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Demonstration of the value of a graphics-based decision support system for order picking warehouse design

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Demonstration of the value of a graphics-based decision support system for order picking warehouse design

by

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The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this thesis. The Graduate College will ensure this thesis is globally accessible and will not permit alterations after a degree is conferred.

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DEDICATION

To my parents, Scott and Rosemary; and siblings, Andy, Dana, and Renee.

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NOMENCLATURE

AEIOUX	Absolutely necessary, Especially important, Important and core, Ordinary, Unimportant, Prohibited or Undesirable
ELECTRE	ELimination and Et Choice Translating REeality
GRA	Grey Relational Analysis
MACBETH	Measuring Attractiveness by a Categorical Based Evaluation TecHnique
OSHA	Occupational Safety and Health Administration
PROMETHEE	Preference Ranking Organization Method for Enrichment Evaluation
PSI	Preference Selection Index
SKU	Stock Keeping Unit
TOPSIS	Technique for Order of Preference by Similarity to Ideal Solution

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ABSTRACT

All warehouses have a layout design. A company can reduce operational costs in their warehouse by up to 75% with a layout design that allows for products on a pick list to get picked quicker. Evaluating which layout design would best reduce picking times and communicating the results of that evaluation continue to stump workforces.

Manual techniques fail to quickly test layout designs en masse or offer inaccurate heuristics. Automated techniques often increase the accuracy but are either esoteric or have simulation run-times which rival the durations of a manual technique.

A fast and accurate automated technique that is both executable and provides quantitative and visual outputs accessible to a layperson was documented and empirically tested against a manual technique of similar stature. Time studies were conducted to measure and compare the process times for analyzing different layout design alternatives with both techniques, using data provided by a retailer for analysis.

The proposed automated technique had a process time of 12 minutes to produce the outputs for each subsequent layout design iteration while the manual technique provided identical outputs at a process time of 16.5 hours per iteration.

The value of these outputs and this technique was confirmed by an industry expert and students in the Industrial and Manufacturing Systems Engineering program at Iowa State University.

With the implementation of this automated technique, industry can expect accuracy, picking output data accessible to laypeople, layout visuals illustrating optimal routing, data for determining staffing levels under different demands, and the ability to test multiple layout

designs–all by a worker with minimal training. The outputs are expected to lead to better decision making when choosing a layout design alternative as a team.

CHAPTER 1. INTRODUCTION

Problem Statement

Background

Most often, a warehouse's largest operational cost comes from its picking operation. Picking has been shown to reach an upper bound of 75% of a warehouse's operational costs, with layout design accounting for an upper bound of 70% of the picking cost. Inefficient layout designs, when applied on a scale of millions of product orders per year, leaves an organization little choice but to pass on some of the additional costs and increased fulfillment times to the customer.

But in the current climate and that of the near future, where customer's demands for shorter delivery times becomes the new industry standard, companies with inefficient layouts could find themselves no longer competitive as they struggle to meet the customer's demanded delivery date. As automation used in the picking process becomes more viable and common, the difference in performance between warehouses that implement techniques for efficient layouts versus those who ignore those techniques will only be exacerbated.

Details

In order to produce evidence to suggest which warehouse layout design is superior from a set of alternatives, quantitative performance metrics combined with a visual depiction should be produced for each layout design iteration. Without such quantitative and qualitative data, an individual at an organization may find it difficult to convince a large group of people to come to a common conclusion quickly and confidently. The quantitative performance metrics should quantify the pick time associated with a proposed layout design for a realistic pick list, and provide the travel distances accompanying the routing taken by the picker throughout the warehouse. The visual should accurately display the transportation routing necessary to fulfill each pick list along with vectors providing directional information at each stop in the warehouse. In addition, the visual should be easy to read and allow for queries on data associated with individually selected paths.

If an employee makes the realizations of their current organization's longevity status concerning their layout efficiency and decides to search for a documented and published method for analyzing warehouse performance quantitatively and visually across a set of alternatives, they will find slow manual methods and perplexing papers using techniques learned in an engineering doctorate program. Although the manual methods are capable of solving said problem, the individual needs to be able to quickly generate a pick sequence that was generated from historical pick lists would persist. In addition, the simulation would have to be run again every time products were moved around within a warehouse because pick sequences would need to be redetermined in order to conclude optimal travel methods within a warehouse and to provide accurate outputs.

In addition, as the amount and specificity of the input variables increase, the manual techniques used to analyze layout designs becomes more time consuming to the extent where few companies would justify the full analysis in the layout design selection process. Although it would be unlikely to avoid a manual analysis altogether, key variables would likely be left out, leading to increased uncertainty amongst a team in the decision-making process.

Proposal

However, an automated technique can be employed quickly by a layperson involving tools such as Autodesk's AutoCAD, Proplanner's Flow Planner, and Microsoft's Excel to output results that can be used to aid in determining superior warehouse layout design across a set of given alternatives.

Asking students who are intellectually capable of making basic layout design decisions to make layout decisions with and without the quantitative and visual data which can be provided from an automated technique can be used to document the necessity for having the data present when making a layout-based decision in an organization.

Asking an organization's warehouse planner directly in an interview format for the documentation of their current state techniques used to analyze a layout design can be used for benchmarking the proposed automated technique against said manual technique. An interview would also confirm the additional quantitative and qualitative outputs provided from an extended analysis would add value.

Research was done into the ideal format to present the results of a warehouse layout design analysis to help an organization change and the fastest way to produce the results in said format.

This thesis takes a software program's module originally designed for a tuggers study and modifies the inputs to produce optimal routing for a set of pick lists quickly and easily. These routings and their associated quantitative descriptors allow for an individual to identify potential changes in layout design or test a layout design's performance against other alternatives. Simulating picking a high number of historical pick lists across multiple layout design alternatives allows an individual to make informed decisions on layout design superiority after looking at the outputs for total pick time, cost, and other factors.

This program does not generate layout patterns automatically, but it supplies the user with the necessary information to make educated decisions on value added changes to the layout designs and analyzing the effectiveness of a layout.

The superiority of this technique is demonstrated empirically through time studies in a simulation experiment and confirmed of value by individuals through interviewing an industry expert and multiple students intellectually capable of making layout-based decisions.

CHAPTER 2. LITERATURE REVIEW

Concepts of Warehouse Facilities

Warehouse Rationale

An individual or group may have an idea and decide to create a company around that idea, with the goal of making money (Denning, 2011). One potential outcome of this company is growth. Some companies are fortunate enough to approach a customer demand high enough to reach critical mass—or the demand needed to begin or sustain a project or venture (Sellar, 2016).

As a company grows, the company may find it beneficial to add a warehouse facility within its supply chain system. A facility is typically characterized as a warehouse if the facility is a large building designed for the use of storing raw materials, packing materials, spare parts, or finished products in bulk prior to distribution for commercial purposes (Davies & Jokiniemi, 2008; Admin, 2016). In addition, the operations performed within a warehouse are expected to fall under one of the following five categories: (1) Receiving and inspection, (2) storing, (3) picking, (4) order consolidating, and (5) shipping (Pingulkar, 2011).

Seeing as having a warehouse in a supply chain requires expenses to cover infrastructure, labor, capital, and information systems, most companies would benefit from avoiding this expense (Bartholdi & Hackman, 2016). However, if a company faces the need for either additional inventory storage, reduced order fulfillment times and costs, or facility space for order consolidating and shipping goods, then adding a warehouse facility can help meet these needs. (Croxton, 2003; Chand, 2014).

For example, Just Born, the producer of Eater's Peeps marshmallow candies, produces two billion peeps over the course of a year in Bethlehem, Pennsylvania, and needs space to store their inventory until Easter (Zeveloff, 2013). Adding a warehouse to Just Born's supply chain allows for additional inventory storage so production has space to continue operation. The additional inventory storage comes through the consequently added square footage of the warehouse facility. In addition, "the economics of manufacturing may dictate large batch sizes to amortize large setup costs, so that excess product must be stored," hence the need for a warehouse (Bartholdi & Hackman, 2016).

For another example, with the idea of warehousing, Amazon was able to introduce one day delivery times because the company, "spent 20-plus years expanding [their] fulfillment and logistics network" (Olsavsky, 2019). Reduced order fulfillment times and costs can be attained through having warehouse facilities closer to the shipping addresses of the customers or through a facility dedicated to order fulfillment with a performance metric focused around order fulfillment times. Warehouses also provide an opportunity for cost savings through reducing material handling number of touches. For example, because the state of New York dictates labeling all items in drug stores with prices, cost savings can be observed through outsourcing this work to warehouse employees where the item is likely to be handled anyway instead of leaving this work to retail employees whose focus should be on customer service (Bartholdi & Hackman, 2016).

As a final example, Home Depot has benefited through order consolidation in a warehouse because it allows for larger shipments from vendors that qualify for lower, full-truckload rates. Facility space for order consolidation and shipping goods can be attained similarly to additional inventory storage–through additional square footage. As transportation methods require either cargo ships or aircraft, this need only becomes more apparent. As shipment sizes consolidate, the ease of receiving downstream increases as the limited number of dock doors are no longer a constraint requiring drivers to wait. (Bartholdi & Hackman, 2016).

Warehouse Operational Costs

As beneficial as warehouses are to some supply chain systems, they come with many unavoidable costs if a company chooses to use one. Some costs are fixed, such as the land, lumber, salaries, and information systems. Many operational costs are variable and subject to improvements and subsequent cost savings from improvements. These operations were listed above: (1) Receiving and inspection, (2) storing, (3) picking, (4) order consolidating, and (5) shipping.

(3) Picking–"the process of extracting requested goods from inventory as per demand, bringing them together to form a shipment accurately, on time and in good condition," (Rushton, Oxley, & Croucher, 2006) has been estimated to incur 50-75% of all warehouse operating costs [55% (Tompkins, White, Bozer, & Tanchoco, 2003), 60% (Drury, 1988), 60% (Roodbergen, 2000), and 50-70% (Coyle, Bardi, & Langley, 1996)]. Due to this disparity in allocation of warehouse operating costs toward picking, it is reasonable to conclude that focusing attention on improving picking efficiencies could result in a greater minimization of expenses, and ultimately make a company more money, as stated in the goal communicated by Denning (2011) above (Denning, 2011).

One significant factor attributing to this high picking operation cost is the facility's layout design. It was identified 15-70% of operating costs are associated with the layout design, with improved layout designs reducing the costs by 10-50% [10-30% (Tompkins, 1996) & 50% (Drira, Pierreval, & Harjri-Gabouj, 2007)]. Separate studies confirm that 50% of the total picking time can be attributed strictly to travel (Tompkins et al., 2003; De Koster & van der Poort, 2007).

Travel includes retrieving products, moving throughout the warehouse, and delivering products. Since travel time and travel distance are directly correlated with total operational costs, it is expected that a decrease in travel time and travel distance should cause a decrease in total operational costs.

While travel distance can be a strong indicator of total operational cost, minimizing time is the primary objective. Time is more relevant toward operational cost than distance as two equal distances can take different travel times if one of the routes contains corners requiring additional travel time for decelerating, turning, and accelerating. Because layout design is a leading contributing factor toward warehouse operational costs, optimizing attributes of a layout design should lead a company toward significant cost savings.

Concepts of Layout Design

The full cycle from layout design ideation to implementing the layout takes place over three distinct and separate phases: (1) Generation, (2) Evaluation, and (3) Communication.

(1) Generation

Layout design rationale

In a warehouse, every item needs a designated location. This is important because if item locations are left to randomness, then locating specific items would be difficult and time-consuming. Creating a warehouse layout design is a solution to this problem.

Layout design has been previously defined as, "the physical arrangement of the manufacturing facilities (machines, processing equipment, service departments, etc.) of a plant and its various parts." (Karande & Chakraborty, 2014). Karande and Chakraborty (2014) specify that a good layout will yield, "the most effective physical arrangement [of these facilities] in order to achieve the best coordination and efficiency in the usage of manpower, machines, and materials resulting in the fastest and smoothest production activities." (Karande & Chakraborty, 2014).

There is a nearly infinite number of physical arrangements for the manufacturing facilities. Naturally, some of those physical arrangements will be superior to other arrangements. In this context, superiority will mean total cost savings and avoidance.

Creating a new warehouse layout design can be necessary either for the initial design to begin operations, or during the production process as the current layout design begins to stray further from optimal. While the current layout design may have been optimal at the time of development, as new processes get introduced, changes in manufacturing procedure take place, products change, designs of products change, or demand for products change, then a new warehouse layout will have to be developed to account for these changes (Ertay, Ruan, & Tuzkaya, 2006). Even if the current warehouse layout design does fulfill the needs of the company, a new layout could benefit a company seeing as the operational costs associated with poor layout design are at the forefront of total costs.

Regardless of the cause for needing a new warehouse layout design, the question of how to most effectively arrange the physical items proves no easy feat. This topic has been researched extensively as companies see the potential for decreasing operational costs that come along with better layout design.

Business operating processes

Designing a layout which will interact smoothly with the business operating processes of a warehouse is mandatory to ensure a cohesive system. Identifying and incorporating these processes will lead to decreased costs for a company. Business operating processes are methods incorporated by a business that dictate how a warehouse should function. This includes rules such as where items should be located or how items should be picked. This is different than metrics since metrics are solely meant for measurement, whereas business operating processes aid in selecting metrics.

Because pick time affects the overall evaluation of a layout design at a disproportionate rate to the other metrics, looking at strategies to reduce picking time in a warehouse layout is worthwhile. Two methods proposed here for reducing picking time are the popularity rule and zoning.

The popularity rule

Many products in a warehouse follow the Pareto principle–or the 80/20 rule. This principle states that 20% of the inventory products make up 80% of the customer ordered products (Bunkley, 2008). Given this phenomenon, travel time can be reduced by organizing a warehouse so products most commonly picked are located closest to the shipping and receiving dock(s). A typical product is moved twice in a warehouse–the initial delivery of the product to its warehouse storage location from the receiving dock, and the movement from its storage location to the delivery dock during the picking operation. Neither of these processes fall under the category of value added work, so reducing the times and distances of these interactions are beneficial to the company. Similarly, placing rarely ordered products furthest away from the dock(s) allows for the storage of the products which are ordered more frequently to occupy the locations closer to the dock(s).

Zoning

Zoning is a strategy to organize a warehouse layout into different zones based on whichever criteria the company finds advantageous. Often this zone is based on customer type, but a warehouse can also be zoned by order frequencies such as in the popularity rule, storage requirements such as temperature requirements for refrigerated or frozen products, a zone for expensive items requiring additional security measures, or any other preferred zoning category. Zoning adds more benefits to the picking process as the size of a warehouse increases or the number of SKUs increase (Hornby, 2017). Dividing SKUs into zones based on pick frequency can decrease average pick times compared to a benchmark with SKUs not zoned by pick frequency. Zoning by items that are commonly ordered and therefore picked together, such as a toothbrush and toothpaste, allows for those items to be picked in quick succession and reduce total pick time.

To maximize the cost savings which can be attributed to successful zoning, it is recommended to designate a different warehouse picker to each zone. This designation is expected to reduce picking and travel times due to increased familiarity with the products and storing locations in the zone as well as reduce the total travel distance because zones are constructed to be a subset of the population for all locations within a warehouse. (van Gils, Ramaekers, Braekers, Depaire, & Caris, 2016). Zoning also allows for picker accuracy to be measured and traced in the event of an error (Hornby, 2017).

Zoning complications

One problem that can occur during the picking of a zoned warehouse is if a customer's order contains products from more than one zone. One solution is to split the order into two different pick lists which must be consolidated after retrieving the SKUs (van Gils et al., 2016).

Another solution is to fill the order by different employees as the order gets passed through each zone (Hornby, 2017)

If overlapping products between two zones begins to present a recurring pattern, then establishing a zone dedicated to the specific overlap is a solution to further reduce picking time.

(2) Evaluation

Characteristics of a good layout design

In short, a good layout design allows work to occur at the rate it needs to occur while minimizing expenses. In order to ensure a good warehouse layout design, metrics have been created to use as proxies toward evaluating the performance of a generated layout.

Metrics

Typical patterns observed in successful warehouse layout designs include:

- Minimized pick time
- Minimized personnel travel time
- Minimized material handling travel time and number of touches on material
- Minimized injuries and fatalities to personnel

A well-designed warehouse layout can affect each aspect described above. For a more exhaustive list, Besbes, Affonso, Marc, Masmoudi, and Haddar (2019) created a survey of the literature presenting value added metrics for facility layout evaluation. The metrics were classified into two categories: (1) quantitative and (2) qualitative–all of whose metrics are listed below (Besbes, Affonso, Marc, Masmoudi, & Haddar 2019).

Quantitative

- Adjacency – closeness between manufacturing facilities (Sule, 2008). A warehouse can experience a positive or negative interaction based on the closeness between two areas. For example, placing two areas adjacent which share a set of tools or the same manager can be positive due to reduced travel and increased oversight. However, placing an area that produces flammable gas next to an area producing flames creates a risk for a fire which a warehouse would be smart to avoid. Other features that could cause problems for adjacency are noise, light, vibrational forces, and dust. To account for adjacency, relationship planning (AEIOUX diagramming) was introduced by Muther in 1969, which is commonly found in workplace practices still today (Muther & Knut, 1969). Houshyar and White (1993) presented an exact optimal solution for facility layout by deciding which pairs of locations should be adjacent (Houshyar & White, 1993). Al-Hawari, Mumani, and Momani (2014) extended the importance for adjacency beyond manufacturing areas and on to material handling equipment and having a high number of routes available between heavily congested areas (Al-Hawari, Mumani, & Momani, 2014).
- Cost – total expense. A good layout can reduce the cost of manufactured parts by contributing in one of four cost subcategories:
    - Operating cost – the cost to run the plant. Operating costs consist of overhead, materials handling, repair and maintenance, and indirect materials used by machines. Minimizing idle time is expected to reduce operating cost. In addition, as the need for flexibility in systems continues to increase, reconfiguration cost is included here as well.

- Capital investment – the cost to establish the plant. Capital investment costs include the building, machines, and engineering. Machine capital investment cost includes procurement and salvage costs.
- Inventory cost – "raw materials, work-in-progress, and finished goods inventories" (Abdul-Hamid, Kochhar, & Khan, 1999).
- Labor cost – payroll cost. Labor costs include operators, supervisors, and internal employees.

The production process type directly influences all of these costs. Production volume levels have been directly associated with total cost. It can be argued that all metrics can be converted into costs, however, leaving the cost metric separate allows for companies to make better decisions based on budgetary constraints (Abdul-Hamid et al., 1999; Abdi, 2005).

- Distance – the amount of space between things ("distance", n.d.). A good placement of facilities can contribute to the overall efficiency of operations and reduce almost 50% of the total operating expenses (Drira et al., 2007). Standard work instructions for facilities include traveling to a destination to pick a product, performing an operation, or dropping off a product. Travel can be by foot, bike, forklift, tugger, or other material handling methods for transportation. As mentioned above, separate studies confirm that 50% of the total picking time can be attributed strictly to travel (Tompkins et al., 2003; de Koster et al., 2007). Therefore, many companies focus on reducing total travel distance in a warehouse to reduce costs and fulfillment times. Traveling any distance in this scenario is considered non-value added work because traveling does not increase the value of the final product. To accurately measure distance, all employees' traveling should be recorded over an extended time period in order to get an accurate representation of the total travel occurring within a warehouse. Minimizing total distance also minimizes material handling costs and increases the utilization of that machinery and personnel (Yang & Kuo, 2003). Total flow distance should be considered, which is, "the sum of the products of flow volume and rectilinear distance," between the two locations (Kuo, Yang, &, Huang, 2008). Distance is based on pick sequence orders, so a high-quality solver is required to ensure distance is minimized (Hadi-Venchen & Mohamadghasemi, 2013). Other expected benefits from a layout design which minimizes total distance include reduced energy expenditure from operating material handling machines shorter distances–especially if routing paths are optimal, reduced man-hours required to fulfill pick lists, and a competitive advantage in the marketplace by allowing a company to promise faster delivery times and being able to take on more business if the demand rate exceeds the current throughput rate from a warehouse due to a faster throughput rate. Despite all of the benefits that accompany decreasing total distance in warehousing operations, if the decrease is dependent on adding additional turns around corners, then a quantitative analysis should be completed to determine if the pick time is expected to decrease or increase for the operation.

- Machine utilization – the proportion of time a machine is being operated to accomplish work versus the time a facility is open for work (Ateekh-Ur-Rehman & Lateef-Ur-Rehman, 2013). If a machine is observed to be a bottleneck operation, then utilization under 100% would prevent maximum throughput.

- Material handling vehicle utilization – the proportion of time a material handling vehicle is being operated to accomplish work versus the time a facility is open for work (Ertay et al., 2006).
- Number of machines and number of operators – the count of machines and line workers who are necessary based on the layout configuration (Ben Cheikh, Hajri-Gabouj, & Darmoul, 2016).
- Process capacity – "the amount a process can produce" (Kaye, Fox, & Urman, 2012). Maximizing the process capacity of a layout for a company allows for the demand to be met if the demand grows either in the short or long term (Yang, Su, & Hsu, 2000).
- Productive area utilization – the proportion of value added areas to non-value added areas in a plant (Al-Hawari et al., 2014). Value added activity occurs when a customer is willing to pay for a non-rework process to transform the product toward its completed state (Swan, 2012).
- Productivity – total work throughput as a function of the number of workers (Yang & Kuo, 2003).
- Products indicators – how close a product was completed relative to its desired completed time. Early completion time is likely preferred to late, although both scenarios would come second to an ideal just-in-time framework (Ben Cheikh et al., 2016).
- Quality – the standard established for the completed products and production process. The Expert Choice program has previously valued product quality over production process quality when comparing layout design alternatives (Ertay et al., 2006).

- Shape ratio – "the maximum of the depth-to-width and width-to-depth ratio of the smallest rectangle that completely encloses the department" (Yang & Kuo, 2003). It is ideal to minimize the shape ratio and flow distance while maximizing adjacency (Yang & Kuo, 2003).
- Throughput time – the required time for a single unit to have completed the production process (Ben Cheikh et al., 2016).

Qualitative

- Accessibility – the space to allow for movements of people, materials, and machinery throughout a facility without excessive challenge or a high risk of safety. This quality should account for not just the production process, but to also include things like maintenance and training new employees. The designing phase of a layout should allow extra aisle room and room along the contours of the department to allow for accessibility with current travel methods and anticipated future methods.
- Flexibility – "the capability to adapt to new, different, or changing requirements" ("flexible", n.d.). A flexible manufacturing system is expected to respond to dynamic and uncertain requirements efficiently (Ertay et al., 2006). Flexibility has been shown to occasionally be a company's greatest factor during layout design comparisons (Abdul-Hamid et al., 1999). A good layout designs for flexibility in five subcategories:
    - Design flexibility – the capability for a facility to adjust to design changes in the manufactured product.

- Expansion flexibility – the capability for a facility to adjust to additional capacity with ease. Typical characteristics include large amounts of floor space with, "good shape factors or useable areas" (Besbes et al., 2019).
- Manufacturing flexibility – the capability for a plant to produce multiple products using multiple machines with different processing requirements. Setup times for product changes on the line are a significant contributing factor. The ability to adjust scheduling can also add value here.
- Routing flexibility – the capability to change the routing or material handling plans for product transport. Having a high number of accessible and alternate routes allows for more routing flexibility (Al-Hawari et al., 2014).
- Volume flexibility – the capability for a facility to adjust to large increases or decreases to scheduled production amounts. Changing the number of manufacturing facilities can change this metric (Besbes et al., 2019).

- Human issues cluster – this is an umbrella term for all issues involving personnel. This includes supervisory challenges dealing with adjacency of areas to ergonomics for the operators. A sufficient layout should allow for supervisory duties to be carried out without undue difficulty if the supervisor oversees multiple areas. As far as ergonomics–safety, noise, light, vibrational forces, emotional stresses, and temperature were deemed important in previous research (Shang, 1993). As the product line requires greater quantities of work to be done without automation, the value of this metric increases to improve human performance. Neglecting this metric could result in OSHA violations and decreased worker morale (Ben Cheikh et al., 2016).

- Layout reconfigurability – the ability for a layout to quickly change or rearrange manufacturing facilities as the product line, technology, or environmental requirement change. Six prominent criteria for layout reconfigurability are modularity, material handling, scalability, variety, mobility, and reconfiguration time (Abdi, 2005; Ben Cheikh et al., 2016).
- Maintenance – "the required space for maintenance engineers and tool movement" (Yang & Kuo, 2003).
- Work in process – product that is unfinished for any reason. (Ben Cheikh et al., 2016). Poor layout design can introduce an accumulation of work in process which is typically unwanted by a company (Singh & Singh, 2011). Work in process presents a liability since the product is susceptible to damage until delivered to a customer. Work in process also brings the problems that are presented with decreased available floor space.

As one can see, due to the large number of metrics provided for layout assessment, exceeding in one criterion does not guarantee a good layout. Rather, companies will benefit greater by considering as many criteria as possible while still allowing a cost-effective and fast enough designing process for the layout. Balancing these metrics will present unique challenges to each company as values within a company are likely personalized. In other words, there is not a one-size-fits-all algorithm for layout design created for all companies.

All of the qualitative metrics listed above need to be assessed by an employee. Due to this personnel constraint, assessing a layout design to all metrics will take significant time. However, these assessments should be completed, because if some of these metrics are graded poorly, then the layout design alternative should not be considered for implementation. For example, the owner of a warehouse may choose to veto a layout design if the aisle widths appear too narrow for safe transportation by material handling vehicles.

Concepts of warehouse layout design comparison

As the reality of creating multiple good warehouse layout designs became available, there quickly became a need for a method selecting the best layout design. The method can be separated into two categories: manual techniques and automated techniques. Automated techniques require software capable of either creating layout designs or generating reports for the operational processes, whereas manual techniques are created for use without the assistance of software.

Manual techniques

Different manual techniques yield either estimated values for metrics or actual values. Estimated values are often simpler to collect and may be a good enough measure for a smaller-scale warehouse. Estimated values are acceptable to use especially if expected cost savings from other operations exceed the predicted cost savings from more accurately reporting metrics such as pick distances.

Estimated values

Using existing manual techniques for calculating and comparing quantitative metrics is believed to have a process time significantly slower than using existing automated methods. Using estimated values can be quicker when individual layout design metric scores are compared rather than the aggregate across all metrics. For example, Hall (1993), authored a paper on how to approximate distance for routing manual pickers in a warehouse (Hall, 1993). This paper uses historical pick lists and a rectangular warehouse to calculate the total distance traveled. However, this method is not as precise as the data output from certain automated techniques.

Different customer orders have different pick times, which is largely influenced by the number of unique items and other metrics such as travel distance. Estimating a pick time for each pick list is nearly always necessary to ensure equal distribution of work to warehouse pickers by line balancing. Pick time has been historically calculated by hand through either a location-driven method, zone travel method, or a discrete standards method. (Dorcas, 2015). A routing path must first be created as a prerequisite to distance measurement. If reduced order picking costs is desired, then the route should be as short as possible with as minimal turns as possible. Identifying this route is time consuming when done by hand. Typical manual techniques for this task are using heuristic approaches to provide estimated travel distances and times. In regards to routing strategies, heuristics, such as the s-shape, return, aisle-by-aisle, largest gap, midpoint, and combined routing strategies (Roodbergen, n.d.; Roodbergen & de Koster, 2001, Vaughan & Peterson, 1999; Ratliff & Rosenthal, 1983; Hall, 1993) all attempt to provide solutions to warehouses by providing estimates for the mathematically optimal solution for minimizing travel distance. (Gui, Dai, & Cimini, 2000).

The biggest problem presented with calculating quantitative characteristics by hand is if the decision maker wants to change only one location in the warehouse, then the pick sequence and routing paths have to be redetermined since the previously reported distances and times would now have different values.

Location-driven method

In a location-driven method, credit is given for the time to travel between locations based on average time. Employees will underperform or overperform, but over a longer period of time, this value will approach the average. While arguably the easiest of the methods to put into action, situations with employees having lists requiring longer pick times should report a worse performance. Also, there is an incentive for employees to choose to place different pallets out of their proper location in nearby locations to save on travel time and receive a higher performance rating. (Dorcas, 2015)

Zone travel method

Unrelated to the business operating process, zoning, from above, the zone travel method divides a facility into zones. This approach typically divides a warehouse into 20-150 zones. The average distance between zones is then calculated based on where the intermediate destinations were located (Dorcas, 2015).

Actual values

Discrete standards method

In the discrete standards method, each warehouse location is assigned a unique x, y, and z coordinate. After routing paths are created by hand, then the distance is calculated based on the ideal path. While this method is the most accurate approach for manual calculation, this method is complicated and time-consuming to maintain. As new locations are added or previous locations changed, an employee must manually update the new coordinates. In addition, blocked aisles would require the picker to take a non-ideal routing path, leading to a misrepresentation of performance in their individual picking report. (Dorcas, 2015). Without the computational power offered by commercial computer programs today, continuing to measure and compare layout designs by hand would take far greater time and effort to complete the same amount of work.

Automated techniques

Similar to the manual techniques section, calculating quantitative metrics and comparing said metrics can be attempted by computer. Methods for selecting the best layout from a set of alternatives all seem to incorporate a multiple attribute decision making method. Many of these methods utilize an automated technique for comparing layouts but require human measurement and input of data from metrics. These methods were introduced in the order: GRA (Kuo, Yang, & Huang, 2006), TOPSIS and fuzzy TOPSIS (Yang & Hung, 2007), a second GRA (Kuo, Yang & Huang, 2008), ELECTRE (Lateef-Ur-Rehman, Ateekh-Ur-Rehman, & Babu, 2009), PROMETHEE (Rehman & Rehman, 2012), PSI (Maniya & Bhatt, 2011), a simulation, fuzzy analytic hierarchy process, and quality function deployment (Shahin & Poormostafa, 2011), a second TOPSIS and fuzzy TOPSIS (Ataei, 2013), MACBETH (Karande & Chakraborty, 2014, followed by aggregating survey results for previous methods (Besbes et al., 2019).

Lack of automated methods focusing on picking

All research focused on automated techniques to evaluate warehouse layout design within the last five years was gathered. Three papers were published 2014-current which feature a qualitative or visual output from automated techniques:

(1) Use of promethee method to determine the best alternative for warehouse storage location assignment (Fontana & Cavalcante, 2014).

The main objective of this paper was to determine the best alternative for assigning a product to a warehouse storage location. The method uses a model to rank alternatives for allocating the products so a decision maker can choose which allocation is preferred. The model determined the most efficient storage at the lowest overall cost to the company (Fontana & Cavalcante, 2014).

The promethee algorithm begins with studying historical information about the warehouse, including, “layout, operation costs, inventory, requirement space, order frequency, equipment to order picking, etc” (Fontana & Cavalcante, 2014). Following this, six criteria were identified as most important in determining the value of the product placement through a warehouse. These criteria are as follows: “Required space, order picking distance, total operation cost, the average time to reach different type of product, the time spent on average to meet a client’s orders, and the average time it takes to serve orders from client groups who demand the same product” (Fontana & Cavalcante, 2014). The layouts were scored across the six criteria and the layouts which were stochastically dominated were eliminated. Three decision makers then were consulted for preferences in value weighting across the criteria. The algorithm ends by analyzing the layout alternative ranking provided by promethee to determine the superior alternative. Further details on the software used to execute the calculations used to provide the scoring was not included (Fontana & Cavalcante, 2014).

The visuals provided include four tables. One table displays the six scored criteria previously denoted as important, with the associated weighted values from three different decision makers. The second table displays all six layout design alternatives and their respective scores across the six criteria. The third table ranks the alternatives for each decision maker using the outputs from the promethee I and promethee II methods. The fourth table displays the product classes ranking formed by each alternative. (Fontana & Cavalcante, 2014).

(2) The number of pickers and stock-keeping unit arrangement on a unidirectional picking line (Hagspihl & Visagie, 2014).

This paper simulated a picking line configuration with an agent-based approach to describe the behavior of an individual picker. The simulation was then used to analyze the effect of the number of pickers and the SKU arrangement (Hagspihl & Visagie, 2014).

This simulation uses agents to evaluate their current surroundings and respond based on current stresses. The agents represent the pickers in this simulation. The picking model was developed by the company XJ Technologies in a software titled Anylogic, using functions such as nested if statements to determine behavioral decisions. Inputs included data such as a list of products with their product locations, a list of customer orders, the number of pickers available, and an algorithm to determine picker walk velocities. Video recordings provided proportions for time allocations by pickers. The simulation considered four SKU arrangements: The organ-pipe arrangement, greedy ranking and partitioning, classroom discipline heuristic, and the original arrangement. The simulation compared completion times and congestion rates across the four SKU arrangements. Ultimately, a marginal analysis method was used to choose an optimal number of pickers up to a specified level of maximum permissible congestion. The classroom discipline heuristic was recommended as it provided the lowest level of congestion amongst the simulated pickers. This heuristic attempts to spread out the SKUs according to their pick frequencies as evenly as possible, avoiding groupings of SKUs with ultra-low or ultra-high pick frequencies–the opposite of what the popularity rule recommends (Hagspihl & Visagie, 2014).

A table and a large number of graphs were included as visuals. The table displayed a, "comparison of the two alternative layout designs and the historical SKU arrangements with respect to percentage picks and the corresponding percentage congestion for a selection of the first 10 bays, out of a total number of 56 bays" (Hagspihl & Visagie, 2014). The graphs displayed things including the pick frequencies by SKU when arranged by the other two alternatives, the congestion fraction as a function of the number of pickers, and the total completion time across the number of pickers. (Hagspihl & Visagie, 2014).

(3) Artificial intelligence applied to assigned merchandise location in retail sales systems (Cruz-Domínguez & Santos-Mayorga, 2016).

This paper wanted to determine product placements in a warehouse beyond the typical sales frequency metric. Flexsim® was used to allocate product locations additionally by product family, physical characteristics, and sales patterns–such as seasonal goods (Cruz-Domínguez & Santos-Mayorga, 2016).

The experiment involved a simulation that uses artificial neural networks to detect sales patterns and cyclical behaviors (Cruz-Domínguez & Santos-Mayorga, 2016).

Included as visuals were tables displaying wait times in a queue and graphs picturing the number of customers in a queue and the number of purchased items per customer which entered the retail store. There was also a picture of layout zones used according to product sales volume. (Cruz-Domínguez & Santos-Mayorga, 2016).

There appears to be a disconnect between what academia has been providing and what the industry wants. Despite numerous programs and decision models created intended for industry use, industry continues to often proceed without a solution that considers the metrics listed in the "Characteristics of a good layout design" sub-section.

(3) Communication

Rationale

As noted back in 1993, few publications provide both qualitative and visual feedback beyond those which implement heuristics (Hall, 1993). Unfortunately, the research has not started to provide qualitative and visual feedback to the scale at which it is demanded by industry today.

Belief for rejection of current academia methods

Some academic models were described above, yet few of these models have ever seen a warehouse floor. If an engineer shows an output with quantitative metrics, this information may be information overload or appear inaccurate to the decision maker. This may be because many of the current methods reviewed by Besbes et al. (2019) have no associated visual or quantitative metrics displayed in conventional units. The methods which do provide any form of metrics often elect to use non-conventional units such as an arbitrary scale or a low, medium, and high rating system–often difficult to interpret or to use for comparisons without an extended explanation by the creator of the scaling system. If a warehouse floor manager or lead decision maker without an advanced engineering degree were to receive a discrete-event simulation output which was difficult to interpret, what would they possibly do with that information? If other quantitative metrics of interest were not also reported, the floor manager may also reason that the program does not consider all of the variables.

In conclusion, the belief is that there is simply not enough buy-in from the warehouse floor manager to make the confident and costly decision to change layout designs after seeing the outputs from the models provided by the academic community. The customer for the models in this process is the warehouse team–often not another engineer nor computer. People will be looking at the results from the computer simulations, not another computer. The results need to be formatted as non-intimidating to the average worker and convincing enough to quickly gain buy-in from the team.

Group buy-in

When designing a new warehouse layout or assessing warehouse layouts, getting buy-in from the other employees is a must. Warehouses which utilize human labor for picking and want maximal productivity output and minimized turnover from their employees will find it in their best interest to make decisions as a team and clearly explain why a new process will add value to the current operations in terms of ease or safety for the employees doing the labor. As communicating results from layout design research approaches a higher technical level, the researcher should expect a greater level of push back from the employees if the ideas cannot be clearly explained and results immediately noticed.

Strategies for increasing group buy-in

Using visual methods for displaying current operations and anticipated future operations add value to the process of gaining buy-in by allowing all employees to see how a proposed new process would impact future operations. More experienced employees can provide additional value if they have had experience with a similar process in the past at the same company because the more experienced employee may notice something that the engineer failed to consider. Simply displaying this information quantitatively does not allow for this opportunity.

An example of one visual and clear method for displaying a process problem and its solution is by creating a spaghetti diagram. A spaghetti diagram starts with an overhead view of a layout, which an individual draws lines over to trace the movement of a person or product throughout its period of study. They add value by clearly communicating how much non-value added travel there is throughout a build or assembly. As one senior consultant said:

> The results are surprising! The visual picture of movement (the waste of “motion”) within the process is usually nothing like what everyone believes is happening. It is often a real WOW moment. “I can’t believe that I walk that far!” They cannot believe that they travel so much, do that much back-tracking, search and wander around that much to do their jobs. (Lowstuter, 2006).

He continues by stating how a spaghetti diagram can be created for a new process flow and compared to the original process flow, resulting in clear visual documentation for both processes which can, “be shared with leaders within the organization to get buy-in for change to occur” (Lowstuter, 2006).

Not only are the spaghetti diagrams good for supplying visuals, but the distance can later be measured and used to quantify the waste in the process, and walking speeds can be estimated to provide an estimated calculation for total time wasted on travel (Gladysz, Santarek, & Lysiak, 2017).

Measuring and displaying current processes can increase confidence and credibility for an engineer hoping to propose a new method since the employees can believe the calculations used for projected future processes is reliable. For example, if an engineer proposing change to a process is operating under the conclusion that a specific process takes a full eight-hour workday to complete based on the math used in their simulation, but the employees know the process can be completed within an hour because they did the process that day, then the employees would have no reason to switch to a new method provided by the engineer which promises that the process can be completed in two hours. If this new method is forced on the employees and the process does yield the longer time, then the engineer will see the implementation as an improvement while the employees will see the implementation as unnecessary labor which can lead to conflict, lower employee morale, and rejections of future new methods which may actually add value.

How can warehouse layout designs be compared better?

To start, buy-in from the team is required. In order to win over the team, a visual for optimal routing in both the current and proposed layouts would add value. A quantitative output for operations will add value too, because if the team knows it took an eight-hour day to pick two hundred items and the output from a program confirms the current layout’s abilities, then the team may believe in the new method which proposes that the same amount of work can be accomplished in an hour less. A warehouse floor manager can have increased confidence in their decision by seeing the results of a simulation that ran historical pick lists in the current and future layouts and provided visual routing with quantitative metrics such as pick time and distance traveled in an easy to read format.

