and signed off by Law Warehouses long before the any acceptance testing begins. Each area test listed in section 7.2 will be individually signed off by Law Warehouses as they are completed. Stage 2 will be completed when all the tests listed in section 7.2 are completed.

7.3 Acceptance Testing

The objective of this test is to demonstrate that all parts of the system work together. This test will take place before actual system operation. Two test waves of 6,000 cases each will be run through the entire system consecutively. This will require 12,000 cases and take about 4 hours.
The WES will process “test orders” created by the WMS. This test must be done with customer personnel. The test will be complete if 99.5% of all attempted transactions are completed correctly on the test day.

Training of Law Warehouses personnel must be well under way before this test can take place. Law Warehouses is responsible for providing product to run the test with. Law Warehouses is responsible for putting product back into the picking locations after the test is done.

Actual testing time can be agreed to between Law Warehouses and System Logistics in the course of the project. This many need to be adjusted given the volume of material and labor needed for the test. Keep in mind that all of these cases will turn into about 240 pallets. All of these pallets must be taken apart to be restocked back into the system for each full test.

8. Training

8.1 Training during the Installation

There are significant training opportunities during the installation and we highly recommend that Law take advantage of it. During installation maintenance personnel can get “ground up” training and fully understand how the equipment works. In addition, training during the startup phase provides valuable insight into the inner workings of the hardware and software and any details that may provide an advantage in future troubleshooting.

8.2 Scheduled Training

System Logistics provides a comprehensive training program for supervisors, operators, and maintenance personnel. Our training plan will ensure a complete and successful transition. The
training program will cover the whole system and be “hands-on”. Training will cover mechanical maintenance; basic controls, and PC based operating systems. Following is a summary of the training to be provided:

<table>
<thead>
<tr>
<th>Type</th>
<th>Attendance</th>
<th>Days</th>
<th>Duration</th>
<th>Trainer</th>
</tr>
</thead>
<tbody>
<tr>
<td>PowerPick Software</td>
<td>Pickers / supervisors</td>
<td>1</td>
<td>8 hour day</td>
<td>System Logistics</td>
</tr>
<tr>
<td>DirectPick Software</td>
<td>Pickers / supervisors</td>
<td>1</td>
<td>8 hour day</td>
<td>System Logistics</td>
</tr>
<tr>
<td>AutoPick Software</td>
<td>Supervisors</td>
<td>2</td>
<td>8 hour days</td>
<td>System Logistics</td>
</tr>
<tr>
<td>BestFit Software</td>
<td>Supervisors</td>
<td>3</td>
<td>8 hour days</td>
<td>System Logistics</td>
</tr>
<tr>
<td>WES (software)</td>
<td>IT / supervisors</td>
<td>4</td>
<td>8 hour days</td>
<td>System Logistics</td>
</tr>
<tr>
<td>Carousel Maintenance</td>
<td>Maintenance</td>
<td>1</td>
<td>8 hour day</td>
<td>System Logistics</td>
</tr>
<tr>
<td>Extractor Maintenance</td>
<td>Maintenance</td>
<td>1</td>
<td>8 hour day</td>
<td>System Logistics</td>
</tr>
<tr>
<td>General Conveyor procedures</td>
<td>Operators / pickers</td>
<td>1</td>
<td>4 hour day</td>
<td>System Logistics</td>
</tr>
<tr>
<td>Conveyor Maintenance</td>
<td>Maintenance</td>
<td>1</td>
<td>4 hour day</td>
<td>Conveyor supplier</td>
</tr>
<tr>
<td>Conveyor Controls</td>
<td>Maintenance</td>
<td>1</td>
<td>8 hour day</td>
<td>System Logistics</td>
</tr>
</tbody>
</table>

Please note that the System Logistics equipment in this system is very simple to operate and use. The equipment operation does not require more training than we are listing here. PowerPick and DirectPick are already in use with the existing bottle picking system. AutoPick software runs the automated carousel picking stacks and does not require operator interface unless there is a problem. It rarely takes us more than one day to train operators in the work areas. Depending on the final system configurations we may adjust the training time for some areas. The scheduling of this training will be left to the discretion of the project manager working in cooperation with Law Warehouses.

Note

While much of this training can be completed in the time shown, the WES requires some “hands on time”. This is especially true in a system this large and with multiple subsystems. We encourage Law Warehouses personnel to work with us during the testing phases to watch and learn how the software works with the system. Most of the WES software is in place by this
time and it is in use during the testing phase. Time spent working with it in this way is the most effective method to learn the software and the system operation.

8.3 Training Manuals

System Logistics will supply copies of our standard documentation for this equipment and software. Our standard documentation is extensive and complete. Maintenance manuals will include detailed instructions on both preventive and corrective maintenance of electronic and mechanical components (inspection requirements, periodic tests, lubrication requirements, adjustment procedures, preventive maintenance procedures and repair and replacement procedures). The quantities supplied are listed in the table below.

<table>
<thead>
<tr>
<th>Training Type</th>
<th>Documentation</th>
<th>Bound copies</th>
<th>digital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carousel Maintenance</td>
<td>Horizontal Carousel Maintenance Manual</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Carousel Preventive Maintenance Schedule</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Horizontal Carousel Troubleshooting Guide</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carousel Controller Operation Manual</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Spare Part List</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Extractor Maintenance</td>
<td>Same list as carousels</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>AutoPick (extractor stacks)</td>
<td>Operators manual and software documents</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>PowerPick (carousel picking)</td>
<td>Operators manual and software documents</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>DirectPick (light picking)</td>
<td>Operators manual and software documents</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Best Fit (palletizers)</td>
<td>Operators manual and software documents</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>WES (overall system)</td>
<td>Operators Guide</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Palletizer Robots</td>
<td>Same list as carousels</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Conveyor System</td>
<td>Operations manual</td>
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<td>1</td>
</tr>
<tr>
<td></td>
<td>Maintenance manual and spare parts list</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Note that we have supplied these manuals for hundreds of systems which continue to operate and train their own people. Our equipment and software is not that complex and is easy to understand and operate. PowerPick, Direct Pick, and AutoPick software packages include:
• Host interface
• Workstation users guide
• System administration guide
• System configuration guide

Additional documentation will be supplied for any relevant equipment used in the system (hardware or software).

9. Service

A separate service agreement will be needed for this project.

This is included on a separate section in attachment 4.
## 10. Schedule

### 10.1 Project Schedule

<table>
<thead>
<tr>
<th>LAWS WAREHOUSES</th>
<th>PRELIMINARY GANTT CHART FOR IMPLEMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TASKS</strong></td>
<td><strong>Duration</strong></td>
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<tr>
<td>Contract Award</td>
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<td>General System Layout Finalized and Approved</td>
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<tr>
<td>Engineering, Mechanical/Electrical/Controls/Software</td>
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<td>Procurement/Manufacturing</td>
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<td>Rack &amp; Mezzanine</td>
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<td>Conveyors</td>
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<tr>
<td>VLS / Palletizer</td>
<td>14</td>
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<tr>
<td>Inserter/Extractor System</td>
<td>11</td>
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<tr>
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<td>5</td>
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<td>Conveyors</td>
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<tr>
<td>VLS / Palletizer</td>
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<td>Installation-Mechanical/Electrical</td>
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<td>VLS / Palletizer</td>
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<td>Inserter/Extractor System</td>
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<td>Controls-Software Integration</td>
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<td>Inserter/Extractor System</td>
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<td>Split Case Picking Moved</td>
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<td>Commissioning</td>
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<td>Inserter/Extractor System</td>
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<td>Split Case Picking</td>
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<td>Go-Live</td>
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</tr>
<tr>
<td>Stand-By Support</td>
<td>4</td>
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</tbody>
</table>

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**Preliminary Schedule**

This is a preliminary schedule. The final schedule will be completed using Microsoft Schedule and will contain significantly more detail than what is shown here. Schedule is affected by the time of the order, various vendor lead times, testing requirements and multiple other issues. The detailed schedule will be produced early in the engineering phase of the project.

**Expected Timing**

This goal of this preliminary schedule is to show Law Warehouses the stages of the project and the expected timing of those stages. This project will take 12 to 14 months to complete. This should be taken into account planning the related operations and for training.

**Moving Stock**

There are approximately 17,000 pallets of stock in Nashua right now. This is a lot of material to be moved and it will take considerable time and planning to do it. The reserve storage racks will be available as much as 6 months before the system is completed. Law Warehouses should work out a plan to move as much stock as possible into the reserve racks during this time.

This process should be included on the detailed schedule to everyone is working to the same plan.
Law Warehouses, Inc.
NHSLC Warehouse Services RFP 2012 – 14

Section IV
Item by Item Response
PART 1. GENERAL INSTRUCTIONS TO VENDORS
1.0 Definition of Terms:

Understood

1.1 Purpose:

We understand the purpose of this Request for Proposal (RFP) is to solicit responses from qualified Vendors to provide a comprehensive and efficient distribution system for the State of New Hampshire Liquor Commission (NHSLC), a system which will be capable of responding to the needs of its customers while maximizing revenue to the NHSLC.

Following our analysis of the RFP and of our existing operations, we have determined that service enhancements, such as reduced cycle times and increased receiving slots, are not feasible in the existing Concord/Nashua warehouse scenario. In addition, a manually operated split volume system will continue to be heavily reliant on labor cost factors. As the combination of SKUs, inventory and order volumes increase, the impact on these factors in a manual operation environment are compounded. This will be exacerbated in an improving economy as the demand for this type of labor exceeds supply. Without the high volume SKUs currently shipped from vendor inventory in Concord, the revenues do not support transitioning to a new automated operation. In addition, completing such a transition, only to be followed by adding the Concord volumes a few years later, adds significant cost. As a result of these cost factors we have declined to submit a two warehouse proposal (Scenario B).

1.2 Schedule of Events through 1.5.1 Nature of Proposal:

Understood
1.5.2 Proposal Offer:

Law currently has options in place for our proposed facility in Seabrook, NH which expire September 30, 2012 (115 days from Proposal submission). To the extent that a contract is not executed with the NHSLC under this procurement process prior to August 30, 2012 Law reserves the right to withdraw its Proposal and shall not forfeit its bidders bond of $50,000.

1.5.3 Amendments to this RFP:

Understood

1.5.4 Assignment Provisions:

We reserve the right to address in contract negotiations the legal permissibility, extent and appropriateness of requiring vendors to assign such rights.

1.5.5 NHSLC’s Options:

Understood

1.5.6 Public Information:

Understood, subject to the conditions in Sections 1.5.8 (Inspection of Records), 1.13 (Property of NHSLC) and 1.14.b (Disclosure of Proposal; NHSLC Obligation) and our Statement of Confidentiality (Exhibit A) included with the proposal as required under RFP, Section 1.14b.

1.5.7 Liability:

We reserve the right to address in contract negotiations the validity and appropriateness of requiring us to agree to such a broad waiver of liability, including without limitation, requiring us to
waive the pursuit of available legal remedies and recovery of damages for violation of the NHSLC’s confidentiality obligations or a misappropriation of intellectual property rights.

1.5.8 Inspection of Records:

We have included information about our finances and operations, including but not limited to, our audited financial statements (Exhibit B), for the purpose of enabling the NHSLC to evaluate our ability to conduct the operations required under the RFP. This information is confidential, financial, and proprietary information exempt from public disclosure under RSA 91-A:5 and other applicable laws or regulations. We submit this confidential, financial and proprietary information to the NHSLC subject to the conditions described in Sections 1.13 (Property of NHSLC) and 1.14.b (Disclosure of Proposal; NHSLC Obligation) and our Statement of Confidentiality (Exhibit A) included with the proposal as required under RFP, Section 1.14b.

1.6 Proposal Submission through 1.7.2 Mandatory Requirements:

Understood

1.7.3 Innovation:

Law agrees with the NHSLC’s interest in innovation. Beginning with Law’s proposal 15 years ago to develop the first ordering and reporting website for the NHSLC, we have worked to create new ideas and enhancements. In the fall of 2007 we invested more than $500,000 in an automated system designed to more efficiently handle the growing demand for split cases. In addition to the operational benefits it has provided for the split case side of the business, it also gave us a window into the process of evaluating more automated systems for the growing full case side of the business as well.
Over the past few years we have been researching systems designed for wine and spirit distribution centers across the country. We believe, the system we are proposing, is the most innovative distribution system available. One that will provide the process improvements, operational efficiencies, and operational flexibility that will allow the NHSLC to remain at the forefront of wine and spirit distribution for years to come.

In Section II of our proposal and in Section 3-IX, the Rate and Price Analysis, we have outlined the elements of the system and the service enhancements this Proposal provides the NHSLC.

1.7.4 Financing:

Law has worked diligently with its primary financial institutions to obtain the most advantageous financing available. One of our primary banks (TD Bank or Sovereign), working in conjunction with Granite State Development, will provide funding to successfully implement the planned automation. This financing will include a combination of short-term “construction” financing during the build phase of the project and long-term, permanent financing for the amortization of the loan. Actual rates will be locked in as soon as possible to take advantage of exceptionally low interest rates and to limit variables that could potentially impact costs to the NHSLC. However, an optional floating rate for a period of time may be beneficial and allow the NHSLC to share in the additional saving with Law. Law is willing to discuss this option with the State during negotiations. Although fixed rates are expected to remain low in the short-term, please understand that any delay in the award of this contract could impact the interest rates of this project. An interest rate increase of more than ½% may require a revision of contract rates.
1.8 The Americans with Disabilities and USA Patriot Acts:

Understood

1.9 Contract Performance Bond:

Understood. However, if the amount of the Performance Bond changes significantly from what is currently in place, Law reserves the right to make corresponding adjustments to its rates.

1.10.1 Duration of Contract:

Understood

1.10.2 Exclusive Contract:

Our proposal is specifically based upon the volumes only available through the award of an exclusive contract.

1.10.3 Rates:

Understood; however, Law proposes that our rates will be put into effect January 1, 2013 and run through April 30, 2016 rather than implementing the 14% rate increase scheduled to take effect January 1, 2013. This will eliminate the increase of $1,200,000 of costs to the NHSLC and Suppliers. In addition, this will provide forty-eight (48) months at our initial proposed rates instead of the minimum thirty (30) months requested by the NHSLC.

1.10.4 Rate Changes:

Law reserves the right to negotiate rate changes beyond the requested limit to CPI for the previous twelve months. Rates are fixed for approximately three year periods; however, the RFP
limits rate increases to the change in CPI for the previous twelve months, which will not match
increases in costs and will quickly put any contractor in a loss position. In order for the State to
benefit from service enhancements of a long-term contract, it is imperative that the contractor
remain a Going Concern so that it can meet its operating requirements, financial obligations, etc.

1.11 Monthly Billing Summary through 1.12 Supportive Materials:

Understood

1.13 Property of NHSLC:

The information contained in our proposal includes proprietary, financial, confidential, and
other competitively sensitive information, including, but not limited to, information pertaining to
our operations and financial matters, services, suppliers, sales, revenues, customers, employees and
other business matters. While we understand that the NHSLC will not return our written proposal
to us, by submitting a proposal we do not agree to transfer any property or other rights, title or
interest in the information and materials contained in our proposal, and all such rights, title and
interest in the information shall remain with us and any third parties to whom the information
belongs. We submit our proposal subject to the conditions that any use or disclosure, publication or
dissemination of the information and materials in the proposal is limited to (a) authorized state
officers and employees for the limited purpose of evaluating our proposal, (b) to those state officers
and employees that have a reasonable need to know such information in order to assist in carrying
out the provisions of any resulting contract with us, and (c) any public disclosure of the Confidential
Information (as defined in Section 1.14.b) is subject to the conditions described in Section 1.14.b
(Disclosure of Proposal; NHSLC Obligation) and our Statement of Confidentiality (Schedule A)
included with the proposal as required under RFP, Section 1.14b.
1.14 Disclosure of Proposal:

a. Understood

b. We have included in our proposal highly valuable and significant confidential, financial, and proprietary information belonging to us and third parties for the limited purpose of enabling the NHSLC to evaluate our proposal for contract award. This information includes without limitation and regardless of its format, information relating to our operations, customers, suppliers, business plans, finances, revenues, trade secrets, know-how, technology, and intellectual property as may exist now and/or hereafter come into existence, regardless of whether such rights arise under the laws of the United States or any other jurisdiction (including without limitation copyrights, trademarks, patents, rights of privacy and publicity, and goodwill), and information belonging to third parties, (collectively the confidential and proprietary information is referred to as the “Confidential Information”).

The Confidential Information is exempt from public disclosure under the Right to Know Law, RSA 91-A:5, IV, because it constitutes “confidential,” “commercial” and “financial” information, the disclosure of which would constitute an invasion of privacy within the meaning of RSA 91-A:5, IV. As held by the New Hampshire Supreme Court, and consistent with the State of New Hampshire’s longstanding practice, the terms “commercial or financial” encompass information such as business sales statistics, research data, technical designs, overhead and operating costs, and information on financial condition. The disclosure of any of the Confidential Information would result in substantial harm and irreparable damage to our legitimate business interests and competitive position, and to those of third parties whose Confidential Information is included in our proposal. For example, if the Confidential Information were publicly disclosed, a competitor could use the information to develop similar practices or systems, placing us and third parties in jeopardy of losing our competitive positions. Given the nature of the Confidential
Information and its high economic value, we have a valid and substantial interest in maintaining the confidentiality of the Confidential Information which far outweighs any interest in public disclosure. We do not waive any privacy interests in maintaining the confidentiality of the Confidential Information by submitting our proposal. We have included, as required under RFP Section 1.14b, a signed Statement of Confidentiality (Exhibit A) describing in detail the nature of the Vendor Confidential Information and the grounds for its position that the Vendor Confidential Information is exempt from public disclosure under applicable laws and regulations.