This research relied on commercial software designed for another purpose. The software produced quantitative and visual feedback with a quick and easy technique that could be employed by an individual in minimal time. This paper attempts to demonstrate 2 things:

1. This method is an accurate way to document and analyze different warehouse layout design alternatives
2. This technique is faster than the techniques that have previously been published

A company provided data regarding layouts and historical pick lists for initial analysis. To validate the quantitative superiority of this method, other methods were used without the aforementioned tool for a few sample routings and the execution time was recorded. Then, the proposed method was executed and with that time also recorded. Next, to demonstrate that the diagrams and quantification for flows are effective, these methods were shared with an industry expert who design warehouse layouts and feedback was gathered. The result was that the industry expert accepted the technique as superior.

Besbes et al. (2019) noted in their discussion and conclusion section, "In fact, the commercial software available to reinforce the facility layout problems are currently restricted." (Besbes et al., 2019). That is where this paper will add value. Previous publications require lengthy execution times to run their techniques and require redetermining pick sequences after moving an object around within the layout. Software such as Proplanner's Flow Planner used in conjunction with Autodesk's AutoCAD and Microsoft's Excel provides an automated technique that can output travel time statistics for all pick orders for each layout alternative in minimal time, while also providing a qualitative routing display on a layout in AutoCAD. This process should lead to selecting the superior layout design amongst a set of numerous layout design alternatives.

CHAPTER 3. METHODOLOGY

A General Overview

Research Questions

A two-part research question was developed:

1. What is the ideal format to present the results of a warehouse layout design analysis to help an organization change?
2. What is the fastest way to achieve that outcome?

Ideal format

First, in order to make an accurate and quick decision about warehouse layout design superiority across a set of alternatives, it would be beneficial to have additional data on the performance and optics of each layout. Such additional information includes pick times for historical pick lists, cost, and a visual layout with clearly drawn optimal travel routes.

Industry Valuation

In an attempt to document a technique which would be implemented in industry in the future rather than lay dormant in an internet repository, an interview was held with a supply chain engineer for a retailer. During this conversation, it was stated that without the aid of software in industry, the picking order for a pick list, "would be based on tribal knowledge and experience." It was also stated that, "they do not have any graphics," but "it would be definitely helpful, at least from a planning perspective," to receive layout drawings with exact locations marked and arrows drawn to indicate directional travel along an optimal aisle route, and, "strategically, it makes sense." Later in the interview, manually quantifying the performance of a layout design was discussed. Statements were made, including, "calculations would not be exact

… it would be basically estimates," and, "I do not think you can really get a good answer doing hand calculations. Multiple pick lists would take hours [to complete]." The interview was concluded with, "you just cannot do it by hand."

Method Overview

A simulation was done using an automated technique that produces visual and quantitative outputs. All data for the inputs of this simulation was provided by a retailer for this research effort.

Figure 1 and Table 1 display a quantitative and visual output for the performance of a pick list which caters to the requests from the supply chain engineer. The picture on the left of Figure 1 shows an AutoCAD layout drawing with a straight flow routing (which ignores physical barriers but displays the chronological pick order) for the pick list entitled, "Retail 3." This pick list was one from the set of fifteen historical pick lists supplied from a retailer for this research effort. The picture on the right of Figure 1 shows an AutoCAD layout drawing with an aisle flow routing for the same pick list, "Retail 3." The picture depicting the straight flow communicates the optimal order in which to visit the twelve product locations from later discussed part routings table in a visual format. The picture depicting the aisle flow visits the same picking locations as the straight flow routing but allows for realistic travel through obeying factory travel constraints.

The quantitative table, Table 1, reports the data from the main prioritized calculations which would be used in determining the best layout from a set of alternatives. The data includes distance, time, cost, and percentage of time spent on travel. Calculations that provide supplementary information are shown later in the report.

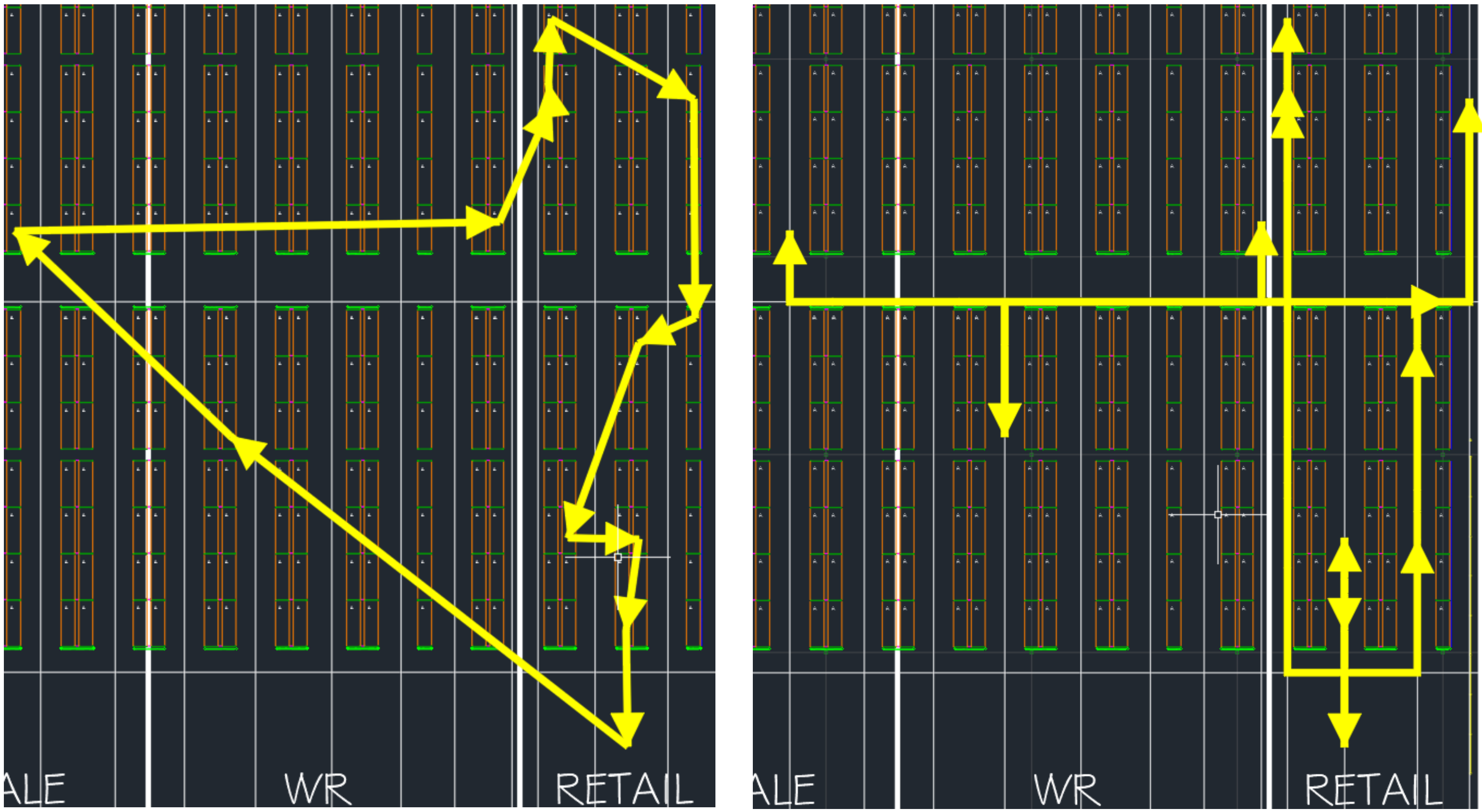


Figure 1. Pick List “Retail 3” with Straight Flow Routing (L), Pick List “Retail 3” with Aisle Flow Routing (R)

Table 1. Initial Results Window for Pick List “Retail 3”

Pick List	Distance (Feet)	Time (Hours)	Cost	Travel Percent
Retail 3	1,183.50	0.26	$ 5.27	68.38%

Given the output of the AutoCAD aisle flow routing diagram, one can observe which specific locations are geographically distant from the main set of products to be picked. The picture on the right in Figure 1 is again displayed in Figure 2, but with the geographically distant product locations encircled in red. The flow diagrams add value because it is easier to convince a group of people with minimal training to relocate the distant product closer to the location which holds the main products for the pick list, assuming it is not needed in the other zone and is sorted loosely based on the popularity rule (explained in further detail later).

One consequence of having this diagram is being able to quickly identify distant product locations. After finding out which products those locations correspond to, the product locations can be moved closer to the main set of products, which would result in a faster pick time if a set of similar products were to be reordered.

Figure 3 provides an example of a new layout and routing with the distant locations moved closer to the main set of pick items.

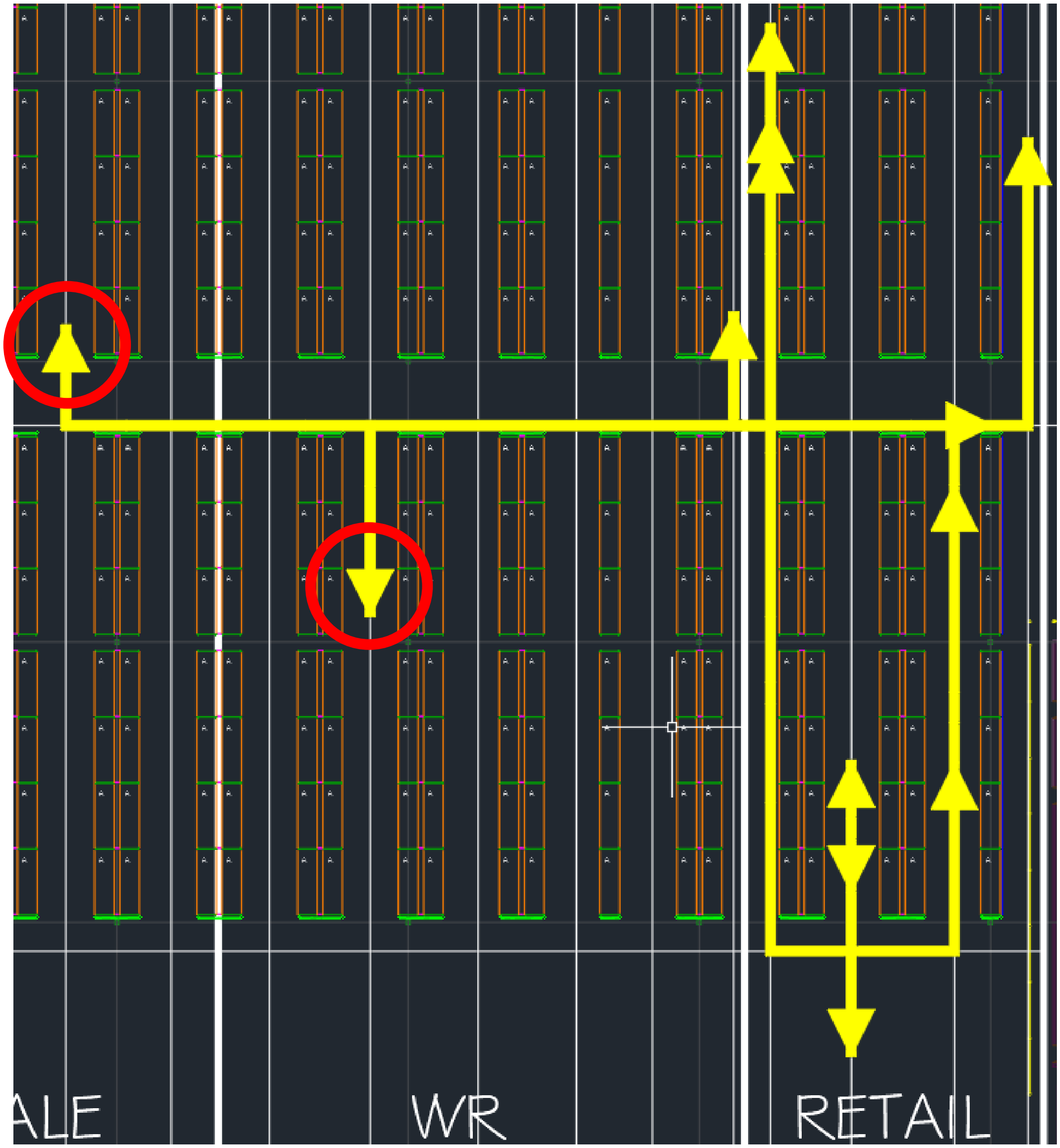


Figure 2. Pick List "Retail 3" with Aisle Flow Routing and Distant Locations Encircled in Red

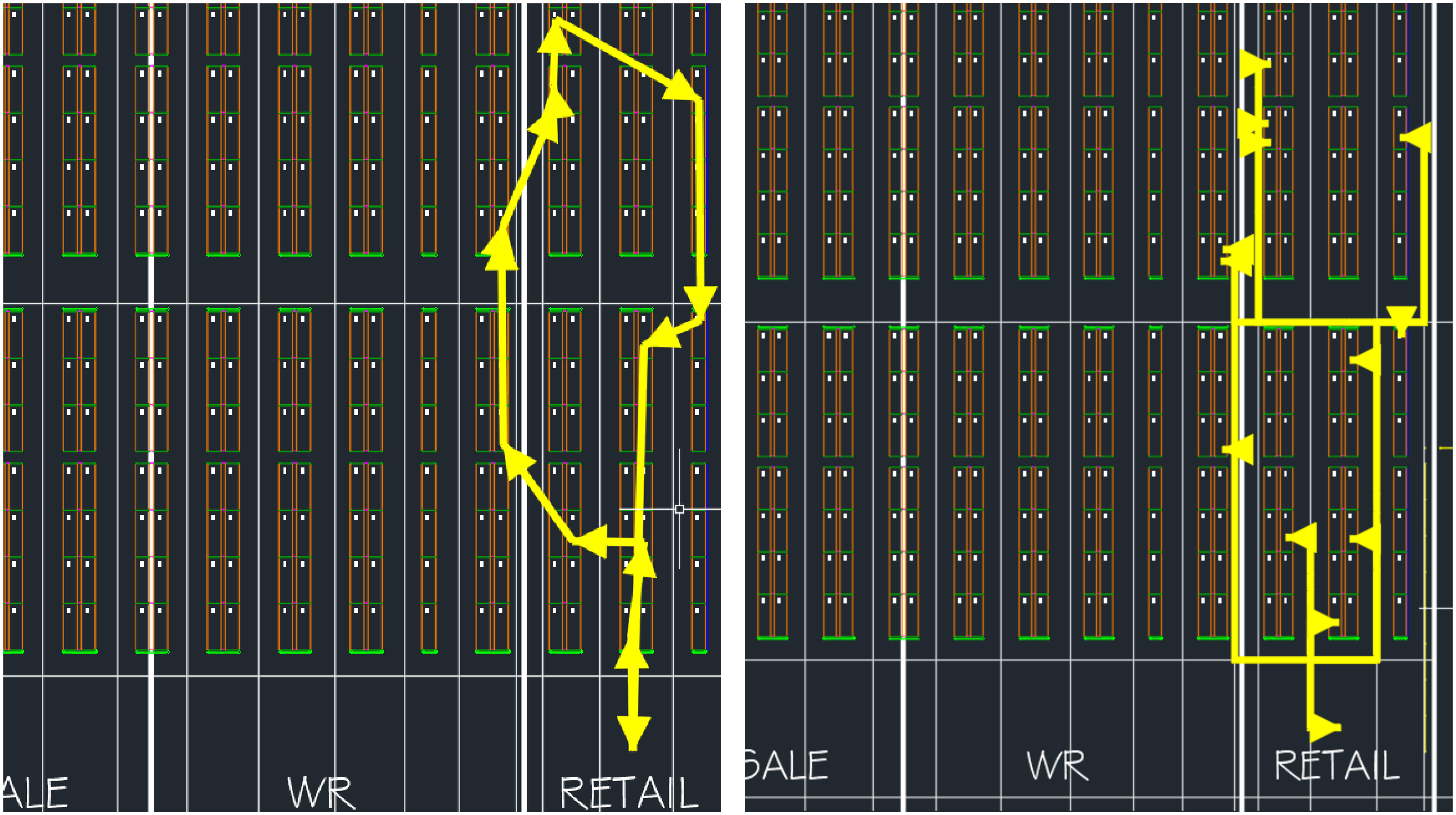


Figure 3. Pick List “Retail 3” with Improved Layout’s Straight Flow Routing (L), Pick List “Retail 3” with Improved Layout’s Aisle Flow Routing (R)

Table 2. Initial Results Window for Pick List "Retail 3" for Improved Layout

Pick List	Distance (Feet)	Time (Hours)	Cost	Travel Percent
Retail 3	944.67	0.23	$ 4.59	63.65%

Table 3. Historical Initial Results Window for Pick List "Retail 3"

Pick List	Distance (Feet)	Time (Hours)	Cost	Travel Percent
Retail 3 Original	1,183.50	0.26	$ 5.27	68.38%
Retail 3 Improved	944.67	0.23	$ 4.59	63.65%
Difference (%)	**20.18%**	**11.54%**	**12.90%**	**6.92%**

As one may have guessed from the improved layout drawings in Figure 3, the associated pick time for the pick list "Retail 3" with the new product locations has decreased. This can be confirmed from the output of the quantitative table from the same simulation. Table 3 communicates a layout which can allow for the picking to occur 11.54% faster, at a cost savings of 12.9%, with 20.18% less distance traveled. Time and cost are calculated and explained in the Experimental Details section of this thesis.

However, some layouts will perform better for some pick lists but worse for others. Selecting a layout design alternative based on the performance of a single pick list is not enough evidence to suggest superiority. However, when a layout is fed mass amounts of often cyclical historical pick lists, either a statistically significant difference in performance will likely surface or pick patterns will likely be identifiable visually which will likely allow for layout changes to decrease total pick time and costs. In addition, this technique allows for nearly instant feedback after altering product locations in a layout by recording and outputting different layout performances in a historical table.

Questioning why a layout should change in the first place, especially if orders are making it out the door on time, is expected. However, with the help of a visual diagram and quantitative report, relocating the distant product locations closer to the set of other product locations on the pick list produces a travel route that empirically decreases distance, pick time, and cost. Therefore, it is in the organization's best interest to change the layout in order to reap the benefits of a faster process.

Access to these diagrams and quantitative reports allows a group of people to respond with better judgment toward decision-making in the discussion of a layout redesign. Providing both visual and quantitative summaries of the process creates information accessible to people of all learning and communication styles. The addition of data tables from this method provides quantitative evidence for individuals desiring measurable improvements. It is important to remember a previous point–which is that humans will be the ones reading the simulation outputs and not another computer.

One can now see the additional value provided by the data and drawings. These diagrams enable a person very quickly to figure out how to improve a layout and they provide a means to clearly communicate to the team concerns about a specific layout alternative.

Peer Valuation

In an effort to provide more evidence of the value added by these diagrams and tables, two industrial engineering graduates were individually interviewed and their responses were collected. Interviewees included two students currently pursuing a Master of Science in Industrial and Manufacturing Systems at Iowa State University, both of whom graduated with a Bachelor of Science in Industrial Engineering from Iowa State University.

The interviews started by providing the graduates with a layout absent of product storage locations and a list of the 1265 product numbers which were provided for this research.

The graduates were asked how they would place the product numbers in an AutoCAD drawing with empty product storing racking locations. Both students commented that they would place products that were the most frequently sold closest to the docks, with less frequently sold products getting placed further from the dock.

After being given a sample pick list, the interviewees were asked what if any actions they would perform before sending out a picker to pick the products on the pick list. One student commented:

> I would take the time to locate the product locations before I send a picker out to pick. Because otherwise, they could be looking all the way on the other side of the warehouse, not knowing that the product's location was right in front of them. I would try to design a route before I send them out to go pick.

The other student commented:

> I do not think I would just send them out. How would they know where the products are? The numbering of products seems pretty random. That would be difficult. How would they know which product lies where? They would be lost. Marking the locations would be easier. Drawing a route would also be quicker.

The interviewees differed in how they would apply this method across multiple pick lists. One student commented, "I would identify the product locations and the routing for all 15 pick lists in a shift prior to sending them out to pick," while the other student commented, "If you are given 15 pick lists, you cannot mark the locations and routings for each one of them. It would take too long."

Regardless of which action would be taken, one can conclude that not only would the routing diagrams help, but the method often has too long of an execution time to justify its use while completing the process manually. To confirm this conclusion, the interviewees were finally supplied with the automated technique's routing diagrams and quantitative outputs. When asked what difference these tools would make, both students commented that the tools would help. One student commented, "if you had to draw the routings for all pick lists in all shifts every day, that is like a person's job. So, we are talking about saved salary cost and time."

Finally, when asked if they would be able to choose a superior layout design alternative if the analysis had been done for multiple different layouts if only supplied with either the qualitative data (drawing plus routing) or the quantitative data, both students commented that they would need both the qualitative and quantitative data to make a confident decision. One student commented:

> I mean if you were only given either the drawing or the data tables and told to decide then you would just be guessing. I think you would need both. If you just had the drawing, you would be guessing, 'oh that one looks a little shorter.' Maybe I would pull out a ruler. The drawings help to show upper management like somebody who is not as familiar with the process. They want to see the numbers but they would want to confirm this visually too. Warehouse workers would need the visuals, too, for sure. They would not be able to provide feedback on whether the calculations were realistic without seeing it.

Fastest technique to produce ideal format

The second research question asks, "*What is the fastest way to present the aforementioned ideal output format of a warehouse design analysis?*" One can perceive that doing this process without an automated computer tool is unviable. In order to suggest this with empirical evidence, the method was executed with and without the aid of specialized automated software, and the time was measured to complete each step of the process. One constraint was to produce the same level of detail in drawing routings and data reports across the set of pick lists.

Method Completed with Specialized Software

In order to produce diagrams and data tables of the quality levels displayed above and with the omitted supplementary information, the following steps were done:

1. Create an electronic pick list
2. Create a layout
3. Solve the traveling salesman problem
4. Generate expected pick times
5. Change the layout, run the simulation again, and repeat
6. Apply all pick lists for a shift and determine labor requirements in current warehouse

This process is displayed in a flowchart in Figure 4. The number of pick lists chosen for this process was the number of pick lists picked in a shift. The reasoning behind this is to be able to confirm the validity of the simulation with the warehouse pickers to get feedback and buy-in on what they believe is possible over a realistic time period.

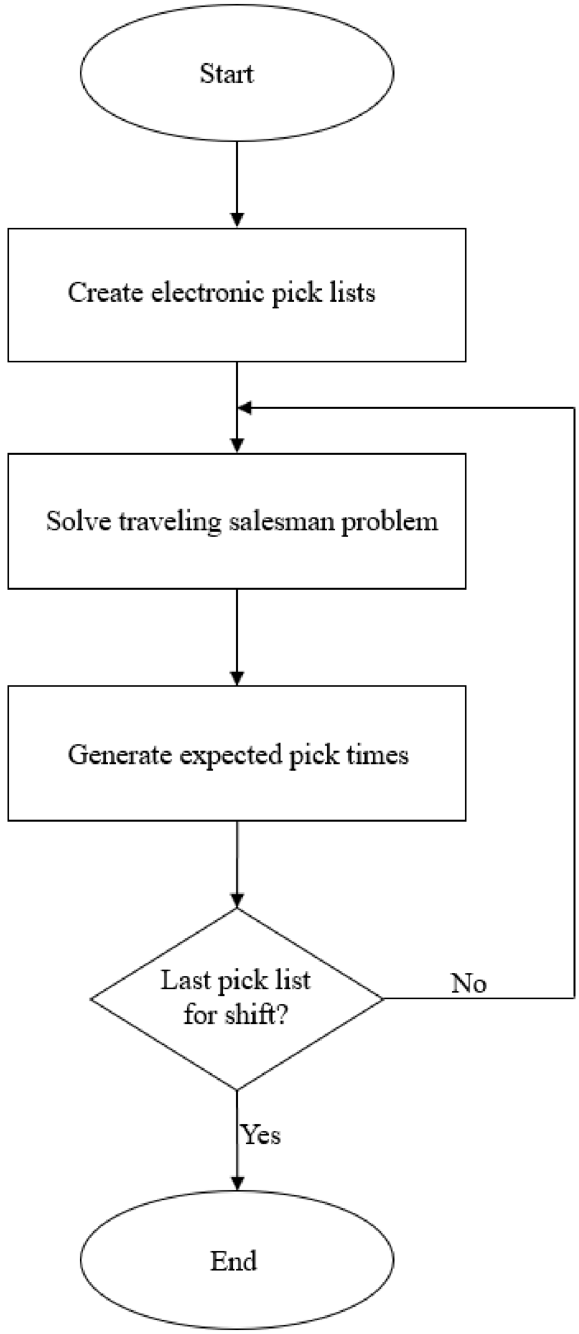


Figure 4. Flow Chart for the Method

1. Create an electronic pick list

A provided pick list was reformatted into a table in Microsoft Excel. The vital column headers needed to ensure a correct picking was done are part numbers, descriptions, and quantities. The reformatted pick list is seen in Table 4 [product descriptions redacted].

Table 4. “Retail 3” Pick List

Part Number	Description	QTY
506284	Description 1	1
473916	Description 2	2
507238	Description 3	1
509198	Description 4	1
509192	Description 5	1
410608	Description 6	2
508782	Description 7	1
511839	Description 8	3
503791	Description 9	1
479006	Description 10	1
511309	Description 11	1
666688	Description 12	4

2. Create a layout

A layout was then created in AutoCAD, and product locations were assigned using principles of zoning and the popularity rule within each zone. Products were placed into zones based on what order type they fell into (DSD, DW, WHOLESALE, WR, RETAIL). The final layout is displayed in Figure 5.

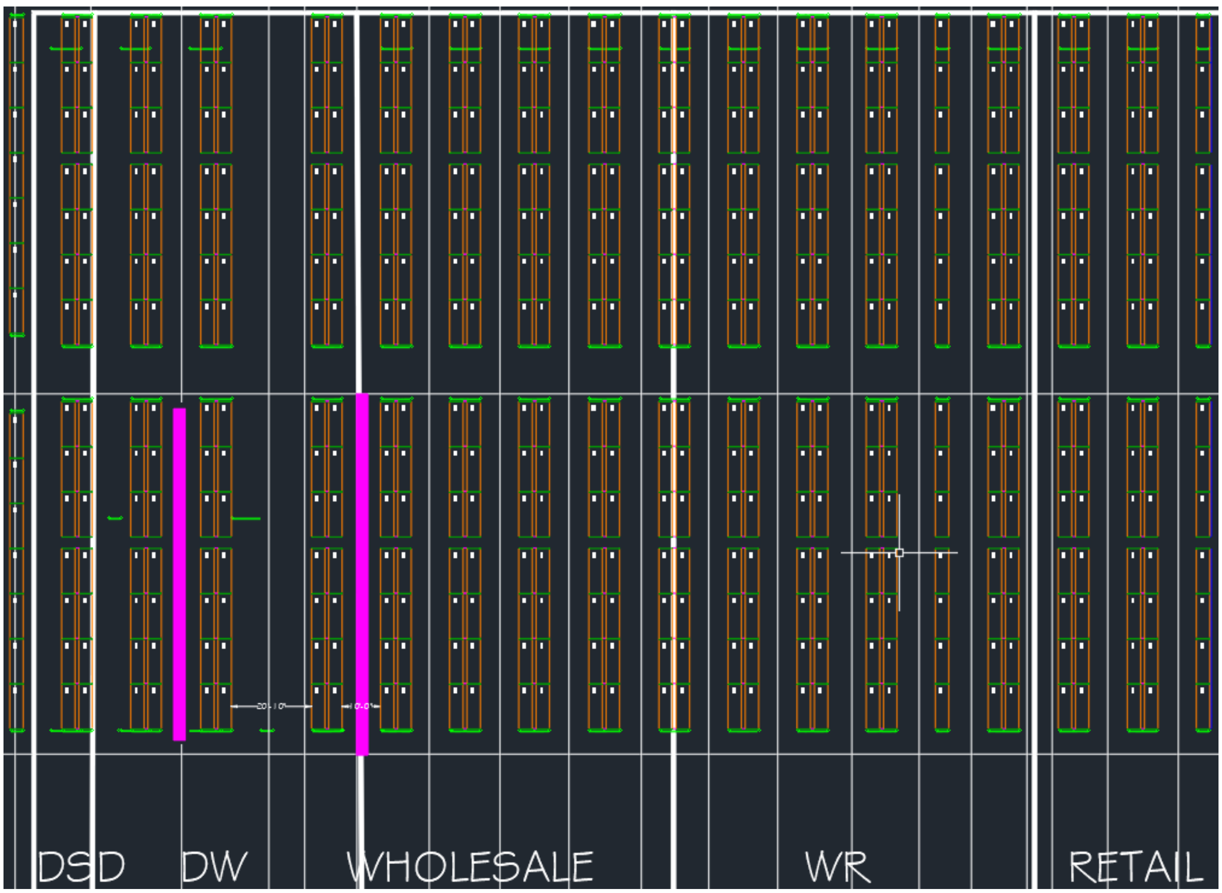


Figure 5. AutoCAD Layout Drawing

3. Solve the traveling salesman problem

To determine the sequence of picking from the pick list provided in step 1 within the layout provided in step 2, the traveling salesman problem was applied using the aisle network of that layout which required solving Dijkstra's shortest path algorithm. When solved, the traveling salesman problem for one specific pick list, “Retail 3,” produced the part routing pick sequence displayed in Table 5.

Table 5. Part Routing Sequence for Pick List "Retail 3"

Zone	From	To	Part	Qty
Retail	RET_DOCK	RW_511309	511309	1
Retail	RW_511309	RW_511839	511839	1
Retail	RW_511839	R_410608	410608	1
Retail	R_410608	R_473916	473916	1
Retail	R_473916	R_507238	507238	2
Retail	R_507238	R_508782	508782	1
Retail	R_508782	R_666688	666688	1
Retail	R_666688	R_479006	479006	3
Retail	R_479006	R_509198	509198	1
Retail	R_509198	R_503791	503791	1
Retail	R_503791	R_506284	506284	4
Retail	R_506284	R_509192	509192	1
Retail	R_509192	RET_DOCK	RETURN	1

Table 5 is read left to right, top to bottom. A picker assigned to the designated “Zone” starts at the “From” location, travels to the “To” location, and picks the product at that location whose identification number is listed under “Part” in the amount under “Qty.” A picker would then travel to get the next product listed in the next row and repeat this process until they return to the dock with all products picked.

4. Generate expected pick times

Now that the optimal picking sequence had been listed and the traveling salesman problem solved, the sequence was applied to generate the flow diagrams and associated pick times seen in Figure 6 and Table 6, which were used as the original diagrams for pick list “Retail 3” in Figure 3 and Table 2.

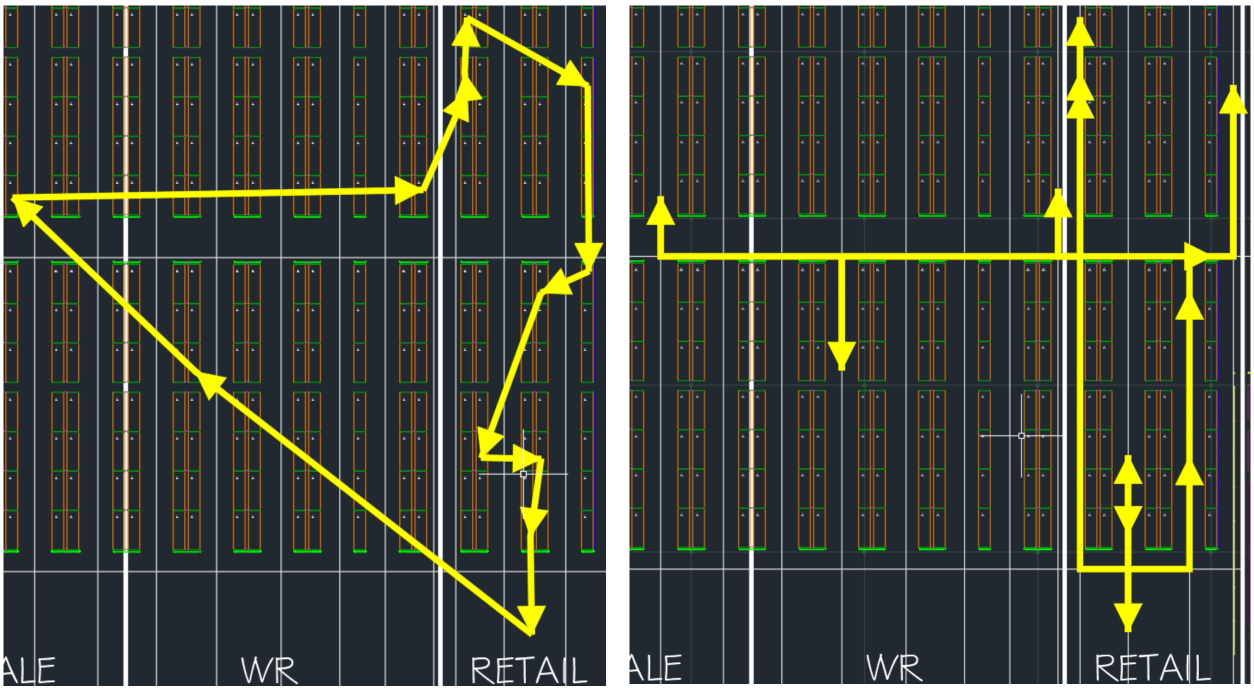


Figure 6. Optimal Routing for Pick List “Retail 3” Straight Flow (L), Aisle Flow (R)

Table 6. Initial Results Window for Pick List “Retail 3”

Pick List	Distance (Feet)	Time (Hours)	Cost	Travel Percent
Retail 3	1,183.50	0.26	$5.27	68.38%

5. Change the layout, run the simulation again, and repeat

The layout was evaluated and appropriate design changes were made to the product locations in an effort to decrease total travel distance. The user should then return to step 3 to solve the traveling salesman problem again, as the pick sequence will have to be redetermined in order to optimally travel throughout the warehouse. The user should continue until this process is completed for all pick lists gathered for all employees across a shift.

6. Apply all pick lists for a shift and determine labor requirements in current warehouse

The value added from the automated technique does not stop at shorter execution times. Since the simulation used real, historical pick lists and a layout drawing as inputs, a side benefit is naturally presented which allows for a company to predict labor requirements at peak warehouse demand periods. Warehouses which operate under time-based demands, such as seasonal ones which observe a peak during seasons like Christmas, a user can answer how many pickers would be required to pick the set of pick lists in the analyzed layout design.

Time study

A time study was completed to quantify the runtimes for completing the method manually versus using automated software. Table 7 summarizes the runtimes to complete the process outlined above. Details on how these were calculated are shown in the experimental details and results sections.

Table 7. Time Study by Executing Method

	Manual	Automated
Create electronic pick list	0:00:00	0:34:19
Create layout	3:03:24	3:03:24
Solve traveling salesman problem	1:37:45	0:05:08
Generate expected pick times	14:53:22	0:06:50
Change layout and run the simulation again	16:31:07	0:11:58
Totals	**19:34:31**	**3:49:41**

The manual process took a user 19:34:31 (hours:minutes:seconds) to produce a detailed analysis for the first layout, with each additional layout requiring an additional 16:31:07 (hours:minutes:seconds) to execute. Many companies would not see the benefit in taking this time to complete said analysis, so the analysis remains incomplete, resulting in sub-optimal warehouse layout designs. The logical step taken next would be to automate this process, so the aforementioned outputs could be provided in a shorter time period.

In comparison, the automated process had an initial simulation runtime of 3:49:41 (hours:minutes:seconds), with each additional layout requiring an additional 0:11:58 (hours:minutes:seconds). It is more likely that a company would complete the analysis with this technique, due to a faster runtime and the significant impact of a warehouse layout on warehouse performance, as outlined in the literature review.

Because of this, a company would be able to test multiple layouts against multiple historical pick lists in a relatively short time period, resulting in the group who decides the warehouse layout to have more complete information and select a warehouse layout design that is closer to optimal.

Summary

To summarize, implementing an automated method in the process of layout design analysis adds value through presenting data and visuals in an industry demanded format in a short time period. A manual technique is not viable in the current warehousing environment due to its slow runtimes (16:31:07 (hours:minutes:seconds) per additional layout). However, an automated technique solves this problem and is viable in the current environment since it comes with a significantly faster run time (0:11:58 (hours:minutes:seconds) per additional layout).

The automated technique concurrently solves two problems. First, it helps a user identify what is wrong with layout designs and identify superiorly designed layouts. The visual helps by highlighting how a layout can be improved by looking at outlier paths with excessive travel distance, which is all quantified in the supplemental quantitative table. Second, with no additional effort, the analysis for determining staffing levels under different demands is already completed due to simulating the automated method using real pick lists and layouts designs.

The following section breaks down the process required to prepare all of the inputs for the method.

CHAPTER 4. EXPERIMENTAL DETAILS

An experiment was created to discover if disparities in simulation runtimes existed between the automated and manual techniques.

This experiment simulated warehouse material handlers picking a set of pick lists using, first, an automated technique, followed by a manual technique using the same set of inputs–including warehouse layout and products. For each pick list, the picker started at a designated dock location, picked the assigned set of products in the quickest, easily identifiable route, and returned to the designated shipping dock.

The conclusion and discussion section of this paper discusses the differences in how the processes were carried out and how realistic applying each method would have been on a larger scale when used to compare different warehouse design layout alternatives.

The simulation run time for each method began when a warehouse picker received the customer order and ended when the customer order was delivered to the designated dock for the customer order.

The data used in the simulation was provided by a company for warehouse layout design analysis. It was reasoned that pick lists that more closely represented actual customer orders would provide increased confidence in the outputs attached to a warehouse layout design, and allow for determining labor requirements across a shift. For this reason historical pick lists were used from the same company to ensure relevancy and accuracy.

Individual Contributions

This experiment used software which the author did not develop or code, using data provided by a company. However, transforming the software from its current state to the state necessary to run this experiment and provide interpretable results was completed by the author. In order to get the software capable of running this experiment, the author had to reformat the data inputs and enter this data into columns different than the definitional labeling from Flow Planner. This process was documented by the author so the experiment could be repeated by another individual using different company data in an industry setting. The author completed a literature review, designed the experiment, ran the simulation, and interpreted the outputs to make the data relevant to the problem. To reiterate, this software was not capable of running an automated warehouse picking prior to the author's contributions.

Layout Generation

Before the evaluation and analysis of layout design, strategies for creating advantageous layout designs are first discussed.

Zoning

Based on the data provided by the company, zoning this warehouse by customer type was considered the best method, as products ordered by different customer types were often unique to the customer type rather than the whole customer base. In fact, many products were only ever ordered by one type of customer. It was also observed that there was considerable overlap between some customer types, and nearly no overlap between other customer types, leading to extra zones being created to cater specifically to products often ordered by two different customer types.

Ultimately it was decided to separate the warehouse horizontally into five unique zones (three main zones and two overlap zones). As the warehouse floor was rectangular, the zones were presented as follows, from left to right: DSD (direct store delivery), DW (the overlap between direct store delivery and wholesale), wholesale, WR (the overlap between wholesale and retail, and retail. Wholesale was chosen as the customer base with two overlapping zones as direct to store and retail had no overlap in common products whereas wholesale had considerable commonality in products ordered with both DSD and retail.

Products were sorted into these zones based on historical customer orders. After each zone had a list of products it would be housing, the next step for the layout generation was to decide the location of each product in terms of proximity to the corresponding dock for each customer type.

Popularity rule

As examined in the literature above (Tompkins et al., 2003; de Koster et al., 2007), minimizing travel distance should reduce pick time and operational cost. Additional literature from above (Fontana & Cavalcante, 2004) organized products in a layout by popularity to preference product location for those with higher order frequencies. For these reasons, the proximity of the products to the docks were organized by order frequency (popularity). The popularity rule was used to designate warehouse locations for each product following the sorting of warehouse products into their respective zones.