In addition, the benefits of non-disclosure to the NHSLC far outweighs any interest in public disclosure of the Confidential Information for numerous reasons, including without limitation, the NHSLC’s interest in preventing any impairment of its ability to obtain confidential, financial or proprietary information in the future. If the Confidential Information were publicly disclosed, such disclosure would operate to discourage companies from responding to future RFPs, if, by responding, a company faces forced disclosure of its confidential, financial or proprietary information.

Accordingly, we are submitting the Confidential Information subject to the conditions that the NHSLC maintain the confidentiality of and not at any time publish, reproduce or disclose the Confidential Information, except as (a) reasonably necessary to authorized state officers and employees for the limited purpose of evaluating our proposal, and (b) to those state officers and employees that have a reasonable need to know such information in order to assist in carrying out the provisions of any resulting contract with us.

Further, we understand that the NHSLC will maintain the confidentiality of the Confidential Information in accordance with applicable laws and regulations, including, but not limited to, RSA 91-A. If the NHSLC receives a request for the Confidential Information and determines that any of the Confidential Information is subject to public disclosure for any reason, we understand that the
NHSLC will immediately notify us and specify the date by which the NHSLC intends to release such information to the extent that the NHSLC determines in its opinion that any of the requested information is subject to public disclosure under RSA 91-A. Given the competitive and confidential nature of the Confidential Information, and the substantial harm that would result to us and third parties if that information were disclosed, the Confidential Information must not be released in the absence of a final order by a court of competent jurisdiction requiring such disclosure. Further, the conditions described herein must remain in force even if we are not awarded a contract or notwithstanding the termination of any resulting contract with us.

1.15 News Releases:

In accordance with our existing contract, Law Warehouses may publicly disclose, including issue a press release or other public statement that refers to the Agreement or the existence of the parties’ business relationship without the prior written consent of the State. Further, subject to the confidentiality provisions of the Agreement and NHSLC approval, which shall not be unreasonably withheld, Contractor may publicly disclose any information concerning the Agreement that is available for public disclosure under applicable laws and regulations, including without limitation, N.H. RSA Chapter 91-A.

1.16 Use of Electronic Versions of This RFP through 1.17 Proposal Format:

Understood
1.18 Confidentiality:

We understand that the NHSLC may seek to maintain the confidentiality of “confidential/sensitive information,” but reserve the right to address the content of any such confidentiality agreement in contract negotiations.

1.19 Form of Contract:

We object to the inclusion of the following provisions contained in Appendix E (General Standards and Requirements), as amended in Exhibit C thereto, in any resulting contract, and request that these provisions be modified as follows:

9. Data:

In accordance with our existing contract, we require that the language in the existing contract serve as the definition of data.

12. Assignments:

In accordance with our existing contract, we require the addition of the existing language providing that consent not be unreasonably withheld.

13. Indemnification:

In accordance with our existing contract the language must be modified to replace “acts and omissions” with “negligence”.

Appendix E – Exhibit C:

25. Protest Process:

We reserve the right to negotiate the contract protest process and any provision in the RFP that requires the contractor to waive or delay institution of any available legal remedies, at law or in equity, including without limitation with respect to confidentiality requirements imposed on the state.

26. Contract Transition Period:

In the event a new Vendor is selected to provide warehousing services at the end of this contract, we agree to assist in the transition for up to 6 months and until the end of a reasonable transition period as determined by the NHSLC, however an increase in rates will be required, the scale of which will be dependent upon the length of the transition period. The loss of trained personnel and the replacement of such individuals with unskilled, untrained people, receiving/shipping volume changes, etc. will also impact our ability to maintain service levels. As such service commitments are likely to be impacted by these and other factors, which could lead to service interruptions and/or lost sales. Law will work to minimize such eventualities that are within its control but may be constrained based on the how such a transition is planned and the many factors that cannot be anticipated until such an event takes place.

In addition, we cannot accept responsibility for costs associated with the transfer of product and control to a new warehouse organization. There is no way to anticipate the costs of a transfer and, thus, such costs cannot reasonably be factored into the proposed pricing.

Net overages and shortages by supplier shall be used to determine any financial obligation between Law and the new warehouse vendor. Net shortages will be paid to each supplier at cost
upon invoicing by each supplier. The new warehouse vendor is required to work with Law and perform cycle counts as needed to verify discrepancies.

27. Assignment Provision:

In accordance with our existing contract we require this section be removed.

28. News Releases:

Law may publicly disclose any information concerning this agreement that is available for public disclosure under applicable laws and regulations, including without limitation, the award of the contract to Law and existence of the contractual between the parties.

To the extent the NHSLC does not agree to modify Appendix E as requested herein, we reserve the right to negotiate these provisions.

1.20 State Funding:

Understood

1.21 Subcontractor:

We do not intend to use subcontractors to perform any of the basic functions outlined in the RFP. For the initial term of this contract we will be leasing the property from Nestle.

1.21.1 Conflict of Interest:

Law Warehouses has no contracts that may present a conflict of interest.
1.22 Proposal Guaranty:

We have submitted this proposal with a certified check made payable to the NHSLC and pledge to enter into a contract with the NHSLC on the terms stated in our Proposal. We understand if we fail or refuse to enter into such a contract without just cause, the amount of the Proposal guaranty shall be forfeited to the NHSLC as liquidated damages, and not as a penalty.

Law currently has options in place for our proposed facility in Seabrook, NH which expire September 30, 2012 (115 days from Proposal submission). To the extent that a contract is not executed with the NHSLC under this procurement process prior to August 30, 2012 Law reserves the right to withdraw its Proposal and shall not forfeit its Proposal Guaranty of $50,000.

1.23 Venue – Merrimack County:

Understood

1.24 RFP Protest Process:

We reserve the right to negotiate the contract protest process and any provision in the RFP that requires the contractor to waive or delay institution of any available legal remedies, at law or in equity, including without limitation with respect to confidentiality requirements imposed on the state.

1.25 Contract Transition Period:

In the event a new Vendor is selected to provide warehousing services at the end of this contract, we agree to assist in the transition for up to 6 months and until the end of a reasonable transition period as determined by the NHSLC, however an increase in rates will be required, the scale of which will be dependent upon the length of the transition period. The loss of trained
personnel and the replacement of such individuals with unskilled, untrained people, receiving/shipping volume changes, etc will also impact our ability to maintain service levels. As such service commitments are likely to be impacted by these and other factors, which could lead to service interruptions and/or lost sales. Law will work to minimize such eventualities that are within its control but may be constrained based on how such a transition is planned and the many factors that cannot be anticipated until such an event takes place.

Law takes exception to storage charges for transferred product not beginning until the first day of the following month due to the 14-day recurring cycle, however we agree that there will be no duplication of charges to Suppliers or the NHSLC.

Net overages and shortages by supplier shall be used to determine any financial obligation between Law and suppliers. Net shortages will be paid to each supplier at their cost upon invoicing by each supplier subject to limits of liability then in effect. The new warehouse vendor is required to work with Law and perform cycle counts as needed to verify discrepancies.

**Part 2 GENERAL:**

2.1 **Introduction:**

We agree that one strategically located warehouse will provide the optimal distribution system for the NHSLC, its customers and suppliers. We have spent a great deal of time and resources over the past few years developing a solution that provides the opportunity for the NHSLC to realize the long-term gains that can be brought by consolidating operations into one location. The system design and fulfillment solution proposed by Law Warehouses offers the NHSLC a long-term opportunity to benefit from automation in beverage fulfillment and achieve the following:

- Bailment Revenue sharing
- Elimination of the per case Outbound Order Processing fee charged to the NHSLC
- Reduced Order to Delivery Cycle Times
- 6-day per week delivery for key stores
- A State-of-the-Art Distribution Center designed to meet future needs

2.2 Factors Affecting the NHSLC’s Operation:

We agree that the NHSLC is likely to incur heavy financial losses by not selecting the distribution system which best meets their needs, for today and for the future. We have seen this on a smaller scale with the implementation of the new web licensee ordering site. Our institutional knowledge has been invaluable in helping the NHSLC’s customer service personnel and licensees navigate this transition as seamlessly as possible.

As we look forward we must look back. Over the past 15-years we have seen a more than 75% increase in daily shipping with an even greater increase in SKUs and inventory. Any vendor must understand the complexities of this distribution model in order to provide the systems needed to allow the NHSLC to take advantage of these continued growth opportunities. We believe we are uniquely qualified to provide these systems and services to ensure that the NHSLC meets all of its growth objectives. Taking a chance that another vendor’s lower cost solution will be capable of servicing these needs could have catastrophic consequences for the NHSLC and the State of NH.

2.2.1 Transportation and Access:

Our new Seabrook facility is well suited for the inbound and outbound distribution of products in New Hampshire. The facility is within 1 mile of I-95, with more than twenty-five (25%) percent of all liquor store sales coming from stores within fifteen (15) miles of the facility, and seventy percent (70%) of all liquor store sales coming from stores within one hour of the facility. The facility was built in an industrial area designed to handle truck traffic 24/7.
2.2.2 Operation:

Over the past fifteen years daily shipping has grown by more than 75% while inventory and SKU growth exceeds 145% requiring a substantial increase in square footage to accommodate this growth. We currently utilize more than 350,000 sqft. Our Seabrook facility is a 505,000 sqft facility providing the necessary space to accommodate growth over the next twenty years.

Exhibit F provides the specific information which highlights the opportunity this unique facility provides.

2.2.3 Interface:

We currently interface with the NHSLC’s automated systems while maintaining our own automated warehouse and business management systems, ones which have been developed through communication and input from NHSLC staff over the years. Our IT staff members have years of experience working with the NHSLC, ensuring our ability to meet expected needs of the commission and maintain a fully functioning / communicating computer system. These individuals have developed a superior working relationship with NHSLC personnel and, with an open system of communication and an understanding of the NHSLC’s internal operations, they are able to communicate with the appropriate individual immediately and effectively reducing the risk of service failures.

All of Law’s critical systems are safeguarded against service interruptions via uninterruptible power supplies (UPS), on-hand duplicate hardware and/or 24-hour service maintenance organizations staffed locally. We continue to seek, analyze and implement both internal and external information system solutions to improve our distribution services.
2.2.4 Relationship with NHSLC Suppliers:

Along with the NHSLC, we consider the NHSLC’s suppliers, brokers and licensees as our customers. We recognize that our ability to service the Commission is contingent upon our ability to maintain effective partnerships throughout the supply chain. For more than 40 years we have developed and maintained solid relationships with suppliers and work to serve their collective and individual distribution center needs. We work hard to recognize and service their needs while working within the rules and regulations established by the NHSLC and the State of New Hampshire.

For a number of suppliers, we provide services beyond the scope of bailment. We provide cross-dock services for the transfer of products to other New England states saving the suppliers transportation costs. We consolidate non-alcoholic wine orders with bailment orders as directed by supplier brokers. We also provide transportation services for suppliers and licensees in New England. We believe the selection of the Law Companies for non-bailment services is indicative of the support and relationships we have developed with the supplier base.

PART 3 TECHNICAL SPECIFICATIONS AND REQUIREMENTS:

3.0.1 A Single Warehouse:

Our Seabrook facility is a single 505,000 sqft distribution center situated on 80 acres.

3.0.2 Location of Product:

This Proposal is contingent upon Law providing 100% of the distribution services for vendor owned wine and spirits for the NHSLC.
3.0.3 Conducting Business with the NHSLC:

We will continue to work the NHSLC’s IT team to maintain the optimum data-transfer capabilities. We recognize the need for continuous improvement and its correlation with changing customer requirements. We remain committed to utilizing our resource base, external partners and the NHSLC staff to affect positive change in the system; however we reserve the right to negotiate the NHSLC’s responsibility to share in the cost of significant costs as a result of NHSLC requirements.

We will continue to work with all members of the supply chain to identify and implement improvements in an effort to improve service and efficiency. As always, we will work with the NHSLC to provide a win-win solution for all parties involved in such work. The costs and restrictions associated with such modifications can only be determined on a case by case basis.

3.0.4 Warehouse General Requirements:

Federal, State and Local Regulations:

Understood

Temperature Control / Protection:

Our Seabrook facility is designed to maintain the required temperature limits. The warehouse will be heated for winter operation. For summer operation, the facility is outfitted with a series of large louvered intake vents on the eastern facing walls with a series of exhaust fans on the western facing wall providing substantial air flow within the facility. This system, in addition to the cool white roof, will allow us to regulate the temperature to within acceptable ranges.
Refrigerated Space:

In the first term of the previous contract we experimented with utilizing refrigerated space for the storage of wines that suppliers requested be stored at cooler temperatures. This project was suspended for a variety of reasons. As a result of this experience, we have not established the capability to provide this service for this contract and thus take exception to the requirement that suppliers may set their own temperature control standards. Providing suppliers and/or the NHSLC the open-ended undefined flexibility to require a different storage temperature range for any specified Product is not a service which can be properly covered in this Proposal. In addition, it is not feasible to adequately develop a proposal to provide a 5,000+ square foot area to be temperature controlled to 55 degrees without providing the associated inventory, throughput and delivery information. We recognize that there is some interest in the industry to provide such services, however too many of the variables continue to be undefined. We are happy to work with the Commission to research the viability of such a program.

First-In / First-Out:

Our receiving procedures are designed to put away products in accordance with first-in / first-out practices and the default setting of our inventory control system are to allocate product similarly. Law has further enhanced the fulfillment process to allow priority shipping at the NHSLC or Supplier representative’s request (e.g., product with “Bike Week” medallions to ship and reach stores in advance of Motorcycle Weekend or to move an older vintage that has a newer receipt into the marketplace before shipping the newer vintages that may have come in earlier). These are examples of how Law has worked with the NHSLC and the Supplier community to provide programming and services above and beyond that being requested in this section.
Receiving:

We commit to unloading standard, single & double appointments within two-hours of the loads scheduled appointment time. More complicated loads will take additional time without penalty to Law Warehouses by the carrier or supplier.

To facilitate improved receiving schedules, receiving entry, and to keep costs down for the entire system, the following supplier requirements will be enacted:

- Items with average monthly shipping volumes greater than three (3) pallets to be shipped inbound in full pallet quantities.

- Pallets must be no larger than 40” wide x 48” deep x 64” high. Pallets exceeding these dimensions will be subject to a break-down labor charge.

- To facilitate bar code scanning of all product, and to maintain uniformity in the industry, all cases must be labeled in accordance with the current Pennsylvania labeling standard, which includes an SCC bar code, NH Code, and packaging data such as Gift and vintage on the label. In addition the code data must be maintained by the supplier/broker in the NHSLC’s brand master database. This will require the NHSLC to create the appropriate fields within the brand master to accommodate this function. The decision to utilize the Pennsylvania labeling standard was done to minimize any costs to the Suppliers since they are already conforming to this standard.

- All Gift items and non-standard packaging configurations must have a unique SCC bar code.

- All items that the supplier wishes to be tracked by the vintage must include the vintage on the label and have a separate SCC code.

- To receive an appointment an electronic or paper packing list identifying the details on the load must be in Law’s possession.
An additional benefit of incorporating SCC bar codes into the inventory control process is to minimize the cycle time between the beginning of unloading a truck/container and when the product is available to be ordered. The cycle time in our proposal will be reduced by improving two key functions.

Firstly, scanning SCC bar codes will improve the efficiencies of the receiving crew in the warehouse, both reducing the unload time and improving accuracy of the receiving tally. Secondly, electronically created receiving tallies will not have to wait to be hand-keyed into the WMS, again reducing time while improving the accuracy entered data. Although we are proud of the processes that we have developed over the years and the accuracy of our warehouse and customer service employees, we recognize that the NHSLC and Suppliers seek to have products available as soon as possible to minimize out-of-stocks and increase sales. We look forward to implementing these changes for the betterment of our business partners.

Packaging Configurations:

We are quite familiar with the various packaging configurations utilized by the industry and have amassed a handling equipment fleet capable of handling all configurations (Exhibit D). We also recognize that some products arrive in nonstandard configurations such as kegs, wooden cases, pallet-packs, gift packs, etc. We have the resources, equipment and experience to continue to handle these products as well. In the receiving section above we have outlined new labeling and inbound shipping requirements that will be presented to suppliers.
Hours of Operation:

To reduce order to delivery cycle times for the NHSLC’s highest volume stores, and to address the extremely high volumes shipped to these stores coming out of weekends and holidays, Law Warehouse will move to a Sunday – Friday operating week.

The new Seabrook facility and the transition to bar code scanning has the potential to dramatically reduce the receiving processing time providing more open appointments during the normal work day. Law Warehouses will maintain a schedule of available receiving appointments from 6:00am to 9:30pm unless both parties agree otherwise. Law will continue its process of adding appointment slots when necessary to meet peak demand periods.

3.0.4.1 Audit:

We have demonstrated our excellence in reporting accuracy and inventory control. Law receives and ships more than 3,500,000 cases per year with an average annual discrepancy of 4 one-thousandths of 1%. We continue to improve the administration and operational aspects of inventory control, are committed to on-going cycle counting, and to performing the annual inventory in no more than two (2) business days.

3.0.5 Transportation Access:

3.0.5.1 Road: Incoming and Outgoing Requirements

3.0.5.2 Access:

Our Seabrook facility spans 80 acres and was specifically built to serve as a large scale distribution center. The complex currently services tractor-trailers, straight trucks, vans, and automobiles with significantly more doors than are presently available or required under this RFP. All travel surfaces are sufficiently paved for industrial traffic. The entire area leading to and
surrounding our complex has handled significant truck and auto traffic throughout its existence. As an industrial area it is designed to accommodate 24 hour operations.