In order to determine popularity, a list of all products and all orders were supplied. Counts were taken for each time an order contained a product. These counts were sorted organized into a descending list with their respective counts displayed in a table in Microsoft Excel. Products with higher frequencies of orders received storing locations closest to the dock, and storing locations decreased in proximity to the dock as the order frequencies for products decreased.

Evaluating a Layout Design Using an Automated Technique

The automated method chosen for this experiment was Flow Planner–an application provided by Proplanner and fully integrated with AutoCAD. Flow Planner used input data to create optimal routing for pick lists and displayed these routes visually in a warehouse drawing in AutoCAD. In addition, this application calculates the time, distance, and cost accompanying the routing and displays this information in tabular form as a report.

Additional analysis can be done through different modules offered within the application's interface. The combination of the quantitative routing information and the qualitative visualization can help a user determine inefficiencies in current or theoretical material handling processes.

Because Flow Planner is integrated within AutoCAD, it uses AutoCAD layers to create and draw the material handling routings. While all file inputs and analysis' can be completed in the Flow Planner interface in AutoCAD, files can also be created externally through third-party software such as Microsoft Excel or Microsoft Notepad and imported into Flow Planner.

Although no Flow Planner module exists explicitly to analyze a warehouse layout, the tuggers module input format can be modified to simulate multiple pick lists' performance metrics on different warehouse layouts.

Historically, the tuggers module had been used to create routings for tuggers–a specific type of material handling equipment used to transfer multiple materials to multiple locations within a facility. Generally, the input format is a list of different materials to be delivered to different locations at different times. However, if the input format is altered to ask for all products delivered to the same location at the same time, then the situation mirrors that of picking a pick list and bringing those products to the designated dock all at the same time. The tuggers module then calculates a shortest-path routing based on the time and travel space constraints input by a user.

Since a starting layout had been created, it was time to evaluate the layout. The automated technique's layout design evaluation in this experiment was divided into three phases: (1) pre-picking, (2) picking, and (3) post-picking.

(1) Pre-picking

The Pre-picking phase consisted of preparing a drawing and creating readable input files for the analysis.

Preparing a drawing

The calculations performed later in this experiment uses the distances provided from the AutoCAD drawing. Therefore, increased accuracy in the drawing will produce increased confidence in the calculation results. The drawing must allow for a user to identify all locations to which a warehouse picker travels. When analyzing a warehouse, warehouse storing dimensions, storing locations, dock locations, and aisle widths are of the highest priority to accurately portray.

The warehouse drawing consisted primarily of the walls, racking, and aisles. From there, zones were added to the drawing for the reasons presented above in the literature review.

The finished drawing can be seen in Figure 7. The product locations become apparent when zoomed-in, as seen in Figure 8.

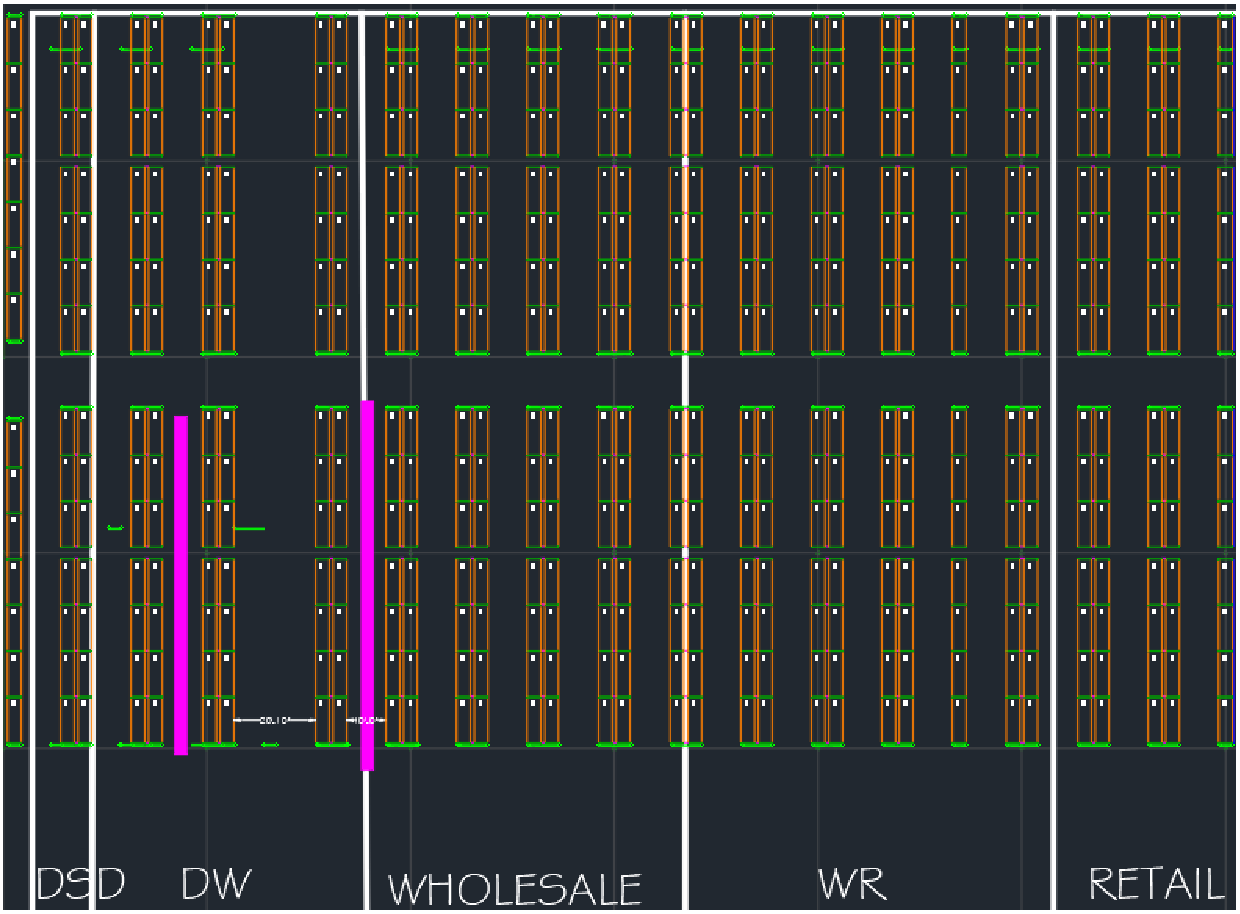


Figure 7. AutoCAD Layout Drawing

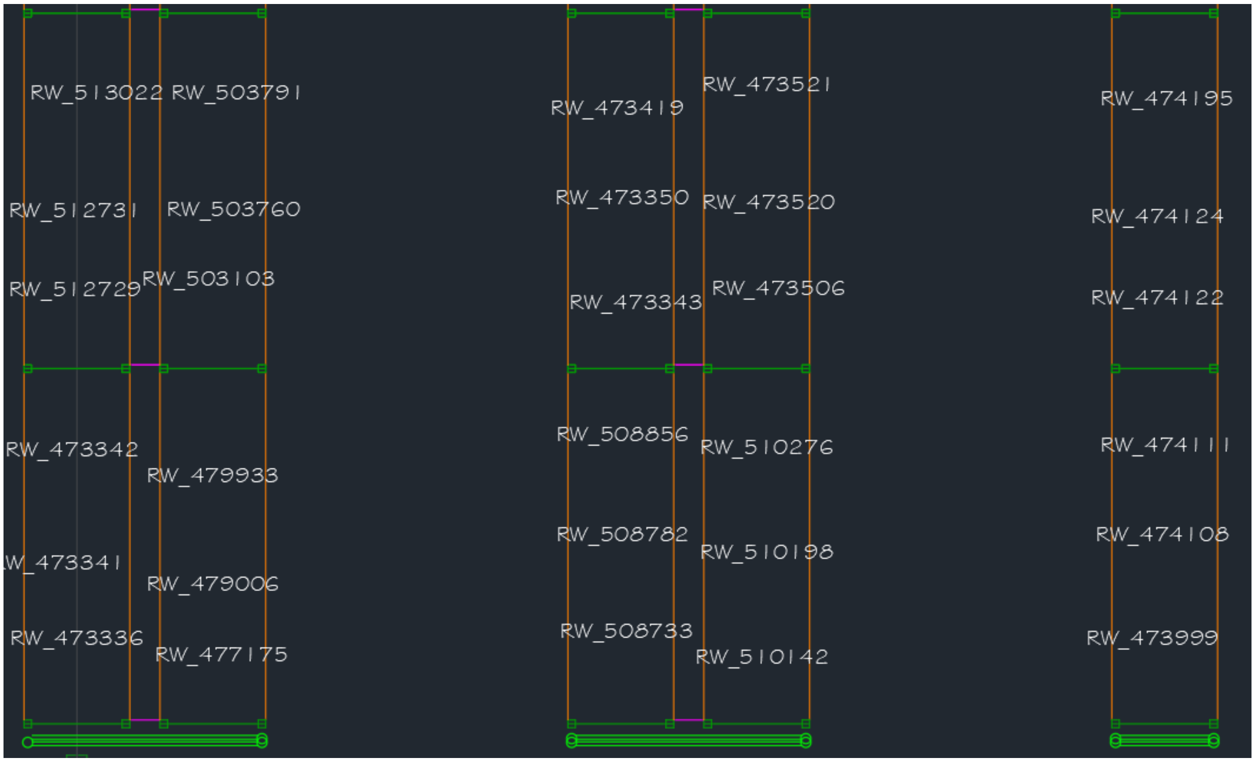


Figure 8. AutoCAD Layout Drawing Zoomed-in with Locations Viewable

Understanding the received data

The automated technique began to differentiate itself from the manual technique by requiring data inputs readable by the software. A pick list (customer order), in its original format, is currently unreadable by Flow Planner. A pick list is a standard item a warehouse picker would receive at the beginning of the picking process. An example of this is displayed in Table 8.

Table 8. Pick List Not Prepared for Simulation

Pick List #			
###.###.#####		Identification Number	
email@email.com		DD/MM/YYYY	Shipping Company
ATTN: Warehouse Manager's Name			
ITEM NO.	UOM	QTY	DESCRIPTION
506284	CASE(12)	4	Description 1
473916	Each	1	Description 2
507238	Each	2	Description 3
509198	CASE(6)	1	Description 4
509192	CASE(6)	1	Description 5
410608	Each	1	Description 6
508782	Each	1	Description 7
511839	CASE(12)	1	Description 8
503791	CASE(150)	1	Description 9
479006	CASE(12)	3	Description 10
511309	CASE(12)	1	Description 11
666688	Each	1	Description 12
TOTAL PIECE COUNT		12.00	
Approximate Item Weight 141.00 LBS			

The pick list is formatted as a table with four columns–three columns of which are of interest ("ITEM NO.," "UOM," and "QTY"). A column of interest in this example is defined as a column whose information is required to fulfill a pick list without making mistakes during the picking operation. For this pick list example, there were twelve items ordered by the customer, denoted by each row in the table starting with the first entry.

The first column of interest, "ITEM NO." (item number), is a numerical, six digit, unique identifier for a specific product. Many products are similar in name in the description column or similar in appearance while on the warehouse floor. A unique numerical identifier ensures that the correct product is picked rather than a similar product.

The second column of interest, “UOM” (unit of measurement), communicates what a product with an order quantity of one should look like. In the example from Table 8, a unit of item number 506284 is a case (12 pack), whereas a unit of item number 473916 is a single item. This column prevents a warehouse picker from disassembling a packaged unit if the unit of measurement contains multiple of the same single item.

The third and last column of interest, “QTY” (quantity), communicates the order quantity for the unit of measurement associated with each ordered product.

These three columns when combined form a row that corresponds to an item, the quantity that item is stored in, and the total quantity in the order. A warehouse picker needs this information to fulfill each item on this pick list without an error.

Fifteen pick lists were provided by a company for layout design analysis. These pick lists are displayed in their entirety in the Appendix.

Creating readable data files

In order for the customer’s order data to be read by the software which executes the automated technique, and the analysis of routings and travel times to take place, the data had to be reformatted to create an electronic file capable of interacting with the software as an input. Flow Planner recommended either a comma-separated values Microsoft Excel file or their interface as the source for input. Both of these input sources were used depending on the file type. Five different input files had to be created on a user’s computer. These files were:

1. A .prd file that contained information on which pick lists were used and which zones the products on the pick lists would be located. Other information included which products belonged to which pick lists and zones. The file also contained information on which color the optimal routing paths should be displayed after the paths were drawn in the AutoCAD drawing.
2. A .loc file that contained information about all locations visited in the picking operation.
3. A .csv file that contained locations for center aisle lines which material handling equipment used for travel during picking.
4. A .mhe file that contained material handling information–such as type and speeds, container information–such as type and dimensions, and processes information–such as type and time.
5. A second .csv file that contained order information. The information included products, container types, container quantities, product locations, dock locations, pick list number, and zone.

The .prd file

The .prd file was created in Microsoft Excel and had two main categories: products and parts. As this experiment was considered a non-traditional study for the tuggers module in Flow Planner, the column names did not always correspond to their definitional labeling. For this scenario, it is easier to think of product as a "main flow group", and to think of part as a "sub-flow group".

Products

The Products category of the .prd file required information to be entered in the format displayed in Table 9.

Table 9. Product Input Format

Column	Data Value
1	Name
2	Quantity
3	Color
4	Calc

The first column, "Name", corresponded to the name of the three main zones and the pick list number. As there were three different main zones (DSD, retail, and wholesale), and 15 different pick lists in the original data set (four DSD pick lists, four retail pick lists, and seven wholesale pick lists), there were 15 rows in this Excel file–excluding the row with column headings. These rows began with "DSD|1", and ended with "WHOLE|7".

The second column, "Quantity", corresponded to how many entries the pick lists in the "Name" column had in this table. Since this experiment had historical pick lists for zones whose delivery information remained constant, this column always had a numerical data value of "1". In other words, only "1" pick list named "WHOLE 5" was used and only "1" pick list named "RETAIL 4" was used.

The third column, “Color”, corresponded to which color each optimal routing path of the fifteen pick lists should be drawn in on the AutoCAD interface. This experiment assigned unique colors for each of the three main zones, with DSD using red lines and arrows, retail using yellow lines and arrows, and wholesale using green lines and arrows. The software had an input constraint for numbers, so the numbers “1”, “2”, and “3” were used to correspond to the colors red, yellow, and green respectively.

The fourth column, “Calc” (calculation), corresponded to whether Flow Planner would perform its calculations (e.g. distances, costs, flow diagrams), with the information in the table. Since this information was desired as an output, all columns had the categorical value of “Yes”.

The final products data table appeared as displayed in Table 10.

Parts

As mentioned above, for this scenario, it is easier to think of part as a “sub-flow group”.

The parts category of the .prd file required information to be entered in the format displayed in Table 11.

Table 10. Products Data Table

Name	Quantity	Color	Calc
DSD|1	1	1	Yes
DSD|2	1	1	Yes
DSD|3	1	1	Yes
DSD|4	1	1	Yes
RETAIL|1	1	2	Yes
RETAIL|2	1	2	Yes
RETAIL|3	1	2	Yes
RETAIL|4	1	2	Yes
WHOLE|1	1	3	Yes
WHOLE|2	1	3	Yes
WHOLE|3	1	3	Yes
WHOLE|4	1	3	Yes
WHOLE|5	1	3	Yes
WHOLE|6	1	3	Yes
WHOLE|7	1	3	Yes

Table 11. Part Input Format

Column	Data Value
1	Product Name
2	Part Name
3	Qty Parts/Product
4	Use%
5	Days Inventory
6	Color

The first column, “Product Name”, corresponds to the name of the zone and the pick list number, identical to the values entered in the “Name” column from the product table. Similarly, these rows began with “DSD|1”, and ended with “WHOLE|7”. However, each product and return to dock step required its own row, and as there were 302 total products across 15 pick lists, 317 rows were needed in Excel. For example, pick list “DSD|1” has 27 products on its pick list and its return to dock step. Therefore, the first 28 rows of the “Product Name” column had the value “DSD|1”.

The second column, “Part Name”, was used to identify the product or the return step. The same six-digit numerical item number from the pick list was copied over here. Each of these numbers was used to identify a unique product. The examples from the pick list “Retail 3” include “506284” to represent “Description 1” and “479006” to represent “Description 10” [product descriptions redacted]. The only exception to this rule is the last “Part Name” on each pick list had a value of “RETURN” to signify a return to dock step.

The third column, “Qty Parts/Product”, corresponded to how many times the “Part Name” appeared under each “Product Name”. Since the pick sequence only had a picker go to the product location once to pick multiple of a part, this value was always entered as “1”.

The fourth column, “Use%”, corresponds to how often the “Part Name” was given in a specific pick list. Since all of the pick lists had the “Part Name” required for picking 100% of the time, this value was entered as “100%” for all rows.

The fifth and sixth columns, “Days Inventory” and “Color” were not pertinent to this experiment. These values were both set to “1” for all rows to keep the Flow Planner application running as intended. The parts table of pick list "RETAIL|3" is displayed in Table 12. The parts table of the .prd file is shown in its entirety in the Appendix.

Table 12. Parts Table for Pick List "RETAIL|3" of .prd File

Product Name	Part Name	Qty Parts/Product	Use%	Days Inventory	Color
RETAIL|3	506284	1	100	1	1
RETAIL|3	473916	1	100	1	1
RETAIL|3	507238	1	100	1	1
RETAIL|3	509198	1	100	1	1
RETAIL|3	509192	1	100	1	1
RETAIL|3	410608	1	100	1	1
RETAIL|3	508782	1	100	1	1
RETAIL|3	511839	1	100	1	1
RETAIL|3	503791	1	100	1	1
RETAIL|3	479006	1	100	1	1
RETAIL|3	511309	1	100	1	1
RETAIL|3	666688	1	100	1	1
RETAIL|3	RETURN	1	100	1	1

The .loc file

Following the organizing of relevant information into a readable .prd file for Flow Planner, a locations file was created using the Flow Planner interface.

Locations

The bulk of the .loc file is the locations section. This step began with opening the warehouse layout drawing to be analyzed in AutoCAD on a user's computer. Once AutoCAD was open with the proper drawing loaded, Proplanner's Flow Planner application had to be launched either by selecting the Flow Planner icon button from the Proplanner ribbon of

AutoCAD or by typing “ppfp” into the command window–an acronym for Proplanner Flow Planner. The Flow Planner interface opened in AutoCAD over the drawing, but the drawing could be accessed again simply by clicking the “Go to AutoCAD button” from the Flow Planner interface.

Once in the Flow Planner interface, the default selected tab from the top of the window was “Part Routings”. For this specific file, the “Locations” tab needed to be selected. The interface for this tab is shown at the end of this section.

The locations are documented through clicking product locations on the AutoCAD drawing and attaching a text label to the chosen x and y coordinates. This file type can be exported as a .loc file.

When in the “Locations” tab’s interface, the “Add Location” button was clicked. The first prompt for the user was to type in the “Location Name”. For this experiment, the input format of Zone_Product# or “Part Name” from the .prd file was used (e.g. “R_511816” and “DW_512487”). Here, the zones DSD, retail, warehouse, retail/warehouse, and DSD/warehouse were input as D, R, W, RW, and DW, respectively. Docks were also added in this phase as MainZone_DOCK (i.e. “DSD_DOCK, “RET_DOCK”, and “WHL_DOCK”). The second prompt for the user was to “Select Location for “Part Name””. It is here where the user would click on the AutoCAD drawing on a storing location. The chosen product location could be based on principles of the popularity rule, zoning, or simply to see how moving a product’s location would affect performance metrics associated with picking said product.

The x and y coordinates of this location were stored in a .loc file and used as variables in optimal routing calculations to minimize travel time. After the user clicks on a location in the

AutoCAD drawing, they will automatically get returned to the Flow Planner interface with the new location added. Flow Planner will automatically fill in the values under the “Group” and “Route” columns as “UNASSIGNED”, the values under the “Passthrough” and “Stop” columns as “No”, and the values under “Delaytime” as “0”. Since all of these values were not pertinent to this experiment, these values were left unchanged. The process of typing in the part name and selecting the location on the AutoCAD drawing was repeated until all locations for all products were added to the Flow Planner interface. In the AutoCAD drawing, these location names were displayed as text in the selected area for each location, defaulted to the layer “PP_LOCATIONS”. The “Locations” tab’s interface is displayed in Figure 9. A portion of the data table is shown in Table 13. The locations data table is shown in its entirety in the Appendix.

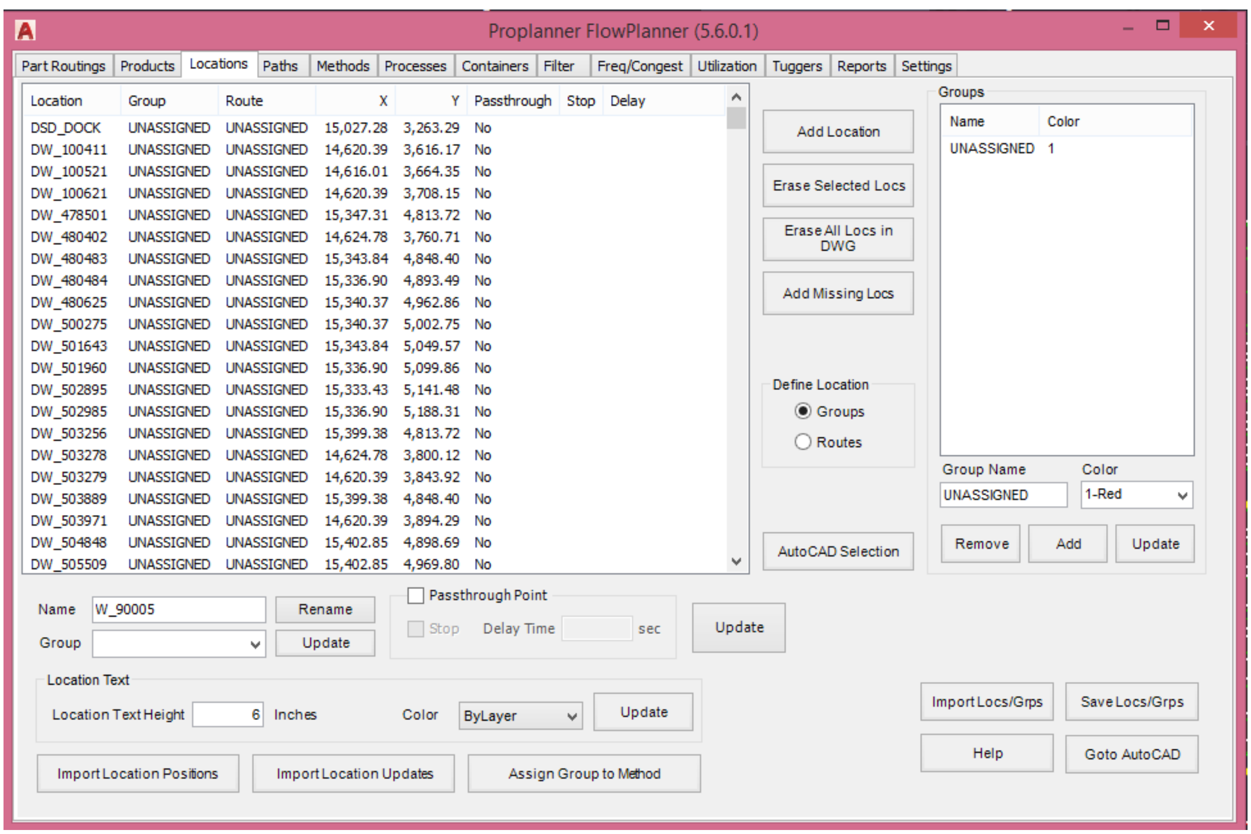


Figure 9. Locations Tab Interface

Table 13. Portion of the Locations Data Table

NAME	X (INCHES)	Y (INCHES)	GROUP	TUG_ROUTE	PASSTHROUGH	STOP	DELAYTIME
836261_BULK	13856.1	3491.31	UNASSIGNED	UNASSIGNED	No	No	0
DSD_DOCK	14802.3	2984.72	UNASSIGNED	UNASSIGNED	No	No	0
RET_DOCK	17822.8	2988.28	UNASSIGNED	UNASSIGNED	No	No	0
RW_509554	16926.6	3623.31	UNASSIGNED	UNASSIGNED	No	No	0
RW_509594	16926.6	3666.12	UNASSIGNED	UNASSIGNED	No	No	0
RW_510130	16926.6	3716.07	UNASSIGNED	UNASSIGNED	No	No	0
RW_510136	16923	3769.58	UNASSIGNED	UNASSIGNED	No	No	0
RW_510138	16923	3815.96	UNASSIGNED	UNASSIGNED	No	No	0
RW_510141	16923	3855.2	UNASSIGNED	UNASSIGNED	No	No	0
RW_510142	16923	3905.15	UNASSIGNED	UNASSIGNED	No	No	0
RW_510198	16915.9	3937.26	UNASSIGNED	UNASSIGNED	No	No	0
RW_510418	16923	3972.93	UNASSIGNED	UNASSIGNED	No	No	0
RW_510419	16851.6	3619.74	UNASSIGNED	UNASSIGNED	No	No	0
RW_510421	16855.2	3680.39	UNASSIGNED	UNASSIGNED	No	No	0
RW_510422	16855.2	3719.63	UNASSIGNED	UNASSIGNED	No	No	0

Table 13 Continued

NAME	X (INCHES)	Y (INCHES)	GROUP	TUG_ROUTE	PASSTHROUGH	STOP	DELAYTIME
RW_510425	16862.3	3773.15	UNASSIGNED	UNASSIGNED	No	No	0
RW_510426	16855.2	3815.96	UNASSIGNED	UNASSIGNED	No	No	0
RW_510646	16851.6	3858.77	UNASSIGNED	UNASSIGNED	No	No	0
RW_510835	16855.2	3908.71	UNASSIGNED	UNASSIGNED	No	No	0
RW_510936	16855.2	3930.12	UNASSIGNED	UNASSIGNED	No	No	0
RW_511108	16858.8	3976.5	UNASSIGNED	UNASSIGNED	No	No	0
RW_511309	16723.1	3616.17	UNASSIGNED	UNASSIGNED	No	No	0
RW_511312	16730.2	3662.55	UNASSIGNED	UNASSIGNED	No	No	0
836261_BULK	13856.1	3491.31	UNASSIGNED	UNASSIGNED	No	No	0
DSD_DOCK	14802.3	2984.72	UNASSIGNED	UNASSIGNED	No	No	0
RET_DOCK	17822.8	2988.28	UNASSIGNED	UNASSIGNED	No	No	0
RW_509554	16926.6	3623.31	UNASSIGNED	UNASSIGNED	No	No	0
RW_509594	16926.6	3666.12	UNASSIGNED	UNASSIGNED	No	No	0
RW_510130	16926.6	3716.07	UNASSIGNED	UNASSIGNED	No	No	0
RW_510136	16923	3769.58	UNASSIGNED	UNASSIGNED	No	No	0
RW_510138	16923	3815.96	UNASSIGNED	UNASSIGNED	No	No	0

Groups

After establishing the product's locations, a basic group has to be established. On the right side of the interface, typing "UNASSIGNED" as the group name and choosing "1-RED" as the dropdown box for color, and then clicking the "Add" button creates the group necessary to run the analysis. The groups data table is displayed in Table 14.

Table 14. Groups Data Table

Name	COLOR	X	Y
UNASSIGNED	1	0	0

Tug Routes

Three tug routes were created in this file. These tug routes describe the color and time intervals for the routes. This data table is displayed in Table 15.

Table 15. Tug Routes Data Table

NAME	COLOR	INTERVAL	INCLUDE
DSD	1	0.0/24.0/60/60	YES
WHOLE	3	0.0/24.0/60/60	YES
RETAIL	4	0.0/24.0/60/60	YES

Drawing Extents

The last section of the .loc file quantifies the extrema of the coordinates of the AutoCAD drawing. This data table is displayed in Table 16.

Table 16. Drawing Extents Data Table

MINX (INCHES)	MINY (INCHES)	MAXX (INCHES)	MAXY (INCHES)
12180.9349	2733.4438	24902.767	13028.277

The first .csv file

The next step in this experiment was to create a .csv file in the Flow Planner interface to add center aisle lines in the AutoCAD drawing. Center aisle lines are read by Flow Planner as the only paths capable of travel by the material handling equipment. To initiate this step, the “Paths” tab in the Flow Planner interface was clicked. The “Paths” interface is shown in Figure 10. This was followed by clicking the “Add/Edit Aisle” button, which takes the user to the AutoCAD drawing. From there, the user should click the radio button indicating any directional travel constraints (bidirectional in this experiment), select the aisle width (undefined in this experiment), and draw lines by indicating the starting and ending points of a center aisle line and repeating these steps until all aisles are drawn and connected/intersecting. These center aisle lines tell the software where material handling equipment can geographically travel. The center aisle lines appeared in the layer “PF_AISLEPATH” and in white color by default. The drawing with center lines is displayed in Figure 11. Once all aisles had been drawn, clicking the “Return” button to return to Flow Planner and clicking the “Join Locs to Aisle” (Join Locations to Aisle) drew a red line in the FP_AISLEPATH-JOIN layer to connect all designated locations' texts to the center aisle lines. This is shown in Figure 12. This function located the closest center aisle line to each previously named location and drew a perpendicular line to minimize travel distance, which the software used for travel calculations. The software uses a shortest-path algorithm to find the best route between two location points using the center aisle lines. The final .csv file is shown in its entirety in the appendix.

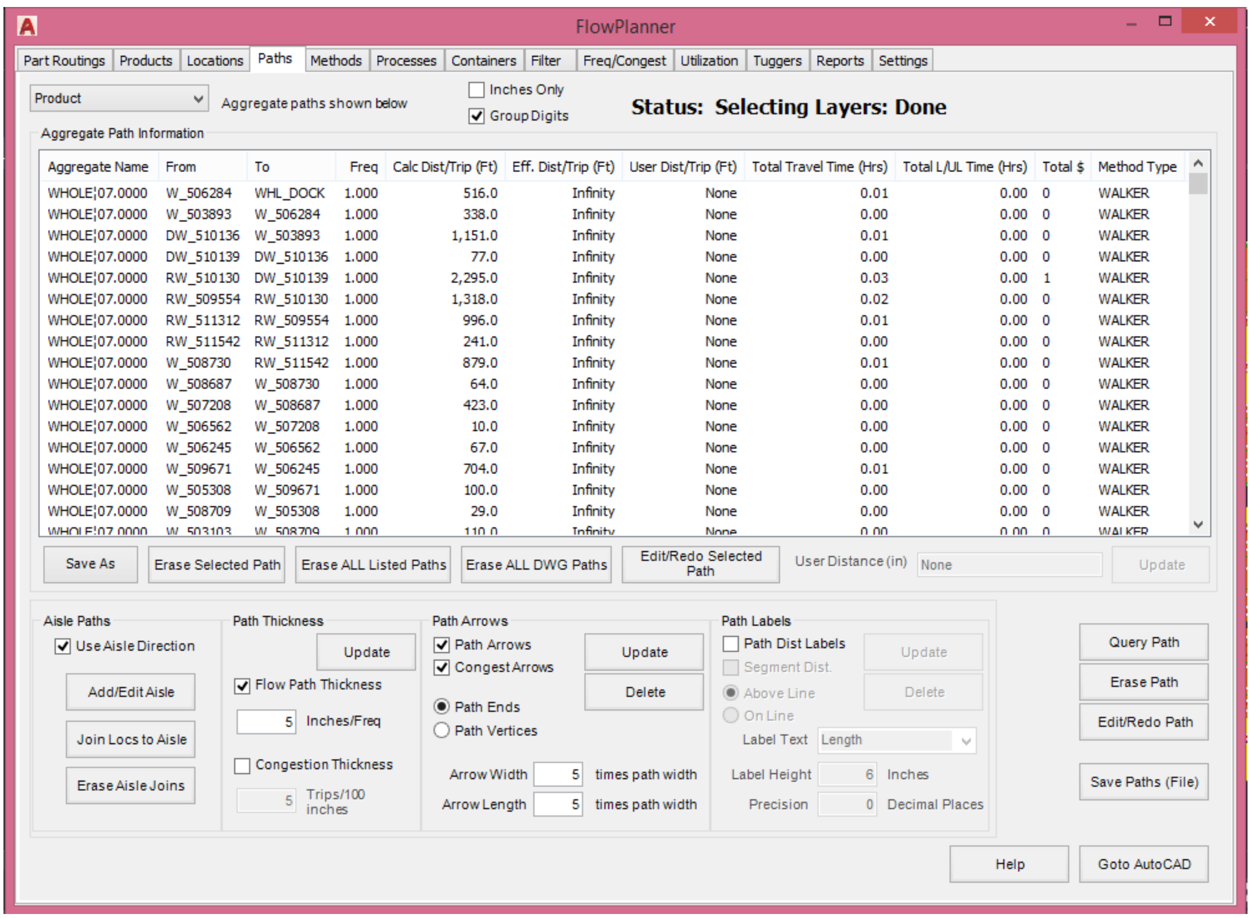


Figure 10. Paths Tab Interface

Figure 11. Center Lines (Color Changed to Yellow for Easier Identification)

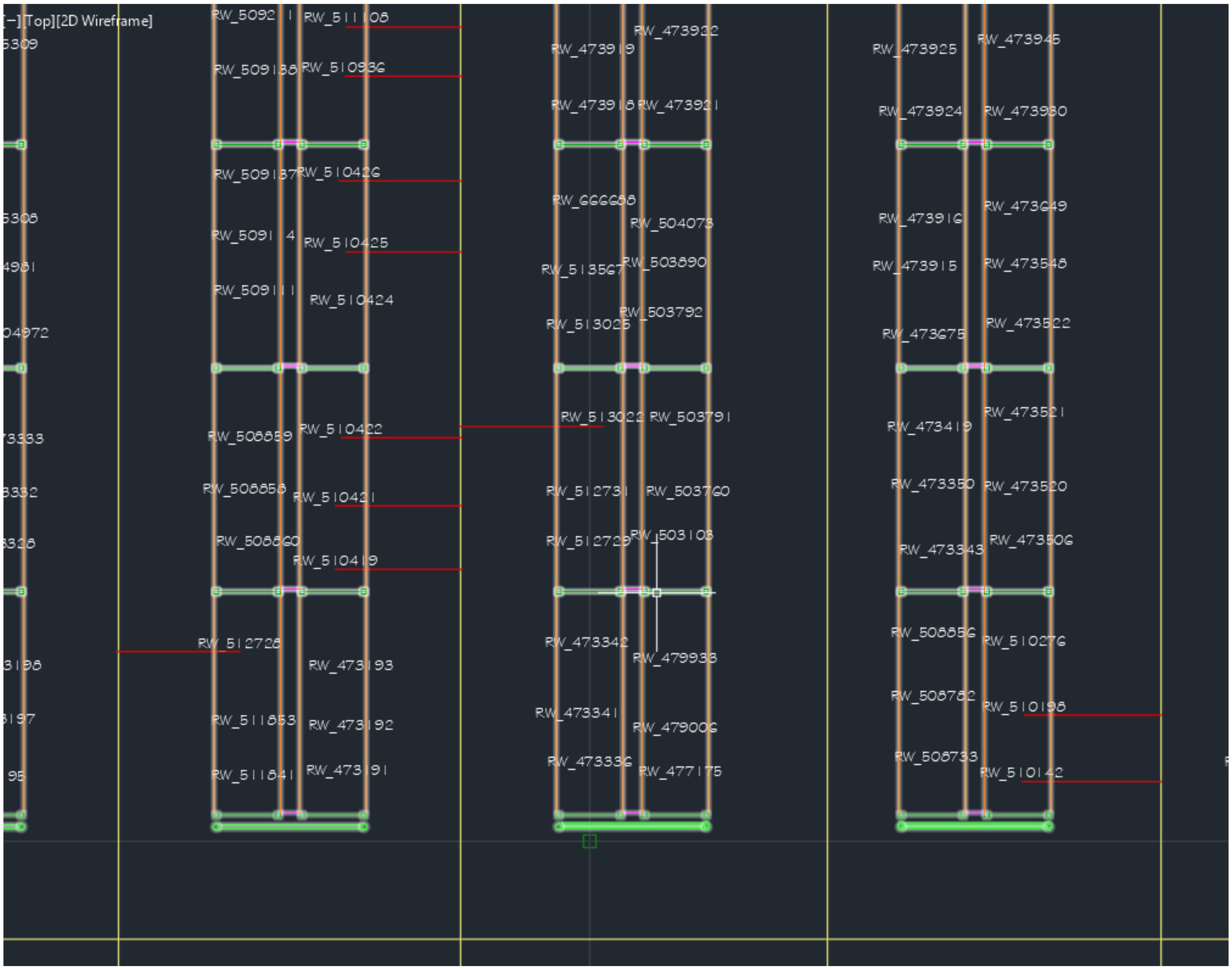


Figure 12. Locations Joined to Center Lines (Zoomed-in)

The .mhe file

At this point, a .mhe file that stores material handling, container, and processes information was created using the Flow Planner interface.

Processes

The processes information was first input, in the “Processes” tab. As processes are functions used in the time calculations and therefore costs of methods, creating the processes data input was a prerequisite to the rest of the .mhe sub-files. In this experiment, only one process type needed to be created, “LOAD”. Creating an unload process was not done because the load and unload processes were determined to be approximately equal, so simply using the load process for the unload process satisfied this condition. Therefore, regardless of the direction for product flow in relation to the material handling equipment, the selected process and its associated performance times was always the “LOAD” process.

The predetermined time systems, including MODAPTS, MTM-B, MTM-UAS or BasicMOST, were foregone in favor of building a "Template".

"Template” is a predetermined time parser code in Flow Planner. The chosen “Activity Code or Description” was “BT(10/10)” which translates to a base time of 10 seconds per process plus an additional time of 10 seconds per container. This means that if a forklift was to pick up four containers, the total load time for this operation is considered to be 50 seconds (10 seconds for the base time, plus 10 additional seconds for each of the four containers to be loaded). The processes interface is shown in Figure 13. This data table is shown in Table 17.