3.0.5.3 Dock and Approach:

We recognize the need for each of the more than 100 suppliers to have the ability to ship product to the warehouse on a timely basis while also providing sufficient shipping doors to accommodate all outbound loading. Our new facility is set up specifically to handle multiple loads simultaneously providing more than adequate capacity for inbound and outbound carrier activity. Our dock and approach facilities are as follows:

- Fifty-Six (56) roofed or covered docks capable of handling 53’ trailers;
- Two (2) large overhead door areas for van and automobile traffic.
- Three hundred (300) trailer parking spaces for trailers waiting loading or unloading.

Each truck dock area meets the requirements of adjustable height features and floor approaches plus has additional security features including individual trailer lighting and UCC bumper locks.

3.0.6 Floor Capacity and Storage Strategy:

Law Warehouses has in place a dynamic computerized inventory control system which identifies each inventory lot by NH code number, bottles per case, warehouse location, status, gift/non-gift, priority, vintage and receipt date. Vintage is recorded if the vintage is clearly printed on the outside of case and easily identifiable at the time of receipt.
Inventory Growth:

Our Seabrook facility is 505,000 sqft., with the system having a capacity of more than 1,400,000 cases utilizing less than 375,000sqft. As a result, there is ample capacity to meet the growth of the business during the life of the contract.

Having the capacity for growth in SKU, inventory, and shipping volume growth is a critical element of this RFP. During the existing contract the number of codes in inventory has grown from 4,000 to 9,000; inventory has grown from less than 400,000 to peaks over 750,000, and average shipping has grown from less than 9,000 per day to 14,000 per day.

From traveling to conferences and speaking with industry experts, we believe this type of growth over the next contract period is possible. This is one of the most significant reasons why we believe moving to a larger facility and implementing automated systems is critical to the continued success of the NHSLC. As the following charts show, SKU growth has been the catalyst for volume growth and volume growth is directly related to and NHSLC sales. Here you see that the proliferation of SKU’s has far outpaced shipping; however, this increase in customer choice has clearly been a driving force in increasing sales.
It is imperative that the NHSLC have a distribution center of adequate size that it is not only capable of handling today’s volumes, but also the expected growth in both SKUs and shipping volume over the next twenty years. Our Proposal provides for those growth opportunities.

Customs Bonded Area:

In past years we have operated a Customs Bonded Area for bailment customers. Due to a lack of demand, this service was discontinued. We commit to reinstating this service upon sufficient demand. Rates for such service will be determined at the time of reinstatement based upon expected volumes and the administrative resources required to meet customs regulations in effect at that time.

Breakage and Damage:

Law Warehouses currently maintains a broken package room program for handling received damage and operational damage. Each bailment vendor is notified of damaged products and the remaining bottles are segregated for future recoupment, transfer to the split case operation, removal or destruction.

Unsaleable status:

Unsaleable products are physically segregated according to the nature of the status and the quantity of the product involved. In all instances, products can be clearly identified through placarding and computer hold codes.
Carrier Returns:

Carrier returns are segregated from inbound bailment stock upon receipt. Each case is then evaluated as to its reason for return and dispositioned according to NHSLC guidelines.

SKU and volume capacity:

Our Seabrook facility is a 505,000 sqft distribution center which will be configured specifically to become the NHSLC’s distribution center of the future. Section IV provides the specific information which highlights the opportunity this unique facility provides.

Non-FIFO Inventory Allocation:

Law Warehouses allocates inventory based on a FIFO strategy; however, programming to accommodate non-FIFO allocation is in place when instructed by the NHSLC or the Supplier/Broker. In addition, our ordering system allows licensee and state stores to order both gift and non-gift items in the same order. We will continue to work with the NHSLC to manage non-FIFO shipping strategies as needed and can be accomplished utilizing the bar code systems described in previous sections of this Proposal.

During the development of the web ordering systems at the beginning of the current contract, brokers specifically communicated that it was important that vintage was captured at the time of receipt when possible and tracked through the inventory system, but that vintage not be made part of the ordering systems. As such our systems are not designed to allow ordering by vintage. Should this functionality become necessary, we are prepared to accommodate this ability provided it is implemented in accordance with our bar code labeling requirements.
Shipping Volumes:

We are aware that the combined volumes of Nashua and Concord have resulted in peak shipping days of more than 43,000 cases in one day. The significant investment in distribution systems we are making is specifically designed to more efficiently and effectively manage such volumes while at the same time provide for compressed cycle times. Over the life of the current contract daily shipping volume has grown more than 75%. We have specifically chosen this facility and this design to accommodate this type of growth over the next twenty-years.

This Proposal is specifically contingent upon the total combined volumes of Concord and Nashua. Should the NHSLC choose an option which splits volume between warehouses, Law reserves the right to withdraw this Alternate Proposal without forfeiture of our $50,000 Proposal Guaranty. During the life of the contract, should the NHSLC choose to shift volume to another warehouse facility, we reserve the right to adjust rates accordingly; such adjustment cannot be unreasonably denied.

3.0.7 Floor Movement Capacity:

Over the term of the current contract, the number of codes, the levels of inventory and various shipping measurements have all increased dramatically. We recognize that in order to ensure that we can handle this type of growth in the future, without placing limitations on receiving and shipping, it requires a single large facility specifically designed to accommodate this business. For several years we have been traveling the country touring other wine and spirit distribution systems while working with an international distribution systems integration company, System Logistics, specifically for the purpose of designing the distribution center of the future for the NHSLC.
Law Warehouses is proposing to support wine and spirits fulfillment from a new and modern distribution center. This distribution center will promote trending technologies in beverage fulfillment such as paperless picking, automated storage and retrieval, automated conveyors and robotic mixed case pallet building. This new and modern distribution center will incorporate a well-balanced mix of conventional and automated handling systems to assure order accuracy and on-time shipping.

The distribution center is managed by intelligent software systems to facilitate inventory, receipts, product putaway, paperless case and bottle picking, intelligent conveyor routing, automated case labeling, automated pallet building and shipping. The objective of this intelligent and efficient beverage handling system is to minimize product touches, speed order processing, assure accurate and timely shipping, accommodate peak velocity and plan for scalability.

Section IV provides a more detailed explanation of the systems we will utilize to ensure the required capacity is in place to meet the expected growth of the NHSLC. Exhibit D is a listing of our other equipment.

This fleet is maintained by in-house mechanics. These mechanics are supplemented by our Heavy Duty Truck & Diesel operation, which is in the business of repairing and maintaining large truck and handling equipment fleets. As such, the new systems, all lift trucks, attachments, walkie riders, and accessorioal equipment are well-maintained. With our own repair center and an extensive material handling fleet, the warehouse operation is positioned to minimize any downtime and maximize performance.

3.0.8 Product Distribution:

We have clearly listed all charges related to the storage and distribution of product and understand that Licensees will define the carrier we are to give their order to within every order file.
Rigid Control:

We will continue to maintain rigid control over outgoing products through the use of our existing or a similar label design. Each case picked will have a label affixed identifying, at a minimum, the consignee, and product code and invoice date. Each non-automatic order is verified by a supervisory level employee to ensure the accuracy of the shipment.

Scheduling:

Currently both Law and NHSLC store management personnel develop a mutually agreed upon delivery and polling schedule. We require that this practice be maintained. As always we seek to develop a delivery schedule that optimizes the NHSLC’s ability to have product on store shelves when and where needed. To reduce order to delivery cycle times for the NHSLC’s highest volume stores, and to address the extremely high volumes shipped to these stores coming out of weekends and holidays, we require the NHSLC move to a 6-day per week order and delivery cycle for the highest volume stores that are within 1-hour of Seabrook.

Shifts / Outside Normal Working Hours:

Two significant reasons for moving to this system design are to compress order-to-shipment cycle times and to address the significant shipping and delivery peaks realized coming out of weekends and holidays. To meet these goals we have established a shift schedule where the week will begin on Saturday night, taking order data for the NHSLC’s highest volume stores within 1-hour of Seabrook, and delivering them on Sunday. Eight (8) and Ten (10) hour shifts, with mandatory overtime as required, will continue throughout each day and night through Friday. As these schedules will be developed in concert with the NHSLC, there are no extra charges for night picking. Charges for unscheduled weekend and/or holiday work are detailed in Appendix D.
Customer Pick-Up:

We will continue to allow licensees to pickup directly from the warehouse in a way which does not affect distribution to NHSLC stores. The approval of the customer pick-up schedule cannot be unreasonably denied by the NHSLC.

Order-to-Shipment Cycle Times:

A significant benefit of our Proposal is the compression of order-to-shipping cycle times. Through the implementation and learning process we will collectively determine the optimum cycle time for various store groups. Our picking processes will release orders in waves in accordance with the load they will be delivered. As such, it is not practical to pick and load all orders within 8-hours of receipt of the order; however, Law will continue to commit to timely delivery of orders to NHSLC stores.

3.0.9 Additional Services:

Law Warehouse currently provides additional services to NHSLC suppliers, such as sub-assembly and the distribution of non-alcoholic products. The charges for these types of services are determined on a case-by-case basis.

3.0.10 Computer Linkage with the NHSLC:

We have considerable experience interfacing with NHSLC computer systems. We maintain an Information Technology team of three (3) on staff in part to continually work with the NHSLC to improve and upgrade the information systems to meet tomorrow’s needs. We believe our resources and experience could provide extremely valuable insight into upgrade considerations as the NHSLC begins the process of looking for Mapper’s replacement. These are very significant considerations.
for the NHSLC as a disruption in the computer linkage between the two parties would result in considerable additional costs for the NHSLC.

We have reviewed Appendix K and have a number of objections which we will address with the NHSLC directly in the continued development of our systems.

3.0.11 Transition from the Current Contract:

We are proud of our more than forty (40) year partnership with the NHSLC. We feel that we have played a key role in creating the systems and the environment which has lead to a more than 75% growth in volume over the past 15 years. We have expended considerable resources over the past year developing a strategy that we believe will put the NHSLC in the best position to take advantage of the opportunities the next twenty years will bring. We are prepared to make the necessary investment to secure New Hampshire’s position as the leading retail and distribution channel for wine and spirits in New England. To transition to a new vendor would put all of these elements at tremendous risk of failure.

Should Law not be the successful bidder, net overages and shortages by supplier shall be used to determine any financial obligation between Law and the supplier. The new warehouse vendor would be required to work with Law and perform cycle counts as needed to verify discrepancies.

3.0.12 Warehouse Charges and Rates:

Our pricing goal remains to appropriately match revenues to costs and to reward suppliers who manage their inventories. As a result, we have chosen to maintain a scaled rate structure in our Proposal which allocates revenues to costs.

a – f: Understood
Hourly Charges: It is not possible to anticipate all services that may be requested by the NHSLC and/or Suppliers and Broker within the hourly rate sections, and as such it is not feasible to provide a clear and accurate estimate of the hours necessary.

Appendices D and D-1: Understood

3.0.13 Security:

As a public warehouse operation we understand that we have a responsibility to take care custody and control as our customers would in their own facilities. We also understand that wine and spirits are valuable commodities. As such we take security very seriously. Our facilities are secured by a centrally monitored alarm system which will utilize a combination of devices to protect against intruders including door/window sensors, motion detectors, cameras, coded security door access and 24/7 alarmed emergency exits. Our Seabrook facility has the added security of a gated guard station utilizing video recording and remote access technology. A detailed security plan will be developed for the Seabrook facility following successful award of the contract.

Our operational policies are designed to maintain inventory integrity and prevent employee theft. Employee access during business hours is monitored and restricted. Employee parking is segregated from the facility.

One of the ways we have been able to keep costs down over the years is through our ability to share resources between the NHSLC distribution operation and our non-bailment clients. We have done so with no threat to security. To provide the best pricing to the NHSLC and its suppliers we require the ability to co-mingle wine and spirit inventory with other inventories. We pledge that this will in no way reduce the security of the facility or impact the integrity of the product.
3.0.14 Fire:

The entire facility is protected by a high suppression automatic sprinkler system which, when triggered, immediately notifies the Fire and Police Departments and the central security agent. The Seabrook Fire Station is within three (3) miles of the facility.

All sprinkler systems are maintained by High Tech Fire Protection of Auburn, ME. We do not currently occupy the facility. Following award and the completion of the sublease all documentation certifying the systems will be provided.

3.0.15 Insurance, Bond and Registration:

Copies of the applicable certificates are enclosed in Exhibit C. Law maintains a Liquor Liability Bond and will continue to do so as required by this section. This is also included in Exhibit C.

Law Warehouses maintains a Warehouseman’s Legal Liability policy for damage to product under its care, custody and control due to its own negligence. Limits of liability are shown in Appendix D, except that limits of liability for product owned by the NHSLC are at 100% of the NHSLC’s purchase price from the Supplier.

Law Warehouses currently commits to absolute liability, subject to limited exclusions, of product owned by the NHSLC while in its care, custody and control. We will continue to do so and are prepared to obtain an all risks insurance policy as described in this section. Cancellation notices must be specifically endorsed in each policy and as such may vary from one insurer’s practices to another. Law Warehouses agrees to work diligently and in good faith to obtain their agreement but reserves the right to negotiate a different time period should an insurer not be able to provide the required notification period.
3.0.16 Business Continuity:

As part of the current contract the NHSLC has been provided a copy of our current Business Continuity Plan. Upon successful award of the contract we will update our business continuity plan for the Seabrook facility. At the onset of the transition, our existing Nashua IT facilities will remain providing excellent IT redundancy. In addition, these facilities provide redundancy for storage and shipping while a more extensive alternative location network is established.

3.1 APPENDIX A:

A-1 Overview through A-2 NHSLC:

Understood

A-3 Related Documents:

Please refer to Exhibit C for the documents required under this section.

3.2 APPENDIX B:

Understood

3.3 APPENDIX C:

I. Background:

Understood, however this Proposal is specifically contingent upon the total combined volumes of Concord and Nashua.
II. General Requirements:

Technical Plan:

Immediately following the completion of a contract with the NHSLC, the final steps in the financing and purchase of the System Logistics system will be completed. In the unlikely event that significant change in variables, such as interest rates, result from the period between Proposal submissions and contract award be realized, Law reserves the right to renegotiate rates. Following the release of funds from financing the requisite purchase orders with all of the warehouse systems vendors will be executed. The final build and delivery dates of the various systems will be used to create a transition schedule.

A critical factor in our ability to provide the quoted rate structure and revenue sharing is the transition of the vendor owned inventory and volumes to our Seabrook facility prior. In order to secure the Seabrook facility for this contract we were obligated to begin paying rent, taxes and expenses on the Seabrook facility totally more than $147,000 per month beginning May 1, 2012. Effective October 1, 2012 this number increases to more than $205,000 per month. In our previous proposal to the NHSLC we had negotiated a significant free rent period followed by a period of partial occupancy. The loss of these negotiated factors has increased costs by nearly $2,000,000.

Emergencies, etc.

As we have throughout this contract, we will work together with the NHSLC, its suppliers and customers to address emergency situations as they occur. However, we do agree that certain
emergency situations can be predicted and require pre-planning. We encourage the NHSLC to develop a more detailed emergency order system as protection against order communication failures. We will have installed a generator capable of maintaining operations should power be lost to the facility. Our company is non-union, and we utilize the services of several temporary agencies. In addition, by moving to an automated system, the impact of a labor action is reduced significantly. Although the risk of a strike is low for our operation, our labor resources and managements knowledge of the system would provide for continued operation.

Security:

Our facility is secured by a centrally monitored alarm system which will utilize a combination of devices to protect against intruders including door/window sensors, motion detectors, cameras, coded security door access and 24/7 alarmed emergency exits. In addition, the entrance and exit to the facility is gated and controlled by a guard shack with security cameras.

Our operational policies are designed to maintain inventory integrity and prevent employee theft. Employee access during business hours is monitored and restricted. Employee parking is segregated from the facility.

Warehouse Layout:

Exhibit F provides a warehouse layout and system design explanation.

Corporate Resolution:

Exhibit C provides a copy of the corporate resolution evidencing authority to submit the Proposal and to negotiate and to bind the corporation to a contract.
A. Conflict of Interest:

Law Warehouses, Inc. has not entered into any contract that may present a conflict of interest.

B. Release of Information:

Law Warehouses, Inc. agrees not to divulge or release any information provided to it by the NHSLC prior to the official release date.

C. References:

In Exhibit E we have provided references from two (2) customers from our public warehouse operations and from three (3) customers from bailment warehouse operations.

D. Suspension:

We certify that Law Warehouses, Inc. is not currently under suspension or debarment by the State of New Hampshire, any other state, or the federal government.

E. W-9:

Please refer to Exhibit G for our W-9.

III. Personnel Data:

Exhibit H provides an organizational chart as well as the resumes of the key managerial positions. All Managers will be working from the Seabrook facility. In addition to the Managers listed, approximately 63 employees are outlined in the organizational chart. These numbers reflect our current operation. Law Warehouses, Inc. is a non-union operation.
IV. Prior Experience:

Law Warehouses has been performing distribution functions for the NHSLC for more than forty (40) years. All current management employees have been working in the operation for more than ten years. In addition to performing these functions for the NHSLC, we perform these functions for more than thirty (30+) non-liquor companies. We have served as the U.S. distribution center for Asolo since 2000. Other New Hampshire customers you may recognize include Segway, Hendrix Wire & Cable, Hitchiner Mfg., Elbit Systems (formerly Kollsman) and Radisson Hotels. We have been providing warehouse services since 1950 (over 60 years) and transportation services since 1882 (130 years).

Although we are a diversified organization, our contract with the NHSLC represents our largest piece of business. As a result, it is our primary focus. Every person in our organization is involved in serving the NHSLC during the course of the year. As a result, every person in our organization takes great pride in serving you and your customer’s needs.