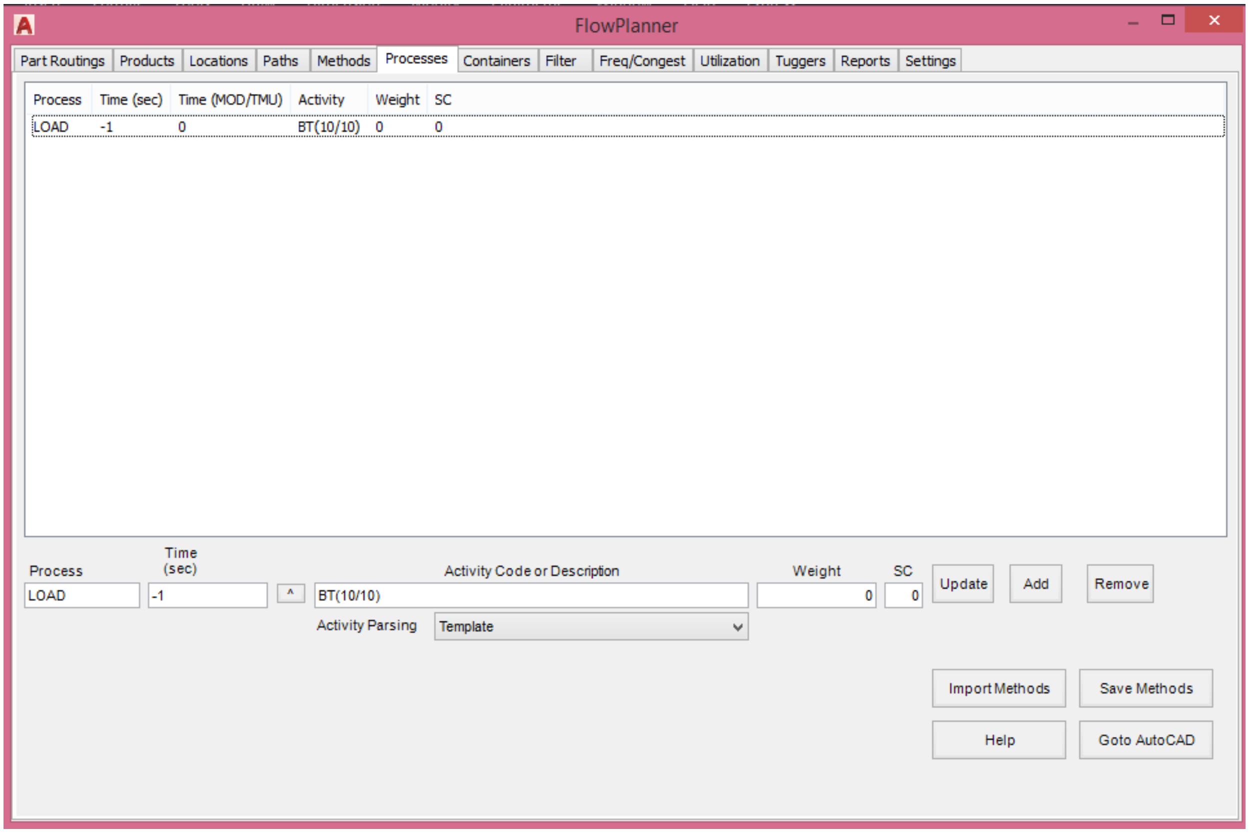


Figure 13. Processes Interface

Table 17. Processes Data Table

Name	**Time in sec**	**Time in MOD/MU**	**Activity Code**	**Special Code**	**Weight Code**
LOAD	-1	0	BT(10/10)	0	0

Method Types

Material handling information was then input into the “Methods” tab. The “Method Types” section was first addressed. The method types category of the .mhe file required information to be entered in the format displayed in Table 18.

Table 18. Method Type Input Format

Column	Data Value
1	Type
2	Qty
3	Eff. %
4	Max (min)
5	Fixed$
6	Variable$
7	Straight Speed (f/s)
8	Accel/Decel (f/s^2)
9	Turn Angle (deg)
10	Aisle Path Layer
11	Color

The “Type” column described the characteristics of the material handling equipment while also acting as an input column option for the methods. “WALKER” was chosen for all method types for the provided data.

The “Qty” (Quantity) column counted how many of this method type exist for use in the picking operation. Since eight pickers were available in the system, the “Qty” column had a value of 8.

The “Eff. %” (Effective percentage) displayed the percent of value-added time by the method type, and as such was constrained from 0 to 100. The only occasion when this data value would not be 100 is if the method type traveled while empty to a location not including the initial routing if provided in the “Parts Routing” tab. As there was no deadheading required in the company data, this value was 100.

The “Max (min)” (Maximum minutes) column quantified the maximum minutes the method type was available per time period. The default was 115,200 minutes per year (one full-time shift), which was left at its default value for the data column here.

The “Fixed$” (Fixed Cost) column was not pertinent to this experiment so a value of 0 was used.

The “Variable$” (Variable cost) column displayed the method type’s variable cost per hour. The chosen value here was $20/hour, which was the salary of a picker for the company that supplied the data.

The “Straight Speed (f/s)” column corresponded to the travel time in feet per second the method type traveled while moving in a straight line. A value of 2 feet/second was determined to accurately represent a picker’s straight speed in this experiment.

The “Accel/Decel (f/s^2)” column corresponded to the rate of acceleration and deceleration in feet per second squared for the method type. This information was important for pick time calculations when traveling around corners which required accelerating and decelerating to accurately quantify total travel time. A value of 2 feet/second/second was determined to accurately represent a picker’s acceleration and deceleration in this experiment.

The “Turn Angle (deg)” column corresponded to the angle in degrees required for the method type to complete a turn, and therefore require accelerating and decelerating. This would alert the software to account for additional travel time, as traveling 100 feet straight would take less time than traveling 100 feet with multiple U-turns. The input data was constrained to integer values. The default value was 100 degrees, which meant that any turn angle less than or equal to 100 degrees would constitute a turn for the method type. However, the material handling equipment used in this experiment elicited turn at 120 degrees, which was the value used in this experiment.

The “Aisle Path Layer” column denoted which AutoCAD layer the aisle paths were drawn on so the method type could locate the travelable lines. The default layer created by Flow Planner was “PF_AISLEPATH”, which was left to its default layer for this experiment.

The “Color” column corresponded to which color AutoCAD would display the method type if method type was the decided aggregation. The default value of “1” (red) was used.

The “Method Types” interface is displayed in Figure 14. This data table is displayed in Table 19.

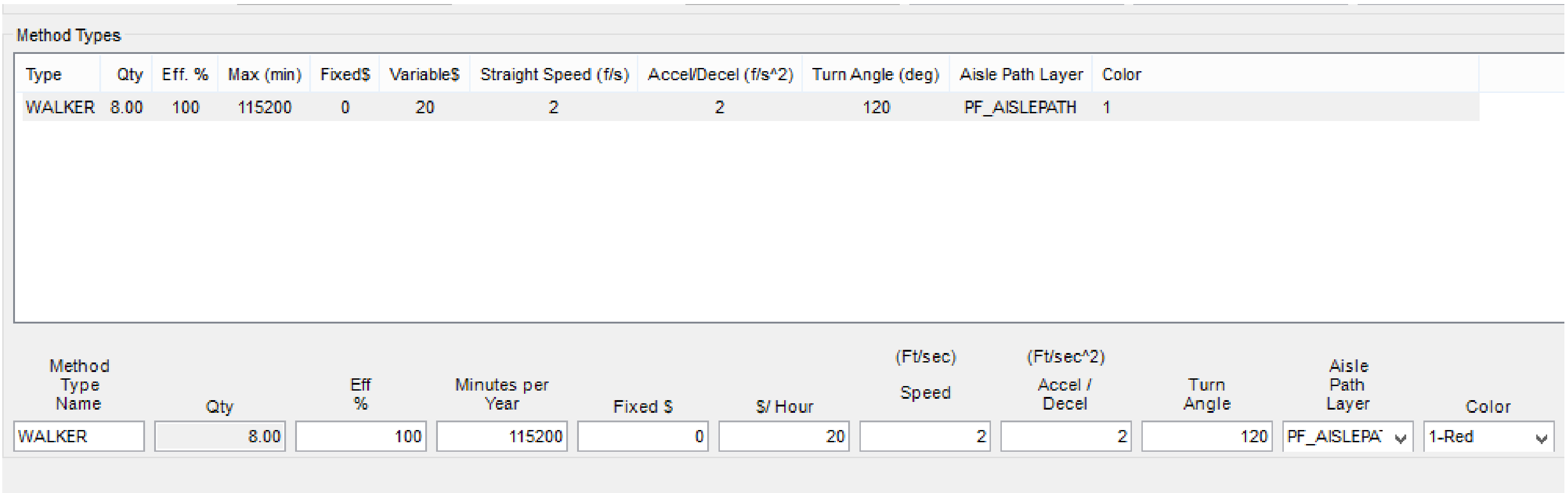


Figure 14. Method Types Interface

Table 19. Method Types Data Table

Type	Qty	Eff. %	Max (min)	Fixed$	Variable$	Straight Speed (f/s)	Accel/Decel (f/s^2)	Turn Angle (deg)	Aisle Path Layer	Color
WALKER	8	100	115200	0	20	2	2	120	PF_AISLEPATH	1

Material Handling Methods

Following method types, the “Material Handling Methods” information was then input in the “Methods” tab. The Material Handling Methods category of the .mhe file required information to be entered in the format displayed in Table 20.

Table 20. Material Handling Information Input Format

Column	**Data Value**
1	Method
2	Calc
3	Qty
4	Type
5	Load (secs)
6	Unload (secs)
7	Start Loc
8	Color

The “Method” column named the main zone in which the material handling method would be picked. As mentioned before, since the three main zones were DSD, retail, and wholesale, this column’s values were constrained to “DSD”, “RETAIL”, and “WHOLE”. These values were used in the upcoming second .csv file in the “Method” column.

The “Calc” (calculation) column corresponded to whether Flow Planner would perform its calculations (e.g. distances, costs, flow diagrams), with the information in the table. Since this information was desired as an output, all columns had the categorical value of “Yes”.

The “Qty” (Quantity) column in the context of this experiment meant how many warehouse main zones have the “Method” name. As there were only one DSD, RETAIL, and WHOLE zones, all quantities were input as “1”.

The “Type” column referenced a method type created in the previous section. As there was only one method type created, “WALKER”, this was the method type used for this material handling method type. The quantitative metrics from the method types section were linked to this material handling method type.

The “Load (secs)” and “Unload (secs)” tell the software how long in seconds it takes to respectively load and unload the material handling method. Previously created processes can be mentioned here instead of using these columns. DSD and RETAIL elected to use the times assigned to the “LOAD” process, while WHOLE elected to use the load time from the “LOAD” process, but use an unload time of 15 seconds.

The “Start Loc” (Starting location) column was left blank as it was not pertinent to this experiment.

The “Color” column designated the color used to draw paths for the material handling method. All material handling methods used the default value of “1” (red).

The material handling methods interface is displayed in Figure 15. This data table is displayed in Table 21.

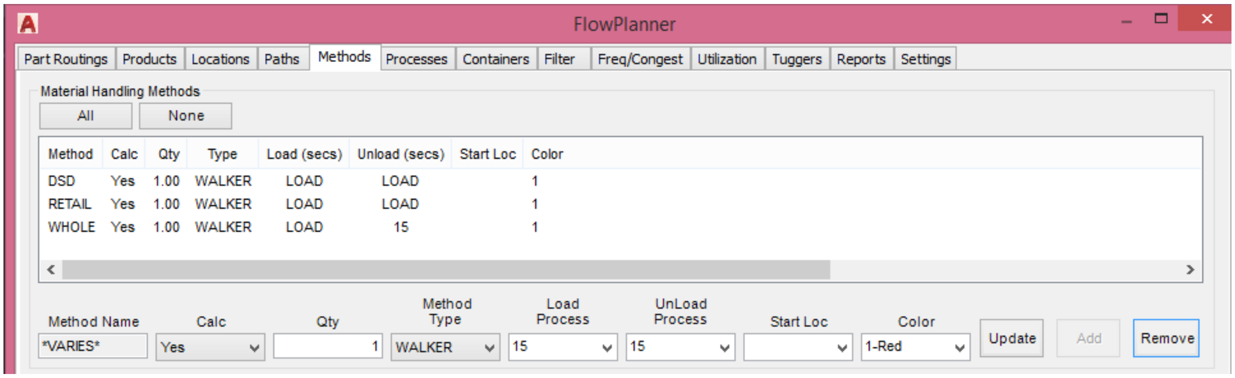


Figure 15. Material Handling Methods Interface

Table 21. Material Handling Methods Data Table

Name	**Calc**	**Qty**	**Type**	**Load (secs)**	**Unload (secs)**	**Start Loc**	**Color**
DSD	Yes	1	WALKER	LOAD	LOAD		1
RETAIL	Yes	1	WALKER	LOAD	LOAD		1
WHOLE	Yes	1	WALKER	LOAD	15		1

Containers

After the material handling information part of the .mhe file, the containers section of the file was created in Flow Planner. First, the “Containers” tab, which stores the information about container type used for product movement throughout the warehouse and container dimensions was clicked. There was only one type of container used here, “CASE,” whose dimensions were not pertinent to this experiment as congestion diagrams for the aisles would not be created. For this reason, leaving the default dimensions of the container to 1-inch x 1-inch x 1-inch was sufficient.

The case container was determined to have full and empty stack quantities of 1, meaning that only 1 case can be carried along the paths joining the Locations to the center aisle lines at a time. Last, color was left at the default value “1” (red) as container would not be used as an aggregation technique. Group and description were left blank as they were not pertinent to this experiment.

The containers interface is dispalyed in Figure 16, and this data table is displayed in Table 22.

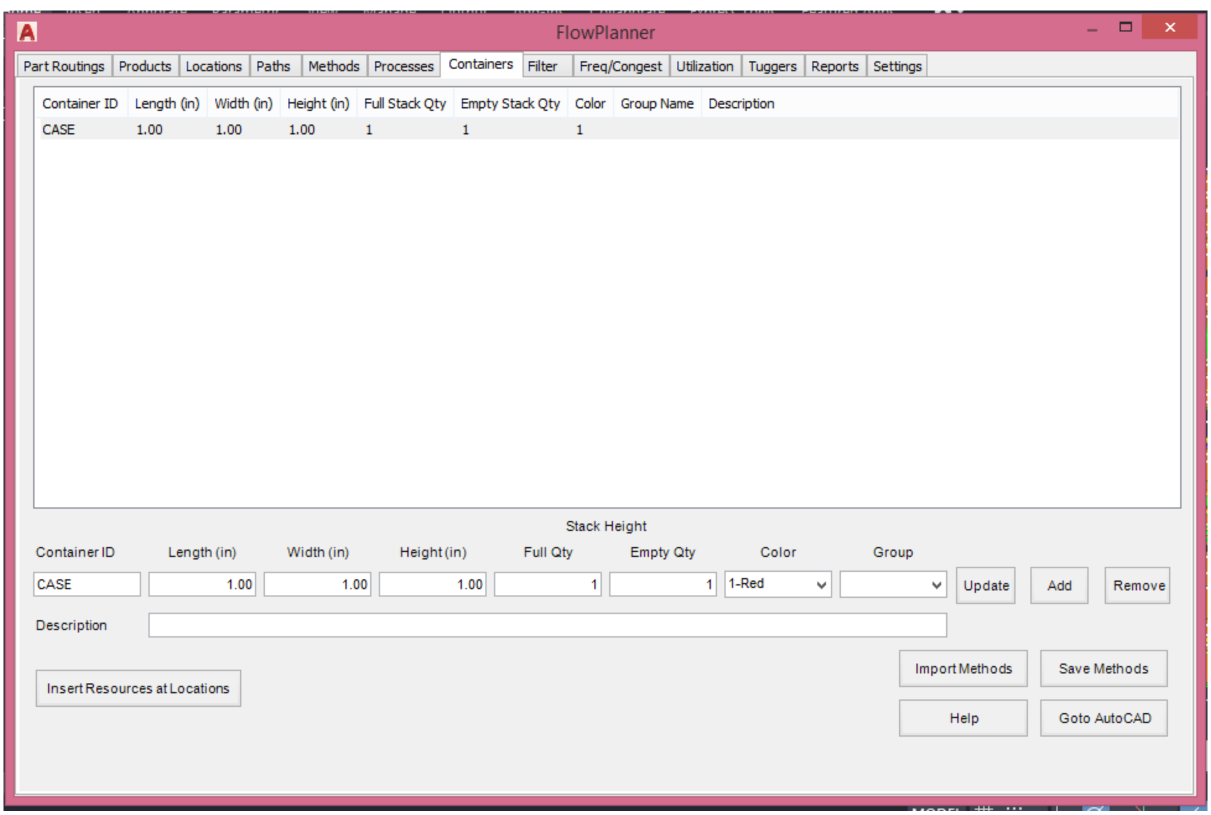


Figure 16. Containers Interface

Table 22. Containers Data Table

Name	Length	Width	Height	Full Qty	Empty Qty	Color
CASE	1	1	1	1	1	1

The second .csv file

The last file type created was a second .csv file, used to store part routings information. A company provided fifteen different historical pick lists to be used in the analysis of different warehouse layout designs. These fifteen pick lists had product order quantities of 27, 37, 32, 42, 18, 19, 12, 17, 11, 13, 9, 15, 13, 16, and 21 products, corresponding to 302 total products across all orders. Since Flow Planner reads each row as a product order, 302 total rows were needed under the column heading row to encompass all of the historical data for the warehouse layout analysis.

The Part Routings category of the .csv file required information to be entered in the format displayed in Table 23.

Table 23. Part Routings Input Format

Column	Data Value
1	*ID
2	Part
3	Container
4	ContQty
5	From
6	Stage
7	To
8	ETD
9	Direction
10	Load
11	Unload
12	Route

A Microsoft Excel table was created which had twelve columns, with each row representing a different product from a customer's order. The resulting Excel file was 12 columns by 303 rows, including the first row of column headings.

As this was a non-standard use of the tuggers module, a strategy of defining the "Stage" and "To" locations for the deliveries file while leaving the "From" field blank communicated to the software to read this file to mean start at the "Stage" location (which remained constant across all rows for a pick list), travel to all of the “To” Locations, and return to the “Stage” location. The significance of the other columns is explained below.

The “*ID” column was used to provide a unique numerical identifier associated with each different delivery of a product to a location. The first row had an *ID value of “1”, and this column increased by 1 for each row, i.e. 1, 2, 3, 4, 5, … , n. In the data provided by the company, 302 products needed picking so the final value in this column was “302”.

The “Part” column was used to identify the product. The same six-digit item number from the pick list was copied over here. This is different from the *ID column as there were instances where the same product was used as a part of two different orders in the data file. For instances such as these, the products had different *ID numbers but identical part numbers. Examples of part numbers representative to those provided used for the experiment were 310565, 305644, and 751008. Each of these numbers was used to identify a unique product.

The “Container” column was used to name which storing container was used to transport the parts. Examples used for analysis in Flow Planner include pallet, tub, barrel, rack, case, etc. This field is important for congestion diagrams as the data in this column corresponded with the capacity pickers had for carrying containers, which affected the total picking time if multiple containers were ordered. However, this experiment did not use congestion diagrams. In the data provided by the company, “CASE” was designated as the container type for all 302 products.

The “ContQty” (Container Quantity) column was used to denote the order quantity of a product number. This column’s values were constrained to real numbers greater than 0. In the data provided by a company, ContQty values were observed to be as low as “1” product and as high as “30” products.

The "From" column was left blank in the data provided by the company. This column could be used to store a location if the picking order needed to be completed in a specific order. Occupying this column with a value was expected to decrease the optimality for the routing path provided by Flow Planner.

The "Stage" column designated the dock to which all the picked products would be brought at the completion of the pick list. This column's information became more necessary as the number of shipping docks in a warehouse increased. Since there were three different main docks in the warehouse provided by the company, this column had one of the three docks ("DSD_DOCK", "WHL_DOCK", and "RET_DOCK") listed here depending on which shipping dock was selected from the zoned customer order areas.

The "To" column was used to designate the location of the particular product in the warehouse. These locations were placed in the drawing as text for the Flow Planner software to locate and create an x and y coordinate. This column was necessary to provide pickers with the locations of the products in the pick lists and to determine optimal path routing for the picking operation.

The "ETD" (estimated time of delivery) column was originally created to denote the exact time at which a product needed to be delivered from the tugger material handling equipment to the "Stage" location. This column value held integer values to represent the hour or hold values with one decimal point, with each increasing decimal point adding six minutes to the estimated time for delivery. However, to determine optimal routing paths, the tuggers file type can use this column to instead communicate which pick list was getting picked. To do this, all products of the same pick list received the same value which told the software to have all of the products in an order delivered to the user-designated dock at the same time. The values used in the company provided data ranged from “1” to “4” for the DSD zone, “1” to “4” for the retail zone, and “1” to “7” for the wholesale zone, with each number denoting the pick list to which a product belonged.

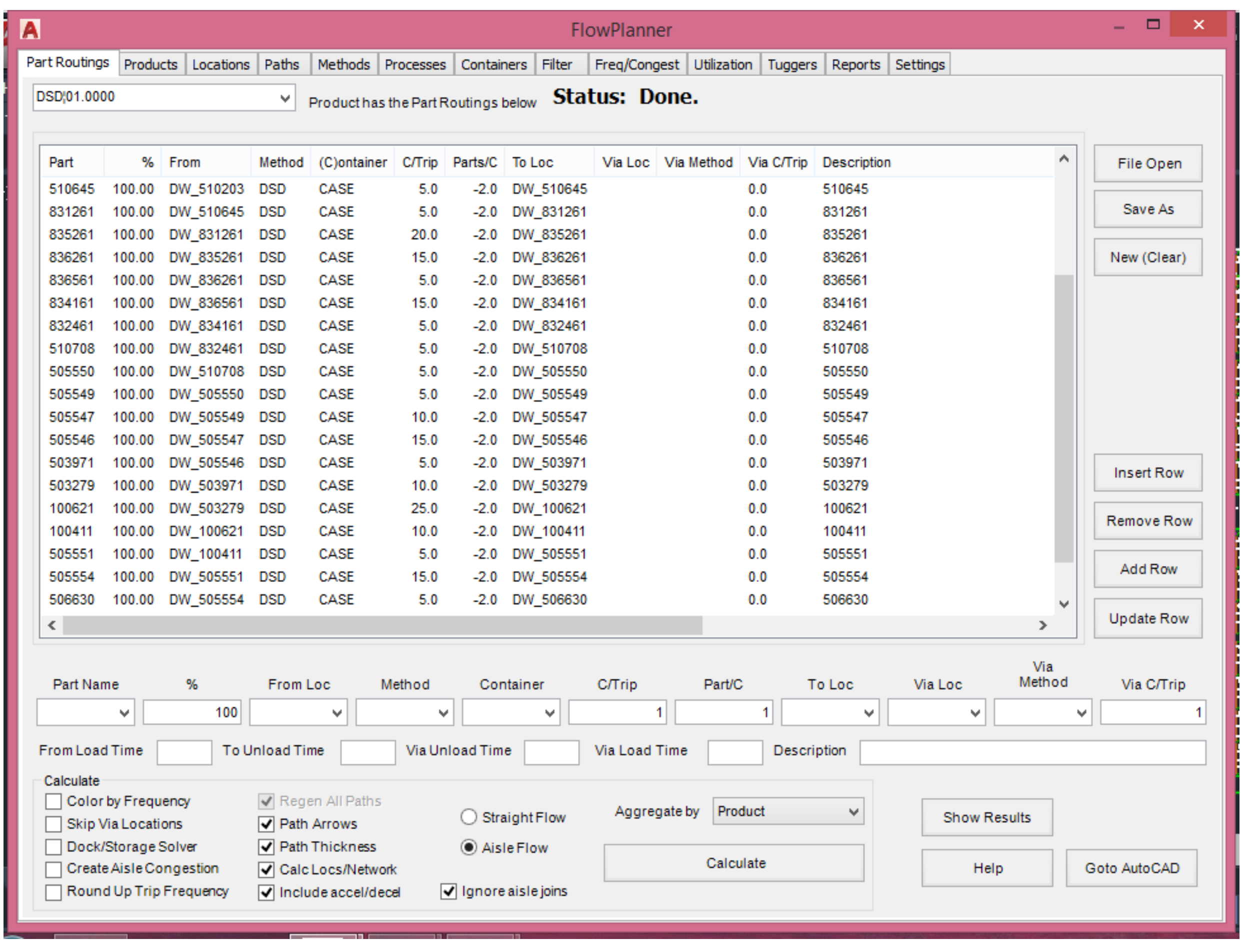
The “Direction” column tells Flow Planner the delivery direction. Only two values were allowed in this field. “1”, meaning the container was picked up at the “From” location and dropped off at the “TO” location, or, “-1”, meaning the container was picked up at the “TO” location and dropped off at the “From” location. This information was necessary for Flow Planner to account for the additional operation of returning empty containers if products held directional values of “-1”. In this experiment, because the products were all part of a pick list, and not dropped off at the product’s location, this column’s values were all “1”s.

The “Load” column was optional, which could have been used to designate the time in seconds it takes a worker to load the container for this product. Filling in values for this column is expected to provide a more reliable estimation for the pick time of a pick list. There was also an option in the Flow Planner interface to input a standard load time for all containers regardless of product. This column was left blank in the data provided by the company, as the alternative of defining load and unload times by material handling method was elected instead.

Similarly, the “Unload” column was optional, which could have been used to designate the time in seconds it takes a worker to unload the container for this product. Filling in values for this column is expected to provide a more reliable estimation for the pick time of a pick list. There was also an option in the Flow Planner interface to input a standard unload time for all containers regardless of product. This column was also left blank in the data provided by the company, as the alternative of defining load and unload times by material handling method was also elected instead.

The “Route” column was also optional, which was used in this experiment to assign a main zone to the particular delivery row used to designate which route a particular set of pick lists belonged. Since the company whose data was provided was zoned into three main areas, there were three routes provided. Each route was listed in alphabetical characters. These routes were “DSD”, “RETAIL”, and “WHOLE”. This also indicated which pick lists should be picked by which route drivers.

The part routings interface is displayed in Figure 17. A portion of this data table is shown in Table 24. This second .csv file’s data table is displayed in its entirety in the Appendix.



Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
510645	100.00	DW_510203	DSD	CASE	5.0	-2.0	DW_510645			0.0	510645
831261	100.00	DW_510645	DSD	CASE	5.0	-2.0	DW_831261			0.0	831261
835261	100.00	DW_831261	DSD	CASE	20.0	-2.0	DW_835261			0.0	835261
836261	100.00	DW_835261	DSD	CASE	15.0	-2.0	DW_836261			0.0	836261
836561	100.00	DW_836261	DSD	CASE	5.0	-2.0	DW_836561			0.0	836561
834161	100.00	DW_836561	DSD	CASE	15.0	-2.0	DW_834161			0.0	834161
832461	100.00	DW_834161	DSD	CASE	5.0	-2.0	DW_832461			0.0	832461
510708	100.00	DW_832461	DSD	CASE	5.0	-2.0	DW_510708			0.0	510708
505550	100.00	DW_510708	DSD	CASE	5.0	-2.0	DW_505550			0.0	505550
505549	100.00	DW_505550	DSD	CASE	5.0	-2.0	DW_505549			0.0	505549
505547	100.00	DW_505549	DSD	CASE	10.0	-2.0	DW_505547			0.0	505547
505546	100.00	DW_505547	DSD	CASE	15.0	-2.0	DW_505546			0.0	505546
503971	100.00	DW_505546	DSD	CASE	5.0	-2.0	DW_503971			0.0	503971
503279	100.00	DW_503971	DSD	CASE	10.0	-2.0	DW_503279			0.0	503279
100621	100.00	DW_503279	DSD	CASE	25.0	-2.0	DW_100621			0.0	100621
100411	100.00	DW_100621	DSD	CASE	10.0	-2.0	DW_100411			0.0	100411
505551	100.00	DW_100411	DSD	CASE	5.0	-2.0	DW_505551			0.0	505551
505554	100.00	DW_505551	DSD	CASE	15.0	-2.0	DW_505554			0.0	505554
506630	100.00	DW_505554	DSD	CASE	5.0	-2.0	DW_506630			0.0	506630

Figure 17. Part Routings Interface

Table 24. Portion of the Second .csv File

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
1	506632	CASE	5		DSD_DOCK	DW_506632	1	1			DSD
2	506952	CASE	30		DSD_DOCK	DW_506952	1	1			DSD
3	506953	CASE	30		DSD_DOCK	DW_506953	1	1			DSD
4	509625	CASE	5		DSD_DOCK	DW_509625	1	1			DSD
5	100411	CASE	10		DSD_DOCK	DW_100411	1	1			DSD
6	100621	CASE	25		DSD_DOCK	DW_100621	1	1			DSD
7	505554	CASE	15		DSD_DOCK	DW_505554	1	1			DSD
8	510203	CASE	5		DSD_DOCK	DW_510203	1	1			DSD
9	509046	CASE	5		DSD_DOCK	DW_509046	1	1			DSD
10	503971	CASE	5		DSD_DOCK	DW_503971	1	1			DSD
11	503279	CASE	10		DSD_DOCK	DW_503279	1	1			DSD
12	507087	CASE	5		DSD_DOCK	DW_507087	1	1			DSD
13	831261	CASE	5		DSD_DOCK	DW_831261	1	1			DSD
14	836561	CASE	5		DSD_DOCK	DW_836561	1	1			DSD
15	832461	CASE	5		DSD_DOCK	DW_832461	1	1			DSD
16	834161	CASE	15		DSD_DOCK	DW_834161	1	1			DSD
17	835261	CASE	20		DSD_DOCK	DW_835261	1	1			DSD

Table 24 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
18	836261	CASE	15		DSD_DOCK	DW_836261	1	1			DSD
19	505546	CASE	15		DSD_DOCK	DW_505546	1	1			DSD
20	505550	CASE	5		DSD_DOCK	DW_505550	1	1			DSD
21	505547	CASE	10		DSD_DOCK	DW_505547	1	1			DSD
22	505549	CASE	5		DSD_DOCK	DW_505549	1	1			DSD
23	505551	CASE	5		DSD_DOCK	DW_505551	1	1			DSD
24	510645	CASE	5		DSD_DOCK	DW_510645	1	1			DSD
25	510708	CASE	5		DSD_DOCK	DW_510708	1	1			DSD
26	506630	CASE	5		DSD_DOCK	DW_506630	1	1			DSD
27	509042	CASE	15		DSD_DOCK	DW_509042	1	1			DSD
30	505548	CASE	4		DSD_DOCK	DW_505548	2	1			DSD

After the drawing had been prepared and the electronic files created, Flow Planner was able to design the optimal route and perform calculations necessary for providing performance metrics of the tested warehouse layout. This information is covered in phase two–picking.

(2) Picking

The picking phase for the automated method's half of this experiment consisted of running the simulation.

Load electronic inputs

This step began in the Flow Planner interface. Once in the Flow Planner interface, the default selected tab from the top of the window was "Part Routings". For this specific analysis, the "Tuggers" tab needed to be selected since that is the module used for this scenario. Once the "Tuggers" tab was selected, the next step was to click the "Import Deliveries" button in the upper-left corner of the Flow Planner interface. This loaded another window where the part deliveries, methods, containers, processes, location group, and route assignments were imported (the .csv, .mhe, and .loc files). This window is displayed in Figure 18.

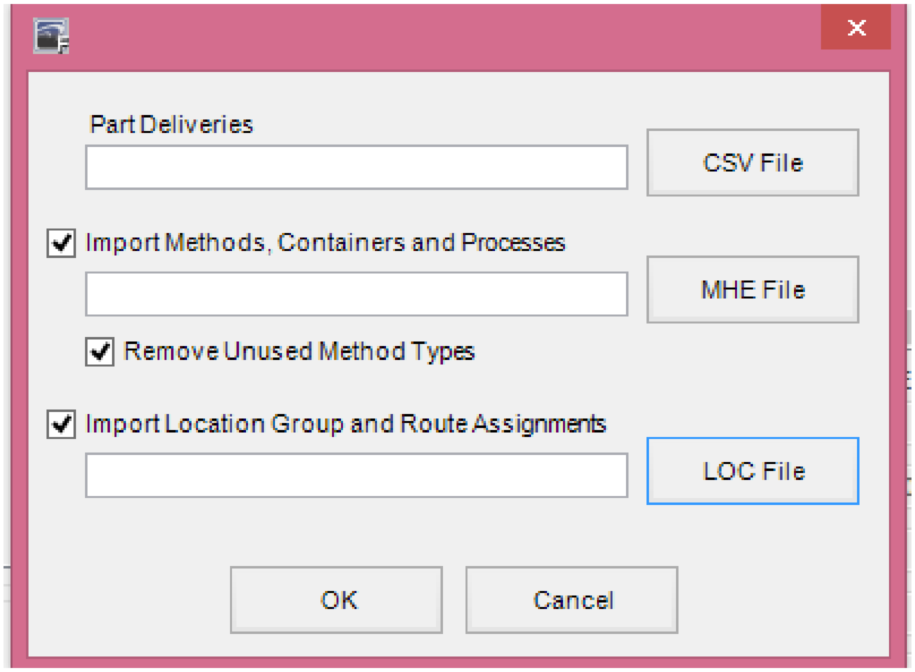


Figure 18. Window to Load Electronic Files

The user should first click the “CSV File” button next to the “Part Deliveries” input box and locate the saved comma-separated values file on the user’s computer, which was created in the “Creating readable data files” phase. The user should then click the “MHE File” button and locate the created MHE file. Last, the user should click the “LOC File” button and locate the LOC file from the user’s computer.

After all three files had been loaded into the import windows, clicking the “OK” button in the bottom left corner resulted in Flow Planner successfully loading the different files’ information into its interface. This step was completed as soon as the “Status” display area gave a reading of “Done.”

Generate routings

After importing all of the relevant information, the next step was to generate the tuggers routes which consider the constraints entered from the input files and order the products in an order which a warehouse picker should pick the products in order to deliver the full pick list to the designated dock in the shortest time. This step is also completed in the tuggers tab.

Proplanner recommended first generating routes by selecting the less-realistic "Distance Type" of the "Straight Flow" option instead of the more-realistic "Aisle Flow" option. The straight flow option ignored all lines drawn in the AutoCAD drawing and allowed transportation in a straight line while ignoring physical barriers such as walls, racking, and inaccessible areas. Generating initial tugger routes this way allowed for validation of data by ensuring all products' locations are approximately in the correct areas and for the joining of locations to aisles to occur. These routes were not included in the analysis. After generating the straight flow routes, the user clicked on the "Paths" tab and clicked the "Join Locs to Aisle" button located in the "Aisle Paths" area to link all travel locations to aisles capable of travel.

Generate flow diagrams

The tuggers tab generated the routings based on the information imported into Flow Planner. The next step was to create the flow diagrams–lines drawn in the AutoCAD drawing which instructed the picker which route to take to pick which goods in which order if the order was placed. The flow diagrams added a visual display for the decision makers of the group and allowed for calculations on performance metrics to take place for the routes. To finish the simulation, the user switched from the tuggers tab to the "Part Routings" tab, and selected the following options under the "Calculate" settings: "Path Arrows", "Calc Locs/Network", "Include accel/decal", "Straight Flow", and "Aggregated by" "Product". Selecting the path arrows option creates the flow lines in AutoCAD with arrows at the end of the line segments, indicating directional travel for a route. Selecting to include accelerations and decelerations provides a more accurate pick time as it is not feasible for material handling equipment to make turns without initially decreasing speed while entering a turn followed by increasing speed while exiting a turn. As more corners and stops are required for the picking, selecting this option approximates the simulated picking time closer to the actual picking time. Cost will also be reflected in the longer pick times associated with accelerations and decelerations, but travel distance should not observe any change.

The straight flow generated for the fifteen pick lists is displayed in Figure 19.

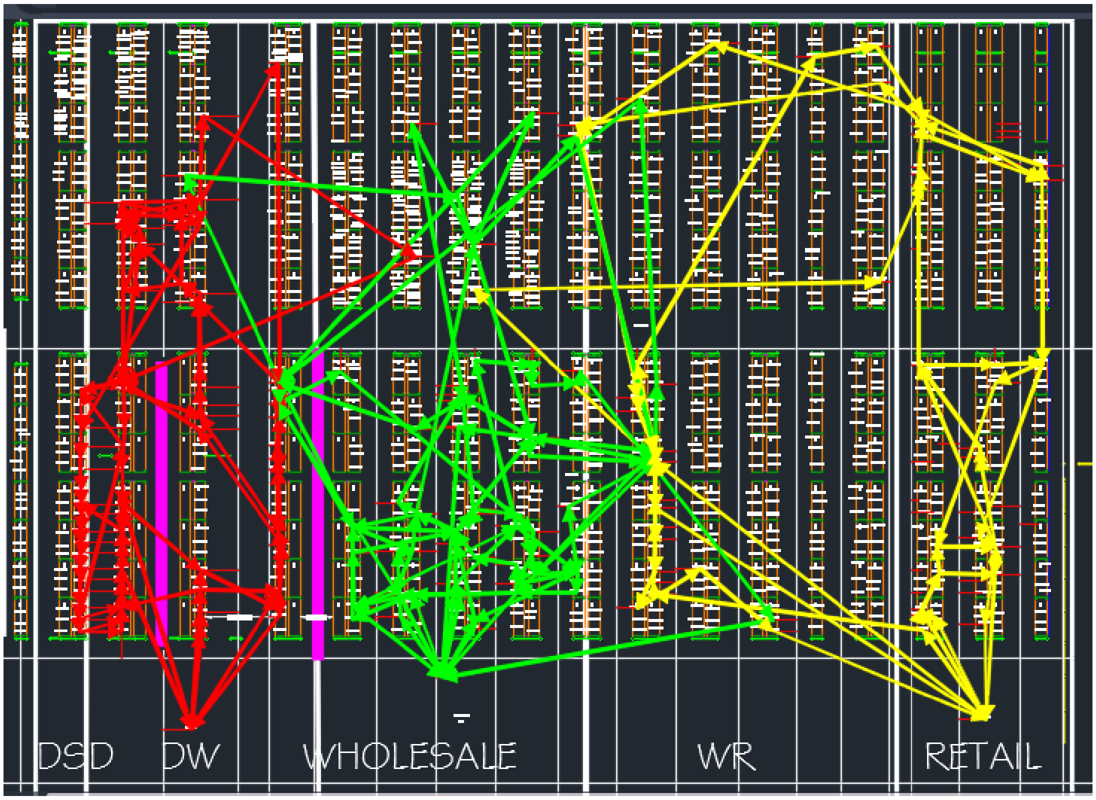


Figure 19. Straight Flow for All Pick Lists (15)

After verifying no obvious mistakes were made using the straight flow technique, the user switched back to the tuggers tab and changed the distance type from straight flow to aisle flow which allowed for routes capable of analysis to be generated. The “TSP Algorithm” radio button was changed from “Fast” to “Accurate” for increased accuracy as these results would be used for the warehouse layout design analysis. The “Staging Time” was set to “0” seconds as the time for staging activities was not pertinent to this experiment. Clicking the “Generate Routes” button was the last step to generate the routes.

After clicking the generate routes button with the new settings, the routes were regenerated. This time, the routing was restricted to travel in the center aisle lines and the aisle join lines from the center aisle lines to the product locations, and accounted for obstacles in the drawing which material handling equipment would have to avoid in the event of an actual picking occurring. The simulation run time for aisle flow took longer than straight flow but was able to produce routes that were capable of travel. The result was a picking order assigned to all pick list routes to minimize total picking time in the warehouse layout drawing.

To finish the simulation, the user switched from the tuggers tab to the “Part Routings” tab, and changed the “Calculate” settings from “Straight Flow” to “Aisle Flow”. The user clicked the “Calculate” button to put into sequence the final action for completing the simulation. Once the calculations terminate, a “Results” window appeared over the Flow Planner interface, and the run time of the simulation was considered over.

The aisle flow generation is displayed in Figure 20.