We are uniquely qualified to provide these services for the NHSLC for the next twenty (20) years. We understand your business and the intricacies of interfacing the various systems. Our in depth knowledge of the IT systems of both organizations makes us most suited to assisting the NHSLC during an upgrade of Mapper.

A transition to a new organization creates great risk. For a new organization to have the resources and experience to be qualified for this contract, this contract will most likely not be its primary business. We continue to grow with the NHSLC, are uniquely qualified to provide the greatest return for the NHSLC, and are prepared to make the investments necessary to ensure continued success for years to come.
V. Qualifications:

A. Proposal Guaranty:

Exhibit I includes a $50,000 bond. We understand that failure to comply with any of the terms of our Proposal could result in forfeiture of this bond.

B. Compliance Statements

Exhibit G includes the required compliance statement.

VI. Subcontractors:

Law Warehouses has no contracts that may present a conflict of interest. We currently have no plans to utilize contractors to perform services under this contract.

VII. General Requirements:

1. Transportation:

We agree that it is critical that the warehouse and transportation providers work together seamlessly. This is especially true given the reduced cycle time parameters, 6-day shipping and delivery cycle, and wave picking cycles incorporated into our system design. In order to provide for an efficient order picking operation, we require that the NHSLC’s contract transportation vendor provide an electronic loading manifest prior to the start of the picking shift, and provide delivery service to NHSLC stores Sunday through Friday. As a result, we believe Law Motor Freight provides the greatest opportunity for a smooth, coordinated and timely operation, however, for many years prior to this contract, we worked closely with previous transportation vendors and will
do so should Law Motor Freight not be awarded the transportation contract. The transportation contractor must agree to abide the delivery schedule developed between Law and the NHSLC.

2. Personnel and Equipment:

Understood

3. Bills of Lading:

Both Law Warehouses and the Concord warehouse have the carrier sign the packing list as the Bill of Lading. We will to continue this practice.

4. Transportation coordination:

Law Warehouse requires the following from the transportation vendor:

- An electronic load manifest must be transmitted prior to the start of each days picking shift within our defined window so as not adversely affect picking.

- A six (6) day per week delivery schedule, Sunday through Friday, with Sunday deliveries being for the highest volume stores within 1-hour of Seabrook.

- The staffing of a yard man to assure that all trailers are in place for loading at the start of each picking wave.

- That the order picking scheduling is controlled by the warehouse in coordination with the NHSLC.
5. Schedule Changes:

Law Warehouses will continue to work with the NHSLC to develop the standard and holiday delivery schedules, understanding changes to the schedule may be necessary due to unforeseen circumstances.

6. Weekends and Holidays:

Law Warehouses will continue to work with the NHSLC to develop the standard and holiday delivery schedules. Rates for weekend or holiday services to be performed off schedule are listed in the extra labor section of Appendices D & D-1.

7. Liability:

In accordance with our applicable provisions in our existing contract, we shall be liable for any loss or damage to all liquor and wine products of the NHSLC during the period of time beginning from when we officially receive product at our warehouses until possession of product is officially transferred to the transportation contractor.

8. Insurance:

We agree to provide insurance coverage as defined in our existing contract.

9. Shortages/Breakages:

Understood
10. Performance Bond:

Exhibit C includes a copy of our performance bond in the amount of $1,000,000. Should the NHSLC require a higher limit, a change in rates may be necessary.

a. We agree to provide receiving resources in accordance with our existing contract.

b. Understood

c. Understood

d. We take exception to imposing penalties as defined in this section. The proper coordination between all members of the supply chain is critical to its success and we are committed to ensuring delays do not become an operational issue, but we can not accept sole responsibility for this measurement under such a general definition.

11. Employment laws:

We agree to follow all federal and state laws in this regard.

12. Termination through 13. Force Majeure:

Understood

VIII. Specific Requirements:

A1. Picking and Staging Work Plan:

This system incorporates three automated paperless picking processes: (1) high velocity SKUs are picked by light on conveyor from the pallet flow modules (2) low velocity SKUs are picked by automated storage and retrieval system on conveyor with no operator interface and (3) bottle picks are batch-picked by light on conveyor. Wave picks from all three picking operations are sorted by conveyor into an automated case buffer and sequencing system.
A2. Order Loading Procedures:

As pallets are completed by the palletizer they are positioned for the loader to apply the pallet tag and to either live load or stage for loading. Since all load manifests are developed prior to the pick shift, the system designates to the operator where each pallet is to be loaded in the trailer, which trailer is to be loaded and at what door. Once the trailer is loaded the shipping operator contacts the yard man indicating the load is complete and ready to be signed off.

A3. Hours of Operation:

Two significant reasons for moving to this system design are to compress order-to-shipment cycle times and to address the significant shipping and delivery peaks realized coming out of weekends and holidays. To meet these goals we have established a shift schedule where the week will begin on Saturday night, taking order data for the NHSLC’s highest volume stores within 1-hour of Seabrook, and delivering them on Sunday. Eight (8) and Ten (10) hour shifts, with mandatory overtime as required, will continue throughout each day and night through Friday.

A4. Order Merging:

The system is specifically designed to merge split case cartons during the wave. Operationally the split case picking wave will begin prior to the full case picking wave to ensure the timely completion of each wave. Add-on orders will be handled within the waves automatically.

A5. Temperature Control:

Our Seabrook facility is designed to maintain the required temperature limits. The warehouse will be heated for winter operation. For summer operation, the facility is outfitted with a series of large louvered intake vents on the eastern facing walls with a series of exhaust fans on the
western facing wall providing substantial air flow within the facility. This system, in addition to the roof being light in color, allows us to regulate the temperature to within acceptable ranges.

**B1. Damage Processing:**

Damaged or distressed product is transferred from active inventory to the damage re-coup area. A form is filled out identifying the product (code, quantity broken) and the reason code (warehouse drop damage, equipment damage, found/hidden damage or received damage). Remaining bottles are removed from the damaged case, wiped off and the case cleaned out. The damaged product is processed through the AS-400 Damage Application and if prior damage product of that code number exists in the recoup area; the quantities will be combined to make a full case and one case returned to active inventory. If a full case of that product is not available to recoup; the remaining bottles from the damaged case will be placed on a shelf in the damage area and recorded as a K-Status – partial case. If the K-Status case is listed in the Brand Master as “Sub-pack available” then the remaining partial case will be converted to bottles (Sub-packs) and transferred to a carousel bin location in the Sub-pack operation. Periodically the Liquor Commission will authorize the purchase of some non-subpackable, K-Status items to be shipped to select Liquor Stores. The Brokers are periodically notified of the items remaining that cannot be handled by one of the criteria listed above. The Broker will then direct Law Warehouse of the action to take to dispose of the product. Examples: destroy product under established guidelines, remove from inventory and ship back to supplier or request permission from the Commission to remove for “Samples”.
B2. FIFO:

Our Seabrook facility eliminates the current bulk storage layout. As a result, all inbound product is received directly to single pallet locations or directly into the carousels. Every inbound load is assigned a Receipt Number. If the load contains product from multiple suppliers then a different receipt number is assigned to each account. The receipt number specifies the year, the month and a unique number identifying that receipt in date/time order. The receipt number system establishes the “first in – first out” identification for each item in inventory. Receiving and shipping will be predicated on the assigned Receipt Number. Each pallet received will be labeled with the receipt number specific to the inbound load and supplier account.

Our order processing system allocates based on FIFO, unless otherwise instructed. Order files are transferred to the replenishment personnel instructing them to replenish the specific pallet or cases required to feed the picking system.

B3. Merchandise Validation:

Validation of product is primarily conducted at the time of receiving. Each item received is checked against the packing slip or advanced paperwork for accuracy. In addition the Receiver or Tally verification specialist will also check the item for accuracy against the information displayed in the Brand Master file. Each lot received is checked for:

- Correct code number
- Correct description
- Correct number of bottles per case
- Correct size of bottles in case.
- Gift or non-gift status
- Vintage is recorded if printed on the outside of case and easily identifiable.
Any discrepancy recorded at the time of receiving results in the product being received on an unsaleable status (Mis-coded, Un-coded, Delisted or “C”/“S” status). The Broker of record is then faxed a copy of the receiving tally and requested to advise the corrective action they want taken.

Product already in inventory discovered to be misidentified follows a similar process. The specific receipt lots are placed on the applicable status in the computer to prevent shipping and the pallets are placarded with the appropriate status tag. The Broker of record is notified.

**B4. Re-Labeling:**

Product identified as un-coded or mis-coded will need to labeled or re-labeled with the correct NH code number. When product is identified with a code label discrepancy, the Broker is notified. The Broker will submit a work-order with the correct code label information and Customer Service at Law Warehouses will create the appropriate label for re-coding.

**NH Liquor Commission code label prepared by Law Warehouses:**

- Dimensions = 2” X 3” self adhesive label
- Heading: NH State Liquor Commission (1/8” bold type)
- The NH Code number (1” Bold type)
- The Description (1/8” bold type)
- The bottle size and the number of bottles per case (1/8” bold type)

The warehouse will apply the new labels over the existing label. If the case is un-coded; the warehouse will apply the code label in the upper right corner of the end panel. If a multi-state code label is printed on the end-panel; the new code label will be applied next to the NH designation on the panel.
C1. Standards for Performance – Inbound Deliveries:

Our first standard appointment is 6:00 AM and the last standard appointment begins at 9:30 PM. We do, however, open up as early as 4:00 AM and stay open as late as 11:30 PM to receive product during periods of heavy inbound volume.

C2. Standards for Performance – Receiving Accuracy:

A significant performance enhancement of our Proposal is the upgrade of our system to real time receiving through the use of bar code scanning. Scanning provides both a faster process, and a more accurate process, through the elimination of manual entries. An important part of the process that is not eliminated is the comparison of what was actually received against the carrier’s delivery receipt and packing slip. Any discrepancies will be noted as over/short, received damaged, uncoded, miss-coded etc on the carrier’s paperwork and within the receipt.

Putaway accuracy is improved dramatically as well through the use of bar code scanning. As product transitions from the staging area to the reserve storage racks, both the item and the location are scanned updating the location system in real time while eliminating errors common to a manual system.

C3. Standards for Performance – Picking & Loading Accuracy:

The implementation of traditional bar code scanning during the picking process through the palletizing phase of the order process virtually eliminates picking errors. The process of picking cases to conveyor, scanning bar codes and diverting to the applicable palletizing area is used by nearly every major distribution company today, in part because of its reliability in sorting accurately.
In order to efficiently release order by carrier and load, all load scheduling data will be integrated into the pick wave prior to picking. As a result when each pallet is completed a pallet tag will be created identifying the licensee or store, the carrier, the trailer and the loading door. This tag will include a bar code allowing the loading operator to scan the tag to be directed where to load the pallet reducing the loading errors found in a manual system.

C4. Standards for Performance – Loading Schedule:

An integral part of the new hire process is the communication of our service philosophy that we must provide better service for our customers then they would if they handled these functions themselves. To accomplish that goal, all employees, across every part of the company, understand that we don’t go home until every order is picked and available for shipment - without exception. An important element of our design discussions centered on the critical nature of this goal understanding that the success of the NHSLC will push peak order volumes to higher and higher levels. Our new system creates the ability to meet these needs going forward while reducing cycle times.

D1. Staffing:

Our staffing plan is outlined in the organizational chart provided in Exhibit H.

D2. Personal Experience:

Every member of Law’s management and supervisory team has a minimum of four (4) years working with the NHSLC. We intend to complete a nationwide search for a marketing and sales specialist from the logistics industry. A significant part of this person’s responsibilities will be to
become a liaison with the NHSLC, the suppliers, broker and licensee community to ensure the timely response to all issue and projects.

**D3. Training Plans:**

System Logistics has a great deal of experience implementing large order fulfillment projects such as this around the globe. Once the contract is complete and the transition schedule has been established we will work closely with System Logistics to establish a detailed training plan.

**D4. Seasonal Demand:**

Historically we have hired on a temporary basis as many as six (6) seasonal material handlers for order picking, while extending the hours of the receiving crews, sometimes to include Saturday, in order to meet seasonal demands. In addition we have utilized personnel from our Asolo hiking boot and other non-bailment operations personnel during extreme peak periods. Our ability to use Law personnel from other internal operations provides a resource not easily accomplished by other companies.

**IX. Rate and Price Analysis:**

Appendices D and D-1 have been bound and sealed separately and clearly marked Rate and Price – RFP 2012-14 as instructed.

1. **Value-added Services:**

The implementation of this Proposal provides the NHSLC with six (6) day per week delivery for the highest volume stores, reducing the labor impact of receiving extremely large deliveries coming out of busy weekends and holidays. This extra delivery day provides an
opportunity for stores to reduce their back room inventories, freeing up inventory dollars while making their back rooms more efficient.

This system also dramatically shortens the order-to-delivery cycle time should Law Motor Freight also be chosen as the NHSLC’s transportation provider. Rather than the current two-day or more lead time between order and delivery, stores will be able to take advantage of an “order today receive delivery tomorrow” cycle time. By reducing the cycle time, in some cases by several days, stores can better service their customers turn around needs while reducing back-room safety stock levels.

The six (6) day schedule, in conjunction with shortened cycle time, provides an opportunity for the NHSLC to service on-line customers in a timely manner. Reducing the cycle time to “overnight” creates the service levels expected of these consumers, driving up consumer demand for both the NHSLC web-site and NHSLC stores.

Not only would service be enhanced, but our research has shown that the high volume nature of the current Concord products, when combined with Nashua’s products to create a single distribution center, generate significant transportation cost savings, warehouse cost savings and revenue sharing that can be returned directly to the State. Following transition of the Concord vendor-owned products to Seabrook, the following cost savings will be implemented.

_**Elimination of the NHSLC in the Feeder Program:**_ Combining all vendor stock into our system provides the opportunity to internally manage the feeder program during the transition year. As a result the NHSLC’s cost of transferring and purchasing feeders is eliminated, savings the NHSLC more than $30,000 annually.
Elimination of the Order Processing Fee Charged to the NHSLC: Elimination of this fee results in direct savings to the NHSLC of more than $475,000 annually. The first year savings to the NHSLC is more than $500,000.

Substitution of the January 1, 2013 Rate Increase:

Law proposes to substitute the current 14% rate increase, scheduled to go into effect on January 1, 2013, with the rate structure in this proposal. Doing so results in direct, annualized savings to the NHSLC of more than $65,000. In addition, it results in indirect savings of an additional $1,200,000 due to increases that would not be applied to Suppliers and, therefore, would not be passed through to the NHSLC in the form of Supplier price increases.

Upon final transition of all liquor operations from Nashua to the new system in Seabrook in the fall of 2013 the following direct cost savings and revenue sharing will take effect:

Revenue Sharing: Each month Law Warehouses will pay to directly to the NHSLC a per-case Revenue Sharing Fee. The ‘per case’ fee will be scaled based upon the total number of cases shipped from our Seabrook facility over the previous rolling twelve months.

<table>
<thead>
<tr>
<th>Threshold</th>
<th>Fee</th>
<th>Min Annual Revenue</th>
<th>Projected Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,000,000 cases</td>
<td>$0.05/case</td>
<td>$250,000</td>
<td>2014</td>
</tr>
<tr>
<td>5,500,000 cases</td>
<td>$0.10/case</td>
<td>$550,000</td>
<td>2016</td>
</tr>
<tr>
<td>6,000,000 cases</td>
<td>$0.15/case</td>
<td>$900,000</td>
<td>2019</td>
</tr>
</tbody>
</table>
**Transportation Savings:**  Economy of scale efficiencies generated by the warehouse operation can also be applied to deliveries to state stores. The improvement in load factors generated by delivering from one location, under the current Nashua delivery schedule, allows us to reduce the Transportation fee for delivery to NHSLC stores by a weighted average reduction of $0.06 per case for every case shipped to NHSLC stores savings the NHSLC $200,000 per year.

**Summary of Savings and Revenue Sharing:**  The first year return to the NHSLC following full implementation is $1,000,000, while the average combined savings and revenue realized directly by the NHSLC is more than $1,750,000 per year, generating a combined return to the State of more than $37,000,000 during the term of the contract.
2. IT Support:

Law is not requesting any computer processing or electronic communication support other than the mutual cooperation that Law and the NHSLC have established over the years. It is our goal to be a business partner with the NHSLC and to create a world-class communication system that will become the “gold standard” to which all other Control States look to emulate.

X. Smooth Transition:

We have been providing reliable service to the NHSLC, its suppliers and customers for more than forty (40) years. Our proposal creates an improved distribution model that will provide cost savings, service enhancements and revenue sharing, without the inherent risk of transitioning to a new Vendor. We believe we are uniquely qualified to provide the systems and services required to ensure that the NHSLC meets all of its growth objectives this year and for years to come. Taking a chance that another vendor’s lower cost solution will be capable of servicing these needs could have catastrophic consequences for the NHSLC and the State of NH. Law is a fifth-generation family business that has operated in NH for 130 years. We have a vested interest in this State, personally and professionally, and seek to ensure that jobs and revenues remain in NH and not flow to other out-of-state owners or parent companies.

XI. Commingled Loads:

Understood

XII. Bid Specifications:

A detailed description of the financing can be found under Section 1.7.4. Exhibit C includes certificates of insurance.
XIII. Business Continuity Plan:

As part of the current contract the NHSLC has been provided a copy of our current Business Continuity Plan. Upon successful award of the contract we will update our business continuity plan for the Seabrook facility. By retaining our Nashua facilities, the existing computer room and systems provide immediate redundancy following a move to Seabrook. In addition, these facilities provide redundancy for storage and shipping in the short run while a more extensive alternative location network is established.

XIV. Breakage and Shortages:

Breakage – The warehouse will only be responsible for breakage that is clearly identified as occurring during the picking or loading process. Once a loaded trailer or van has been accepted by the carrier; wet/damp-damage that is identified during the unloading process will be the transportation contractor’s responsibility.

Shortages – Liquor Stores or Licensees should report shortages to their carrier at the time of delivery transportation contractor. If the carrier cannot resolve the shortage at their terminal site; then the warehouse should be contacted. The warehouse will perform a cycle-count on the item reported as a “short”. If the warehouse cycle-count confirms an overage; the warehouse will arrange transportation of the “shorted” item to the Licensee or Store. If the cycle-count does not reveal an overage; the shortage will be entered into the WMS as a Carrier Claim and resolved during reconciliation at the annual Physical Inventory process.

XV. Temperature Control:

Our Seabrook facility is designed to maintain the required temperature limits. The warehouse will be heated for winter operation. For summer operation, the facility is outfitted with a
series of large louvered intake vents on the eastern facing walls with a series of exhaust fans on the western facing wall providing substantial air flow within the facility. This system, in addition to the roof being light in color, allows us to regulate the temperature to within acceptable ranges.

Once the trailer is loaded, responsibility for protection of the load shifts to the Transportation Vendor, however our intention in the new facility is to stage product in the warehouse for loading shortly before departure to prevent temperature related spoilage and as an increased security measure.

XVI. Overages:

Understood

XVII. Financial Statements:

We have included information about our finances and operations, including but not limited to, our audited financial statements (Exhibit B), for the purpose of enabling the NHSLC to evaluate our ability to conduct the operations required under the RFP. This information is confidential, financial, and proprietary information exempt from public disclosure under RSA 91-A:5 and other applicable laws or regulations. We submit this confidential, financial and proprietary information to the NHSLC subject to the conditions described in Sections 1.13 (Property of NHSLC) and 1.14.b (Disclosure of Proposal; NHSLC Obligation) and our Statement of Confidentiality (Exhibit A) included with the proposal as required under RFP, Section 1.14b.

XVIII. Experience:

Our 130 years servicing New Hampshire companies’ distribution needs, including more than 40 years with the NHSLC, provides the stability and experience required for such a crucial
operation. We are proud of our partnership with the NHSLC. We believe that we have played an integral part in creating the systems and the environment which has lead to a more than 75% growth in volume over the past 15 years. Over the past several years we have expended considerable resources developing the strategy that we believe will put the NHSLC in the best position to take advantage of the opportunities the next twenty years will bring.

XIV. Default:

Understood

XV. Severe Weather:

Understood

XVI. Transition Period:

In the event a new Vendor is selected to provide warehousing services at the end of this contract, we agree to assist in the transition for up to 6 months and until the end of a reasonable transition period as determined by the NHSLC, however an increase in rates will be required, the scale of which will be dependent upon the length of the transition period. The loss of trained personnel and the replacement of such individuals with unskilled, untrained people, receiving/shipping volume changes, etc will also impact our ability to maintain service levels. As such service commitments are likely to be impacted by these and other factors, which could lead to service interruptions and/or lost sales. Law will work to minimize such eventualities that are within its control but may be constrained based on the how such a transition is planned and the many factors that cannot be anticipated until such an event takes place.
In addition, the cost of maintaining the facility for an undetermined amount of time is significant. As such we cannot agree to an open-ended time frame for the Transition Period. This time period shall be negotiated in conjunction with the rate negotiations for the Transition Period.

XVII. Free Storage:

We agree to provide free storage for up to 35,000 full-cases per month for all active inventory full-cases that have been in inventory up to 84 days. Receipt lots older than 84 days and/or on a hold status are subject to storage charges at the applicable rate. Due to the limited capacity of the split case operation, all cases in inventory in the split case operation will be charged storage.

XVIII. Receiving Appointments:

Understood, however there may be instances of extreme inbound volume which require an appointment to be booked more than five business days out.

3.4 APPENDICES D & D-1:

D-1. Purpose through D-3 Vendor’s Response:

Understood

D-4. Value-Added Services:

The details of the service enhancements and pricing elements that bring more than $37,000,000 in added value to the NHSLC have been outlined in Section II of our proposal and in Section 3-IX, the Rate and Price Analysis, above.
3.5 APPENDIX E:

1 through 8:

Understood

9. Data:

In accordance with our existing contract, we require that the language in the existing contract serve as the definition of data.

10 through 11:

Understood

12. Assignments:

In accordance with our existing contract, we require the addition of the existing language providing that consent not be unreasonably withheld.

13. Indemnification:

In accordance with our existing contract the language must be modified to replace “acts and omissions” with “negligence”.

14 through 24:

Understood
Appendix E – Exhibit C:

1 through 14:

Understood

25. Protest Process:

We reserve the right to negotiate the contract protest process and any provision in the RFP that requires the contractor to waive or delay institution of any available legal remedies, at law or in equity, including without limitation with respect to confidentiality requirements imposed on the state.

26. Contract Transition Period:

In the event a new Vendor is selected to provide warehousing services at the end of this contract, we agree to assist in the transition for up to 6 months and until the end of a reasonable transition period as determined by the NHSLC, however an increase in rates will be required, the scale of which will be dependent upon the length of the transition period. The loss of trained personnel and the replacement of such individuals with unskilled, untrained people, receiving/shipping volume changes, etc will also impact our ability to maintain service levels. As such service commitments are likely to be impacted by these and other factors, which could lead to service interruptions and/or lost sales. Law will work to minimize such eventualities that are within its control but may be constrained based on the how such a transition is planned and the many factors that cannot be anticipated until such an event takes place.

In addition, we cannot accept responsibility for costs associated with the transfer of product and control to a new warehouse organization. There is no way to anticipate the costs of a transfer and, thus, such costs cannot reasonably be factored into the proposed pricing.
Net overages and shortages by supplier shall be used to determine any financial obligation between Law and the new warehouse vendor. Net shortages will be paid to each supplier at cost upon invoicing by each supplier. The new warehouse vendor is required to work with Law and perform cycle counts as needed to verify discrepancies.

27. Assignment Provision:

In accordance with our existing contract we require this section be removed.

28. News Releases:

Law may publicly disclose any information concerning this agreement that is available for public disclosure under applicable laws and regulations, including without limitation, the award of the contract to Law and existence of the contractual between the parties

29. Confidentiality:

Understood

3.6 APPENDIX F through APPENDIX J

Understood

3.11 APPENDIX K

We have reviewed Appendix K and have a number of objections which we will address with the NHSLC directly in the continued development of our systems.
3.12 APPENDIX L through APPENDIX Q:

Understood

PART 4 EVALUATION PROCESS

4.1 General through 4.3 Evaluation Process:

Understood

4.4 Phase I - Initial Analysis Review and Ranking:

Criteria for Selection:

Understood

General:

Understood

Vendor Experience & Qualifications/Transition:

Our 130 years of servicing New Hampshire companies’ distribution needs, including more than forty (40) years with the NHSLC, provides the stability and experience required for such a crucial operation. We are proud of our partnership with the NHSLC, its suppliers and Licensees. We feel that we have played a key role in creating the systems and the environment which has lead to a more than 75% growth in volume over the past 15 years. We are committed to investing in the business relationships, protocols and systems necessary to create the optimum distribution system for the NHSLC, its suppliers, and licensees.

Our organizational chart (Exhibit H) clearly shows the depth of experience in the key management personnel as in the key supervisory personnel. Many of these positions have in excess
of 20 or 30 years experience with Law and the NHSLC and are proud of the changes effected over the years and their team’s involvement in creating such changes. In fact, the average Law employee has over 10 years with the company – a testament to their dedication.

Law recognizes the importance of the organizational operating experience needed to handle high value and high velocity commodities and believes it is uniquely qualified to ensure the best possible solution has been provided with the least amount of risk to this extremely important revenue source for the State of NH. We fully understand the magnitude of effort and resources necessary and have demonstrated our ability to resolve unforeseen problems and avert disruptions in service.

Financial Stability and Capacity:

The Law Family has been operating as a distribution services company in New Hampshire since 1882. Our position as the valued distribution services partner of the NHSLC has been recognized over the years by multiple lending institutions as they have supported us in the expansion of our Nashua facilities. These institutions and others have recognized us and our strategy for the NHSLC for the next twenty (20) years, by providing commitments to loan the $20,000,000 necessary to acquire the systems that will modernize the distribution system for the NHSLC. Final approval is contingent upon satisfactory award of a long-term contract. Final terms are contingent upon the timing of final contract award. Law Warehouses, Inc. has the financial backing and capacity to undertake the investments necessary to create the distribution system necessary to accommodate the future growth of the NHSLC and is prepared to move forward following the award of a long-term contract.
Vendor Technical, Service, and Project Management Proposal:

Law Warehouses has proven its willingness and ability to create and maintain IT systems beyond the minimum requirements and has been a valued IT partner to the NHSLC, its suppliers and customers. Our institutional knowledge and resources are invaluable to the NHSLC, especially at a time when a major system upgrade is contemplated.

We are committed, throughout the organization, to be a partner with the NHSLC, its suppliers and licensees, and to provide mechanisms for rapidly and effectively resolving errors and disruptions when they do occur. In addition to our current staff we will hire a marketing and sales person whose highest priority will be to become a key liaison with the NHSLC, the suppliers, broker and licensee community to ensure the timely response to all issue and projects.

We have reviewed Appendix K and have a number of objections which we will address with the NHSLC directly in the continued development of our systems.

Our primary goal with this next contract is to take advantage of the opportunities that exist right now to create the state-of-the-art distribution facility and systems necessary to meet the growing demands of the NHSLC, its Suppliers and Customers. We look forward to working together with the NHSLC to make this a reality.

Vendor Overall Solution:

We have spent considerable resources working with System Logistics to develop a strategy specifically designed to address the needs of the NHSLC and Law Warehouses for the next twenty years. Our Proposal involves transitioning our operation to an existing 505,000 sqft, 40 ft. clear height, distribution center in Seabrook. Over the course of the next year we will install a combination of traditional and state-of-the-art warehouse and order fulfillment technologies, creating the distribution center of the future for the NHSLC and Law. We are prepared to invest
more than $20,000,000 in the development of a state-of-the-art distribution center while creating both service improvements and a financial benefit to the State of NH through substantial revenue sharing.

The structural benefits of our Proposal provide the NHSLC with six (6) day per week delivery for the highest volume stores within 1 hour of Seabrook, reducing the labor impact in stores of receiving extremely large deliveries coming out of busy weekends and holidays. This extra delivery day provides an opportunity for stores to reduce their back room inventories, freeing up inventory dollars while making their back rooms more efficient.

This system also dramatically shortens the order-to-delivery cycle time. Rather than the existing long lead times, which currently can extend to ten days between order and delivery, stores will be able to take advantage of an “order today receive delivery tomorrow” cycle time. By reducing the cycle time, stores can better service their customer’s needs while reducing back-room safety stock levels.

The six (6) day schedule, in conjunction with shortened cycle time, provides an opportunity for the NHSLC to service on-line customers in a timely manner. Reducing the cycle time to “overnight” creates the service levels expected of these consumers, driving up consumer demand for both the NHSLC web-site and NHSLC stores.

Financially the NHSLC benefits through cost reductions and revenue sharing averaging more than $1,750,000 per year, totaling more than $37,000,000 over the term of the contract.

**Vendor Pricing and Innovation:**

Understood. In addition to the pricing provided in Appendices D and D-1, details of the service enhancements and pricing elements that bring more than $37,000,000 in added value to the
NHSLC have been outlined in Section II of our proposal and in the Rate and Price Analysis, Section 3-IX, above.

**Vendor References:**

In Exhibit E we have provided references from two (2) customers from our public warehouse operations and from three (3) customers from bailment warehouse operations.

4.5 **Phase II Oral Interviews and Documentation Supplementation:**

We strongly urge the committee to allow us to take you through a presentation of the system we have designed for this contract – on site. We feel that only through an on-site visit can you best understand why we would move our business from the city we have operated from for 130 years and why we would choose this system design for the NHSLC, its suppliers and customers.

4.6 **NHSLC Evaluation and Approval through 4.8 Contract Execution:**

Understood

**Definition of Terms:**

Understood

1.0 **Introduction to the NHSLC through 2.0 Requirements:**

Understood
Law Warehouses, Inc.
NHSLC Warehouse Services RFP 2012 – 14

Vendor Confidentiality
Law Warehouses, Inc. ("Law", "our" or "we") is submitting the enclosed proposals (the "proposals") in response the State of New Hampshire, Liquor Commission (the "NHSLC") RFP 2012-14 for warehouse services for spirits & wine product, equipment and supplies (the "RFP"). As required under the RFP, Section 1.14.b, we are submitting this written statement to describe the nature of the confidential information contained in the proposal and the grounds for our position that the information is exempt from public disclosure under applicable laws and regulations, including but not limited to, the Right to Know Law, N.H. RSA Chapter 91-A. Also enclosed is a redacted version of the proposal that removes the confidential information along with an unredacted version of the proposal as required under RFP, Section 1.14.b.

STATEMENT OF POSITION ON CONFIDENTIALITY

Embodied in the proposal are significant and highly confidential, financial and propriety information, including without limitation and regardless of its format, our audited financial statements, information relating to the system design for our automated order fulfillment system (including but not limited to proprietary and confidential data analysis, equipment design, and software function), and information relating to our operations, customers, suppliers, business plans, finances, revenues, trade secrets, know-how, technology, and intellectual property as may exist now and/or hereafter come into existence, regardless of whether such rights arise under the laws of the United States or any other jurisdiction (including without limitation copyrights, trademarks, patents, rights of privacy and publicity, and goodwill), and confidential and
proprietary information belonging to third parties, (collectively our and third party confidential, financial and proprietary information is referred to as the “Vendor Confidential Information”).

The Vendor Confidential Information is confidential, financial, and proprietary information exempt from public disclosure. We are submitting the Vendor Confidential Information for the sole and limited purpose of enabling the NHSLC to evaluate our ability to conduct the operations required under the RFP, and with the understanding that the information will be held in strict confidence in accordance with and subject to the conditions described herein and in the proposal including Sections 1.5.8 (Inspection of Records), 1.13 (Property of NHSLC) and 1.14.b (Disclosure of Proposal; NHSLC Obligation).

The Vendor Confidential Information constitutes “confidential,” “commercial” and “financial” information, the disclosure of which would constitute an invasion of privacy within the meaning of RSA 91-A:5, IV. As held by the New Hampshire Supreme Court, and consistent with the State of New Hampshire’s longstanding practice, the terms “commercial or financial” encompass information such as business sales statistics, research data, technical designs, overhead and operating costs, and information on financial condition.

The disclosure of any of the Vendor Confidential Information would result in substantial harm and irreparable damage to our legitimate business interests and competitive position, and to those of third parties whose Vendor Confidential Information is included in the proposal. For example, if the Vendor Confidential Information were publicly disclosed, a competitor could use the information to develop similar practices or systems, placing Law and third parties in jeopardy
of losing our competitive positions. Given the confidential and competitively sensitive nature of the Vendor Confidential Information and its high economic value, a valid and substantial interest exists in maintaining the confidentiality of the Vendor Confidential Information which far outweighs any interest in public disclosure. We do not waive any privacy interests in maintaining the confidentiality of the Vendor Confidential Information by submitting the proposal.

In addition, the benefits of non-disclosure to the NHSLC far outweigh any interest in public disclosure of the Vendor Confidential Information for numerous reasons, including without limitation, the NHSLC’s interest in preventing any impairment of its ability to obtain confidential, financial or proprietary information in the future. If the Vendor Confidential Information were publicly disclosed, such disclosure could operate to discourage companies from responding to future RFPs, if, by responding, a company faces forced disclosure of its confidential, financial or proprietary information.

Accordingly, we submit the Vendor Confidential Information with the understanding that the NHSLC will maintain the confidentiality of the Vendor Confidential Information in accordance with applicable laws and regulations, including, but not limited to, RSA 91-A. If the NHSLC receives a request for the Vendor Confidential Information and determines that any of the Vendor Confidential Information in its reasonable opinion is subject to public disclosure for any reason, we understand that the NHSLC will immediately notify us and specify the date by which the NHSLC intends to release such Vendor Confidential Information. Given the competitive and confidential nature of the Vendor Confidential Information, and the substantial
harm that would result to Law and third parties if any of the Vendor Confidential Information was publicly disclosed, the Vendor Confidential Information must not be released in the absence of a final order by a court of competent jurisdiction requiring such disclosure. Further, the conditions described herein must remain in force even if we are not awarded a contract or notwithstanding the termination of any resulting contract with Law.

In addition, given that the information contained in the proposal includes proprietary, financial, confidential, and other competitively sensitive information, while we understand that the NHSLC will not return our the proposal to Law, by submitting the proposal we do not agree to transfer any property or other rights, title or interest in the information and materials contained in the proposal, and all such rights, title and interest in the information shall remain with Law and any third parties to whom the information belongs. We submit the proposal subject to the conditions that any use or disclosure, publication or dissemination of the information and materials in the proposal is limited to (a) authorized state officers and employees for the limited purpose of evaluating the proposal, and (b) to those state officers and employees that have a reasonable need to know such information in order to assist in carrying out the provisions of any resulting contract with Law.