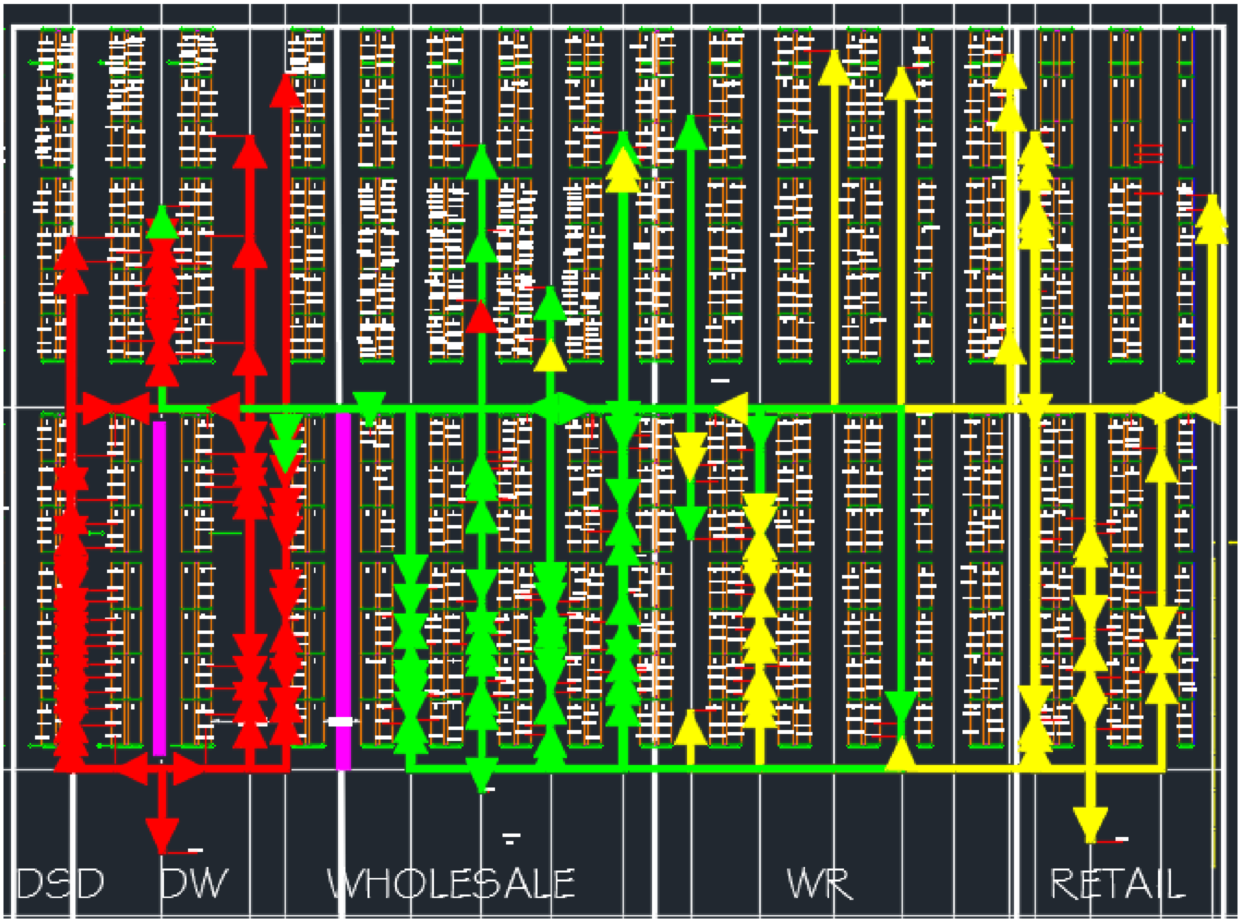


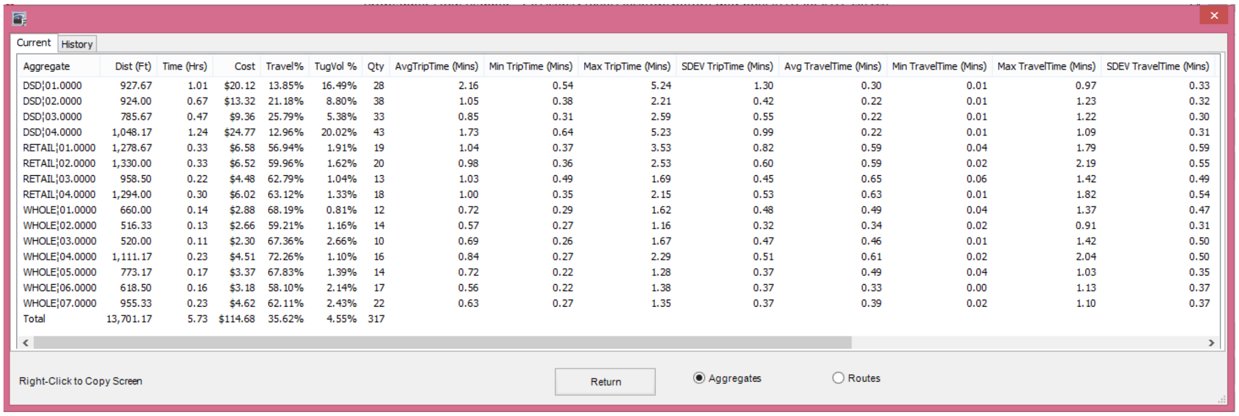
Figure 20. Aisle Flow for All Pick Lists (15)

(3) Post-picking

The final phase of the automated technique's process was the post-picking analysis phase. This phase consisted of the software calculating all necessary quantitative metrics and creating all visual displays used to aid the decision-making team in determining the value of a warehouse layout drawing. The analysis for the automated technique was divided into eight categories: The initial results window, part routings tab, paths tab, filter tab, utilization tab, tuggers tab, reports tab, and the AutoCAD drawing.

Initial results window

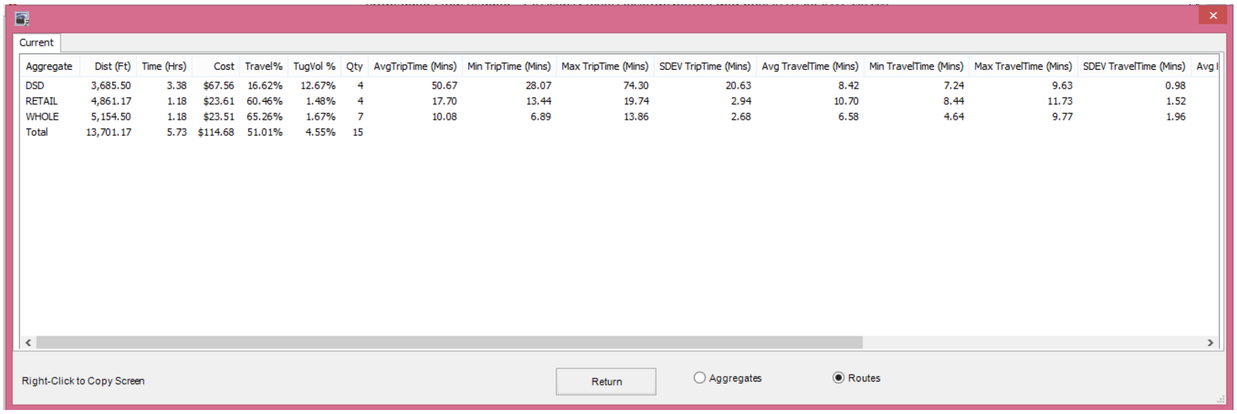
The first observation the simulator would notice is the "Results" window, which can be viewed by the default "Aggregates" (pick lists), or "Routes" (main zones) if the radio button is changed at the bottom of this window. The initial results window hosts a table displaying quantitative performance results for the picking operation for the theoretical warehouse layout design. The quantitative performance data includes the distance traveled, time for the trip, cost for the trip, percent of time spent in the picking operation dedicated only to travel as opposed to load and unload times, quantity of items in each pick list, average trip time, minimum trip time, maximum trip time, standard deviation of the trip times, average travel time, minimum travel time, maximum travel time, standard deviation of the trip times, average handle time, minimum handle time, maximum handle time, standard deviation of the trip handle times, and how many containers were used with each pick list and main zone or just main zone–along with the totals for all columns. A portion of this window grouped by pick list and by main zone can be seen in Figures 21 and 22. These data tables are shown in their entirety in the Appendix.


Current History

Aggregate	Dist (Ft)	Time (Hrs)	Cost	Travel%	TugVol %	Qty	AvgTripTime (Mins)	Min TripTime (Mins)	Max TripTime (Mins)	SDEV TripTime (Mins)	Avg TravelTime (Mins)	Min TravelTime (Mins)	Max TravelTime (Mins)	SDEV TravelTime (Mins)
DSD¦01.0000	927.67	1.01	$20.12	13.85%	16.49%	28	2.16	0.54	5.24	1.30	0.30	0.01	0.97	0.33
DSD¦02.0000	924.00	0.67	$13.32	21.18%	8.80%	38	1.05	0.38	2.21	0.42	0.22	0.01	1.23	0.32
DSD¦03.0000	785.67	0.47	$9.36	25.79%	5.38%	33	0.85	0.31	2.59	0.55	0.22	0.01	1.22	0.30
DSD¦04.0000	1,048.17	1.24	$24.77	12.96%	20.02%	43	1.73	0.64	5.23	0.99	0.22	0.01	1.09	0.31
RETAIL¦01.0000	1,278.67	0.33	$6.58	56.94%	1.91%	19	1.04	0.37	3.53	0.82	0.59	0.04	1.79	0.59
RETAIL¦02.0000	1,330.00	0.33	$6.52	59.96%	1.62%	20	0.98	0.36	2.53	0.60	0.59	0.02	2.19	0.55
RETAIL¦03.0000	958.50	0.22	$4.48	62.79%	1.04%	13	1.03	0.49	1.69	0.45	0.65	0.06	1.42	0.49
RETAIL¦04.0000	1,294.00	0.30	$6.02	63.12%	1.33%	18	1.00	0.35	2.15	0.53	0.63	0.01	1.82	0.54
WHOLE¦01.0000	660.00	0.14	$2.88	68.19%	0.81%	12	0.72	0.29	1.62	0.48	0.49	0.04	1.37	0.47
WHOLE¦02.0000	516.33	0.13	$2.66	59.21%	1.16%	14	0.57	0.27	1.16	0.32	0.34	0.02	0.91	0.31
WHOLE¦03.0000	520.00	0.11	$2.30	67.36%	2.66%	10	0.69	0.26	1.67	0.47	0.46	0.01	1.42	0.50
WHOLE¦04.0000	1,111.17	0.23	$4.51	72.26%	1.10%	16	0.84	0.27	2.29	0.51	0.61	0.02	2.04	0.50
WHOLE¦05.0000	773.17	0.17	$3.37	67.83%	1.39%	14	0.72	0.22	1.28	0.37	0.49	0.04	1.03	0.35
WHOLE¦06.0000	618.50	0.16	$3.18	58.10%	2.14%	17	0.56	0.22	1.38	0.37	0.33	0.00	1.13	0.37
WHOLE¦07.0000	955.33	0.23	$4.62	62.11%	2.43%	22	0.63	0.27	1.35	0.37	0.39	0.02	1.10	0.37
Total	13,701.17	5.73	$114.68	35.62%	4.55%	317								

Right-Click to Copy Screen Return Aggregates Routes

Figure 21. Portion of the Results Window by Aggregates



Current

Aggregate	Dist (Ft)	Time (Hrs)	Cost	Travel%	TugVol %	Qty	AvgTripTime (Mins)	Min TripTime (Mins)	Max TripTime (Mins)	SDEV TripTime (Mins)	Avg TravelTime (Mins)	Min TravelTime (Mins)	Max TravelTime (Mins)	SDEV TravelTime (Mins)	Avg I
DSD	3,685.50	3.38	$67.56	16.62%	12.67%	4	50.67	28.07	74.30	20.63	8.42	7.24	9.63	0.98	
RETAIL	4,861.17	1.18	$23.61	60.46%	1.48%	4	17.70	13.44	19.74	2.94	10.70	8.44	11.73	1.52	
WHOLE	5,154.50	1.18	$23.51	65.26%	1.67%	7	10.08	6.89	13.86	2.68	6.58	4.64	9.77	1.96	
Total	13,701.17	5.73	$114.68	51.01%	4.55%	15									

Figure 22. Portion of the Results Window by Routes

This simulation would likely be run with multiple layout alternatives to determine which layout would provide the company with superior value. Different layouts would produce different performance metrics for the columns in the results' window tables. A group can look at total time spent picking as a prioritized metric while looking at the proportion of time spent traveling (a non-value added activity) to attempt to further decrease total picking time by editing the layout design. This column can also provide the team with information as to whether prioritizing process improvements toward reducing total travel time or reducing picking time would be in the company's best interest.

The "Qty" column in the "Aggregates" window represents how many stops were made for each pick list (this includes stops for picking products and the final stop of returning to the dock). The same "Qty" column in the "Routes" window represents how many pick lists exist for each main zone (4 for the DSD zone, 4 for the RETAIL zone, and 7 for the WHOLE zone).

For a further breakdown of how time was utilized, charts can be accessed in the utilization tab–as discussed below.

The quantitative metrics from the layout design analysis can be saved, and after some locations are moved, the model can be run again to generate the quantitative metrics associated with the different layout design alternative. All of the design iteration's performance metrics are stored in the "History" tab of the calculation results window. The history tab allows for direct comparisons across multiple metrics quickly–a positive quality about incorporating an automated method, as mentioned previously. This window can be shown to a group of people to aid in converging on an optimal layout. The history tab from the initial results window is displayed in Figure 23.

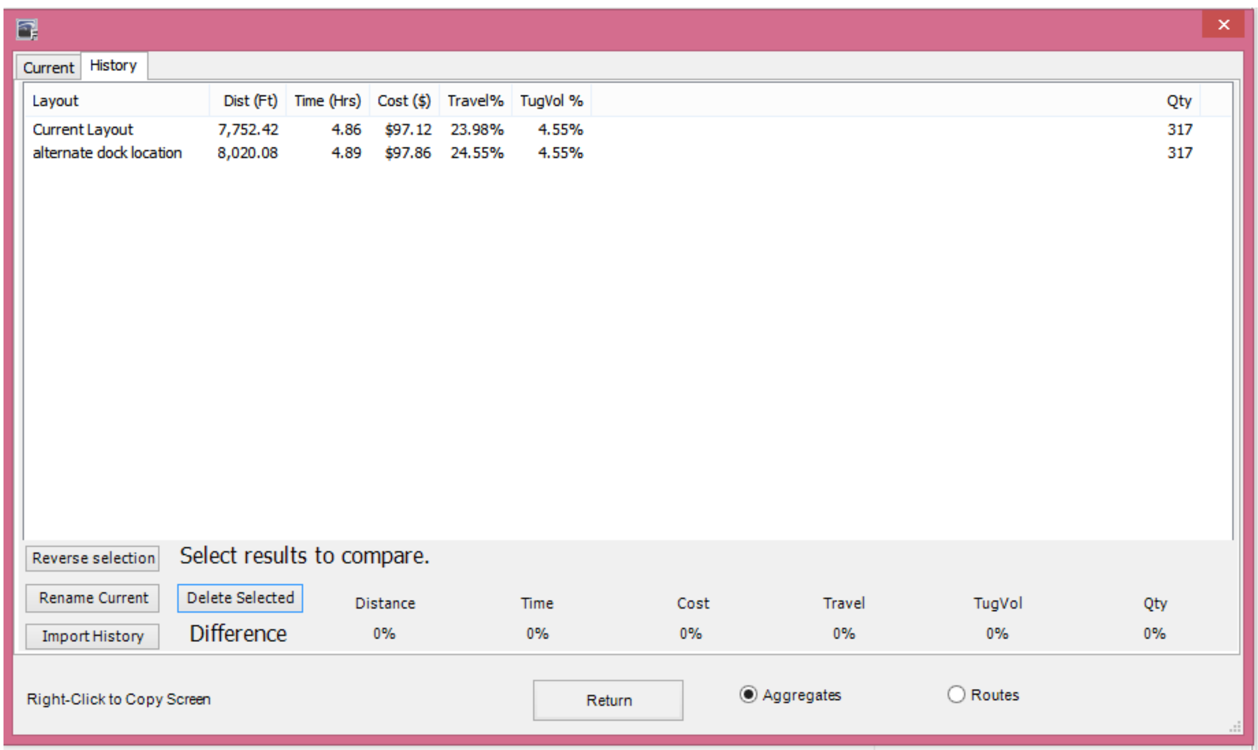


Figure 23. History Tab from the Results Window

Part Routings tab

Clicking the “Return” button in the results window will take the user back to the main Flow Planner interface, in the “Part Routings” tab. The part routings window is displayed in Figure 24.

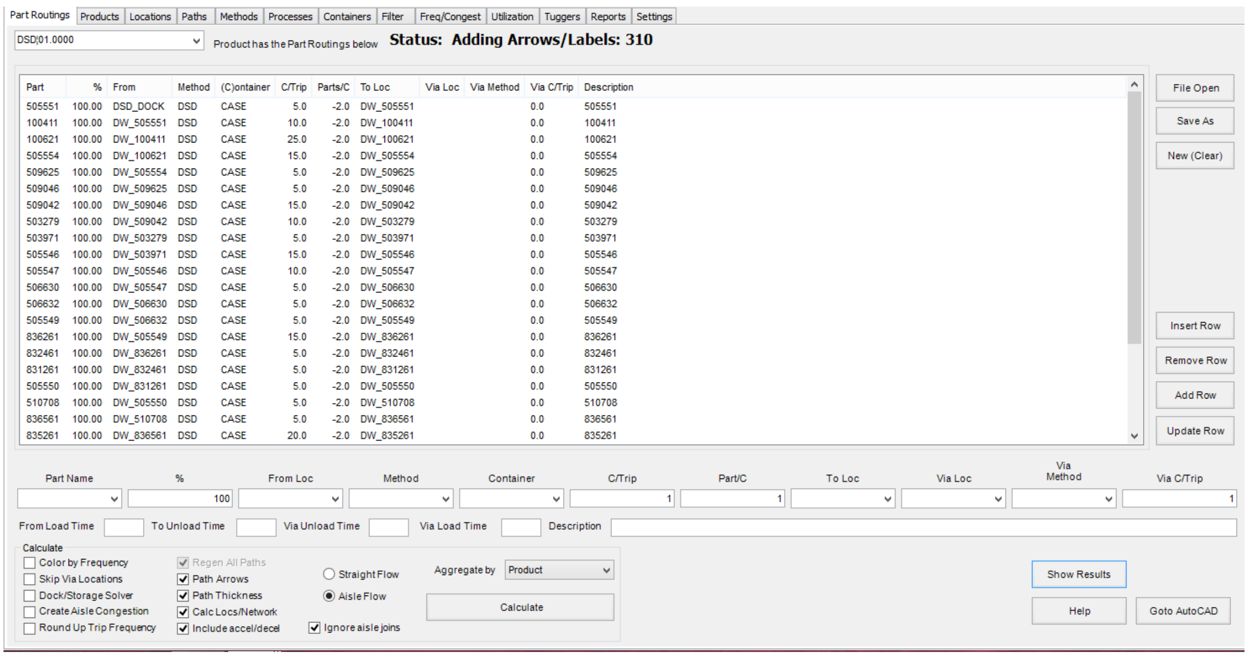


Figure 24. Part Routings Tabular Display of Generated Routes

Here, the simulator can observe the generated flow routes in a tabular format. The first pick list, “DSD 1” (the first historical pick list from the DSD zone route) is the default route shown, but the pick list can be changed by selecting a different pick list from the drop-down box in the upper left corner of the part routings window.

The pick list’s data table provides a data entry (row) for every stop made (load) in a pick. Each row provides information on which product was picked from which location using which container type, how many containers, and where the next picking location is. All of these rows are automatically sorted in chronological visitation order.

The table can be read as the picker starting at “DSD_DOCK” (row 1 under the “From” column) and traveling to the text location in the drawing “DW_506952” (under the “To Loc” column) to pick 30 cases of the product 506952. Following this pick, the picker would next travel to “DW_506953” (row 2 under the “To Loc” column) to pick 30 cases of that product. The final entry on the pick list (not shown in Figure 24) tells the picker to return to the dock “DSD_DOCK” (listed in the final row under the “To Loc” column).

This pick list makes one delivery of twenty-seven items to one location (the dock). This is read in the final row which uses a part number of “RETURN” which tells the software to return to the initial dock, in this case, “DSD_DOCK”. The container name is listed as “!NA” as this value communicates to the software to ignore the load/unload time but to calculate the distance and walk time. A value of “-2” in the “Parts/C” column communicates to the software that the stop is an unload at the “TO” location. Since all products had the same “ETD” value in the tuggers tab, this delivery delivered all products at the same time to the final staging area (“DSD_DOCK”).

The part routings data tables are shown in their entirety for all fifteen pick lists in the Appendix.

Paths tab

The data table in the paths tab, which populated after the simulation, is filled with quantitative metrics on every path traveled throughout the simulation. Each path lists the pick list in which the path was traveled, origin point, destination, distance, travel time, load/unload time, and cost. Figure 25 displays a portion of the data table in an interface format, with the data table provided in its entirety in the Appendix.

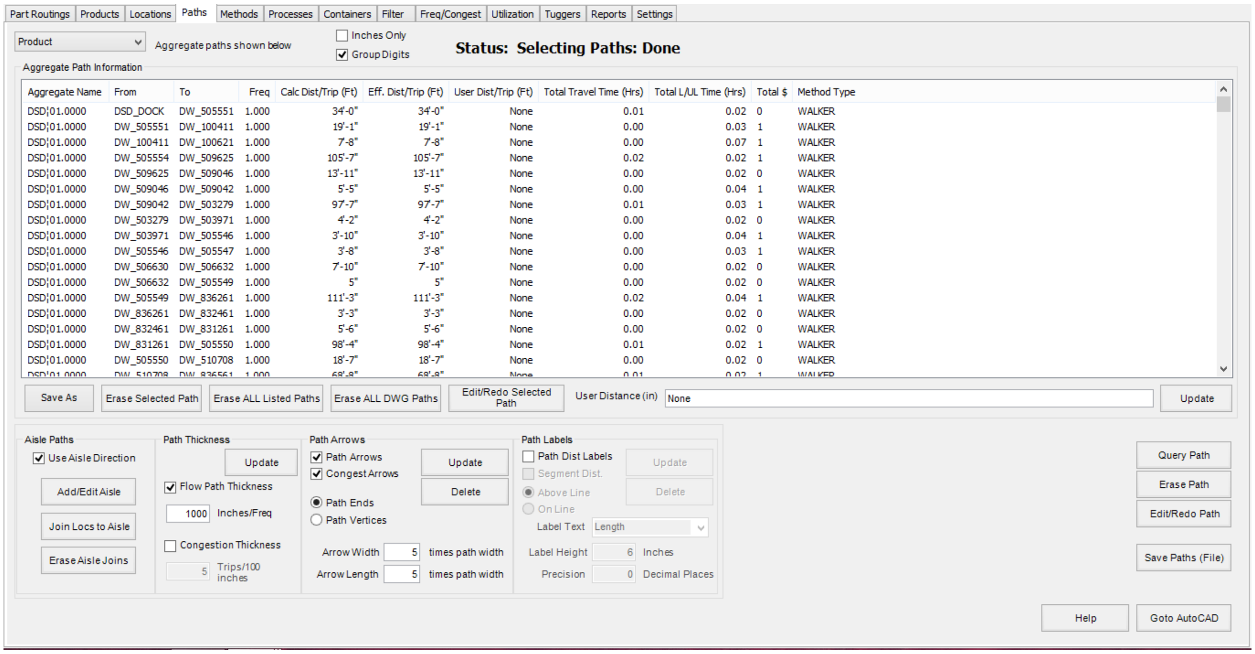
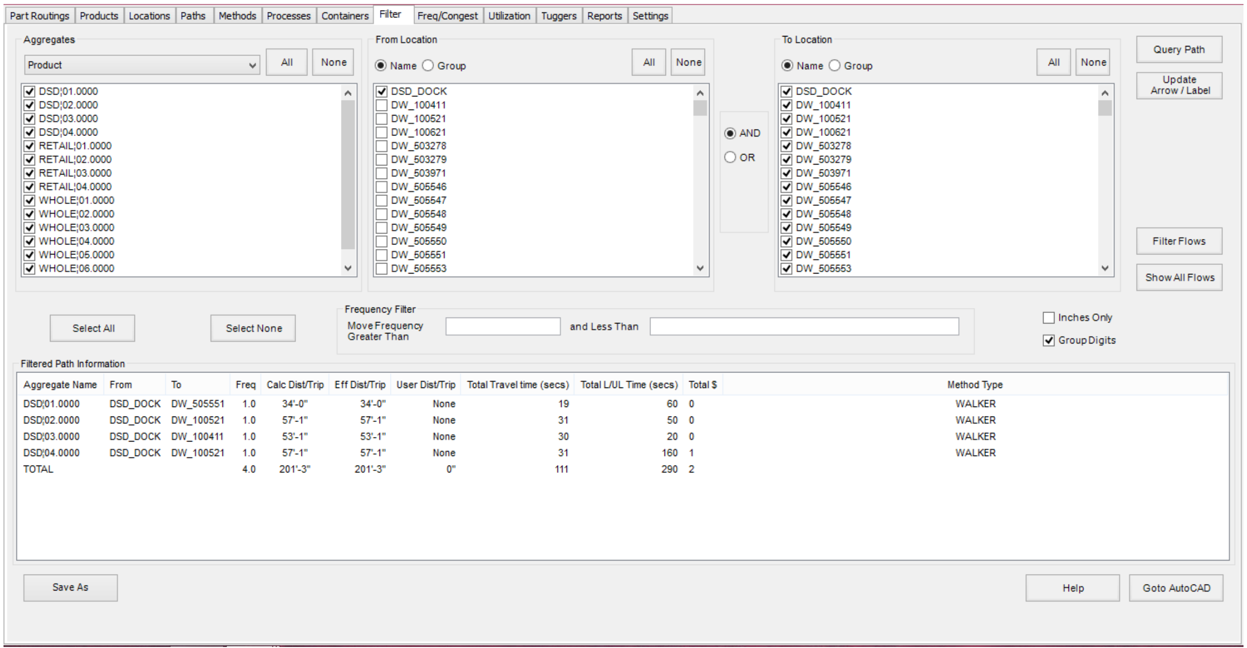


Figure 25. Portion of the Paths Tab

Filter tab

The filter tab allows for a subset of the population's results to be displayed either visually or in the format of a data table–effectively, hiding specific data points.

This process begins with the user clicking the "Filter" tab in the Flow Planner interface. Once in the filter tab, the user would select pick list(s), from location(s), and/or to location(s) of interest and click the "Filter Flows" button to get the data filtered to the chosen inputs. For example, if the user wanted to see a quantitative report and visual routing in the AutoCAD drawing for all picking that originated from the "DSD_DOCK", then Flow Planner would output the data table shown in Figure 26 and the flow diagram displayed in Figure 27.



Aggregate Name	From	To	Freq	Calc Dist/Trip	Eff Dist/Trip	User Dist/Trip	Total Travel time (secs)	Total L/UL Time (secs)	Total $	Method Type
DSD|01.0000	DSD_DOCK	DW_505551	1.0	34'-0"	34'-0"	None	19	60	0	WALKER
DSD|02.0000	DSD_DOCK	DW_100521	1.0	57'-1"	57'-1"	None	31	50	0	WALKER
DSD|03.0000	DSD_DOCK	DW_100411	1.0	53'-1"	53'-1"	None	30	20	0	WALKER
DSD|04.0000	DSD_DOCK	DW_100521	1.0	57'-1"	57'-1"	None	31	160	1	WALKER
TOTAL			4.0	201'-3"	201'-3"	0"	111	290	2	

Figure 26. Portion of Interface and Quantitative Output from the “Filter” Tab Data Table

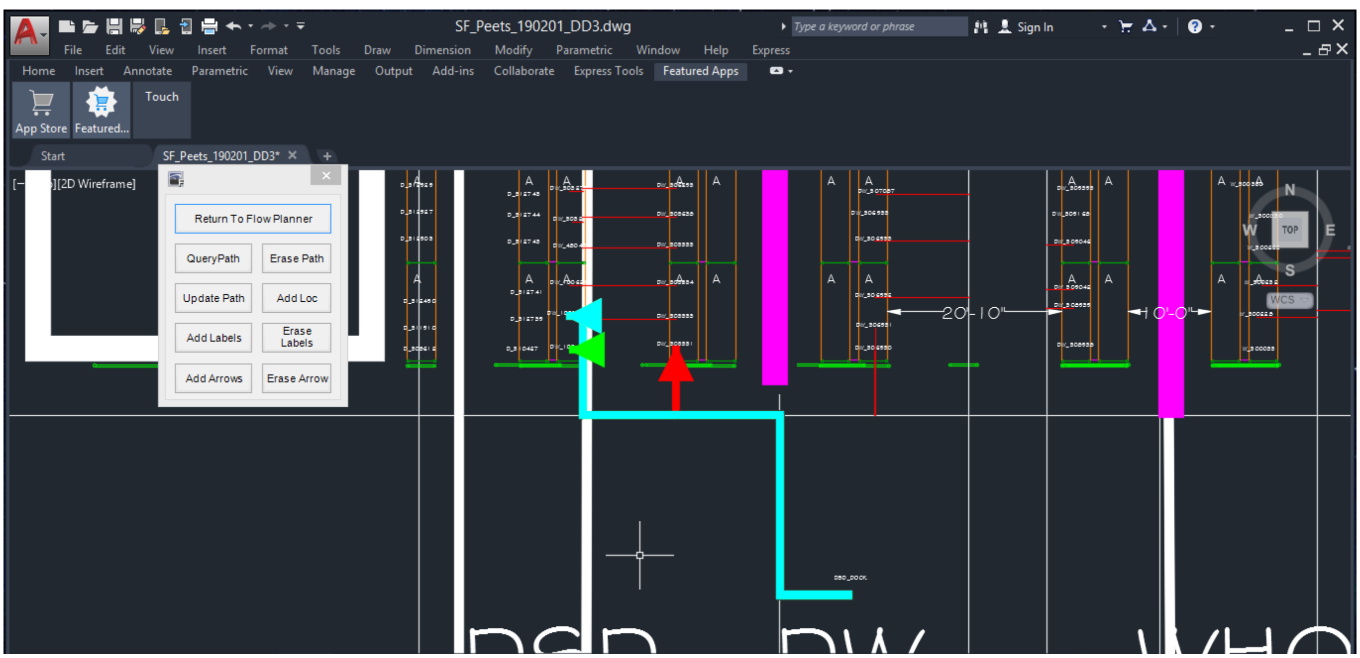


Figure 27. AutoCAD Drawing with the Applied Filter Flow Diagram

Utilization tab

Selecting the “Utilization” tab in the Flow Planner interface shows the user graphical depictions (bar charts) on performance metrics for each pick list with respect to material handling equipment. The first “Chart Type”, “Aggregate (Load/Unload)”, provides the user with a bar chart for each pick list displaying the percentage of total pick time spent on loading and unloading versus traveling. Users can use this information to adjust policies for picking or to further change product locations to add more value-added work to the picking process. In the data provided from a company, usage rates for travel time in a pick list ranged from approximately 19% in pick list “DSD 1” to approximately 76% in pick list “WHOLE 4”, as seen in the bar chart in Figure 28.

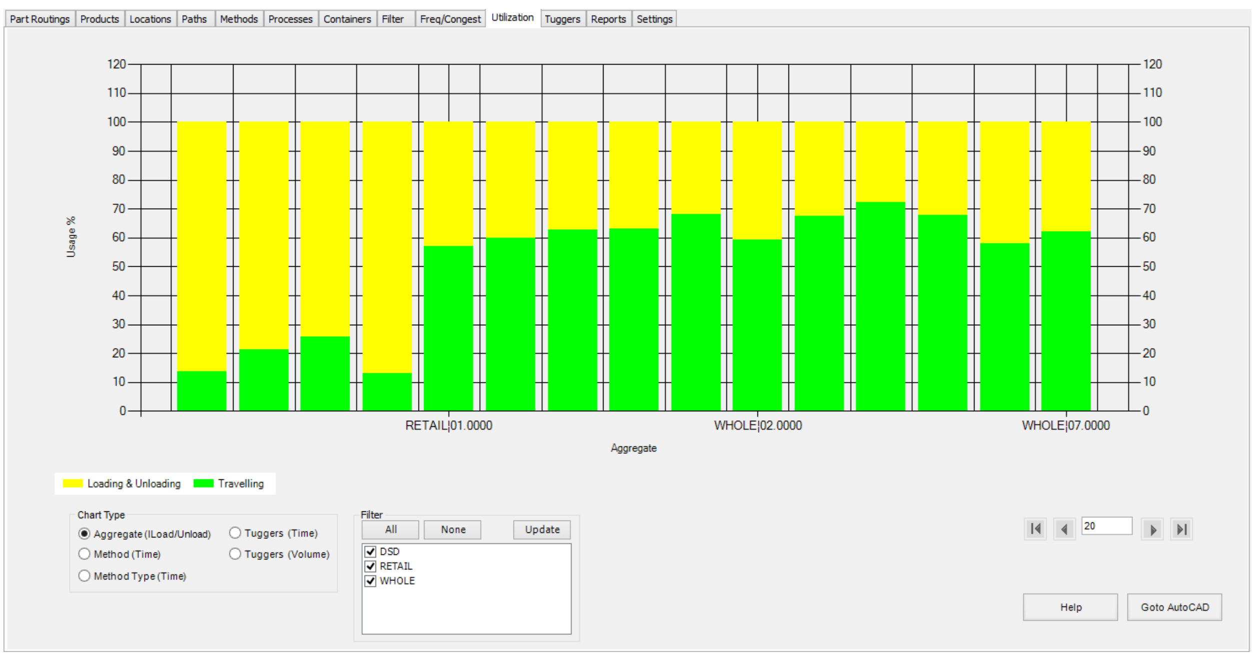


Figure 28. Flow Planner Bar Chart for Aggregate (Load/Unload) by Usage %

In addition, these utilization charts can be filtered by pick list to observe a smaller scale of pick lists which can be used for more direct comparisons while ignoring pick lists not of concern at that moment of analysis. Figure 29 displays the result of filtering to only show the DSD pick lists' performance for loading and unloading versus traveling time.

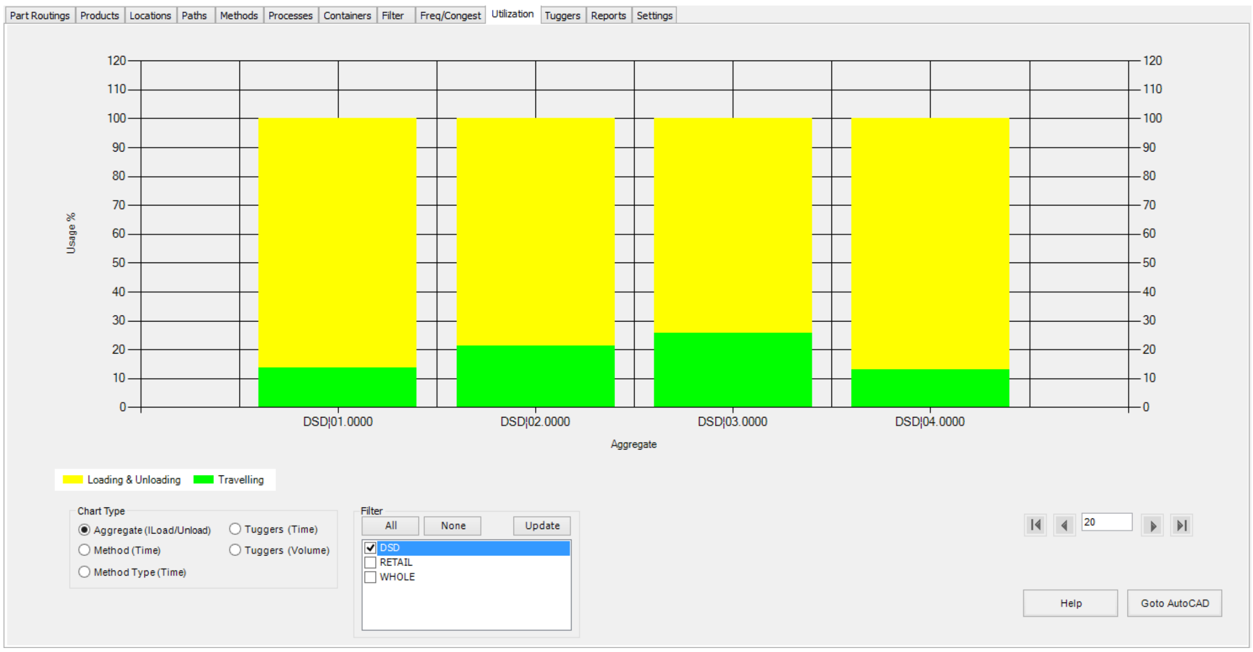


Figure 29. Flow Planner Bar Chart for Aggregate (Load/Unload) by Usage % Filtered to Only Show DSD Pick Lists

The bar chart type can be changed by selecting a different radio button option from the "Chart Type" area in the bottom left corner of the utilization tab. The second chart type which can be used is the "Tuggers (Time)" option. This chart type displays the percent of the time a picker is overutilized versus idle versus busy. These performance metrics provide the user with information on whether more products can be added to a specific pick list without overworking the picker with respect to time. This bar chart is shown in Figure 30.

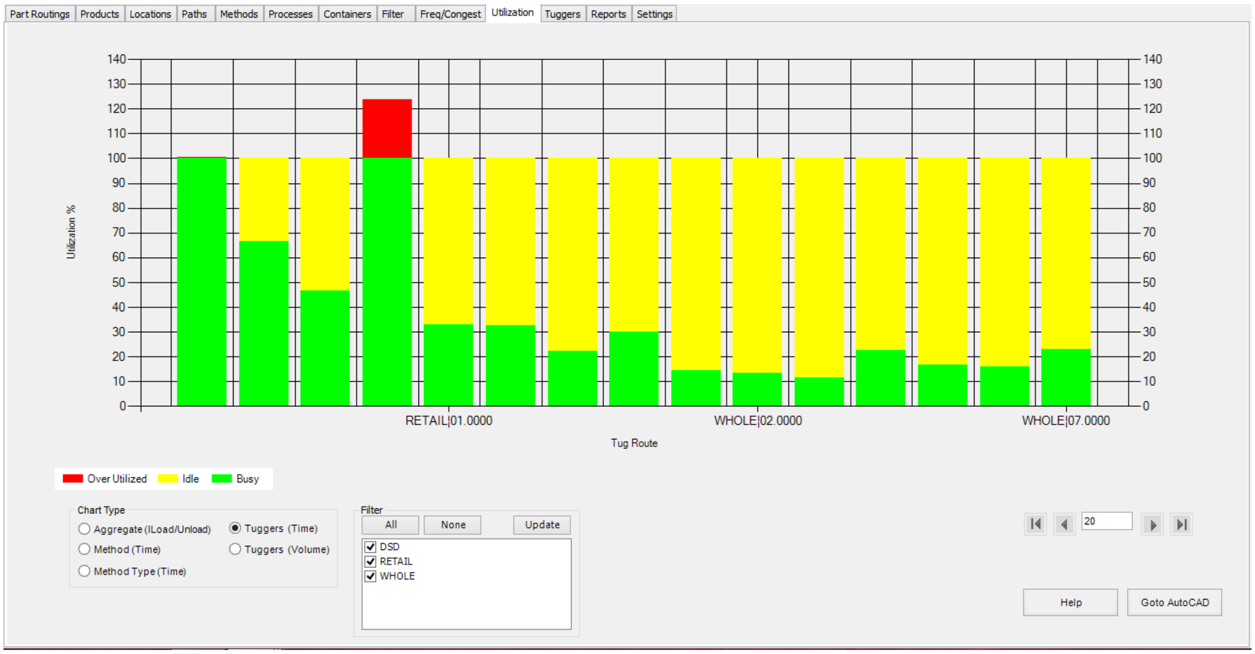


Figure 30. Flow Planner Bar Chart for Tuggers (Time) by Usage %

Tuggers tab

Following the generate routings action performed earlier, a sequence of picks was created with the objective of minimizing the total pick time for each pick list. The main window in the "Tuggers" tab, "Import Deliveries", is a table which stores information between every stop in the picking process. A portion of this table can be seen in Figure 31.