Brian H. Law
President
Exhibit B - Financials
Exhibit B
Financials

Removed from Redacted proposal.
Exhibit C

RFP Section 1 Required Documents
CERTIFICATE OF LIABILITY INSURANCE

PRODUCER: Marsh USA Inc.
99 High Street
Boston, MA 02110
Attn: Boston.Certrequest@marsh.com Fax: 212-948-4377

INSURER:

- LAW REALTY CO., INC., LAW WAREHOUSES INC
- LAW MOTOR FREIGHT INC, BSP TRANS INC,
- BULK HAULERS, INC, STATE STREET, INC,
- HEAVY DUTY TRUCK & DIESEL SERVICE, INC, CLAWRK, LLC
- 27 AIRPORT ROAD
- NASHUA, NH 03063

CONTACT

NAME: [Redacted]
PHONE: [Redacted]
FAX: [Redacted]
E-MAIL: [Redacted]
ADDRESS: [Redacted]

INSURER(S) AFFORDING COVERAGE NAIC #

- INSURER A: Zurich American Insurance Co
  16535
- INSURER B:
- INSURER C:
- INSURER D:
- INSURER E:
- INSURER F:

COVERAGE:

- GENERAL LIABILITY
  - COMMERCIAL GENERAL LIABILITY
  - CLAIMS-MADE
  - X OCCUR
  - GENL AGGREGATE LIMIT APPLIES PER:
    - X POLICY
    - PROJ
    - LOC

- AUTOMOBILE LIABILITY
  - ANY AUTO
  - ALL OWNED AUTOS
  - SCHEDULED AUTOS
  - NON-OWNED AUTOS
  - HIRED AUTOS
  - UMBRELLA LIAB
  - EXCESS LIAB
  - OCCUR
  - CLAIMS-MADE

- WORKERS COMPENSATION
  - ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED?
    - (Mandatory in NH)
  - DESCRIPTION OF OPERATIONS below

POLICY NUMBER:

- GLO 3888657-01
- TRK 3888658-01 (ME, NH, VT)
- WC 3888656-01 (ME, NH, VT)

POLICY EFF (MM/DD/YYYY): 09/01/2011
POLICY EXP (MM/DD/YYYY): 09/01/2012

LIMITS:

- EACH OCCURRENCE: $2,000,000
- DAMAGE TO RENTED PREMISES (Located occurrence): $100,000
- MED EXP (Any one person): $5,000
- PERSONAL & ADV INJURY: $1,000,000
- GENERAL AGGREGATE: $2,000,000
- PRODUCTS - COMPOP AGG: $2,000,000
- COMBINED SINGLE LIMIT (ca accidents): $2,000,000
- BODILY INJURY (Per person): $2,000,000
- BODILY INJURY (Per accident): $2,000,000
- PROPERTY DAMAGE (Per accident): $2,000,000
- EACH OCCURRENCE: $2,000,000
- AGGREGATE: $2,000,000
- E.L. EACH ACCIDENT: $1,000,000
- E.L. DISEASE - EA EMPLOYEE: $1,000,000
- E.L. DISEASE - POLICY LIMIT: $1,000,000

CERTIFICATE HOLDER:

- NH STATE LIQUOR COMMISSION
- STORRS ST
- CONCORD, NH 03301

CANCELLATION:

- SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE:

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# Certificate of Liability Insurance

**Certificate Number:** 006396297-01  
**Revision Number:** 3

## Insures


## Coverage

<table>
<thead>
<tr>
<th>Insured</th>
<th>Certificate Number</th>
<th>INSURER A</th>
<th>NAIC #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marsh USA, Inc 99 High St, Boston, MA 02110</td>
<td>Travelers Property Casualty Co. of America</td>
<td>25674</td>
<td></td>
</tr>
</tbody>
</table>

## Coversages

### General Liability

<table>
<thead>
<tr>
<th>Type of Insurance</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial General Liability</td>
<td>$</td>
</tr>
<tr>
<td>Claims-Made</td>
<td>$</td>
</tr>
<tr>
<td>Occur</td>
<td>$</td>
</tr>
</tbody>
</table>

### Automobile Liability

<table>
<thead>
<tr>
<th>Type of Insurance</th>
<th>Limit</th>
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</thead>
<tbody>
<tr>
<td>Any Auto</td>
<td>$</td>
</tr>
<tr>
<td>All Owned Autos</td>
<td>$</td>
</tr>
<tr>
<td>Sched Autos</td>
<td>$</td>
</tr>
<tr>
<td>Non-Owned Autos</td>
<td>$</td>
</tr>
</tbody>
</table>

### Umbrella Liability

<table>
<thead>
<tr>
<th>Type of Insurance</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occur</td>
<td>$</td>
</tr>
<tr>
<td>Claims-Made</td>
<td>$</td>
</tr>
</tbody>
</table>

### Workers Compensation

<table>
<thead>
<tr>
<th>Type of Insurance</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>WC Statutory Limits</td>
<td>$</td>
</tr>
<tr>
<td>Other</td>
<td>$</td>
</tr>
</tbody>
</table>

### Warehouse Legal Liability

- **Certificate Number:** QT-660-3092B494-TIL-11  
- **Issued Date:** 09/01/2011  
- **Expiry Date:** 09/01/2012  
- **Limit:** $10,000,000  
- **Deductible:** $10,000

## Certificate Holder

- **NH State Liquor Commission**  
  STORRS ST  
  CONCORD, NH 03031

## Cancellation

- **Should any of the above described policies be cancelled before the expiration date thereof, notice will be delivered in accordance with the policy provisions.**

- **Authorized Representative:** [Signature]

---

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EVIDENCE OF PROPERTY INSURANCE

THIS EVIDENCE OF PROPERTY INSURANCE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFER NO RIGHTS UPON THE ADDITIONAL INTEREST NAMED BELOW. THIS EVIDENCE DOES NOTAFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS EVIDENCE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE ADDITIONAL INTEREST.

AGENCY
MARSH USA INC.
99 HIGH STREET
BOSTON, MA 02110
Attn: Boston.Certrequest@marsh.com Fax: 212-948-4377

FAX (A/C, No.):
E-MAIL ADDRESS:

CODE: SUB CODE:

AGENCY

CUSTOMER ID:

INSURED
Law Realty Co., Inc. Law Warehouses
Inc., Law Motor Freight, Inc., BSP Trans., Inc.,
Bulker Haulers Inc., State Street Realty, Inc.,
Heavy Duty Truck & Diesel Service, Inc.
27 Airport Road
Nashua, NH 03063

COMPANY
Federal Insurance Company

LOAN NUMBER

POLICY NUMBER
3527-3150

EFFECTIVE DATE
09/01/2011

EXPIRATION DATE
09/01/2012

CONTINUED UNTIL TERMINATED IF CHECKED

THIS REPLACES PRIOR EVIDENCE DATED:

PROPERTY INFORMATION
LOCATION/DESCRIPTION

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTwithstanding ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS EVIDENCE OF PROPERTY INSURANCE MAY BE ISSUED OR MAY Pertain, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

COVERAGE INFORMATION

COVERAGE / PERILS / FORMS AMOUNT OF INSURANCE DEDUCTIBLE

ANNUAL POLICIES
68,156,577 5,000

EQUIPMENT BREAKDOWN
44,179,811 5,000

EARTHMOVEMENT
5,000,000 50,000

FLOOD
5,000,000 50,000

REMARKS (Including Special Conditions)
Dedicated Limit to NHRSC for Inventory: $2,060,000

CANCELLATION
SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

ADDITIONAL INTEREST

NAME AND ADDRESS
NH STATE LIQUOR COMMISSION
STORRS ST
CONCORD, NH 03301

MORTGAGEE
LOSS PAYEE
ADDITIONAL INSURED

AUTHORISED REPRESENTATIVE

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The ACORD name and logo are registered marks of ACORD
State of New Hampshire
Department of State

CERTIFICATE

I, William M. Gardner, Secretary of State of the State of New Hampshire, do hereby certify that LAW WAREHOUSES, INC. is a New Hampshire corporation duly incorporated under the laws of the State of New Hampshire on December 27, 1955. I further certify that all fees and annual reports required by the Secretary of State's office have been received and that articles of dissolution have not been filed.

In TESTIMONY WHEREOF, I hereto set my hand and cause to be affixed the Seal of the State of New Hampshire, this 22nd day of May, A.D. 2012

William M. Gardner
Secretary of State
CERTIFICATE OF VOTE

I, Jack R. Law, hereby certify that I am a duly appointed Director of Law Warehouses, Inc.

I hereby certify the following is a true copy of a vote taken at a meeting of the Board of Directors of the corporation, duly called and held on Friday March 30, 2012, at which a quorum of the Board was present and voting.

DULY VOTED:
On motion made and duly seconded, it was unanimously voted to that Brian H. Law, President; negotiate with the NH State Liquor Commission and other parties as needed to obtain a twenty (20) year contract at terms acceptable to Law Warehouses, Inc. Furthermore, Brian H. Law has full authority to enter into such agreement and sign necessary documents to bind the contract.

There being no further business, on motion duly seconded, it was voted to adjourn at 2:45pm.

This signature authority has not been revoked and remains in full force and effect as of the date of the proposal.

Director

State of New Hampshire
County of Hillsborough

On this 14th day of May 2012, before me Julie McMahon, personally appeared Jack R. Law, who acknowledged himself to be Director of Law Warehouses, Inc., a New Hampshire corporation, and, as Director, that he executed the foregoing certification.

In witness whereof I hereunto set my hand and official seal.

Julie McMahon
Notary Public

My Commission Expires April 28, 2015

N:\Corporate\LAW_WHSE\Whse Corp minutes\Whse Special Meeting NHSLC RFP 2012-03-30.docx
State of New Hampshire
Liquor Commission

LAW WAREHOUSES INC
LAW WAREHOUSES
27 AIRPORT RD
NASHUA NH 03063

LIQUOR/WINE/BEVERAGE WAREHOUSE
OFF-PREMISES BEVERAGE/WINE/LIQUOR

License No. 565112 Effective Date: 01/01/2012 Expires: 12/31/2012

This license is issued and is subject to the conditions prescribed in Title XIII of the revised statutes annotated and regulations enacted by the commission thereunder. This license is effective for the period specified above unless sooner revoked and is not transferable.

State Liquor Commission

Joseph W. Mollica, Chairman
Mark M. Bodi, Commissioner
Michael R. Milligan, Commissioner

This document and any addendum must be conspicuously displayed on the described premises.
Travelers Casualty and Surety Company of America

a certain Bond No. 104079686

dated effective April 30, 2003 (MONTH-DAY-YEAR)
on behalf of Law Warehouses, Inc. (PRINCIPAL)
and in favor of State of New Hampshire (OBLIGEE)

does hereby continue said bond in force for the further period

beginning on April 24, 2012 (MONTH-DAY-YEAR)
and ending on April 24, 2013 (MONTH-DAY-YEAR)
Amount of bond $1,000,000.00

Description of bond State Liquor Commission Bailment Warehouse Contract Bond

PROVIDED: That this continuation certificate does not create a new obligation and is executed upon the express condition and provision that the Surety's liability under said bond and this and all Continuation Certificates issued in connection therewith shall not be cumulative and that the said Surety's aggregate liability under said bond and this and all such Continuation Certificates on account of all defaults committed during the period (regardless of the number of years) said bond had been and shall be in force, shall not in any event exceed the amount of said bond as hereinbefore set forth.

Signed and dated on May 14, 2012 (MONTH-DAY-YEAR)

Travelers Casualty and Surety Company of America

By Kellie McKinney, Attorney-In-Fact

Marsh U.S.A., Inc.
Agent
1111 Northshore Drive, Suite N-550, Knoxville, TN 37919
Address of Agent
865-769-7700
Telephone Number of Agent
WARNING: THIS POWER OF ATTORNEY IS INVALID WITHOUT THE RED BORDER

POWER OF ATTORNEY

TRAVELERS

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

Attorney-In Fact No. 224712
Certificate No. 004781280

KNOW ALL MEN BY THESE PRESENTS: That St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company and St. Paul Mercury Insurance Company are corporations duly organized under the laws of the State of Minnesota, that Farmington Casualty Company, Travelers Casualty and Surety Company, and Travelers Casualty and Surety Company of America are corporations duly organized under the laws of the State of Connecticut, that United States Fidelity and Guaranty Company is a corporation duly organized under the laws of the State of Maryland, that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc., is a corporation duly organized under the laws of the State of Wisconsin (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint

Barbara A. Thompson, Carolyn E. Wheeler, Novetta M. Anderson, Kellie McKinney, Leslie M. Patterson, Loretta M. Jones, Mary Y. Volmar, Sandra Ward, and Vicki Nobinger

of the City of Knoxville, State of Tennessee, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

IN WITNESS WHEREOF, the Companies have caused this instrument to be signed and their corporate seals to be hereunto affixed, this 21st day of March, 2012.

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company
St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

State of Connecticut
City of Hartford ss.

By: ____________________________

George W. Thompson, Senior Vice President

21st day of March, 2012, before me personally appeared George W. Thompson, who acknowledged himself to be the Senior Vice President of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

In Witness Whereof, I hereunto set my hand and official seal.

By Commission expires the 30th day of June, 2016.

Marie C. Tetreault, Notary Public

58440-6-11Printed in U.S.A.
This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company’s name and seal with the Company’s seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company’s seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, Kevin E. Hughes, the undersigned, Assistant Secretary of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies, which is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 14th day of May 20

Kevin E. Hughes, Assistant Secretary

To verify the authenticity of this Power of Attorney, call 1-800-421-3880 or contact us at www.travelersbond.com. Please refer to the Attorney-In-Fact number, the above-named individuals and the details of the bond to which the power is attached.
CONTINUATION CERTIFICATE
FIDELITY OR SURETY BONDS/POLICIES

In consideration of $100.00 dollars renewal premium, the term of Bond/Policy No. 100997662 in the amount of $10,000.00, issued on behalf of Law Warehouse, Inc., whose address is Airport Road, Nashua, NH 03060, in favor of State of New Hampshire, Bureau of Public Works, whose address is Concord, NH 03302, in connection with Public Warehouse Bond is hereby extended to January 5, 2013, subject to all covenants and conditions of said bond/policy.

This certificate is designed to extend only the term of the bond/policy. It does not increase the amount which may be payable thereunder. The aggregate liability of the Company under the said bond/policy together with this certificate shall be exactly the same as, and no greater than it would have been, if the said bond/policy had originally been written to expire on the date to which it is now being extended.

Signed, sealed and dated 5/31/2012

Travelers Casualty and Surety Company of America

By: Carolyn E. Wheeler
Caroline E. Wheeler

Attorney-in-Fact

58-M (2/95)
POWER OF ATTORNEY

St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company

Attorney-In Fact No. 224712
Certificate No. 004852007

KNOW ALL MEN BY THESE PRESENTS: That St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company and St. Paul Mercury Insurance Company are corporations duly organized under the laws of the State of Minnesota, that Farmington Casualty Company, Travelers Casualty and Surety Company, and Travelers Casualty and Surety Company of America are corporations duly organized under the laws of the State of Connecticut, that United States Fidelity and Guaranty Company is a corporation duly organized under the laws of the State of Maryland, that Fidelity and Guaranty Insurance Company is a corporation duly organized under the laws of the State of Iowa, and that Fidelity and Guaranty Insurance Underwriters, Inc., is a corporation duly organized under the laws of the State of Wisconsin (herein collectively called the "Companies"), and that the Companies do hereby make, constitute and appoint

Barbara A. Thompson, Carolyn E. Wheeler, Novetta M. Anderson, Kellie McKinney, Leslie M. Patterson, Loretta M. Jones, Mary Y. Volmar, Sandra Ward, and Vicki Nobinger

of the City of Knoxville, State of Tennessee, their true and lawful Attorney(s)-in-Fact, each in their separate capacity if more than one is named above, to sign, execute, seal and acknowledge any and all bonds, recognizances, conditional undertakings and other writings obligatory in the nature thereof on behalf of the Companies in their business of guaranteeing the fidelity of persons, guaranteeing the performance of contracts and executing or guaranteeing bonds and undertakings required or permitted in any actions or proceedings allowed by law.

WITNESS WHEREOF, the Companies have caused this instrument to be signed and their corporate seals to be hereto affixed, this 8th day of May, 2012.

Farmington Casualty Company
Fidelity and Guaranty Insurance Company
Fidelity and Guaranty Insurance Underwriters, Inc.
St. Paul Fire and Marine Insurance Company
St. Paul Guardian Insurance Company

St. Paul Mercury Insurance Company
Travelers Casualty and Surety Company
Travelers Casualty and Surety Company of America
United States Fidelity and Guaranty Company

State of Connecticut
City of Hartford ss.

By: George W. Thompson, Senior Vice President

On this the 8th day of May, 2012, before me personally appeared George W. Thompson, who acknowledged himself to be the Senior Vice President of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, and that he, as such, being authorized so to do, executed the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

Witness Hereof, I hereunto set my hand and official seal.
Commission expires the 30th day of June, 2016.

Marie C. Tetreault
Notary Public

58440-6-11 Printed in U.S.A.
This Power of Attorney is granted under and by the authority of the following resolutions adopted by the Boards of Directors of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company, which resolutions are now in full force and effect, reading as follows:

RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President, any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary may appoint Attorneys-in-Fact and Agents to act for and on behalf of the Company and may give such appointee such authority as his or her certificate of authority may prescribe to sign with the Company's name and seal with the Company's seal bonds, recognizances, contracts of indemnity, and other writings obligatory in the nature of a bond, recognizance, or conditional undertaking, and any of said officers or the Board of Directors at any time may remove any such appointee and revoke the power given him or her; and it is

FURTHER RESOLVED, that the Chairman, the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President may delegate all or any part of the foregoing authority to one or more officers or employees of this Company, provided that each such delegation is in writing and a copy thereof is filed in the office of the Secretary; and it is

FURTHER RESOLVED, that any bond, recognizance, contract of indemnity, or writing obligatory in the nature of a bond, recognizance, or conditional undertaking shall be valid and binding upon the Company when (a) signed by the President, any Vice Chairman, any Executive Vice President, any Senior Vice President or any Vice President, any Second Vice President, the Treasurer, any Assistant Treasurer, the Corporate Secretary or any Assistant Secretary and duly attested and sealed with the Company's seal by a Secretary or Assistant Secretary; or (b) duly executed (under seal, if required) by one or more Attorneys-in-Fact and Agents pursuant to the power prescribed in his or her certificate or their certificates of authority or by one or more Company officers pursuant to a written delegation of authority; and it is

FURTHER RESOLVED, that the signature of each of the following officers: President, any Executive Vice President, any Senior Vice President, any Vice President, any Assistant Vice President, any Secretary, any Assistant Secretary, and the seal of the Company may be affixed by facsimile to any Power of Attorney or to any certificate relating thereto appointing Resident Vice Presidents, Resident Assistant Secretaries or Attorneys-in-Fact for purposes only of executing and attesting bonds and undertakings and other writings obligatory in the nature thereof, and any such Power of Attorney or certificate bearing such facsimile signature or facsimile seal shall be valid and binding upon the Company and any such power so executed and certified by such facsimile signature and facsimile seal shall be valid and binding on the Company in the future with respect to any bond or understanding to which it is attached.

I, Kevin E. Hughes, the undersigned, Assistant Secretary, of Farmington Casualty Company, Fidelity and Guaranty Insurance Company, Fidelity and Guaranty Insurance Underwriters, Inc., St. Paul Fire and Marine Insurance Company, St. Paul Guardian Insurance Company, St. Paul Mercury Insurance Company, Travelers Casualty and Surety Company, Travelers Casualty and Surety Company of America, and United States Fidelity and Guaranty Company do hereby certify that the above and foregoing is a true and correct copy of the Power of Attorney executed by said Companies which is in full force and effect and has not been revoked.

TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seal of said Companies this 13 day of MAY 2012.

Kevin E. Hughes, Assistant Secretary

To verify the authenticity of this Power of Attorney, call 1-800-421-3880 or contact us at www.travelersbond.com. Please refer to the Attorney-In-Fact number, the above-named individuals and the details of the bond to which the power is attached.
Law Warehouses, Inc.
NHSLC Warehouse Services RFP 2012 – 14

Exhibit D
RFP Section 3 Required Documents
<table>
<thead>
<tr>
<th>Unit#</th>
<th>Category</th>
<th>Description</th>
<th>Year</th>
<th>MAKE</th>
<th>MODEL</th>
<th>Fuel</th>
<th>Gross Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAWWHSE</td>
<td>Auto</td>
<td>BRL</td>
<td>2008</td>
<td>GMC</td>
<td>Yukon Denali</td>
<td>G</td>
<td>7,100</td>
</tr>
<tr>
<td>21</td>
<td>Dump Truck</td>
<td>RW 613</td>
<td>1991</td>
<td>Mack</td>
<td>RW 613</td>
<td>D</td>
<td>55,000</td>
</tr>
<tr>
<td>42</td>
<td>Dump/Flow</td>
<td></td>
<td>1970</td>
<td>Mack</td>
<td>U607T</td>
<td>D</td>
<td>32,000</td>
</tr>
<tr>
<td>27</td>
<td>Lift Truck - Clamp</td>
<td>Carton Clamp</td>
<td>1999</td>
<td>Nissan</td>
<td>CWGP02L305</td>
<td>E</td>
<td>6,000</td>
</tr>
<tr>
<td>34</td>
<td>Lift Truck - Clamp</td>
<td>Carton Clamp</td>
<td>2000</td>
<td>Yale</td>
<td>GLC050</td>
<td>P</td>
<td>5,000</td>
</tr>
<tr>
<td>36</td>
<td>Lift Truck - Clamp</td>
<td>Carton Clamp</td>
<td>2001</td>
<td>Yale</td>
<td>GLC065ZGNAE082</td>
<td>P</td>
<td>6,500</td>
</tr>
<tr>
<td>103</td>
<td>Lift Truck - Clamp</td>
<td>Carton Clamp</td>
<td>2004</td>
<td>Yale</td>
<td>ERC060GH36TE084</td>
<td>E</td>
<td>4,900</td>
</tr>
<tr>
<td>107</td>
<td>Lift Truck - Clamp</td>
<td>Carton Clamp</td>
<td>2004</td>
<td>Hyster</td>
<td>E50Z-33</td>
<td>E</td>
<td>3,500</td>
</tr>
<tr>
<td>115</td>
<td>Lift Truck - Clamp</td>
<td>Carton Clamp</td>
<td>2006</td>
<td>Yale</td>
<td>GLC070VXNGSE085</td>
<td>P</td>
<td>7,000</td>
</tr>
<tr>
<td>122</td>
<td>Lift Truck - Clamp</td>
<td>Carton Clamp</td>
<td>2008</td>
<td>Hyster</td>
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<td>1994</td>
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<td>1994</td>
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<td>1989</td>
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<td>Freuhauf</td>
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<td>14748</td>
<td>Trailer</td>
<td>48' x 13'4&quot; x 96'</td>
<td>1987</td>
<td>Hoobes</td>
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<td>1987</td>
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<td>Trailemobile</td>
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<td></td>
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<tr>
<td>Y5</td>
<td>Yard Straight</td>
<td>24' BODY</td>
<td>1992</td>
<td>Int'l</td>
<td>4900</td>
<td>D</td>
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</table>
Law Warehouses, Inc.
NHSLC Warehouse Services RFP 2012 – 14

Exhibit E References
June 4, 2012

To Whom It May Concern,

I began working with Law Warehouse in September 2010, to develop an effective and efficient process to manage Gallo’s inventory within Law’s warehouse. With the help and cooperation of the Law Warehouse team we implemented a “touchless” ordering and inventory management process that maintains very high service to the stores at appropriate levels of inventory at the warehouse.

During my daily interaction with Law Warehouse I feel I have a very good understanding of Law Warehouse capabilities. Below are three areas I wish to specifically address:

Customer Service
Law Warehouse’s customer service team is one of the best I have dealt with. They act on inquiries and issues immediately and with a very high sense of urgency. I always feel they do everything reasonable to solve issues. The team is very courteous and knowledgeable.

Leveraging Technology
It was imperative we leverage technology to improve Gallo’s ordering and inventory management process. Law Warehouse worked with us to implement a process that leverages electronic transfers of information. Law’s willingness to leverage technology enabled us to build a “world class” Vendor Managed Inventory (VMI) process. Additionally, Law Warehouse’s portal allows suppliers to easily access information on their products and inventory.

Building Strong Partnerships
I regularly meet with Law Warehouse Senior Leadership to discuss improvement opportunities. This leadership team has always be very open and willing to cooperate with new initiatives the Gallo Winery wishes to implement. Recently, Gallo successfully implemented a pallet management program with Law Warehouse, the first control state warehouse to do so.

Law Warehouse has enabled significant improvement in Gallo’s ability to manage service and inventory in New Hampshire. It has been my pleasure to work with Law Warehouse in driving these improvement initiatives.

Feel free to contact me with additional questions.

Mark Milacek
Senior Director, Strategic Distributor Collaboration
E&J Gallo Winery
209-613-1920
May 16, 2012

Re – Law Warehouse

Please accept this letter of reference on behalf of Law Warehouses in its pursuit of providing distribution services to the commission. I have known Brian Law and Law Warehouses since 2008. As a supplier to the New Hampshire State Liquor Commission I find Law to be a valuable resource and I find Law's reliability and service to be an important factor in our success in NH. They have been very helpful with our Jack and Coke repacking program. Brian took time to give our supply chain team a personal tour of the facilities. Brown-Forman, like Law, is a family owned company of strong values and commitment. We sincerely appreciate having a business partner in Law Warehouses.

Sincerely,

Bob Kelley
Brown-Forman Beverages
State Manager ME/NH/VT
(603) 856-4219
To whom it may concern:

Asolo USA has been doing business with Law Warehouses since 2000. They serve as our only U.S. contract distribution center. Law is responsible for distributing roughly 1000 pairs of Asolo Hiking boots per day. They are also responsible for receiving and storing an average of 40,000 pairs of boots.

Asolo has never experienced down-time, or shrinkage to any degree. I find Law's reliability and service to be a primary factor in our continuing success in the U.S. I would recommend Law Warehouses for your, or anyone else's, distribution needs.

Sincerely,

Scott McCurley
C.F.O
June 28, 2011

New Hampshire Liquor Commission
Storrs Street
Concord, NH 03302

To Whom It May Concern:

Bedford Specialty Sales has had a working relationship with the Law Company for more than four years. I have known Brian Law and the Law Companies since 2006. They serve as our contract distribution center for the specialty chemical raw materials we market in New Hampshire and the other New England states as well as in the eastern upstate New York region. The performance and reliability of Law Warehouses has been a key element of our improved sales service to our northeast region customers since we initiated our relationship with Brian Law and his Company.

Law Warehouses has been an important factor in our success in sales to northeast region chemical product manufacturers and to our Principals who we represent in the region and I would recommend without any reservations Law Warehouses for your distribution needs.

Sincerely,

BEDFORD SPECIALTY SALES, INC.

Normand W. Lafontaine
President
June 28, 2011

To Whom It May Concern
New Hampshire State Liquor Commission
50 Storrs Street
PO Box 503
Concord, NH 03301

Dear Sirs:

Please accept this letter of reference on behalf of the Law Companies in its pursuit of providing warehousing and transportation services to the commission. I have known Brian Law and the Law Companies since 1995. During my time on the New Hampshire State Liquor Commission I found Law to be a valuable resource and a key player in the Commission's growth. Now that I am on the supplier side of the business, I find Law's reliability and service to be an important factor in our success in NH and would recommend Law Warehouses for any future contract.

Please feel free to contact me at your convenience.

Sincerely,

John W Byrne
Exhibit F
Seabrook Brochure
Law Warehouses, Inc.
NHSLC Warehouse Services RFP 2012 – 14

Proposed 505,000 sq ft facility
100 Ledge Rd, Seabrook, NH
100 Ledge Road in Seabrook, New Hampshire. This offering consists of up to 100,000 +/- SF of prime warehouse space. Strategically located off Exit 1 on I-95, this state-of-the-art warehouse facility was built in 2002 for Nestle Waters N.A.

This high bay warehouse facility is in excellent condition and offers 41’ clear ceiling heights, 56 loading docks, 50’ x 50’ column spacing, ample parking, trailer storage and potential lay down space. This is truly an outstanding warehouse facility.
# WAREHOUSE/DISTRIBUTION SPACE FOR SUBLEASE

**100 LEDGE ROAD, SEABROOK, NH**

## Property Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
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</thead>
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<tr>
<td>Total Building Size</td>
<td>504,677 +/- RSF</td>
</tr>
<tr>
<td></td>
<td>Approximately 10,000 +/- SF Office expandable to 20,000 +/- SF and 495,000 +/- SF Warehouse</td>
</tr>
<tr>
<td>Available SF</td>
<td>Up to 100,000 +/- SF Warehouse</td>
</tr>
<tr>
<td>Land Area</td>
<td>80.97 +/- acres</td>
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<tr>
<td>Age</td>
<td>Built in 2002</td>
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<tr>
<td>Dimensions</td>
<td>400’ X 1,250’</td>
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<tr>
<td>Existing Parking</td>
<td>300 spaces</td>
</tr>
<tr>
<td>Floor Plan Available</td>
<td>Yes - See broker</td>
</tr>
<tr>
<td>Expandable</td>
<td>Yes</td>
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<tr>
<td>Construction</td>
<td>Structured steel/brick</td>
</tr>
<tr>
<td>Roof</td>
<td>Steel frame/veneer</td>
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<tr>
<td>Column Spacing</td>
<td>50’ X 50’</td>
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<tr>
<td>Ceiling Height</td>
<td>41’ clear</td>
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<tr>
<td>Loading Docks</td>
<td>56 in total; available space has 10 exclusive loading docks</td>
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<tr>
<td>Sprinkler System</td>
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<td>Zoning</td>
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<td>Asking Sublease Rate</td>
<td>$5.25/SF NNN</td>
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<td>NNN Expenses</td>
<td>Approximately $1.00/SF</td>
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<tr>
<td>Utility Expenses</td>
<td>Tenant pays its pro-rata share</td>
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<td>2008 estimate = $0.60/</td>
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---

We obtained the information above from sources we believe to be reliable. However, we have not verified its accuracy and make no guarantee, warranty or representation about it. It is subject to the possibility of errors, omissions, change of price, rental or other conditions, prior sale, lease or financing, or withdrawal without notice. We include projections, opinions, assumptions or estimates for example only, and they may not represent current or future performance of the property. You and your tax and legal advisors should conduct your own investigation of the property and transaction.
Law Warehouses, Inc.
NHSLC Warehouse Services RFP 2012 – 14

Exhibit F
Seabrook Facility Inside
Seabrook Facility – Inside View
Exhibit F
Aerial view of Seabrook Facility
Aerial view of Seabrook Facility

NHSLC Store 73

NHSLC Store 76

BJ's Wholesome Club

Proposed
505,000 sq ft
Law Warehouses, Inc.
NHSLC Warehouse Services RFP 2012 – 14

Exhibit F
Facility Block Plan and Layout
2.6 Block Plan

Building Flow
This graphic shows the primary flow from area to area in the building. It follows the same path as the flow chart. Note that the space required for each operation is laid out over the building drawing. This shows the actual space required for each operation.

Perimeter Aisle
All cases are moved on conveyor above the ground level. All pallets are transported on the ground level. There are fork truck aisles around the perimeter of each area for easy access and transport in any direction.

Flexible Shipping Dock
The shipping dock can be used for both shipping and receiving. Both operations can happen at the same time. The entire dock is open from one side to the other for easy truck traffic. Access aisles allow easy movement to the storage racks.

Expandable Design
Every area of the system can be expanded both in capacity and rate. All areas can be expanded separately depending on future growth or changed requirements. Storage and shipping will follow separate expansion paths.

Cube Utilization
VNA rack allows the densest and most cost effective storage for this building height. The carousel case picking area also uses the full building height for storage of individual cases.
2.7 System Layout

- **Carousels**: 6 stacks, 29,000 cases, 25,030 total cases
- **Fork truck recharge**
- **Office**
- **Fork lift transfer aisle**
- **Shipping / Receiving**
- **Reserve Pallet Storage VNA Rack / Truck**
- **Expansion Path**
  - Storage / Picking
  - Shipping / Receiving
- **Expansion Path**
  - Sorting / Palletizing
Law Warehouses, Inc.
NHSLC Warehouse Services RFP 2012 – 14

Exhibit G
Appendix C Required Documents
Name (as shown on your income tax return)

Law Warehouses, Inc.

Business name/disregarded entity name, if different from above

Check appropriate box for federal tax classification:

☐ Individual/sole proprietor  ☑ C Corporation  ☐ S Corporation  ☐ Partnership  ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶

☐ Exempt payee

Address (number, street, and apt. or suite no.)

27 Airport Road

City, state, and ZIP code

Nashua, NH 03063

List account number(s) here (optional)

Requester’s name and address (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on the "Name" line to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see How to get a TIN on page 3.

Note. If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Social security number

Employer identification number

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and

2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and

3. I am a U.S. citizen or other U.S. person (defined below).

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 4.

Signature of U.S. person

Date ▶ May 31, 2012

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Purpose of Form

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),

2. Certify that you are not subject to backup withholding, or

3. Claim exemption from backup withholding if you are a U.S. exempt person. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners’ share of effectively connected income.

Note. If a requester gives you a form other than Form W-9 to request your TIN, you must use the requester’s form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

• An individual who is a U.S. citizen or U.S. resident alien,

• A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States, or

• An estate (other than a foreign estate), or

• A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax on any foreign partners’ share of income from such business. Further, in certain cases where a Form W-9 has not been received, a partnership is required to presume that a partner is a foreign person, and pay the withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid withholding on your share of partnership income.
June 7, 2012

Law Warehouses, Inc. agrees to comply with all Federal and State laws regarding Fair Employment Practice, the Patriot Act and Nondiscrimination shall be submitted.

Law Warehouses, Inc. agrees to fully comply with all applicable laws and regulations including but not limited to those set forth in Appendix M.

Brian Law
President
STATE OF NEW HAMPSHIRE
Bonded Warehouse License

July 6, 2011

This certifies that in accordance with Revised Statutes Annotated Chapter 348 Law Warehouses, Inc, a corporation located in Nashua, NH has filed in this office a Bonded Warehouse State License application in proper form and a bond for the faithful performance of its duties in the amount of Ten Thousand ($10,000) for this license.

A license is hereby granted to the said warehouse, Law Warehouses, Inc, located in the building at 27 Airport Road Complex, Nashua, NH, to keep and maintain a public warehouse for the storage of all commodities, including beverages.