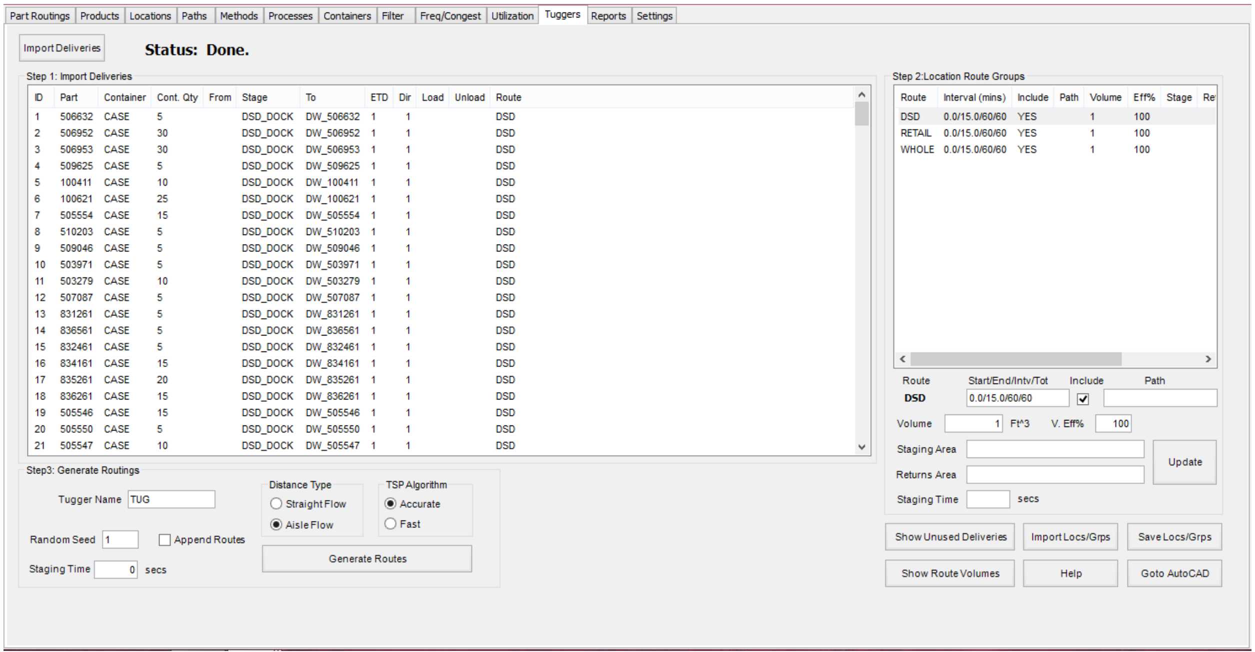


Figure 31. A Portion of the Tuggers Import Deliveries Table

The pick sequence was determined using the built-in Dijkstra's shortest path algorithm which uses the aisle network of the layout to solve the traveling salesman problem. In this example, seen in Figure 31, the algorithm recommended starting by picking product 506632, followed by product 506952, and so forth until the entire pick list had been picked. The data table displayed in this window is shown in its entirety in the Appendix.

Reports tab

The "Reports" tab allows the user to create reports based on specific filters that allow for easier viewing, quick printing, and exporting of these reports to software capable of advanced statistical analysis, such as Microsoft Excel.

The upper left area for this tab is the "Flow Report" area, which includes three subfields: "Aggregate to Report", "Report Type", and "Fields to Print". As this experiment is an atypical tuggers experiment, the only selectable aggregate from the drop-down list to report is “Product”. Report type should be left to its default values, and the “Fields to print” area should have all boxes selected except for “Volume (Tuggers)”, as this field is not pertinent to this experiment. Fields to print means that all selected boxes will appear in the report. Clicking the “Create Report” button in this area will create an XML file type report displaying the fields to print aggregated by the selected aggregate, product (pick list), while displaying the data for all flow paths.

SIMPLE AGGREGATE SUMMARY : Year

AGGREGATE	FROM	TO	FREQUENCY	TOTAL DISTANCE FEET	TRIP DISTANCE FEET	EFF. TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	TRIP TRAVEL TIME SECONDS	COST $
DSD¦01.0000	DSD_DOCK	1	1	34	34	34	19	60	79	19	0.44
	1	1	1	19.08	19.08	19.08	11.54	110	121.54	11.54	0.68
	1	1	1	7.67	7.67	7.67	4.83	260	264.83	4.83	1.47
	1	4	1	0	0	0	0	160	160	0	0.89
	4	5	1	105.58	105.58	105.58	55.79	60	115.79	55.79	0.64
	5	6	1	13.92	13.92	13.92	7.96	60	67.96	7.96	0.38
	6	2	1	5.42	5.42	5.42	3.71	160	163.71	3.71	0.91
	2	9	1	97.58	97.58	97.58	51.79	110	161.79	51.79	0.9
	9	1	1	4.17	4.17	4.17	2.82	60	62.82	2.82	0.35
	1	6	1	3.83	3.83	3.83	2.92	160	162.92	2.92	0.91
	6	7	1	3.67	3.67	3.67	2.54	110	112.54	2.54	0.63
	7	0	1	0	0	0	0	60	60	0	0.33
	0	2	1	7.83	7.83	7.83	4.92	60	64.92	4.92	0.36
	2	9	1	0.42	0.42	0.42	0.65	60	60.65	0.65	0.34
	9	1	1	111.25	111.25	111.25	58.33	160	218.33	58.33	1.21
	1	1	1	3.25	3.25	3.25	2.33	60	62.33	2.33	0.35
	1	1	1	5.5	5.5	5.5	3.49	60	63.49	3.49	0.35
	1	0	1	98.33	98.33	98.33	52.17	60	112.17	52.17	0.62
	0	8	1	18.58	18.58	18.58	10.29	60	70.29	10.29	0.39
	8	1	1	68.67	68.67	68.67	35.08	60	95.08	35.08	0.53
	1	1	1	6.25	6.25	6.25	4.13	210	214.13	4.13	1.19
	1	5	1	49.75	49.75	49.75	26.88	60	86.88	26.88	0.48
	5	1	1	79.83	79.83	79.83	41.92	160	201.92	41.92	1.12
	1	3	1	69.25	69.25	69.25	35.63	60	95.63	35.63	0.53
	3	7	1	43	43	43	22.5	60	82.5	22.5	0.46
	7	3	1	5.67	5.67	5.67	3.83	310	313.83	3.83	1.74
	3	2	1	6.75	6.75	6.75	4.38	310	314.38	4.38	1.75
	2	DSD_DOCK	1	58.42	58.42	58.42	32.21	0	32.21	32.21	0.18
SUB TOTAL			28	927.67			501.64	3,120.00	3,621.64		20.13

Figure 32. Advanced Report Aggregated by Product

Inserting a Legend

The “Legend” area of the “Reports” tab creates a visual key to decipher color codes for different routes based on different aggregations in the AutoCAD drawing. The legend should be used for a clearer interpretation of a visual which may contain many lines. Color-coding routes here is unnecessary if the explanation as to why some routes are displayed in certain colors is left unknown. This experiment aggregated by “Product”, which assigns a different color to each main zone. For instance, the pick lists from the DSD zone, RETAIL zone, and WHOLE zone were represented by red lines, yellow lines, and green lines in the AutoCAD drawing, respectively. The scaling command in AutoCAD adjusts the size of the legend with respect to the size of the warehouse layout. The size and location of the legend are left to the choice of the user. Figure 33 displays an example of how a legend may appear in an AutoCAD drawing.

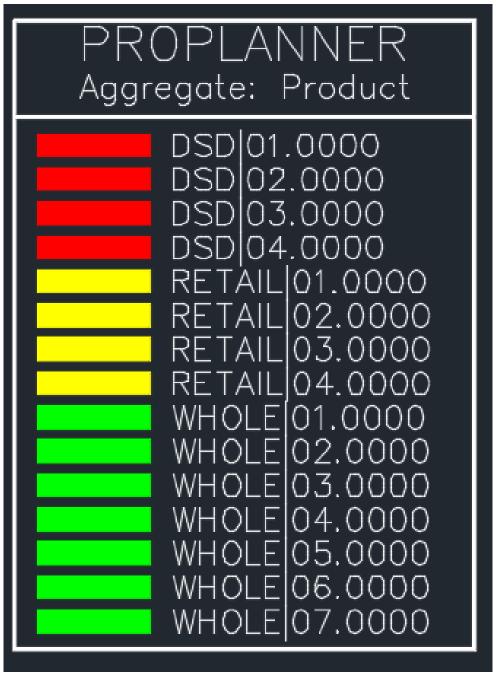


Figure 33. Legend from this Experiment

Methods Reports

The "Methods Reports" area is used to generate external reports for method utilization using either aggregate or method.

The method report aggregates calculations by main picking zone and provides calculations including quantity, travel time, load/unload time, total time, available time/quantity, and utilization. A user can determine from this output whether an individual main zone provides greater room for improvements than others.

MATERIAL HANDLING DEVICE UTILIZATION

METHOD	QUANTITY	TRAVEL TIME HOURS	L/UL TIME HOURS	TOTAL TIME HOURS	AVAIL TIME/QTY	UTILIZATION
DSD	1	0.9	2.82	3.72	1,920.00	0.19%
RETAIL	1	0.86	0.47	1.33	1,920.00	0.07%
WHOLE	1	1	0.41	1.41	1,920.00	0.07%
TOTAL	**8**	**2.76**	**3.7**	**6.46**	**15,360.00**	**0.04%**

Figure 34. Method Material Handling Report

The aggregate report aggregates calculations by pick list and provides calculations including travel time, load/unload time, total time, percentage travelling, and percentage load/unloading. A user can determine from this output whether some individual pick lists provide greater room for improvements than others.

AGGREGATE	TRAVEL TIME HOURS	L/UL TIME HOURS	TOTAL TIME HOURS	PERCENTAGE TRAVELLING	PERCENTAGE LOAD/UNLOADING
		MATERIAL HANDLING AGGREGATE UTILIZATION			
DSD¦01.0000	0.21	0.87	1.08	19.44%	80.56%
DSD¦02.0000	0.23	0.53	0.76	30.26%	69.74%
DSD¦03.0000	0.21	0.35	0.56	37.50%	62.50%
DSD¦04.0000	0.26	1.08	1.34	19.40%	80.60%
RETAIL¦01.0000	0.23	0.14	0.37	62.16%	37.84%
RETAIL¦02.0000	0.24	0.13	0.37	64.86%	35.14%
RETAIL¦03.0000	0.17	0.08	0.25	68.00%	32.00%
RETAIL¦04.0000	0.23	0.11	0.34	67.65%	32.35%
WHOLE¦01.0000	0.12	0.05	0.17	70.59%	29.41%
WHOLE¦02.0000	0.11	0.05	0.16	68.75%	31.25%
WHOLE¦03.0000	0.1	0.04	0.14	71.43%	28.57%
WHOLE¦04.0000	0.2	0.06	0.26	76.92%	23.08%
WHOLE¦05.0000	0.15	0.05	0.2	75.00%	25.00%
WHOLE¦06.0000	0.13	0.07	0.2	65.00%	35.00%
WHOLE¦07.0000	0.19	0.09	0.28	67.86%	32.14%
TOTAL	**2.78**	**3.7**	**6.48**	**42.90%**	**57.10%**

Figure 35. Aggregate Material Handling Report

AutoCAD drawing

When the user wants to look at the qualitative results from the simulation, they can click on the “Go to AutoCAD” button in the Flow Planner interface. This will take them to their warehouse layout design. The paths were made thicker through increasing the “Flow Path Thickness” scale from 100 to 1000 in the “Paths” tab and updating the model. The visual output from this experiment produced the AutoCAD window displayed in Figure 36.

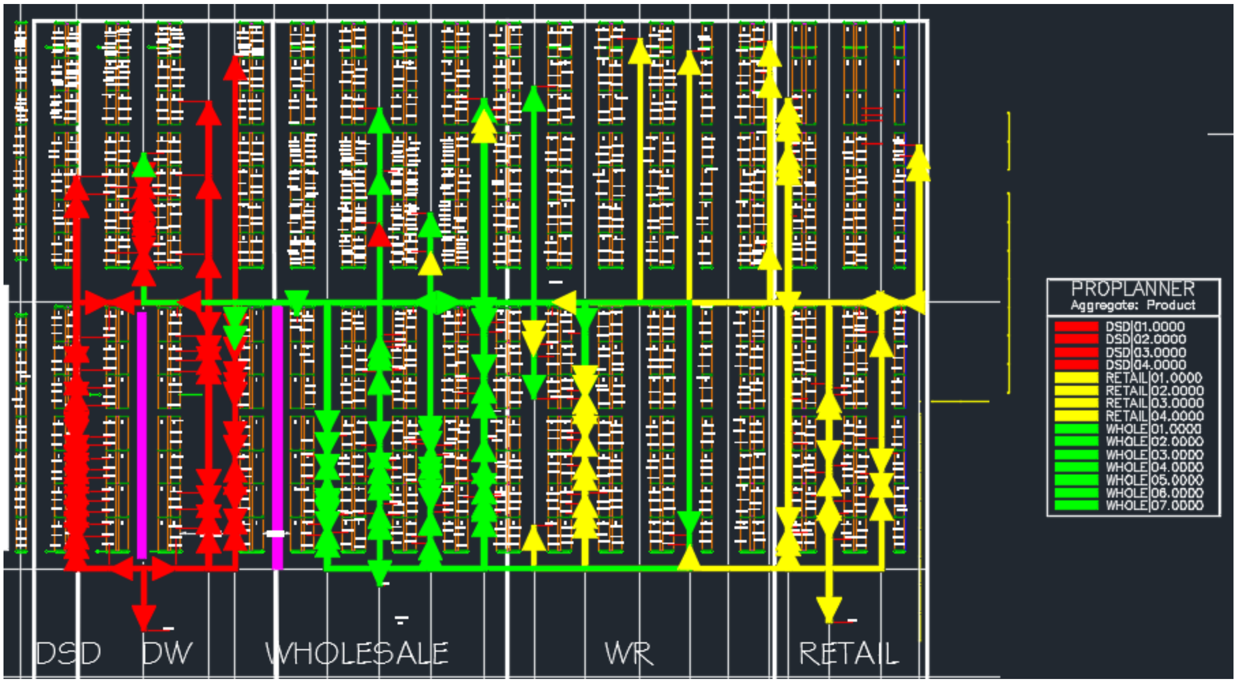
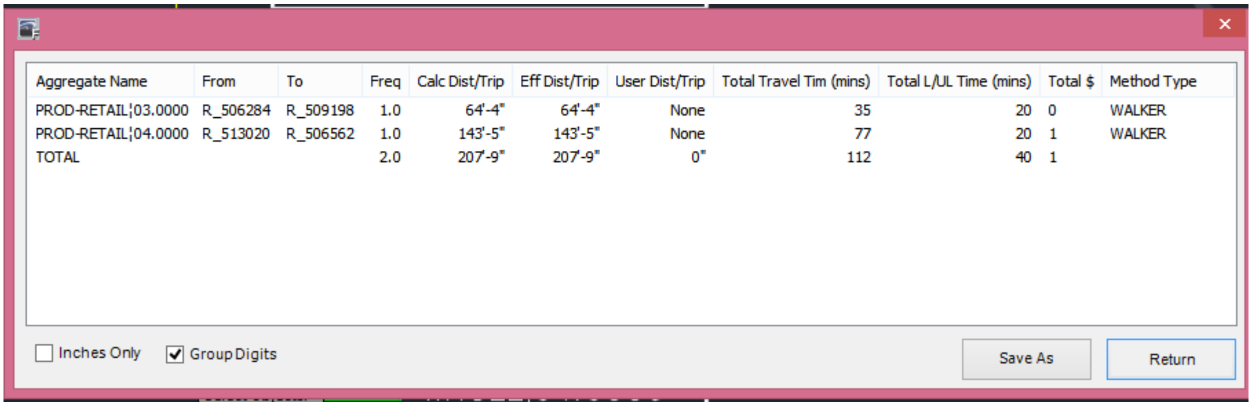


Figure 36. AutoCAD Drawing Aggregated by Pick List

When in the AutoCAD interface, a user can click the "QueryPath" button in the reduced Flow Planner interface to generate a quantitative report on individual or multiple paths from the drawing. A query path report can be seen in Figure 37, which was created from two paths chosen by random in the AutoCAD drawing.



Aggregate Name	From	To	Freq	Calc Dist/Trip	Eff Dist/Trip	User Dist/Trip	Total Travel Tim (mins)	Total L/UL Time (mins)	Total $	Method Type
PROD-RETAIL¦03.0000	R_506284	R_509198	1.0	64'-4"	64'-4"	None	35	20	0	WALKER
PROD-RETAIL¦04.0000	R_513020	R_506562	1.0	143'-5"	143'-5"	None	77	20	1	WALKER
TOTAL			2.0	207'-9"	207'-9"	0"	112	40	1	

Figure 37. Query Path Results Window

The query path results window contains information on individual paths including the pick list to which the path belongs, “From” and “To” locations, distance, total travel time, total load/unload time, cost, and totals from each column.

Evaluating a Layout Design Using a Manual Technique

Similar to the automated technique, the manual technique’s layout design analyzation was divided into three phases: (1) Pre-picking, (2) picking, and (3) post-picking. Rather than using software to determine picking times, costs, and other relevant information used in deciding a warehouse layout design, a human had to manually determine picking routes based on pick lists, measure travel distances manually, and incorporate starting/stopping/accelerating/decelerating/loading/unloading/cost into the calculations used to determine total pick times and costs for given layout alternatives.

(1) Pre-picking

Preparing a drawing

A drawing was created in AutoCAD to provide a visual for the picking process and to aid in determining decisions such as product locations. The scale of the warehouse and internal distances needed to again be accurate as calculating total travel distances had to be done using the "Distance Measure" command offered within AutoCAD. Just like the automated method, warehouse storing dimensions, storing locations, dock locations, and aisle widths are of the highest priority to accurately portray. The AutoCAD drawing needed to have the same qualities regardless of whether an automated or manual technique was being used to analyze the warehouse layout. As such, the warehouse drawing consisted primarily of the walls, racking, and aisles. From there, zones were added to the drawing due to the increased expected performance associated with zoning a warehouse, as mentioned in the literature review above. Figure 38 is a visual display of the AutoCAD drawing up to this point.

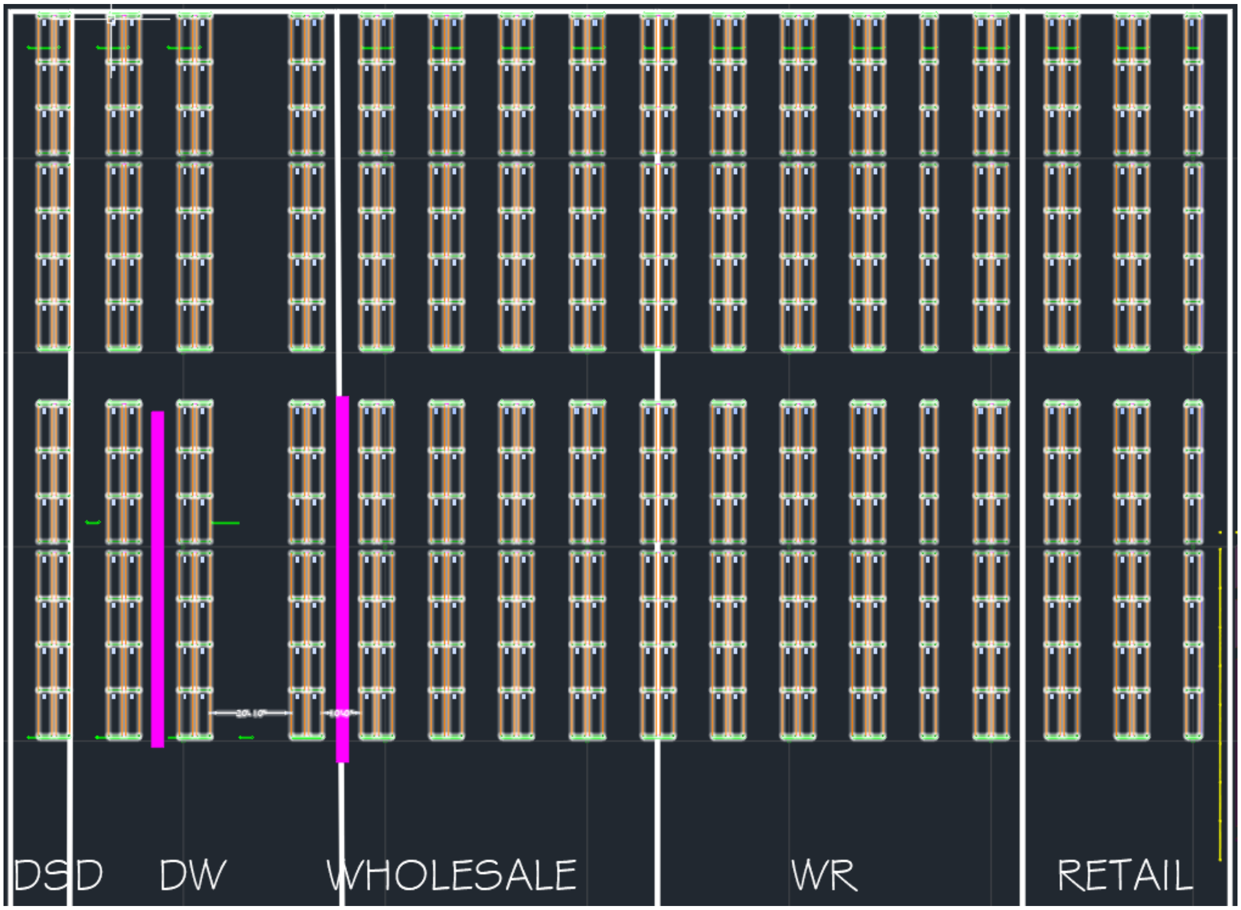


Figure 38. AutoCAD Drawing with Racking, Walls, Aisles, and Zones

Understanding the received data

The pick list received from a customer order would be the same as the one used in the automated technique since historical orders were used for the same company. Therefore, the data within the pick list would be read identical to the pick list in the automated technique's section.

Creating readable data files

Since software meant in assisting the route planning could not be used in a manual technique, the data did not have to be reformatted as a human would be reading the information instead of a computer. However, locations still had to be assigned to racking in the warehouse, load and unload times had to be assigned to the picking process, and the material handling equipment had to have designated performance metrics. All of these metrics are discussed in the following sections.

Assigning product locations

This process consisted of identifying a product name from the product list, identifying which zone the product needed to be located, and typing in a text layer in the AutoCAD drawing within the geographical area of a storage rack to designate the storage rack location to a product. Locations were designated based on zoning principles and the popularity rule. Locations were added one by one until all products from the product list had an assigned storing location in the AutoCAD drawing. Figure 39 displays an updated visual of a portion of the AutoCAD drawing (zoomed-in to make the text layer readable) with the addition of text layers in the drawing to designate product storing locations.

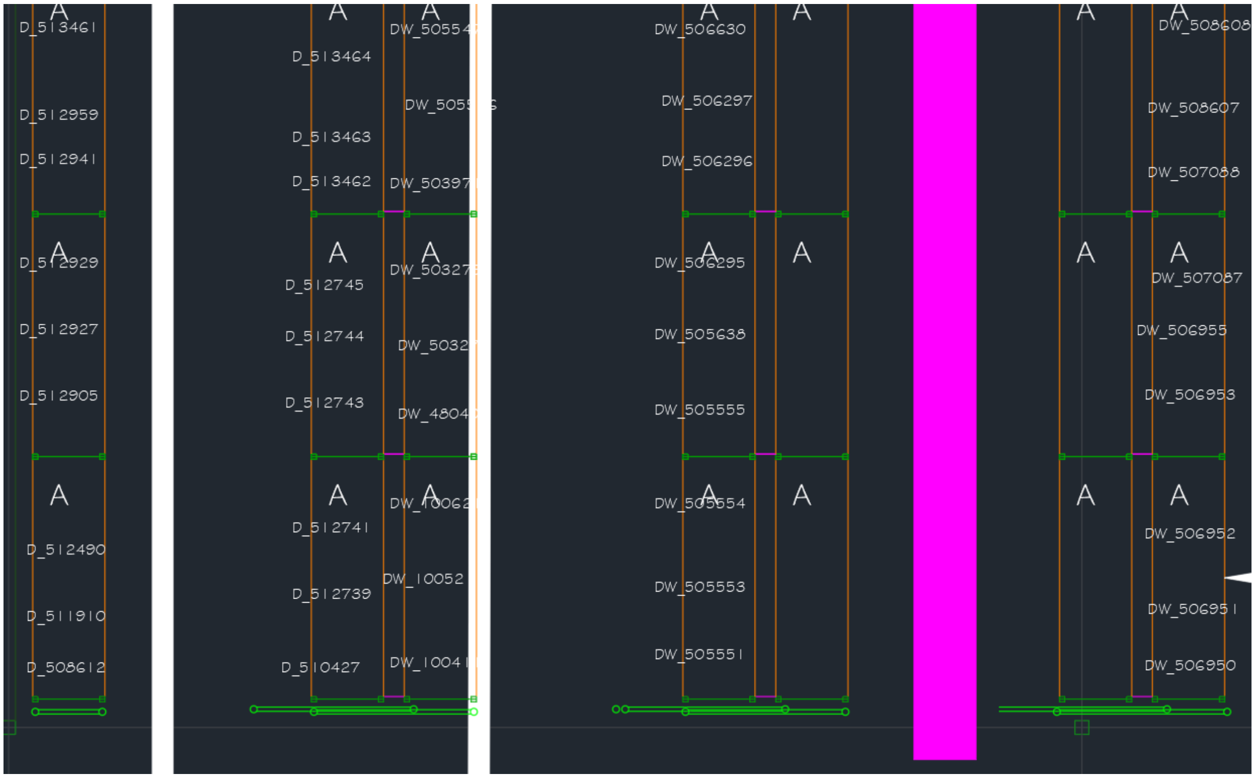


Figure 39. Zoomed-in Portion of AutoCAD Drawing with Added Location Text Layer

Designating load and unload times

It was previously determined to use identical load and unload times for picking, as both processes were estimated to be approximately equal. Similarly, a base time of 10 seconds per process plus an additional time of 10 seconds per container was determined as load/unload times should not change simply because the analyzing technique did.

Quantifying material handling equipment metrics

Material handling equipment needed an assigned variable cost, straight speed (feet/second), acceleration and deceleration times, and turn angle (degrees) to be used in quantifying the picking time and cost for picking each pick list. The chosen values here were identical to the values chosen in the automated technique's section: $20/hour variable cost, 2 feet/second straight speed, 2 feet/second/second acceleration and deceleration rates, and a 120-degree turn angle required to activate an acceleration and deceleration.

(2) Picking

Simulating the picking process consisted of determining the optimal routes for the pick lists and displaying these routes graphically on top of an AutoCAD layout. An AutoCAD drawing file was necessary as a prerequisite to determining the optimal routes. The picking phase was considered terminated when the last path for the last route was drawn, returning the picker to the final pick list's dock.

AutoCAD Drawing

As mentioned, the AutoCAD drawing was a prerequisite to creating the routings. Since a human is determining the optimal route here rather than a computer, creating a visual aid helps minimize the routing mistakes that may have arisen in the routing process. The drawing also happens to serve as a prerequisite to many of the post-picking phase's report calculations, and for these reasons, the drawing was created prior to said routing creations or post-picking phase's report calculations.

In the "Preparing a drawing" section of the pre-picking phase above, the warehouse storing dimensions, storing locations, dock locations, aisle widths, walls, and zones were drawn. In order to produce a final product identical to the output from the automated technique (see Figure 40), the following steps had to be done:

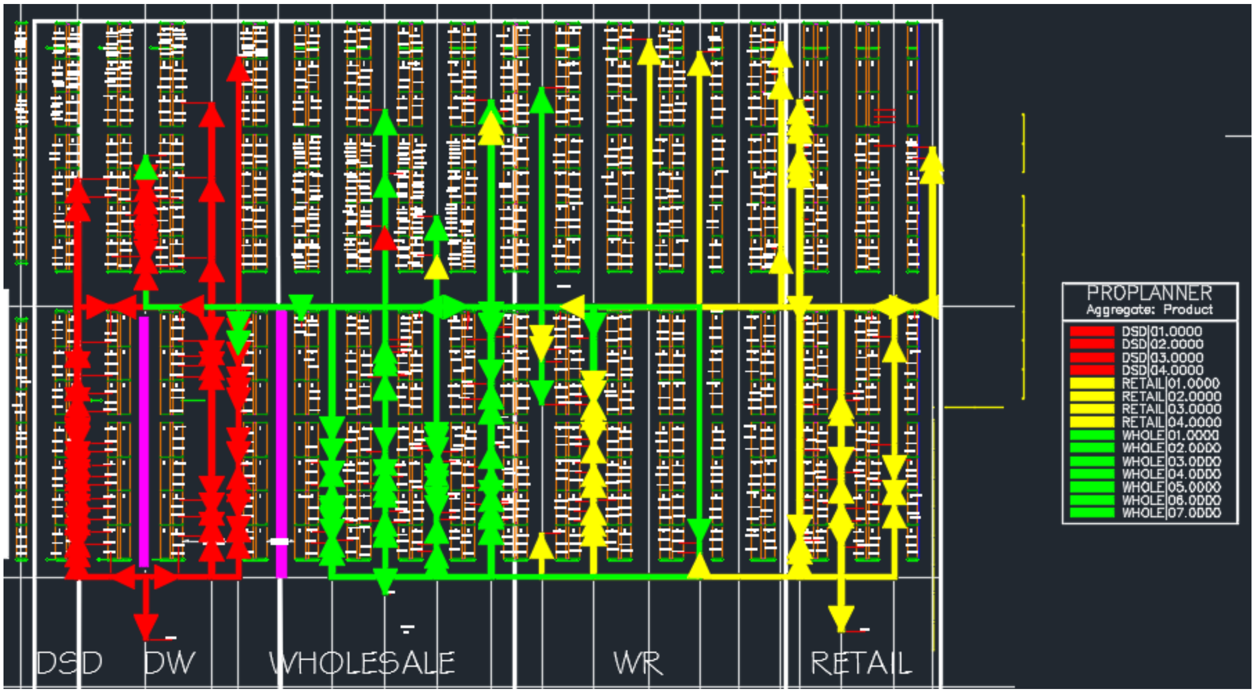


Figure 40. AutoCAD Drawing Output from the Automated Technique

1. Creating a legend

The first step was to choose a color to correspond with each main picking zone. In the interest of replicability, the colors red, yellow, and green were chosen to depict the drawn routes from the DSD, RETAIL, and WHOLE zones. A physical legend was drawn in AutoCAD to serve as a reference for the decision-making team when looking at the drawing.

2. Drawing the routings

Following the assignment of locations, routings had to be created for each pick list. Manually, this process required solving the traveling salesman problem in a user's head–a problem of how to move to multiple locations in the shortest possible time or distance. Other manual techniques included the heuristics identified in the literature review section, such as the s-shape, return, aisle-by-aisle, largest gap, midpoint, and combined routing strategies. For this experiment, a method outlined by an industry expert in chapter 3 was used. First, the user marked each product's location from each product on a pick list in the AutoCAD drawing. Then, the user used their best judgment as to creating a quick route that would stop at each marked location along the way, starting at the designated dock, and ending back at the identical dock. For example, using pick list "DSD 1" in this experiment, the user would have marked the AutoCAD drawing in Figure 41 as such, with red stars designating locations hosting products listed in the pick list currently ready for an assigned routing.

The product location's text layer was turned off for Figure 41 to provide a clearer visual of marked locations.

Following the location marking, a directional route was drawn starting at the designated dock, connecting all of the stars by traveling through the middle of the aisles, and ending back at the same starting dock. To do this, a line had to be drawn in AutoCAD. The thickness for the line was set to 1000 so the routes would be more visible in the drawing. The chosen pick list's corresponding color from the legend was then selected in AutoCAD. An example of a route the user may have identified as sufficient appears in Figure 42.

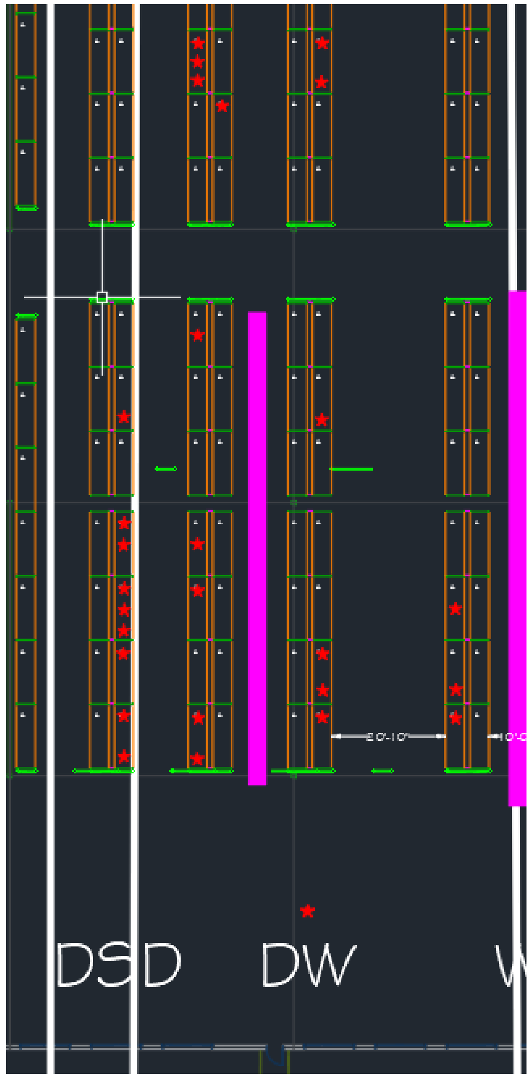


Figure 41. AutoCAD Drawing with Pick List “DSD 1” Locations’ Marked by Red Stars

Figure 42. Routing for Pick List "DSD 1"

Arrows were drawn at each product location and some corners to indicate the direction of travel to minimize mistakes from the picker when it comes time to fulfill a pick list. This step was repeated until all fifteen routes were drawn in the AutoCAD layout. After all of these steps, an AutoCAD drawing identical to the output from the automated technique should be visible with the equivalent level of detail.

(3) Post-picking

The final phase for the manual technique's process consisted of calculating all necessary quantitative metrics and creating all visual displays which could be used to aid the decision-making team when comparing layout design alternatives. As this was an experiment, the outputs from the automated technique had to be identical to the outputs created by the manual technique. Therefore, seven categories were used for dividing the analysis: The tuggers tab, part routings tab, paths tab, reports tab, filter tab, query paths results window, initial results windows, reports tab revisited, and utilization tab.

Tuggers tab

Now that each pick list had a near-optimal pick route, the data table from the tuggers tab could be recreated in Microsoft Excel which would display the products in pick order with their location and the next pick location. An ID, part number, container quantity, dock, location, pick list, direction, and route were entered for each product. The part numbers used for each product were the location without the leading main zone initials. Container quantity information was retrieved from the physical pick lists in the pre-picking phase. The dock was chosen based on which main zone the pick list routed through. The locations were read from the AutoCAD drawing and typed into a cell. The final data table appeared as seen in Table 25–identical to the data table produced in the tuggers tab using the automated technique.

Table 25. Tuggers Data Table for Pick List "DSD 1"

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
1	506632	CASE	5		DSD_DOCK	DW_506632	1	1			DSD
2	506952	CASE	30		DSD_DOCK	DW_506952	1	1			DSD
3	506953	CASE	30		DSD_DOCK	DW_506953	1	1			DSD
4	509625	CASE	5		DSD_DOCK	DW_509625	1	1			DSD
5	100411	CASE	10		DSD_DOCK	DW_100411	1	1			DSD
6	100621	CASE	25		DSD_DOCK	DW_100621	1	1			DSD
7	505554	CASE	15		DSD_DOCK	DW_505554	1	1			DSD
8	510203	CASE	5		DSD_DOCK	DW_510203	1	1			DSD
9	509046	CASE	5		DSD_DOCK	DW_509046	1	1			DSD
10	503971	CASE	5		DSD_DOCK	DW_503971	1	1			DSD
11	503279	CASE	10		DSD_DOCK	DW_503279	1	1			DSD
12	507087	CASE	5		DSD_DOCK	DW_507087	1	1			DSD
13	831261	CASE	5		DSD_DOCK	DW_831261	1	1			DSD
14	836561	CASE	5		DSD_DOCK	DW_836561	1	1			DSD
15	832461	CASE	5		DSD_DOCK	DW_832461	1	1			DSD
16	834161	CASE	15		DSD_DOCK	DW_834161	1	1			DSD
17	835261	CASE	20		DSD_DOCK	DW_835261	1	1			DSD

Table 25 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
18	836261	CASE	15		DSD_DOCK	DW_836261	1	1			DSD
19	505546	CASE	15		DSD_DOCK	DW_505546	1	1			DSD
20	505550	CASE	5		DSD_DOCK	DW_505550	1	1			DSD
21	505547	CASE	10		DSD_DOCK	DW_505547	1	1			DSD
22	505549	CASE	5		DSD_DOCK	DW_505549	1	1			DSD
23	505551	CASE	5		DSD_DOCK	DW_505551	1	1			DSD
24	510645	CASE	5		DSD_DOCK	DW_510645	1	1			DSD
25	510708	CASE	5		DSD_DOCK	DW_510708	1	1			DSD
26	506630	CASE	5		DSD_DOCK	DW_506630	1	1			DSD
27	509042	CASE	15		DSD_DOCK	DW_509042	1	1			DSD

Part routings tab

Since the routes had been generated and detailed in the tuggers tab data table, creating a "Part Routings" data table only added an additional column for the "From" location and a column to indicate whether the stop had a load or unload process at the from or to location (this experiment always unloaded at the To location). Unloading at the To location is designated by a value of "-2" in the "Parts/C" column. The final data table appeared as displayed in Table 26.

Paths tab

The paths tab data table was then created as a table with seven columns: Aggregate Name, From, To, Calc Dist/Trip (Ft.), Total Travel time (Hrs), Total L/UL time (Hrs), and Total $. This table was recreated in Microsoft Excel in a process someone using the manual technique would employ. Each path lists the pick list in which the path was traveled, origin point, destination, distance, travel time, load/unload time, and cost.