This license expires July 6, 2012
Bond expires January 5, 2012

Deputy Secretary of State

No. 015
Law Warehouses, Inc.
Organizational Chart – June 2012

Brian Law
President
20 Years

Claire Edwards
Executive Assistant
5 Years

Julie McMahon
HR Manager
11 Years

Jack Glow
Operations Manager
31 Years

Steve Gagnon
Whse #8
Supervisor
30 Years

2 Employees

Peter Bureau
Material Handlers
Supervisor
32 Years

Matt Griffin
Airport Rd Lift Ops
Supervisor
28 Years

Scott Martell
2nd Shift
Supervisor
13 Years

Sean O'Leary
3rd Shift
Supervisor
13 Years

Karen Wallington
Customer Service
Supervisor
5 Years

John Guerette
Finance Manager
15 Years

Jeff Malone
IT Manager
3 Years

TBD
Marketing & Sales

Mason Schow
Customer Service
27 Years

Kip Gaudette
AS400
5 Years

20 Employees
20 Employees
6 Employees
9 Employees
4 Employees
1 Employee
BRIAN H. LAW

Business: 27 Airport Road
Nashua, New Hampshire 03063
(603)-883-5331 x309
brianlaw@lawwarehouses.com

EDUCATION:
BOSTON UNIVERSITY
Masters in Business Administration
May 1995

NORTHEASTERN UNIVERSITY
Bachelor of Arts Degree in Business Administration
Boston, Massachusetts
March 1988
Majors: Transportation and International Business

WORK EXPERIENCE:
THE LAW FAMILY OF COMPANIES
Nashua, New Hampshire
September 1992 - Present

SUN MICROSYSTEMS, INC.
Methuen, Massachusetts
June 1991 - August 1992
SunExpress Division
Logistics Manager, ISO 9000 Program Manager

East Coast Manufacturing Division
Logistics Specialist
Westford, Massachusetts
April 1988 - June 1991

VOLUNTEER ACTIVITIES:
Greater Nashua Chamber of Commerce, Former Director
Greater Nashua Chamber of Commerce, Current Member of Branding Task Force
Rotary Club of Nashua, NH, President 2000 – 2001
New Hampshire Motor Transport Association, Director
New Hampshire Motor Transport Association Employee Benefit Trust, Chair
Edgewood Cemetery, Nashua, NH, Former Trustee
Nashua Country Club, Former Director and Secretary
Boys & Girls Club of Greater Nashua, Former Director
JOHN M. GUERETTE
27 Airport Road,
Nashua, NH 03063
Phone: 603-883-5531 x302
Email: JohnGuerette@lawarehouse.com

EDUCATION
Enrolled Agent Certification
Southern NH University, Manchester, NH. BS: Accounting/Business Management.
Grade Point Average: 3.9.

EMPLOYMENT HISTORY
Finance and Administration
The Law Companies (Law Warehouses, Inc., Law Motor Freight, Inc., Law Realty Co., Inc. and State Street Realty, Inc), Nashua, NH.
Direct and control Finance and Administrative departments for several companies involved in logistics (warehousing and transportation services), commercial leases and two real estate holding companies comprising 600K square feet. Extensive involvement with State agency for which we were providing services. Specific areas of responsibility include preparing timely and accurate financial statements, creating corporate policies and procedures, preparing RFP submittals, cost analysis and asset management. Other areas of responsibility include accounting operations, fixed asset, payroll, pension plan management, insurance (package, fleet, EPL, worker’s compensation, bonding, etc.), physical inventory control, loan procurement, cash management, banking and financial statement accuracy.

Assistant Controller
PATS Aircraft/DeCrane Aerospace, Georgetown, DE.
Hired to absorb the expanding financial needs of a $100M+ aerospace company, which provides interior fit-up and modifications of private aircrafts – primarily Boeing 737’s – and other private/government business jets. Primary focus is on cash management, financial statement preparation and cost analysis as well as managing day-to-day accounting operations, contract billing, POC accounting, physical inventory, payroll, capital appropriations and budgeting. Requested by the Group President to spearhead a cost control project of the engineering department consisting of more than 80 engineers and support personnel.
Controller
Custom Decorative Manufacturing, Greenwood, DE.
Hired to fill newly created position for this manufacturer and importer.
Primary responsibilities included preparation of financial statements, physical
inventory control, managing relationships with banks and vendors, and
oversight of payroll, human resources, AP and AR. Also responsible for cash
management, loan management, insurance management and procurement
(package, umbrella, worker's compensation, etc), benefit management and
procurement (health, dental, life, etc), and other financial duties required by
the business. (Due to the tenuous financial condition of the company and a
weak housing market, it was mutually agreed that this position should be
eliminated).

Manager of Financial Reporting
H. J. Stabile & Son, Inc, Nashua, NH - a General Contractor, Property
Manager, Professional Services company and Marketing company.
Originally hired as Chief Accountant supervising an accounting department of
nine persons. Ultimately responsible for all accounting operations and
financial reporting for the corporation (sales approximately $65 million in
1993 which included both commercial buildings and large residential
developments). Specific financial requirements included warranty reserves,
uniform capitalization, job cost analysis, revenue analysis, cost of sales
calculations of both fixed fee and cost plus jobs, insurance and bonding. Also
responsible for banking, cash management, budgeting, internal statements,
accuracy of audit preparation, review and approval of corporate tax return and
third-party asset management.

Assistant Controller
Vernitron Corporation, Beau Products Division, Laconia, NH - a manufacturer
of electronic components.
Responsibilities included extensive credit and collection, supervising three
person accounting department, posting to and maintenance of manual general
ledger and automated subsidiary journals, control of accounting aspects of
inventory, International Letters of Credit, and assisting with month-end and
year-end closings.

OTHER ACHIEVEMENTS
Established two Safety Committees according to the laws of the State of NH, Chair
and Member of the Safety Committee for many years, Member of the Board of
Directors for the NH Safety Group, former Member of the Board of Directors and
Treasurer for Locke Lake Colony Association.
EDUCATION

Hessar College 1982 – 1984
Diploma in Digital Technology

Lowell Technological Institute (U-Mass Lowell) 1964 – 1966
Industrial Management

N. Middlesex Regional High School, Townsend Ma 1960 -1964
College prep

IWLA 1996
Basic Course in Public Warehouse Management
Numerous one-two day seminars:
Drug & alcohol reasonable suspicion training, legal up-dates-hiring &
fi ring, OSHA up-dates, supervising the disgruntled employee, writing
evaluations, veterans reemployment rights, and many more. Certified
First Aid & CPR.

Work EXPERIENCE

Law Warehouses Inc Aug 1981 to present
• Material Handler – 1981 – 1982
• Lift Operator shipping & receiving – 1982 – 1984
• Receiving supervisor – 1984 – 1990
• Lead supervisor Warehouse #5 – 1990 – 1996
• Liquor Bailment Operations Manager – 1996 - present
Oversee the wine & spirits bailment warehouse operation. Manage
approximately 58 employees on three (3) shifts. Operating 24 hours
starting Sunday at 8PM through Friday at 10PM. Annual through-put of
3.6 million cases which involves shipping 42,609 orders and 6,639
inbound receipts, in the past 12-months.

• Radar, Enroute Air Traffic Controller
• Additional Training – Military Missions Liaison Coordinator

Young Sales & Service, 1970 – 1971
• Sales – office equipment

• ADJ (Jet/turbojet engine mechanic)
• Active Duty 1968 – 1970 – USS Wright (SVLF testing)

Young Sales & Service, 1967 – 1968
• Photocopier repair technician
• Sales – Nashua Corporation “office copy” supplies

Other Relevant Experience

Milford School District
• School Board member 6 ½ years, 17 years total volunteer time on
numerous committees. School board negotiations team – 3 contracts

Milford Parks & Playground Committee member – 5 years
Private pilots license #1763929 - June 1967
Eagle Scout –Aug 1960
Julie McMahon, PHR
27 Airport Road
Nashua, NH
Phone: 603-883-5531 x311
E-Mail: juliemcmahon@lawwarehouses.com

SUMMARY
Human resources business partner with 11 years of progressive generalist experience. Experience includes managing the areas of recruitment, employee relations, benefits and compensation, safety and health, and performance management.

EDUCATION
PHR Certification, May 2003
B.S., Human Resources Management, Southern New Hampshire University, May 98
A.S., Business Administration, New Hampshire Vocational-Technical College, May 86
Currently enrolled in Masters Program in Organizational Leadership-So. NH University

PROFESSIONAL EXPERIENCE
Law Warehouses Inc, Nashua NH (Warehouse, distribution and transportation services)
Human Resources Manager Jan 01-Present
• Manage the recruiting process for exempt and non-exempt employees including sourcing new agencies, advertising, interview and selection.
• Manage company benefits including employee orientation, administrative filing of paperwork, conducted open enrollment meetings, created company benefit guide, analyzed cost comparisons for health and welfare benefits, researched and implemented new benefits to the company, plan trustee for 401(k) and Defined Pension Plan. Administer Short-term/Long-Term disability paperwork, FMLA guidelines, and workers compensation claims.
• Provide consultation to management and employees on employee issues and policy interpretation, ensuring compliance with state and federal employment laws. Conducted internal investigations relative to sensitive issues, ensuring consistent and fair treatment to employee, while protecting company liability.
• Evaluate jobs and write job descriptions ensuring compliance with FLSA. Worked with departments on writing temporary alternate duty jobs when needed.
• Conduct policy training on Drug and Alcohol policy, Accident Reporting, HazCom, Lock-out, Tag-out, and Emergency Response plan.
• Plan and facilitate company events including Family day, Family outing, quarterly luncheons, quarterly awards, and service awards.
• Administer Drug and Alcohol compliance program for DOT and Non-DOT employees
• Manage all health and safety aspects including recording OSHA 300 log, workers comp. reporting, accident investigation, facilitate safety committee, state reporting for Joint Loss Committee, building inspections, provide recommendations or training after investigation, maintain safety committee minutes and training documents.
• Create or re-write company handbook, and other policies and procedures.
• Process all HR related reports for Government (EEO1, Unemployment, Social Security)
• Complete benefit and salary surveys
Courier Westford (Book Manufacturer)
Human Resources Representative
Recruited for Bindery and Web press personnel which includes advertising, job fairs, interviewing, orientations, benefits administration, and HRIS data entry. Provided support for 401(k) program, active member of company safety committee, completed and monitored performance review program, provided weekly reporting on opening, new hires, pending offers, termination, etc. Administered and tracked STD and FMLA leaves. Provided employee relations guidance to both managers and employees on conflict resolution, respect in the workplace, harassment and other policies.

Grason-Stadler, Inc. (Audiology equipment manufacturer-no longer in business)
Human Resources Representative
Established relationship between existing company and new parent company within a one-person HR department. Worked independently to establish relationships between both parent companies in order to provide better communications to employees on new company benefits and policies. Responsibilities included recruiting, orientations, ISO 9000 training/monitoring, benefits administration, compensation management, established temporary employee housing, organized company recreational functions, ran company wide training on handbook, employee stock purchase program, and annual safety training. Administered all paperwork for 401(k) plan.

Northern Podiatry Surgical Associates
Office Manager
Provided office management support to include recruit new patients, increase insurance carrier contracts by 150%, designed company forms, policies and procedures, researching and purchasing company office equipment and computers. Staying up-to-date with benefit plans, referral system and billing requirements. Educated nursing homes and families on changes in Medicare guidelines for services.

Dr. John A. Cegalis & Forthought, LTD (No longer in business)
Patient Accounts Manager
Supported two clinical psychologist within their independent practices. Duties included accounts receivable, full charge collections, patient scheduling, transcription of clinical reports, telephone interactions with attorneys, insurance companies and patients. Hired and supervised other clerical staff and assisted Doctor with clinical testing using detailed software. In addition, provided technical support for installation, detailing program features, and clinical uses for psychological testing software. Attended trade shows and organized collection of normative data for statistical reporting.

Lockheed Sanders
Human Resources Secretary III

ASSOCIATIONS
Greater Nashua Human Resources Association (President 2006-2008 ,VP of Membership and Programs-7 yrs)
Society for Human Resource Management (SHRM)
New Hampshire Notary (current)
KAREN WALLINGTON
27 Airport Road
Nashua, NH 03063
603-883-5531 x307
karenwallington@lawwarehouses.com

EXPERIENCE:

2007 – PRESENT

- Identify and resolve operational issues using defined processes, expertise and judgment.
- Maintain a high quality work environment in a way that team members are motivated to perform at their highest level.
- Ability to support, formulate, document and implement policies and procedures while seeking / recommending change to improve efficiency and effectiveness.
- Respond to and resolve employee relation issues.
- Facilitate training requirements and accommodate scheduling conflicts.
- Direct daily workflow with emphasis on responsibility and accountability for quality and quantity of work.

2004 - 2010

Anheuser-Busch Inc. Merrimack, NH. Operation Manager.
- Supervise manufacturing and warehouse workforce to ensure that all production targets are met.
- Develop and monitor all critical control points to maintain consistency and quality of product.
- Enforce safe working environment.
- Ensure that Standard Operating Procedures (SOPs) are being followed.
- Coordinate and schedule preventative maintenance work.
- Assist in adherence of compliance to company and division policies and standards.

2004 - 2007

Graphic Packaging Inc. Concord, NH. Customer Account Manager.
- Manage and develop all aspects of corporate account projects including inventory control, production scheduling, accounts receivable, product delivery and customer satisfaction.
- Develop and maintain multiple professional relationships with external corporate executives.
- Coordinate item creation including graphic design, raw materials and die tooling.
- Identify and implement solutions to achieve goals set by corporate management.

2001 - 2004

Osram Sylvania, Exeter, NH. Customer Service Leader II. Glass.
- Proven ability to demonstrate effective leadership.
- Provide advanced level of support, service and training to multiple internal and external customers around the globe.
- Worked directly with upper management and engineering to communicate, escalate and resolve critical purchase issues that may delay production or planning, including inventory.
- Dedicated and motivated team leader with decision-making ability.
- Ability to define unusual problems and use creative skill set to resolve customer concern.
- Track, coordinate and communicate critical internal and external customer issues.
- Proactive approach to improving customer resolutions.
- Ability to learn and adapt in a fast-paced environment.

EDUCATION:
Southern New Hampshire University, Manchester, NH.
B.S. Business Administration. 2003.

COMPUTER SKILLS:
Knowledge of Windows 95/98/2000/XP operating system, Internet and multiple PC applications including Microsoft Office and Lotus Applications.
Jeffrey F. Malone  
45 Pine Meadow Rd., New Hampton, N.H. 03256  
Telephone: (603) 630-3437 • Email: Jeff@Malouno.com

MIS/IT Work Experience

IT Manager, The Law Companies  
October 2011 – Present

General Responsibilities:
- All duties as Network Administrator below as well as project management for and general oversight of a 3 person technical team responsible for the operation and advancement of a custom in-house Warehouse Management System.

Network Administrator, The Law Companies  
January 2009 – October 2011

General Responsibilities:
- Installed, configured, administered, and otherwise maintained network and telecommunications systems and infrastructure across several sites within multiple Microsoft Server 2003/2008 Active Directory Domains
- Implemented, maintained, and streamlined all services within the Microsoft network including shared storage, network monitoring, automated report generation and data archiving, and advanced automatic e-mail distribution
- Established and enforced IT use and security policy through administration of Microsoft Active Directory user rights management and SonicWALL/Cisco router configuration
- Implemented and maintained off-site connectivity through hardware and software VPNs encompassing 13 buildings and utilizing fiber optic, point-to-point wireless backhaul, T1, Cable Internet, and 3G cellular networking

Network Administrator, City Of Laconia  
February 2003 – August 2008

Major Projects:
- Served as sole MIS/IT Network Administrator and technician during extended Director leave of absence
- Assisted in development of citywide disaster recovery and continuance of operations plan
- Designed and implemented multiple network architectures for Laconia Public Library, during and after renovation
- Orchestrated temporary rolling office relocation during City Hall asbestos abatement

Technical Profficiency

Certifications: CompTIA A+ Certified, Pursuing MCSE/MCITP certification


Software: Exchange 5.5, 2003 and 2010, Active Directory, IIS, Seagate/Veritas Backup Exec, Trend Micro

OfficeScan/Server Protect, eSet NOD32, Remote Desktop, PcAnywhere, Acronis, Symantec Ghost, Office


Hardware: Tablets, Laptops, Workstations, Servers, Memory, IDE, SDD, Optical Drives, Tape Drives, Wired/Wireless

Network components, Cisco/SonicWALL Routers and Switches, Scanners, Digital Cameras, Printers (Multifunction Copier, Inkjet, Laser, Dot Matrix, Large Format), PDAs, GPS, Mobile Devices

Education

Brown University – Providence, R.I.  
B.A. Degree with Concentration in

Commerce, Organizations, and Entrepreneurship: Business Economics  
Completed December, 2008


- Collegiate Football  - Executive Member, Sigma Chi Fraternity
- Brown Investment Group  - Executive Board, Brown Club Lacrosse

Laconia High School - Laconia, N.H.  
Graduated June, 2003  
SAT: 1450

Awards/Achievements: National Honor Society, National Merit Scholar, Tri-M Music Honor Society, Academic All-State Football/Basketball, National Football Foundation Hall of Fame: Scholar Athlete, Football Captain
Exhibit I
Proposal Guaranty
## Glossary of Terms

**Law Warehouses, Inc.**

**NHSLC Warehouse Services RFP 2012 - 14**

**June 7, 2012**

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AS-400</td>
<td>IBM eServer™ iSeries™ servers are built to handle the demands of core business applications and e-business</td>
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<tr>
<td>Automated case buffer</td>
<td>A section of racking where cases en-route to a palletizer are stored by the system</td>
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<tr>
<td>Bailment</td>
<td>In this context refers to all elements of the distribution of wine and spirits in NH.</td>
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<tr>
<td>CO</td>
<td>Carbon monoxide</td>
</tr>
<tr>
<td>Fulfillment</td>
<td>The process of receiving, picking, and shipping orders to customers.</td>
</tr>
<tr>
<td>SCC</td>
<td>Shipping Container Code: A bar code used internationally to identify product and packaging information during the shipping process.</td>
</tr>
<tr>
<td>SKU(s)</td>
<td>Stock keeping units. Potentially NH Code may have multiple SKUs. Codes may have both Gift and Non-Gift stock and may be in both full case inventory and split case inventory.</td>
</tr>
<tr>
<td>Split cases</td>
<td>Order line items picked in less than full case quantities, such as bottles or sleeves of nips.</td>
</tr>
<tr>
<td>Sqft</td>
<td>Square Feet</td>
</tr>
<tr>
<td>Wave</td>
<td>A series of orders released for picking</td>
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