Table 26. Part Routings Table

Part	%	From	Method	Container	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
505551	100		DSD	CASE	5	-2	DW_505551			0	505551
100411	100		DSD	CASE	10	-2	DW_100411			0	100411
100621	100		DSD	CASE	25	-2	DW_100621			0	100621
505554	100		DSD	CASE	15	-2	DW_505554			0	505554
509625	100		DSD	CASE	5	-2	DW_509625			0	509625
509046	100		DSD	CASE	5	-2	DW_509046			0	509046
509042	100		DSD	CASE	15	-2	DW_509042			0	509042
503279	100		DSD	CASE	10	-2	DW_503279			0	503279
503971	100		DSD	CASE	5	-2	DW_503971			0	503971
505546	100		DSD	CASE	15	-2	DW_505546			0	505546
505547	100		DSD	CASE	10	-2	DW_505547			0	505547
506630	100		DSD	CASE	5	-2	DW_506630			0	506630
506632	100		DSD	CASE	5	-2	DW_506632			0	506632
505549	100		DSD	CASE	5	-2	DW_505549			0	505549
836261	100		DSD	CASE	15	-2	DW_836261			0	836261
832461	100		DSD	CASE	5	-2	DW_832461			0	832461
831261	100		DSD	CASE	5	-2	DW_831261			0	831261

Table 26 Continued

Part	%	From	Method	Container	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
505550	100		DSD	CASE	5	-2	DW_505550			0	505550
510708	100		DSD	CASE	5	-2	DW_510708			0	510708
836561	100		DSD	CASE	5	-2	DW_836561			0	836561
835261	100		DSD	CASE	20	-2	DW_835261			0	835261
510645	100		DSD	CASE	5	-2	DW_510645			0	510645
834161	100		DSD	CASE	15	-2	DW_834161			0	834161
510203	100		DSD	CASE	5	-2	DW_510203			0	510203
507087	100		DSD	CASE	5	-2	DW_507087			0	507087
506953	100		DSD	CASE	30	-2	DW_506953			0	506953
506952	100		DSD	CASE	30	-2	DW_506952			0	506952
RETURN	100		DSD	!NA	1	-1	DSD_DOCK			0	

The first column, “Aggregate Name”, identified which pick list to which a path belongs. Since the paths were listed in chronological order, row one’s aggregate name was DSD 1, which was repeated until all paths from the pick list DSD 1 were entered into the table.

The second column, “From”, identified the initial point for each path. Commonly, this data entry is the “To” location from the previous data row. However, for the first row, the starting location was at DSD_DOCK, since this is the default starting location for a picker with a new and unpicked pick list.

The third column, “To”, identified the terminal point for each path. This column provided the AutoCAD text label from each product location, with each subsequent row holding the data value from the product location picked next, according to the routing path created previously.

The fourth column, “Calc Dist/Trip (Ft.)”, listed the distance in feet from the “From” location to the “To” location, including all turns. The data entered here was calculated using the “Distance Measure” command in AutoCAD and drawing the lines a material handler would travel to pick the product. AutoCAD automatically measures the distance and provides it as an output, which was entered into Microsoft Excel. This process began with selecting pick list DSD 1, and measuring the distances for all individual paths in AutoCAD, recording said paths distances to the nearest inch, and repeating this process for all fifteen pick lists. For example, pick list DSD 1 begins at the DSD_DOCK and picks its first product at location DW_505551. A table was created in Microsoft Excel displaying the start and end location and the distance measured in AutoCAD (50’-11”).

The fifth column, “Total Travel time (Hrs)”, accounted for the straight speed of the material handling equipment, acceleration and deceleration around corners, and acceleration and deceleration accompanying stopping to pick products. The time for each path was calculated using the straight speed provided for the material handling equipment multiplied by the distance moved in a straight line using the material handling machine. The required stopping distance can be calculated by squaring the straight speed and dividing this result by the product of 2, a constant 9.8 (acceleration due to gravity), and the unitless coefficient of friction (assumed similar to dry asphalt at 0.8). After determining the distance required to imitate a full stop, the time required to complete the stop was necessary in order to determine an accurate pick time, since a material handling device would not be able to travel at its straight speed when approaching a product's location which required stopping to pick.

The sixth column, "Total L/UL time (Hrs)", calculated the walk time to and from the product storing location from the material handling equipment. In the "Designating load and unload times" subsection in the pre-picking phase above, this process was calculated using a base time of 10 seconds per process plus an additional time of 10 seconds per container.

The sixth column, "Total $", converted the time spent picking into a monetary figure and added in any fixed and variable costs associated with production.

The data table in Table 27 was produced to rival the data table created produced from the automated technique used by Proplanner. This data table is shown in its entirety in the Appendix.

Table 27. A Portion of the Paths Table

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD|1	DW_DOCK	DW_505551	1	34'-0"	0.01	0.02	0	WALKER
DSD|1	DW_505551	DW_100411	1	19'-1"	0	0.03	1	WALKER
DSD|1	DW_100411	DW_100621	1	7'-8"	0	0.07	1	WALKER
DSD|1	DW_100621	DW_509625	1	105'-7"	0.02	0.02	1	WALKER
DSD|1	DW_509625	DW_509046	1	13'-11"	0	0.02	0	WALKER
DSD|1	DW_509046	DW_509042	1	5'-5"	0	0.04	1	WALKER
DSD|1	DW_509042	DW_503279	1	97'-7"	0.01	0.03	1	WALKER
DSD|1	DW_503279	DW_503971	1	4'-2"	0	0.02	0	WALKER
DSD|1	DW_503971	DW_505546	1	3'-10"	0	0.04	1	WALKER
DSD|1	DW_505546	DW_505547	1	3'-8"	0	0.03	1	WALKER
DSD|1	DW_505547	DW_506632	1	7'-10"	0	0.02	0	WALKER
DSD|1	DW_506632	DW_505549	1	5"	0	0.02	0	WALKER
DSD|1	DW_505549	DW_836261	1	111'-3"	0.02	0.04	1	WALKER
DSD|1	DW_836261	DW_832461	1	3'-3"	0	0.02	0	WALKER
DSD|1	DW_832461	DW_831261	1	5'-6"	0	0.02	0	WALKER

Table 27 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD|1	DW_831261	DW_505550	1	98'-4"	0.01	0.02	1	WALKER
DSD|1	DW_505550	DW_510708	1	18'-7"	0	0.02	0	WALKER
DSD|1	DW_510708	DW_836561	1	68'-8"	0.01	0.02	1	WALKER
DSD|1	DW_836561	DW_835261	1	6'-3"	0	0.06	1	WALKER
DSD|1	DW_835261	DW_510645	1	49'-9"	0.01	0.02	0	WALKER
DSD|1	DW_510645	DW_834161	1	79'-10"	0.01	0.04	1	WALKER
DSD|1	DW_834161	DW_510203	1	69'-3"	0.01	0.02	1	WALKER
DSD|1	DW_510203	DW_510203	1	69'-3"	0.01	0.02	1	WALKER
DSD|1	DW_510203	DW_506953	1	5'-8"	0	0.09	2	WALKER
DSD|1	DW_506953	DW_506952	1	6'-9"	0	0.09	2	WALKER
DSD|1	DW_506952	DW_DOCK	1	58'-5"	0.01	0	0	WALKER

Reports tab

The first of the three reports, "Advanced Report aggregated by product", was created in Microsoft Excel. All of this information was produced in prior data tables, so the process of filling out this data table was merely done by reorganizing information from previous data tables. The data table in the report includes columns for Aggregate (pick list), From, To, Distance, Travel Time, Load/Unload Time, and Cost. Table 28 displays a portion of the report. The report is shown in its entirety in the Appendix.

Filter Tab

The "Filter" tab added value by allowing a user to select a path or multiple paths, and observe the Pick List, From Location, To Location, Route Distance, Total Travel time, Total L/UL Time, and Total $ associated with the pick list(s). For example, if a user wanted to receive the data for all routes originating from DSD_DOCK, then the user would have to locate the appropriate paths from the paths data table and reorganize this information into a data table in Microsoft Excel. For this example, the filter chosen was again all routes originating from the DSD_DOCK, identical to the filter when using the automated technique. Table 29 is the data table produced from filtering the flows to only flows originating from DSD_DOCK.

Table 28. Advanced Report Aggregated by Product

Aggregate	From	To	Freq	Total Distance (Feet)	Travel Time (Sec)	L/UL Time (Sec)	Total Time (Sec)	Cost ($)
DSD|1	DSD_DOCK	DW_505551	1	34	19	60	79	0.44
DSD|1	DW_505551	DW_100411	1	19.08	11.54	110	121.54	0.68
DSD|1	DW_100411	DW_100621	1	7.67	4.83	260	264.83	1.47
DSD|1	DW_100621	DW_505554	1	0	0	160	160	0.89
DSD|1	DW_505554	DW_509625	1	105.58	55.79	60	115.79	0.64
DSD|1	DW_509625	DW_509046	1	13.92	7.96	60	67.96	0.38
DSD|1	DW_509046	DW_509042	1	5.42	3.71	160	163.71	0.91
DSD|1	DW_509042	DW_503279	1	97.58	51.79	110	161.79	0.9
DSD|1	DW_503279	DW_503971	1	4.17	2.82	60	62.82	0.35
DSD|1	DW_503971	DW_505546	1	3.83	2.92	160	162.92	0.91
DSD|1	DW_505546	DW_505547	1	3.67	2.54	110	112.54	0.63
DSD|1	DW_505547	DW_506630	1	0	0	60	60	0.33
DSD|1	DW_506630	DW_506632	1	7.83	4.92	60	64.92	0.36
DSD|1	DW_506632	DW_505549	1	0.42	0.65	60	60.65	0.34
DSD|1	DW_505549	DW_836261	1	111.25	58.33	160	218.33	1.21
DSD|1	DW_836261	DW_832461	1	3.25	2.33	60	62.33	0.35

Table 28 Continued

Aggregate	From	To	Freq	Total Distance (Feet)	Travel Time (Sec)	L/UL Time (Sec)	Total Time (Sec)	Cost ($)
DSD|1	DW_832461	DW_831261	1	5.5	3.49	60	63.49	0.35
DSD|1	DW_831261	DW_505550	1	98.33	52.17	60	112.17	0.62
DSD|1	DW_505550	DW_510708	1	18.58	10.29	60	70.29	0.39
DSD|1	DW_510708	DW_836561	1	68.67	35.08	60	95.08	0.53
DSD|1	DW_836561	DW_835261	1	6.25	4.13	210	214.13	1.19
DSD|1	DW_835261	DW_510645	1	49.75	26.88	60	86.88	0.48
DSD|1	DW_510645	DW_834161	1	79.83	41.92	160	201.92	1.12
DSD|1	DW_834161	DW_510203	1	69.25	35.63	60	95.63	0.53
DSD|1	DW_510203	DW_507087	1	43	22.5	60	82.5	0.46
DSD|1	DW_507087	DW_506953	1	5.67	3.83	310	313.83	1.74
DSD|1	DW_506953	DW_506952	1	6.75	4.38	310	314.38	1.75
DSD|1	DW_506952	DSD_DOCK	1	58.42	32.21	0	32.21	0.18
		Sub Totals:	28	927.67	501.64	3,120.00	3,621.64	20.13

Table 29. Quantitative Output from the "Filter" Tab

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Sec)	Total L/UL Time (Sec)	Total $	Method Type
DSD|1	DSD_DOCK	DW_505551	1	34'-0"	34'-0"	None	19	60	0	WALKER
DSD|1	DSD_DOCK	DW_100521	1	57'-1"	57'-1"	None	31	50	0	WALKER
DSD|1	DSD_DOCK	DW_100411	1	53'-1"	53'-1"	None	30	20	0	WALKER
DSD|1	DSD_DOCK	DW_100521	1	57'-1"	57'-1"	None	31	160	1	WALKER
Total			4	201'-3"	201'-3"	0"	111	290	1	

Query Paths results window

The query paths results window in Flow Planner queries the paths tab for specific data entries for a specific individual path or multiple paths. Manually, this process would involve an inquirer to physically point to a drawn path in AutoCAD, a user to determine which pick list this path belongs to, which path this is using information including the starting point (From) and the destination (To), and for that individual to copy over the selected values into a table including distance, times, and cost while adding in a summation data row at the bottom. For this example, two paths were selected without methodology using the AutoCAD drawing. The user then queried the rows in the paths table and output the results of the query with a totals row in Table 30.

Initial Results Window

Two initial results data tables were created to match the detail and quality offered from the initial results windows provided by the automated technique. These data tables are aggregated by pick list and aggregated by main zone, each with a totals row.

The first initial results data table, aggregated by pick list, gives summary statistics for all quantitative metrics (mean, minimum, maximum, and standard deviation). These statistics are given for trip times, travel times, and handle times. Other information, which is identical to the information provided by the automated technique, includes distance traveled, time for the trip, cost for the trip, percent of time spent in the picking operation dedicated only to travel as opposed to load and unload times, and container quantities. This table can be seen in Table 31.

The other initial results data table is aggregated by main zone/route. The column headers are identical to the data table shown in Table 31, but pick lists were grouped into main zone rather than as a standalone. This table can be seen in Table 32.

If another layout had been created and ran through all of the above steps, then a data table with comparative metrics would have been produced. This data table simply gathers the totals from previous data tables and displays the differences between the layout alternatives. Since a different layout alternative was not analyzed for this simulation, the time to complete this step was left out from the time studies.

Table 30. Query Paths Results Window

Aggregate Name	**From**	**To**	**Freq**	**Calc Dist/Trip**	**Total Travel Time (mins)**	**Total L/UL Time (mins)**	**Total $**
RETAIL|3	R_506284	R_509198	1	64'-4"	35	20	0
RETAIL|4	R_513020	R_506562	1	143'-5"	77	20	1
TOTAL			2	207'-9"	112	40	1

Table 31. Results Window by Aggregates Part 1

Aggregate	Dist (Ft)	Time (Hrs)	Cost	Travel%	Qty	Avg Trip Time (Mins)	Min Trip Time (Mins)	Max Trip Time (Mins)	SDEV Trip Time (Mins)
DSD¦01.0000	1585	1.11	$22.27	22.17%	28	2.39	1.02	5.9	1.4
DSD¦02.0000	1605.33	0.78	$15.63	32.83%	38	1.23	0.47	2.29	0.44
DSD¦03.0000	1407.33	0.57	$11.44	39.32%	33	1.04	0.42	3.41	0.67
DSD¦04.0000	2028.83	1.4	$27.98	22.95%	43	1.95	0.79	4.41	0.98
RETAIL¦01.0000	1421.33	0.36	$7.20	60.64%	19	1.14	0.46	3.1	0.71
RETAIL¦02.0000	1597.67	0.38	$7.51	65.22%	20	1.13	0.43	2.56	0.61
RETAIL¦03.0000	1183.5	0.26	$5.27	68.38%	13	1.22	0.43	1.91	0.53
RETAIL¦04.0000	1422.83	0.33	$6.59	66.29%	18	1.1	0.47	2.31	0.55
WHOLE¦01.0000	942.33	0.19	$3.82	76.03%	12	0.96	0.43	1.84	0.47
WHOLE¦02.0000	797.5	0.18	$3.59	69.85%	14	0.77	0.41	1.45	0.37
WHOLE¦03.0000	639	0.14	$2.73	72.53%	10	0.82	0.4	1.79	0.46
WHOLE¦04.0000	1471.5	0.29	$5.72	78.15%	16	1.07	0.43	1.96	0.46
WHOLE¦05.0000	1073.67	0.22	$4.39	75.31%	14	0.94	0.42	1.45	0.37
WHOLE¦06.0000	1147.17	0.24	$4.87	72.65%	17	0.86	0.39	1.39	0.36
WHOLE¦07.0000	1550	0.33	$6.55	73.29%	22	0.89	0.4	2.02	0.44
Total	19873	6.78	$135.58	45.54%	317				

Table 31 Continued

Aggregate	Avg Travel Time (Mins)	Min Travel Time (Mins)	Max Travel Time (Mins)	SDEV Travel Time (Mins)	Avg Handle Time (Mins)	Min Handle Time (Mins)	Max Handle Time (Mins)	SDEV Handle Time (Mins)	Container Qty
DSD¦01.0000	0.53	0.08	1.4	0.42	1.86	0	5.17	1.34	285
DSD¦02.0000	0.41	0.07	1.38	0.33	0.83	0	1.5	0.32	152
DSD¦03.0000	0.41	0.09	1.17	0.31	0.63	0	2.5	0.46	93
DSD¦04.0000	0.45	0.07	1.55	0.43	1.5	0	4.33	0.83	346
RETAIL¦01.0000	0.69	0.13	1.9	0.55	0.45	0	2.17	0.43	33
RETAIL¦02.0000	0.73	0.1	2.23	0.58	0.39	0	1	0.19	28
RETAIL¦03.0000	0.83	0.14	1.57	0.49	0.38	0	0.83	0.2	18
RETAIL¦04.0000	0.73	0.14	1.98	0.55	0.37	0	0.83	0.16	23
WHOLE¦01.0000	0.73	0.18	1.59	0.45	0.23	0	0.25	0.07	14
WHOLE¦02.0000	0.54	0.16	1.2	0.36	0.23	0	0.25	0.07	20
WHOLE¦03.0000	0.59	0.15	1.54	0.49	0.23	0	0.25	0.08	46
WHOLE¦04.0000	0.84	0.18	1.71	0.44	0.23	0	0.25	0.06	19
WHOLE¦05.0000	0.71	0.17	1.2	0.36	0.23	0	0.25	0.07	24
WHOLE¦06.0000	0.62	0.14	1.14	0.36	0.24	0	0.25	0.06	37
WHOLE¦07.0000	0.65	0.15	1.77	0.44	0.24	0	0.25	0.05	42

Table 32. Results Window by Routes

Aggregate	Dist (Ft)	Time (Hrs)	Cost	Travel%	Qty	Avg Trip Time (Mins)	Min Trip Time (Mins)	Max Trip Time (Mins)	SDEV Trip Time (Mins)
DSD	6626.5	3.87	$77.33	27.15%	4	57.99	34.33	83.93	21.86
RETAIL	5625.3	1.33	$26.57	64.87%	4	19.93	15.81	22.52	2.97
WHOLE	7621.2	1.58	$31.68	74.23%	7	13.58	8.19	19.66	3.92
Total	19873	6.78	$135.58	59.18%	15				

Table 32 Continued

Aggregate	Avg Travel Time (Mins)	Min Travel Time (Mins)	Max Travel Time (Mins)	SDEV Travel Time (Mins)	Avg Handle Time (Mins)	Min Handle Time (Mins)	Max Handle Time (Mins)	SDEV Handle Time (Mins)	Container Qty
DSD	15.74	13.5	19.26	2.48	42.25	20.83	64.67	19.76	876
RETAIL	12.93	10.81	14.69	1.6	7	5	8.5	1.53	102
WHOLE	10.08	5.94	14.41	3.04	3.5	2.25	5.25	0.97	202
Total									1180

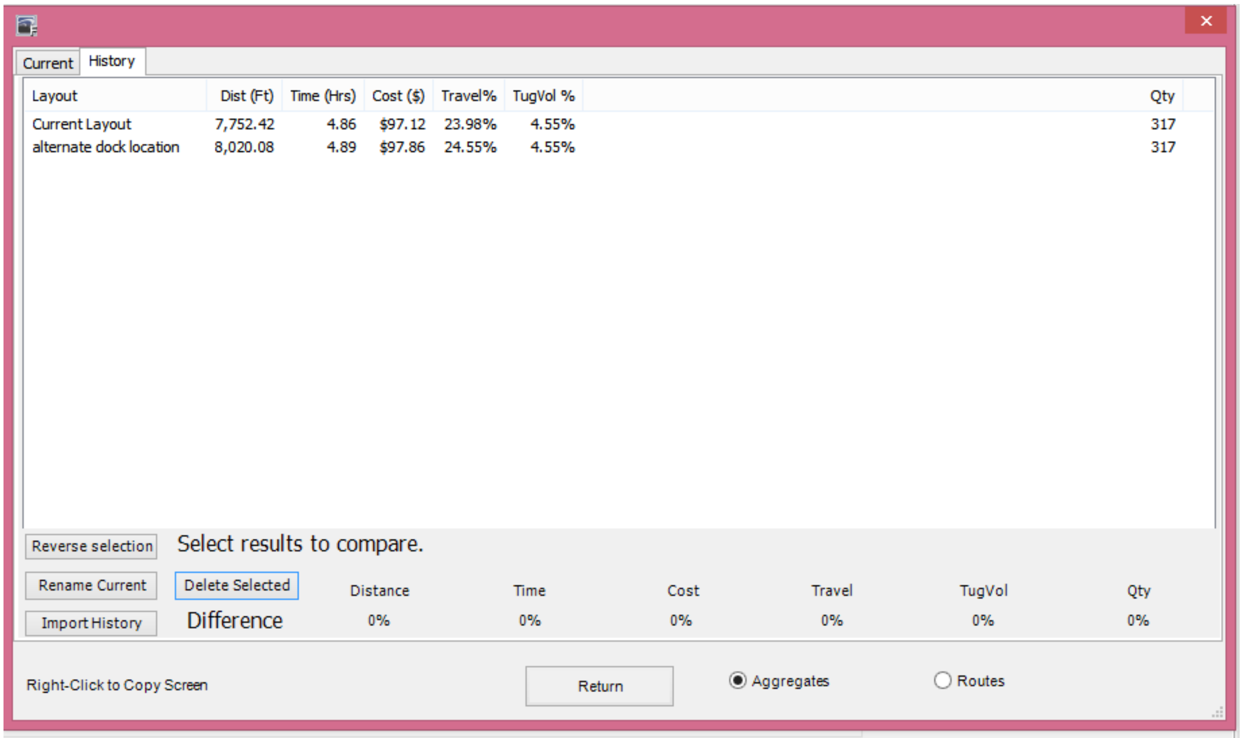


Figure 43. History Tab from the Results Window

Reports tab revisited

Two additional report types were created to fully replicate the reports produced using the automated technique. These reports were both given on methods, with the difference being aggregating by main zone/route versus by individual pick list.

The first method report aggregates calculations by main picking zone and provides calculations including quantity, travel time, load/unload time, total time, available time/quantity, and utilization. A user can determine from this output whether a main zone provides greater room for improvements than others.

MATERIAL HANDLING DEVICE UTILIZATION

METHOD	QUANTITY	TRAVEL TIME HOURS	L/UL TIME HOURS	TOTAL TIME HOURS	AVAIL TIME/QTY	UTILIZATION
DSD	1	0.9	2.82	3.72	1,920.00	0.19%
RETAIL	1	0.86	0.47	1.33	1,920.00	0.07%
WHOLE	1	1	0.41	1.41	1,920.00	0.07%
TOTAL	**8**	**2.76**	**3.7**	**6.46**	**15,360.00**	**0.04%**

Figure 44. Method Material Handling Report

The second method report aggregates calculations by individual pick list and provides calculations including travel time, load/unload time, total time, percentage travelling, and percentage load/unloading. A user can determine from this output whether some specific pick lists provide greater room for improvements than others.

Utilization tab

For a further breakdown of how time was utilized, graphical charts (bar charts) were created to give the same information a decision-making team would have received, had they incorporated the automated technique instead. This information consists of traveling versus loading/unloading usage percentage for each pick list with respect to material handling equipment, and a display of material handling equipment utilization percentage categorized by either over utilized, idle, or busy with respect to each pick list. Figures 45 and 46 were created in Microsoft Excel using data from the previously created data tables.

Table 33. Material Handling Report Aggregated by Pick List

Aggregate	Travel Time (Hrs)	L/UL Time (Hrs)	Total Time (Hrs)	Percentage Traveling	Percentage Load/Unloading
DSD|1	0.21	0.87	1.08	19.44%	80.56%
DSD|2	0.23	0.53	0.76	30.26%	69.74%
DSD|3	0.21	0.35	0.56	37.50%	62.50%
DSD|4	0.26	1.08	1.34	19.40%	80.60%
RETAIL|1	0.23	0.14	0.37	62.16%	37.84%
RETAIL|2	0.24	0.13	0.37	64.86%	35.14%
RETAIL|3	0.17	0.08	0.25	68.00%	32.00%
RETAIL|4	0.23	0.11	0.34	67.65%	32.35%
WHOLE|1	0.12	0.05	0.17	70.59%	29.41%
WHOLE|2	0.11	0.05	0.16	68.75%	31.25%
WHOLE|3	0.1	0.04	0.14	71.43%	28.57%
WHOLE|4	0.2	0.06	0.26	76.92%	23.08%
WHOLE|5	0.15	0.05	0.2	75.00%	25.00%
WHOLE|6	0.13	0.07	0.2	65.00%	35.00%
WHOLE|7	0.19	0.09	0.28	67.86%	32.14%
TOTAL	2.78	3.7	6.48	42.90%	57.10%

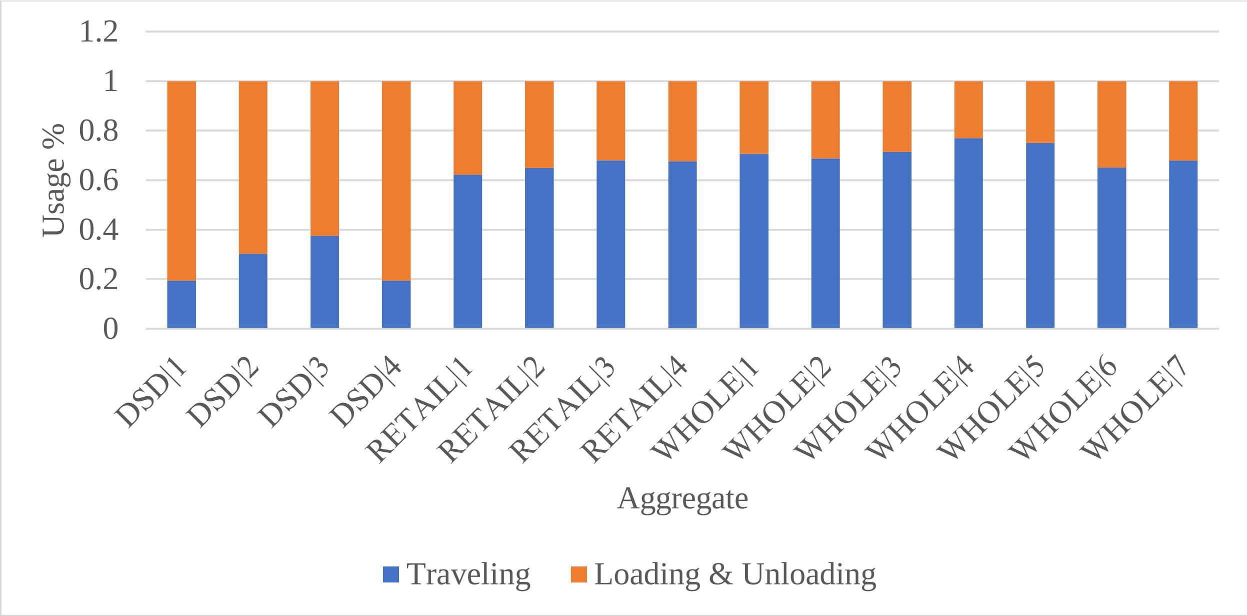


Figure 45. Flow Planner Bar Chart for Aggregate (Load/Unload) by Usage %

The second "Chart Type" which can be used is the "Tuggers (Time)" option. This chart type displays the percent of time a picker is over utilized versus idle versus busy. These performance metrics provide the user with information on whether more products can be added to a specific pick list without overworking the picker with respect to time. This bar chart is shown in Figure 46.

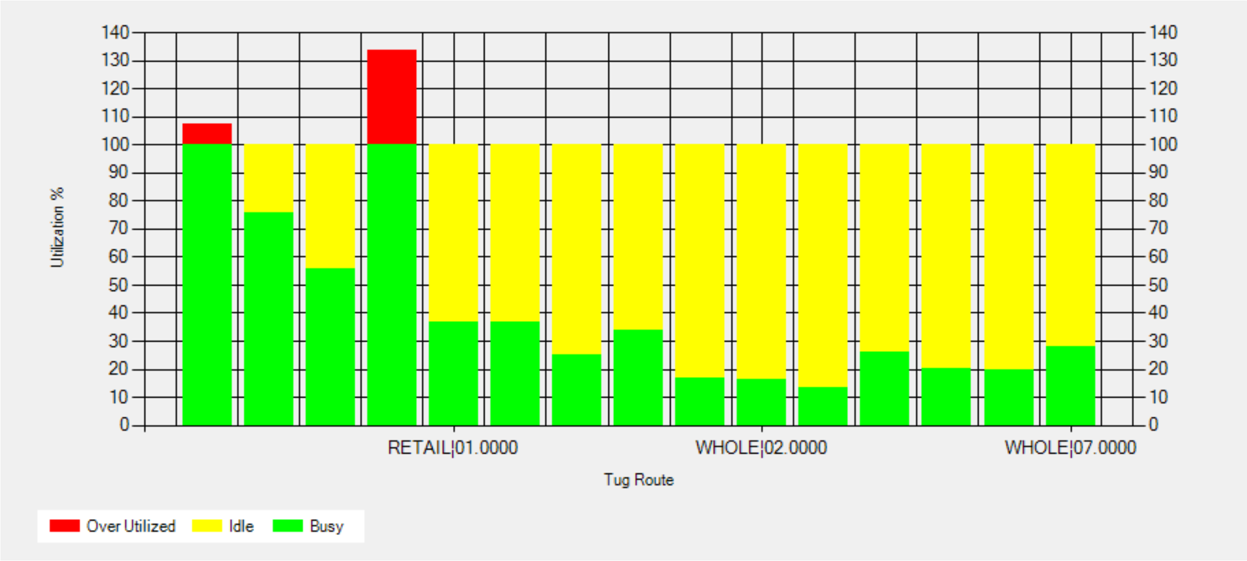


Figure 46. Tug route Versus Utilization % Bar Chart

CHAPTER 5. EXPERIMENTAL RESULTS

A time study was done for each step of the method using both the automated and manual techniques. Seeing as the products of each technique were replaceable, the metric of primary interest for this experiment was process time–or run time. Tables 34 and 35 display the duration for each step's process.

Automated Technique

Table 34. Time Study Automated Technique

Step		Time		
		Hours	Minutes	Seconds
Pre-picking	Create AutoCAD Drawing	3	3	24
	Create Input Files		34	19
Picking			5	8
Post-picking			6	50
	Totals	3	49	41

As one can see, it took a user 3:49:41 (hours:minutes:seconds) to complete all of the analysis necessary to bring to a group for making a layout design alternative decision. Since the AutoCAD drawing and input files remain constant as the warehouse locations change in each design iteration, the analysis for each additional warehouse layout design would take 0:11:58 (hours:minutes:seconds) to complete.

Manual Technique

Table 35. Time Study Manual Technique

	Time		
Step	**Hours**	**Minutes**	**Seconds**
Pre-picking	3	3	24
Picking	1	37	45
Post-picking	14	53	22
Totals	19	34	31

As one can see, it took a user 19:34:31 (hours:minutes:seconds) to complete all of the analysis necessary to bring to a group for making a layout design alternative decision. Since the drawing and input files remain constant as the warehouse locations change in each design iteration, the analysis for each additional warehouse layout design would take 16:31:07 (hours:minutes:seconds) to complete.

Many companies would most likely not see the benefit in expending the process time necessary to complete a layout design analysis when using a manual technique, so the analysis would remain absent or incomplete, resulting in non-optimal layout designs. However, due to the improved process time of 0:11:58 (hours:minutes:seconds) taken to analyze a different layout alternative using the automated technique, a company would more likely find this process beneficial due to the significant impact of a warehouse layout design on warehouse performance, as outlined in the literature review. Because of this, a company would be able to test multiple layouts against multiple historical pick lists in a relatively short time period, resulting in the team who decides the warehouse layout to have more complete information at the time of the decision and select a warehouse layout that is closer to optimal.

CHAPTER 6. CONCLUSION AND DISCUSSION

Overall Conclusions

A new automated technique has been documented and presented for quickly and straightforwardly providing analysis on warehouse layout design. This automated technique provides two main components–quantitative and visual outputs.

The quantitative output provides value added data from a simulation, namely, total pick time, cost, travel distance, travel time, load/unload times, and extended reports on each pick list and each path of each pick list. As discussed in the literature review section, total pick time with respect to historically relevant pick lists often indicates the optimality of its corresponding layout. Minimizing the total picking time across multiple pick lists by reallocating specific products within a warehouse layout is expected to produce a layout capable of better meeting customer demands.

The visual output provides value from producing a layout drawing with optimal routing paths drawn and color-coded. These conditions provide an easy to read layout for analysis and picking, with improvements more easily observable, all while catering to communicators less comfortable with data or more comfortable with spatial intelligence.

It was shown that implementing an automated technique such as the one discussed above, which used AutoCAD, Flow Planner, and Microsoft Excel, can produce an analysis resulting in more optimal layout designs capable of fulfilling pick lists in shorter pick times quicker than the analysis provided from a manual technique. The automated technique's added value is amplified as the number of product locations, pick lists, and size of pick lists increase.

Implications for Engineering and Industry

Industry Valuation

As pointed out previously in the methodology section, the disconnect between academia and industry produces publications that boast improvements to conventional warehouse processes but are not implemented due to either complexity, doubt from the decision makers, unawareness of the publication, or some sort of combination of these factors.

In the interest of building additional credibility in this paper combined with a type of validation, the principles of this process and method were taken to industry to gauge the applicability of the concepts discussed above.

Implications for Engineering

Warehouses are currently a commonplace for manufacturers and retailers. Promising shorter delivery times has led to requiring warehouses in most major regions across the country. As manufacturing has been outsourced globally, the average distance between the manufacturer and the retailer has increased, leading to additional warehouses. Despite a push for just-in-time techniques, which have promoted skipping the warehousing step in a supply chain system with the supplier delivering directly to the consumer, warehouses continue to serve a need. With competition increasing as manufacturers promise shorter delivery times and lower-priced products, costs have to be saved in warehousing in order to either maintain profits or keep the cost from being reflected in the customer's price.

Warehouse layout planners are therefore challenged with:

- how to provide accurate and quick expected pick times for pick lists
- how to quickly produce a visual layout with illustrated optimal routing

- how to analyze multiple layout designs over a short time period
- and how to analyze multiple layout designs with minimal training

Using an automated technique, such as the one presented in this thesis, can provide solutions to all of these grievances. It is anticipated that using an automated tool would lead to better group decisions since there would be more data on hand and increased accuracy in said data.

The methodology provides greater detail and accuracy to current methods of layout design analysis. The results provide empirical evidence suggesting quicker simulation run-times when an automated technique is implemented. Finally, the industry valuation confirms the additional added value from using this technique.

Suggestions for Further Research

Further research into the nature of warehouse layout design analysis will provide additional value. Some suggested research areas are as follows:

1. Designing a scientific study to achieve evaluation of technique
2. Auto-assigning locations from input pick lists for an automated technique
3. Mining the Data Sets to Automate Generation of Zones
4. Group decision-making methods for selecting a layout design
5. Application in warehouse-style supermarkets

Designing a Scientific Study to Achieve Evaluation of Technique

Given more time, designing and running an experiment to suggest effectiveness of the technique would add credibility to the paper. One way to achieve this is to re-do the peer valuation by randomly sorting the students into two groups; one of which runs the manual technique while the other runs the automated technique. Comparing the pick times of the proposed layouts and the run times of each technique would suggest more evidence for superiority than giving the whole group both techniques. Another way to achieve this is to create a layout around a randomly selected 80% of the data points, and then evaluating the quality of the layout and technique using the remaining 20% of the data points. This process would allow a user to observe if the generated layouts are catering too strong to the supplied data and to see if the layout should continue to perform at a high level.

Auto-assigning Locations from Input Pick Lists for an Automated Technique

One drawback that requires additional simulation run-time and prevents optimality is the constraint for the chosen automated techniques software, in this case, Flow Planner, to require a human to initially assign product storing locations within racking. In addition, a human is required to manually move the AutoCAD text layer denoting location to a different location after seeing a visual route that requires travel distant from the main items in the pick list. Creating a feature in one of the modules that allows for an input of locations through a Microsoft Excel file and then assigns those locations to a set of empty racking to minimize travel time would provide a strong starting point for layout design, which could then be compared to the popularity rule calculations to confirm the placement of the auto-assigned locations.

Mining the Data Sets to Automate Generation of Zones

Determining which products get sorted into which zones is currently done manually using this technique. Creating an algorithm which sorts the products into zones based on historical data and updates the zones based on future customer orders would eliminate a manual portion of this technique while notifying the human when orders begin to display an irregular pattern relative to the historical data sets.

Group Decision-making Methods for Selecting a Layout Design

The scope of this research ends with producing the materials necessary for a group to begin the decision-making process. Additional research into objectives hierarchies combined with utilities would aid the group in removing bias between attachments to specific layout designs and provide a starting point for the discussion.

Application in Warehouse-style Supermarkets

Retail stores, such as Costco and Sam's Club, have adopted warehouse-style supermarkets where products are displayed on industrial racking rather than traditional supermarket shelving. This leads to the building functioning as both a warehouse and a supermarket. Retailers such as these could benefit from similar implementation used to design layouts, and effective routing used to store product after receiving. A retailer may even find it beneficial to develop an application for customers to use which displays how to gather all of the items on their shopping list as quickly as possible. This could provide a competitive advantage for a retailer among competitors.

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APPENDIX. TRANSPUT – DATA TABLES

Table 36. Pick Lists

Pick List	Part	Quantity
DSD|1	506632	5
DSD|1	506952	30
DSD|1	506953	30
DSD|1	509625	5
DSD|1	100411	10
DSD|1	100621	25
DSD|1	505554	15
DSD|1	510203	5
DSD|1	509046	5
DSD|1	503971	5
DSD|1	503279	10
DSD|1	507087	5
DSD|1	831261	5
DSD|1	836561	5
DSD|1	832461	5
DSD|1	834161	15
DSD|1	835261	20
DSD|1	836261	15
DSD|1	505546	15
DSD|1	505550	5
DSD|1	505547	10
DSD|1	505549	5
DSD|1	505551	5

Table 36 Continued

Pick List	Part	Quantity
DSD|1	510645	5
DSD|1	510708	5
DSD|1	506630	5
DSD|1	509042	15
DSD|2	505548	4
DSD|2	506953	8
DSD|2	503278	6
DSD|2	509871	4
DSD|2	100521	4
DSD|2	100621	3
DSD|2	505555	4
DSD|2	505554	4
DSD|2	503971	4
DSD|2	831261	3
DSD|2	834161	3
DSD|2	831661	6
DSD|2	836261	4
DSD|2	839061	4
DSD|2	509752	4
DSD|2	505546	6
DSD|2	505547	4
DSD|2	505549	8
DSD|2	510645	4
DSD|2	510644	2
DSD|2	511068	4

Table 36 Continued

Pick List	Part	Quantity
DSD|2	506295	6
DSD|2	506296	3
DSD|2	506297	2
DSD|2	506630	4
DSD|2	508939	2
DSD|2	510416	4
DSD|2	510417	4
DSD|2	510419	6
DSD|2	510425	6
DSD|2	512487	4
DSD|2	512486	6
DSD|2	512485	6
DSD|2	513504	3
DSD|2	510135	1
DSD|2	510139	1
DSD|2	510136	1
DSD|3	506632	1
DSD|3	506952	2
DSD|3	506953	2
DSD|3	509625	1
DSD|3	100411	1
DSD|3	100521	2
DSD|3	100621	5
DSD|3	505554	2
DSD|3	509046	3

Table 36 Continued

Pick List	Part	Quantity
DSD|3	503279	1
DSD|3	831961	1
DSD|3	834161	5
DSD|3	835261	4
DSD|3	831661	1
DSD|3	836261	7
DSD|3	509752	1
DSD|3	505546	4
DSD|3	505549	2
DSD|3	505553	1
DSD|3	510645	1
DSD|3	506295	3
DSD|3	506631	1
DSD|3	506630	1
DSD|3	506951	2
DSD|3	506950	2
DSD|3	510416	14
DSD|3	510419	5
DSD|3	510421	4
DSD|3	510422	2
DSD|3	510426	8
DSD|3	512486	2
DSD|3	512485	2
DSD|4	505548	10
DSD|4	506632	5

Table 36 Continued

Pick List	Part	Quantity
DSD|4	509753	5
DSD|4	503278	10
DSD|4	509871	5
DSD|4	100521	15
DSD|4	511873	15
DSD|4	505555	5
DSD|4	505554	10
DSD|4	513009	15
DSD|4	509046	5
DSD|4	503971	10
DSD|4	507087	5
DSD|4	831261	10
DSD|4	836261	14
DSD|4	836561	5
DSD|4	832461	10
DSD|4	835261	15
DSD|4	831661	5
DSD|4	839061	10
DSD|4	509752	5
DSD|4	505546	25
DSD|4	505547	10
DSD|4	505549	5
DSD|4	505638	3
DSD|4	510645	10
DSD|4	511068	5

Table 36 Continued

Pick List	**Part**	**Quantity**
DSD|4	510706	5
DSD|4	512730	5
DSD|4	506295	20
DSD|4	506296	10
DSD|4	506297	10
DSD|4	510708	5
DSD|4	512487	5
DSD|4	512486	5
DSD|4	512485	8
DSD|4	510052	3
DSD|4	510053	3
DSD|4	510138	5
DSD|4	510135	5
DSD|4	510139	5
DSD|4	510136	5
RETAIL|1	506284	12
RETAIL|1	510141	1
RETAIL|1	508782	1
RETAIL|1	513096	1
RETAIL|1	508730	3
RETAIL|1	511108	1
RETAIL|1	480077	1
RETAIL|1	503890	1
RETAIL|1	479006	2
RETAIL|1	508687	1

Table 36 Continued

Pick List	Part	Quantity
RETAIL|1	511309	1
RETAIL|1	666688	1
RETAIL|1	511312	1
RETAIL|1	510646	1
RETAIL|1	510418	1
RETAIL|1	510419	1
RETAIL|1	510421	1
RETAIL|1	510426	2
RETAIL|2	509209	1
RETAIL|2	509594	1
RETAIL|2	506284	5
RETAIL|2	510138	1
RETAIL|2	510136	2
RETAIL|2	512988	1
RETAIL|2	500078	1
RETAIL|2	509197	1
RETAIL|2	509193	1
RETAIL|2	509206	1
RETAIL|2	509204	1
RETAIL|2	504503	1
RETAIL|2	513020	1
RETAIL|2	508730	3
RETAIL|2	510936	2
RETAIL|2	503791	1
RETAIL|2	479006	1

Table 36 Continued

Pick List	Part	Quantity
RETAIL|2	503760	1
RETAIL|2	511312	2
RETAIL|3	506284	4
RETAIL|3	473916	1
RETAIL|3	507238	2
RETAIL|3	509198	1
RETAIL|3	509192	1
RETAIL|3	410608	1
RETAIL|3	508782	1
RETAIL|3	511839	1
RETAIL|3	503791	1
RETAIL|3	479006	3
RETAIL|3	511309	1
RETAIL|3	666688	1
RETAIL|4	506284	4
RETAIL|4	513022	2
RETAIL|4	512728	1
RETAIL|4	510835	1
RETAIL|4	512986	1
RETAIL|4	506562	1
RETAIL|4	504503	1
RETAIL|4	508782	1
RETAIL|4	513020	1
RETAIL|4	513096	2
RETAIL|4	508730	1

Table 36 Continued

Pick List	Part	Quantity
RETAIL|4	511309	1
RETAIL|4	503760	1
RETAIL|4	511312	2
RETAIL|4	510142	1
RETAIL|4	510422	1
RETAIL|4	510425	1
WHOLE|1	501919	1
WHOLE|1	500252	1
WHOLE|1	501684	1
WHOLE|1	501961	1
WHOLE|1	508737	1
WHOLE|1	511870	4
WHOLE|1	503106	1
WHOLE|1	509148	1
WHOLE|1	509145	1
WHOLE|1	509146	1
WHOLE|1	510139	1
WHOLE|2	507208	2
WHOLE|2	501493	2
WHOLE|2	501627	2
WHOLE|2	501552	3
WHOLE|2	477080	1
WHOLE|2	510136	1
WHOLE|2	512802	3
WHOLE|2	511355	1

Table 36 Continued

Pick List	Part	Quantity
WHOLE|2	503106	1
WHOLE|2	509148	1
WHOLE|2	509145	1
WHOLE|2	509146	1
WHOLE|2	509147	1
WHOLE|3	500252	7
WHOLE|3	510198	1
WHOLE|3	10005	6
WHOLE|3	10003	6
WHOLE|3	10004	6
WHOLE|3	10001	6
WHOLE|3	10016	6
WHOLE|3	10008	6
WHOLE|3	503103	2
WHOLE|4	501919	1
WHOLE|4	501920	1
WHOLE|4	500252	1
WHOLE|4	500030	1
WHOLE|4	501961	1
WHOLE|4	477265	1
WHOLE|4	512986	1
WHOLE|4	510140	2
WHOLE|4	508730	2
WHOLE|4	508732	1
WHOLE|4	509671	2

Table 36 Continued

Pick List	Part	Quantity
WHOLE|4	476422	1
WHOLE|4	511043	1
WHOLE|4	511312	2
WHOLE|4	510139	1
WHOLE|5	506284	4
WHOLE|5	501919	1
WHOLE|5	501493	2
WHOLE|5	504468	2
WHOLE|5	501961	2
WHOLE|5	503565	4
WHOLE|5	508730	1
WHOLE|5	509671	1
WHOLE|5	508202	1
WHOLE|5	479006	3
WHOLE|5	511309	1
WHOLE|5	511042	1
WHOLE|5	511312	1
WHOLE|6	507208	2
WHOLE|6	501919	4
WHOLE|6	500228	2
WHOLE|6	510081	2
WHOLE|6	501552	2
WHOLE|6	503565	2
WHOLE|6	503793	1
WHOLE|6	503794	1

Table 36 Continued

Pick List	Part	Quantity
WHOLE|6	500037	3
WHOLE|6	511309	2
WHOLE|6	503106	3
WHOLE|6	509149	3
WHOLE|6	503760	1
WHOLE|6	508730	3
WHOLE|6	511043	4
WHOLE|6	511042	2
WHOLE|7	506284	12
WHOLE|7	507208	3
WHOLE|7	501919	2
WHOLE|7	504468	3
WHOLE|7	477265	1
WHOLE|7	510136	1
WHOLE|7	508709	1
WHOLE|7	506562	1
WHOLE|7	509554	1
WHOLE|7	505308	1
WHOLE|7	511542	1
WHOLE|7	506245	1
WHOLE|7	510130	1
WHOLE|7	509671	1
WHOLE|7	508686	4
WHOLE|7	503103	1
WHOLE|7	508687	1

Table 36 Continued

Pick List	**Part**	**Quantity**
WHOLE|7	503893	2
WHOLE|7	511312	1
WHOLE|7	508730	2
WHOLE|7	510139	1

Table 37. Part Table from the .prd File

Product Name	Part Name	Qty Parts/Product	Use%	Days Inventory	Color
DSD|1	506632	1	100	1	1
DSD|1	506952	1	100	1	1
DSD|1	506953	1	100	1	1
DSD|1	509625	1	100	1	1
DSD|1	100411	1	100	1	1
DSD|1	100621	1	100	1	1
DSD|1	505554	1	100	1	1
DSD|1	510203	1	100	1	1
DSD|1	509046	1	100	1	1
DSD|1	503971	1	100	1	1
DSD|1	503279	1	100	1	1
DSD|1	507087	1	100	1	1
DSD|1	831261	1	100	1	1
DSD|1	836561	1	100	1	1
DSD|1	832461	1	100	1	1

Table 37 Continued

Product Name	Part Name	Qty Parts/Product	Use%	Days Inventory	Color
DSD|1	834161	1	100	1	1
DSD|1	835261	1	100	1	1
DSD|1	836261	1	100	1	1
DSD|1	505546	1	100	1	1
DSD|1	505550	1	100	1	1
DSD|1	505547	1	100	1	1
DSD|1	505549	1	100	1	1
DSD|1	505551	1	100	1	1
DSD|1	510645	1	100	1	1
DSD|1	510708	1	100	1	1
DSD|1	506630	1	100	1	1
DSD|1	509042	1	100	1	1
DSD|1	RETURN	1	100	1	1
DSD|2	505548	1	100	1	1
DSD|2	506953	1	100	1	1
DSD|2	503278	1	100	1	1
DSD|2	509871	1	100	1	1
DSD|2	100521	1	100	1	1
DSD|2	100621	1	100	1	1
DSD|2	505555	1	100	1	1
DSD|2	505554	1	100	1	1
DSD|2	503971	1	100	1	1
DSD|2	831261	1	100	1	1
DSD|2	834161	1	100	1	1
DSD|2	831661	1	100	1	1

Table 37 Continued

Product Name	Part Name	Qty Parts/Product	Use%	Days Inventory	Color
DSD|2	836261	1	100	1	1
DSD|2	839061	1	100	1	1
DSD|2	509752	1	100	1	1
DSD|2	505546	1	100	1	1
DSD|2	505547	1	100	1	1
DSD|2	505549	1	100	1	1
DSD|2	510645	1	100	1	1
DSD|2	510644	1	100	1	1
DSD|2	511068	1	100	1	1
DSD|2	506295	1	100	1	1
DSD|2	506296	1	100	1	1
DSD|2	506297	1	100	1	1
DSD|2	506630	1	100	1	1
DSD|2	508939	1	100	1	1
DSD|2	510416	1	100	1	1
DSD|2	510417	1	100	1	1
DSD|2	510419	1	100	1	1
DSD|2	510425	1	100	1	1
DSD|2	512487	1	100	1	1
DSD|2	512486	1	100	1	1
DSD|2	512485	1	100	1	1
DSD|2	513504	1	100	1	1
DSD|2	510135	1	100	1	1
DSD|2	510139	1	100	1	1
DSD|2	510136	1	100	1	1

Table 37 Continued

Product Name	Part Name	Qty Parts/Product	Use%	Days Inventory	Color
DSD|2	RETURN	1	100	1	1
DSD|3	506632	1	100	1	1
DSD|3	506952	1	100	1	1
DSD|3	506953	1	100	1	1
DSD|3	509625	1	100	1	1
DSD|3	100411	1	100	1	1
DSD|3	100521	1	100	1	1
DSD|3	100621	1	100	1	1
DSD|3	505554	1	100	1	1
DSD|3	509046	1	100	1	1
DSD|3	503279	1	100	1	1
DSD|3	831961	1	100	1	1
DSD|3	834161	1	100	1	1
DSD|3	835261	1	100	1	1
DSD|3	831661	1	100	1	1
DSD|3	836261	1	100	1	1
DSD|3	509752	1	100	1	1
DSD|3	505546	1	100	1	1
DSD|3	505549	1	100	1	1
DSD|3	505553	1	100	1	1
DSD|3	510645	1	100	1	1
DSD|3	506295	1	100	1	1
DSD|3	506631	1	100	1	1
DSD|3	506630	1	100	1	1
DSD|3	506951	1	100	1	1

Table 37 Continued

Product Name	Part Name	Qty Parts/Product	Use%	Days Inventory	Color
DSD|3	506950	1	100	1	1
DSD|3	510416	1	100	1	1
DSD|3	510419	1	100	1	1
DSD|3	510421	1	100	1	1
DSD|3	510422	1	100	1	1
DSD|3	510426	1	100	1	1
DSD|3	512486	1	100	1	1
DSD|3	512485	1	100	1	1
DSD|3	RETURN	1	100	1	1
DSD|4	505548	1	100	1	1
DSD|4	506632	1	100	1	1
DSD|4	509753	1	100	1	1
DSD|4	503278	1	100	1	1
DSD|4	509871	1	100	1	1
DSD|4	100521	1	100	1	1
DSD|4	511873	1	100	1	1
DSD|4	505555	1	100	1	1
DSD|4	505554	1	100	1	1
DSD|4	513009	1	100	1	1
DSD|4	509046	1	100	1	1
DSD|4	503971	1	100	1	1
DSD|4	507087	1	100	1	1
DSD|4	831261	1	100	1	1
DSD|4	836261	1	100	1	1
DSD|4	836561	1	100	1	1

Table 37 Continued

Product Name	Part Name	Qty Parts/Product	Use%	Days Inventory	Color
DSD|4	832461	1	100	1	1
DSD|4	835261	1	100	1	1
DSD|4	831661	1	100	1	1
DSD|4	839061	1	100	1	1
DSD|4	509752	1	100	1	1
DSD|4	505546	1	100	1	1
DSD|4	505547	1	100	1	1
DSD|4	505549	1	100	1	1
DSD|4	505638	1	100	1	1
DSD|4	510645	1	100	1	1
DSD|4	511068	1	100	1	1
DSD|4	510706	1	100	1	1
DSD|4	512730	1	100	1	1
DSD|4	506295	1	100	1	1
DSD|4	506296	1	100	1	1
DSD|4	506297	1	100	1	1
DSD|4	510708	1	100	1	1
DSD|4	512487	1	100	1	1
DSD|4	512486	1	100	1	1
DSD|4	512485	1	100	1	1
DSD|4	510052	1	100	1	1
DSD|4	510053	1	100	1	1
DSD|4	510138	1	100	1	1
DSD|4	510135	1	100	1	1

Table 37 Continued

Product Name	Part Name	Qty Parts/Product	Use%	Days Inventory	Color
DSD|4	510139	1	100	1	1
DSD|4	510136	1	100	1	1
DSD|4	RETURN	1	100	1	1
RETAIL|1	506284	1	100	1	1
RETAIL|1	510141	1	100	1	1
RETAIL|1	508782	1	100	1	1
RETAIL|1	513096	1	100	1	1
RETAIL|1	508730	1	100	1	1
RETAIL|1	511108	1	100	1	1
RETAIL|1	480077	1	100	1	1
RETAIL|1	503890	1	100	1	1
RETAIL|1	479006	1	100	1	1
RETAIL|1	508687	1	100	1	1
RETAIL|1	511309	1	100	1	1
RETAIL|1	666688	1	100	1	1
RETAIL|1	511312	1	100	1	1
RETAIL|1	510646	1	100	1	1
RETAIL|1	510418	1	100	1	1
RETAIL|1	510419	1	100	1	1
RETAIL|1	510421	1	100	1	1
RETAIL|1	510426	1	100	1	1
RETAIL|1	RETURN	1	100	1	1
RETAIL|2	509209	1	100	1	1
RETAIL|2	509594	1	100	1	1
RETAIL|2	506284	1	100	1	1

Table 37 Continued

Product Name	Part Name	Qty Parts/Product	Use%	Days Inventory	Color
RETAIL|2	510138	1	100	1	1
RETAIL|2	510136	1	100	1	1
RETAIL|2	512988	1	100	1	1
RETAIL|2	500078	1	100	1	1
RETAIL|2	509197	1	100	1	1
RETAIL|2	509193	1	100	1	1
RETAIL|2	509206	1	100	1	1
RETAIL|2	509204	1	100	1	1
RETAIL|2	504503	1	100	1	1
RETAIL|2	513020	1	100	1	1
RETAIL|2	508730	1	100	1	1
RETAIL|2	510936	1	100	1	1
RETAIL|2	503791	1	100	1	1
RETAIL|2	479006	1	100	1	1
RETAIL|2	503760	1	100	1	1
RETAIL|2	511312	1	100	1	1
RETAIL|2	RETURN	1	100	1	1
RETAIL|3	506284	1	100	1	1
RETAIL|3	473916	1	100	1	1
RETAIL|3	507238	1	100	1	1
RETAIL|3	509198	1	100	1	1
RETAIL|3	509192	1	100	1	1
RETAIL|3	410608	1	100	1	1
RETAIL|3	508782	1	100	1	1
RETAIL|3	511839	1	100	1	1

Table 37 Continued

Product Name	Part Name	Qty Parts/Product	Use%	Days Inventory	Color
RETAIL|3	503791	1	100	1	1
RETAIL|3	479006	1	100	1	1
RETAIL|3	511309	1	100	1	1
RETAIL|3	666688	1	100	1	1
RETAIL|3	RETURN	1	100	1	1
RETAIL|4	506284	1	100	1	1
RETAIL|4	513022	1	100	1	1
RETAIL|4	512728	1	100	1	1
RETAIL|4	510835	1	100	1	1
RETAIL|4	512986	1	100	1	1
RETAIL|4	506562	1	100	1	1
RETAIL|4	504503	1	100	1	1
RETAIL|4	508782	1	100	1	1
RETAIL|4	513020	1	100	1	1
RETAIL|4	513096	1	100	1	1
RETAIL|4	508730	1	100	1	1
RETAIL|4	511309	1	100	1	1
RETAIL|4	503760	1	100	1	1
RETAIL|4	511312	1	100	1	1
RETAIL|4	510142	1	100	1	1
RETAIL|4	510422	1	100	1	1
RETAIL|4	510425	1	100	1	1
RETAIL|4	RETURN	1	100	1	1
WHOLE|1	501919	1	100	1	1
WHOLE|1	500252	1	100	1	1

Table 37 Continued

Product Name	Part Name	Qty Parts/Product	Use%	Days Inventory	Color
WHOLE|1	501684	1	100	1	1
WHOLE|1	501961	1	100	1	1
WHOLE|1	508737	1	100	1	1
WHOLE|1	511870	1	100	1	1
WHOLE|1	503106	1	100	1	1
WHOLE|1	509148	1	100	1	1
WHOLE|1	509145	1	100	1	1
WHOLE|1	509146	1	100	1	1
WHOLE|1	510139	1	100	1	1
WHOLE|1	RETURN	1	100	1	1
WHOLE|2	507208	1	100	1	1
WHOLE|2	501493	1	100	1	1
WHOLE|2	501627	1	100	1	1
WHOLE|2	501552	1	100	1	1
WHOLE|2	477080	1	100	1	1
WHOLE|2	510136	1	100	1	1
WHOLE|2	512802	1	100	1	1
WHOLE|2	511355	1	100	1	1
WHOLE|2	503106	1	100	1	1
WHOLE|2	509148	1	100	1	1
WHOLE|2	509145	1	100	1	1
WHOLE|2	509146	1	100	1	1
WHOLE|2	509147	1	100	1	1
WHOLE|2	RETURN	1	100	1	1

Table 37 Continued

Product Name	Part Name	Qty Parts/Product	Use%	Days Inventory	Color
WHOLE|3	500252	1	100	1	1
WHOLE|3	510198	1	100	1	1
WHOLE|3	10005	1	100	1	1
WHOLE|3	10003	1	100	1	1
WHOLE|3	10004	1	100	1	1
WHOLE|3	10001	1	100	1	1
WHOLE|3	10016	1	100	1	1
WHOLE|3	10008	1	100	1	1
WHOLE|3	503103	1	100	1	1
WHOLE|3	RETURN	1	100	1	1
WHOLE|4	501919	1	100	1	1
WHOLE|4	501920	1	100	1	1
WHOLE|4	500252	1	100	1	1
WHOLE|4	500030	1	100	1	1
WHOLE|4	501961	1	100	1	1
WHOLE|4	477265	1	100	1	1
WHOLE|4	512986	1	100	1	1
WHOLE|4	510140	1	100	1	1
WHOLE|4	508730	1	100	1	1
WHOLE|4	508732	1	100	1	1
WHOLE|4	509671	1	100	1	1
WHOLE|4	476422	1	100	1	1
WHOLE|4	511043	1	100	1	1
WHOLE|4	511312	1	100	1	1
WHOLE|4	510139	1	100	1	1

Table 37 Continued

Product Name	Part Name	Qty Parts/Product	Use%	Days Inventory	Color
WHOLE|4	RETURN	1	100	1	1
WHOLE|5	506284	1	100	1	1
WHOLE|5	501919	1	100	1	1
WHOLE|5	501493	1	100	1	1
WHOLE|5	504468	1	100	1	1
WHOLE|5	501961	1	100	1	1
WHOLE|5	503565	1	100	1	1
WHOLE|5	508730	1	100	1	1
WHOLE|5	509671	1	100	1	1
WHOLE|5	508202	1	100	1	1
WHOLE|5	479006	1	100	1	1
WHOLE|5	511309	1	100	1	1
WHOLE|5	511042	1	100	1	1
WHOLE|5	511312	1	100	1	1
WHOLE|5	RETURN	1	100	1	1
WHOLE|6	507208	1	100	1	1
WHOLE|6	501919	1	100	1	1
WHOLE|6	500228	1	100	1	1
WHOLE|6	510081	1	100	1	1
WHOLE|6	501552	1	100	1	1
WHOLE|6	503565	1	100	1	1
WHOLE|6	503793	1	100	1	1
WHOLE|6	503794	1	100	1	1
WHOLE|6	500037	1	100	1	1
WHOLE|6	511309	1	100	1	1

Table 37 Continued

Product Name	Part Name	Qty Parts/Product	Use%	Days Inventory	Color
WHOLE|6	503106	1	100	1	1
WHOLE|6	509149	1	100	1	1
WHOLE|6	503760	1	100	1	1
WHOLE|6	508730	1	100	1	1
WHOLE|6	511043	1	100	1	1
WHOLE|6	511042	1	100	1	1
WHOLE|6	RETURN	1	100	1	1
WHOLE|7	506284	1	100	1	1
WHOLE|7	507208	1	100	1	1
WHOLE|7	501919	1	100	1	1
WHOLE|7	504468	1	100	1	1
WHOLE|7	477265	1	100	1	1
WHOLE|7	510136	1	100	1	1
WHOLE|7	508709	1	100	1	1
WHOLE|7	506562	1	100	1	1
WHOLE|7	509554	1	100	1	1
WHOLE|7	505308	1	100	1	1
WHOLE|7	511542	1	100	1	1
WHOLE|7	506245	1	100	1	1
WHOLE|7	510130	1	100	1	1
WHOLE|7	509671	1	100	1	1
WHOLE|7	508686	1	100	1	1
WHOLE|7	503103	1	100	1	1
WHOLE|7	508687	1	100	1	1

Table 37 Continued

Product Name	Part Name	Qty Parts/Product	Use%	Days Inventory	Color
WHOLE|7	503893	1	100	1	1
WHOLE|7	511312	1	100	1	1
WHOLE|7	508730	1	100	1	1
WHOLE|7	510139	1	100	1	1
WHOLE|7	RETURN	1	100	1	1

Table 38. The Locations Section of the .loc File

Name	X (Inches)	Y (Inches)	Group	Tug Route	Passthrough	Stop	Delaytime
836261_BULK	13856.1425	3491.3096	UNASSIGNED	UNASSIGNED	No	No	0
DSD_DOCK	14802.2765	2984.7154	UNASSIGNED	UNASSIGNED	No	No	0
RET_DOCK	17822.762	2988.2822	UNASSIGNED	UNASSIGNED	No	No	0
RW_509554	16926.6128	3623.3094	UNASSIGNED	UNASSIGNED	No	No	0
RW_509594	16926.6128	3666.12	UNASSIGNED	UNASSIGNED	No	No	0
RW_510130	16926.6128	3716.0663	UNASSIGNED	UNASSIGNED	No	No	0
RW_510136	16923.0435	3769.5803	UNASSIGNED	UNASSIGNED	No	No	0
RW_510138	16923.0435	3815.9578	UNASSIGNED	UNASSIGNED	No	No	0
RW_510141	16923.0435	3855.2016	UNASSIGNED	UNASSIGNED	No	No	0
RW_510142	16923.0435	3905.1479	UNASSIGNED	UNASSIGNED	No	No	0
RW_510198	16915.9025	3937.2551	UNASSIGNED	UNASSIGNED	No	No	0
RW_510418	16923.0435	3972.9312	UNASSIGNED	UNASSIGNED	No	No	0
RW_510419	16851.6354	3619.7426	UNASSIGNED	UNASSIGNED	No	No	0
RW_510421	16855.2072	3680.3902	UNASSIGNED	UNASSIGNED	No	No	0
RW_510422	16855.2072	3719.6341	UNASSIGNED	UNASSIGNED	No	No	0
RW_510425	16862.3483	3773.1471	UNASSIGNED	UNASSIGNED	No	No	0
RW_510426	16855.2072	3815.9578	UNASSIGNED	UNASSIGNED	No	No	0

Table 38 Continued

Name	X (Inches)	Y (Inches)	Group	Tug Route	Passthrough	Stop	Delaytime
RW_510646	16851.6354	3858.7694	UNASSIGNED	UNASSIGNED	No	No	0
RW_510835	16855.2072	3908.7147	UNASSIGNED	UNASSIGNED	No	No	0
RW_510936	16855.2072	3930.1205	UNASSIGNED	UNASSIGNED	No	No	0
RW_511108	16858.7765	3976.499	UNASSIGNED	UNASSIGNED	No	No	0
RW_511309	16723.1064	3616.1748	UNASSIGNED	UNASSIGNED	No	No	0
RW_511312	16730.2449	3662.5532	UNASSIGNED	UNASSIGNED	No	No	0
RW_511542	16715.9653	3694.6614	UNASSIGNED	UNASSIGNED	No	No	0
RW_511839	16719.5346	3762.4447	UNASSIGNED	UNASSIGNED	No	No	0
RW_512728	16719.5346	3812.391	UNASSIGNED	UNASSIGNED	No	No	0
RW_512986	16719.5346	3848.066	UNASSIGNED	UNASSIGNED	No	No	0
RW_512988	16712.3935	3905.1479	UNASSIGNED	UNASSIGNED	No	No	0
RW_513022	16712.3935	3940.8229	UNASSIGNED	UNASSIGNED	No	No	0
R_410608	17894.8435	3976.499	UNASSIGNED	UNASSIGNED	No	No	0
R_473916	17665.6687	3619.7426	UNASSIGNED	UNASSIGNED	No	No	0
R_479006	17658.5276	3662.5532	UNASSIGNED	UNASSIGNED	No	No	0
R_480077	17658.5276	3698.2282	UNASSIGNED	UNASSIGNED	No	No	0
R_500078	17654.9583	3758.8769	UNASSIGNED	UNASSIGNED	No	No	0

Table 38 Continued

Name	X (Inches)	Y (Inches)	Group	Tug Route	Passthrough	Stop	Delaytime
R_503760	17658.5276	3794.553	UNASSIGNED	UNASSIGNED	No	No	0
R_503791	17665.6687	3840.9314	UNASSIGNED	UNASSIGNED	No	No	0
R_503890	17669.2379	3898.0123	UNASSIGNED	UNASSIGNED	No	No	0
R_504503	17662.0994	3937.2551	UNASSIGNED	UNASSIGNED	No	No	0
R_506284	17665.6687	3994.337	UNASSIGNED	UNASSIGNED	No	No	0
R_506562	17751.3564	3616.1748	UNASSIGNED	UNASSIGNED	No	No	0
R_507238	17747.7846	3666.12	UNASSIGNED	UNASSIGNED	No	No	0
R_508687	17747.7846	3712.4985	UNASSIGNED	UNASSIGNED	No	No	0
R_508730	17751.3564	3762.4447	UNASSIGNED	UNASSIGNED	No	No	0
R_508782	17758.4974	3808.8232	UNASSIGNED	UNASSIGNED	No	No	0
R_509192	17747.7846	3855.2016	UNASSIGNED	UNASSIGNED	No	No	0
R_509193	17751.3564	3901.5801	UNASSIGNED	UNASSIGNED	No	No	0
R_509197	17747.7846	3944.3907	UNASSIGNED	UNASSIGNED	No	No	0
R_509198	17754.9256	3983.6336	UNASSIGNED	UNASSIGNED	No	No	0
R_509204	17887.029	3619.7426	UNASSIGNED	UNASSIGNED	No	No	0
R_509206	17879.8879	3673.2556	UNASSIGNED	UNASSIGNED	No	No	0
R_509209	17879.8879	3708.9317	UNASSIGNED	UNASSIGNED	No	No	0

Table 38 Continued

Name	X (Inches)	Y (Inches)	Group	Tug Route	Passthrough	Stop	Delaytime
R_513020	17879.8879	3758.8769	UNASSIGNED	UNASSIGNED	No	No	0
R_513096	17879.8879	3798.1208	UNASSIGNED	UNASSIGNED	No	No	0
R_666688	17883.4572	3844.4992	UNASSIGNED	UNASSIGNED	No	No	0
WD_100411	15038.9814	3905.1479	UNASSIGNED	UNASSIGNED	No	No	0
WD_100521	15038.9814	3951.5253	UNASSIGNED	UNASSIGNED	No	No	0
WD_100621	15046.1224	3994.337	UNASSIGNED	UNASSIGNED	No	No	0
WD_503278	14812.9869	3609.0391	UNASSIGNED	UNASSIGNED	No	No	0
WD_503279	14820.1279	3655.4176	UNASSIGNED	UNASSIGNED	No	No	0
WD_503971	14809.4151	3708.9317	UNASSIGNED	UNASSIGNED	No	No	0
WD_505546	14823.6972	3773.1471	UNASSIGNED	UNASSIGNED	No	No	0
WD_505547	14820.1279	3805.2554	UNASSIGNED	UNASSIGNED	No	No	0
WD_505548	14809.4151	3840.9314	UNASSIGNED	UNASSIGNED	No	No	0
WD_505549	14809.4151	3901.5801	UNASSIGNED	UNASSIGNED	No	No	0
WD_505550	14812.9869	3951.5253	UNASSIGNED	UNASSIGNED	No	No	0
WD_505551	14809.4151	3994.337	UNASSIGNED	UNASSIGNED	No	No	0
WD_505553	14945.0877	3990.7692	UNASSIGNED	UNASSIGNED	No	No	0
WD_505554	14952.2288	3962.2288	UNASSIGNED	UNASSIGNED	No	No	0

Table 38 Continued

Name	X (Inches)	Y (Inches)	Group	Tug Route	Passthrough	Stop	Delaytime
WD_505555	14952.2288	3912.2825	UNASSIGNED	UNASSIGNED	No	No	0
WD_505638	14945.0877	3869.4718	UNASSIGNED	UNASSIGNED	No	No	0
WD_506295	14948.6595	3826.6612	UNASSIGNED	UNASSIGNED	No	No	0
WD_506296	14948.6595	3790.9852	UNASSIGNED	UNASSIGNED	No	No	0
WD_506297	14945.0877	3719.6341	UNASSIGNED	UNASSIGNED	No	No	0
WD_506630	14948.6595	3676.8234	UNASSIGNED	UNASSIGNED	No	No	0
WD_506631	14948.6595	3616.1748	UNASSIGNED	UNASSIGNED	No	No	0
WD_506632	15041.4857	3619.7426	UNASSIGNED	UNASSIGNED	No	No	0
WD_506950	15030.7754	3651.8498	UNASSIGNED	UNASSIGNED	No	No	0
WD_506951	15027.2061	3694.6614	UNASSIGNED	UNASSIGNED	No	No	0
WD_506952	15020.0651	3755.3091	UNASSIGNED	UNASSIGNED	No	No	0
WD_506953	15020.0651	3794.553	UNASSIGNED	UNASSIGNED	No	No	0
WD_507087	15023.6343	3830.229	UNASSIGNED	UNASSIGNED	No	No	0
WD_508939	15170.0173	3616.1748	UNASSIGNED	UNASSIGNED	No	No	0
WD_509042	15177.1584	3658.9854	UNASSIGNED	UNASSIGNED	No	No	0
WD_509046	15177.1584	3712.4985	UNASSIGNED	UNASSIGNED	No	No	0
WD_509625	15166.448	3766.0125	UNASSIGNED	UNASSIGNED	No	No	0

Table 38 Continued

Name	X (Inches)	Y (Inches)	Group	Tug Route	Passthrough	Stop	Delaytime
WD_509752	15170.0173	3801.6876	UNASSIGNED	UNASSIGNED	No	No	0
WD_509753	15180.7302	3844.4992	UNASSIGNED	UNASSIGNED	No	No	0
WD_509871	15166.448	3908.7147	UNASSIGNED	UNASSIGNED	No	No	0
WD_510052	15166.448	3944.3907	UNASSIGNED	UNASSIGNED	No	No	0
WD_510053	15170.0173	3980.0668	UNASSIGNED	UNASSIGNED	No	No	0
WD_510135	15173.5891	4044.2822	UNASSIGNED	UNASSIGNED	No	No	0
WD_510136	15173.5891	4094.2285	UNASSIGNED	UNASSIGNED	No	No	0
WD_510138	15173.5891	4144.1748	UNASSIGNED	UNASSIGNED	No	No	0
WD_510139	15037.9165	4040.7154	UNASSIGNED	UNASSIGNED	No	No	0
WD_510140	15030.7754	4083.5261	UNASSIGNED	UNASSIGNED	No	No	0
WD_510203	15034.3472	4129.9045	UNASSIGNED	UNASSIGNED	No	No	0
WD_510416	14955.798	4051.4179	UNASSIGNED	UNASSIGNED	No	No	0
WD_510417	14945.0877	4083.5261	UNASSIGNED	UNASSIGNED	No	No	0
WD_510419	14945.0877	4119.2011	UNASSIGNED	UNASSIGNED	No	No	0
WD_510421	15173.5891	4194.12	UNASSIGNED	UNASSIGNED	No	No	0
WD_510422	15166.448	4222.6605	UNASSIGNED	UNASSIGNED	No	No	0
WD_510425	15166.448	4261.9043	UNASSIGNED	UNASSIGNED	No	No	0

Table 38 Continued

Name	X (Inches)	Y (Inches)	Group	Tug Route	Passthrough	Stop	Delaytime
WD_510426	15045.0575	4186.9854	UNASSIGNED	UNASSIGNED	No	No	0
WD_510644	15048.6268	4222.6605	UNASSIGNED	UNASSIGNED	No	No	0
WD_510645	15041.4857	4265.4721	UNASSIGNED	UNASSIGNED	No	No	0
WD_510706	14948.6595	4194.12	UNASSIGNED	UNASSIGNED	No	No	0
WD_510708	14948.6595	4219.0936	UNASSIGNED	UNASSIGNED	No	No	0
WD_511068	14959.3698	4261.9043	UNASSIGNED	UNASSIGNED	No	No	0
WD_511873	14955.798	4318.9852	UNASSIGNED	UNASSIGNED	No	No	0
WD_512485	14952.2288	4354.6612	UNASSIGNED	UNASSIGNED	No	No	0
WD_512486	14952.2288	4397.4719	UNASSIGNED	UNASSIGNED	No	No	0
WD_512487	14945.0877	4461.6883	UNASSIGNED	UNASSIGNED	No	No	0
WD_512730	14948.6595	4493.7956	UNASSIGNED	UNASSIGNED	No	No	0
WD_513009	15183.8246	3637.7826	UNASSIGNED	UNASSIGNED	No	No	0
WD_513504	14948.6595	4533.0394	UNASSIGNED	UNASSIGNED	No	No	0
WD_831261	15045.0575	4322.553	UNASSIGNED	UNASSIGNED	No	No	0
WD_831661	15030.7754	4368.9314	UNASSIGNED	UNASSIGNED	No	No	0
WD_831961	15034.3472	4401.0397	UNASSIGNED	UNASSIGNED	No	No	0
WD_832461	15034.3472	4461.6883	UNASSIGNED	UNASSIGNED	No	No	0

Table 38 Continued

Name	X (Inches)	Y (Inches)	Group	Tug Route	Passthrough	Stop	Delaytime
WD_834161	15034.3472	4500.9312	UNASSIGNED	UNASSIGNED	No	No	0
WD_835261	15034.3472	4529.4716	UNASSIGNED	UNASSIGNED	No	No	0
WD_836261	15173.5891	4326.1208	UNASSIGNED	UNASSIGNED	No	No	0
WD_836561	15173.5891	4361.7958	UNASSIGNED	UNASSIGNED	No	No	0
WD_839061	15173.5891	4401.0397	UNASSIGNED	UNASSIGNED	No	No	0
WHL_DOCK	15937.6349	3006.1203	UNASSIGNED	UNASSIGNED	No	No	0
W_10001	15851.9472	3623.3094	UNASSIGNED	UNASSIGNED	No	No	0
W_10003	15844.8086	3669.6878	UNASSIGNED	UNASSIGNED	No	No	0
W_10004	15844.8086	3708.9317	UNASSIGNED	UNASSIGNED	No	No	0
W_10005	15844.8086	3762.4447	UNASSIGNED	UNASSIGNED	No	No	0
W_10008	15841.2368	3790.9852	UNASSIGNED	UNASSIGNED	No	No	0
W_10016	15841.2368	3833.7958	UNASSIGNED	UNASSIGNED	No	No	0
W_476422	15844.8086	3908.7147	UNASSIGNED	UNASSIGNED	No	No	0
W_477080	15841.2368	3947.9585	UNASSIGNED	UNASSIGNED	No	No	0
W_477265	15844.8086	3983.6336	UNASSIGNED	UNASSIGNED	No	No	0
W_479006	15851.9472	4062.1203	UNASSIGNED	UNASSIGNED	No	No	0
W_500030	15851.9472	4101.3641	UNASSIGNED	UNASSIGNED	No	No	0

Table 38 Continued

Name	X (Inches)	Y (Inches)	Group	Tug Route	Passthrough	Stop	Delaytime
W_500037	15848.3779	4140.607	UNASSIGNED	UNASSIGNED	No	No	0
W_500228	15984.0505	4137.0392	UNASSIGNED	UNASSIGNED	No	No	0
W_500252	15987.6198	4094.2285	UNASSIGNED	UNASSIGNED	No	No	0
W_501493	15987.6198	4044.2822	UNASSIGNED	UNASSIGNED	No	No	0
W_501552	15994.7609	3987.2014	UNASSIGNED	UNASSIGNED	No	No	0
W_501627	15994.7609	3958.6609	UNASSIGNED	UNASSIGNED	No	No	0
W_501684	15994.7609	3912.2825	UNASSIGNED	UNASSIGNED	No	No	0
W_501919	15994.7609	3848.066	UNASSIGNED	UNASSIGNED	No	No	0
W_501920	15994.7609	3805.2554	UNASSIGNED	UNASSIGNED	No	No	0
W_501961	15994.7609	3762.4447	UNASSIGNED	UNASSIGNED	No	No	0
W_503103	15987.6198	3701.7961	UNASSIGNED	UNASSIGNED	No	No	0
W_503106	15987.6198	3669.6878	UNASSIGNED	UNASSIGNED	No	No	0
W_503565	15984.0505	3626.8772	UNASSIGNED	UNASSIGNED	No	No	0
W_503760	16069.7382	3626.8772	UNASSIGNED	UNASSIGNED	No	No	0
W_503793	16059.0254	3658.9854	UNASSIGNED	UNASSIGNED	No	No	0
W_503794	16062.5972	3694.6614	UNASSIGNED	UNASSIGNED	No	No	0
W_503893	16051.8869	3773.1471	UNASSIGNED	UNASSIGNED	No	No	0

Table 38 Continued

Name	X (Inches)	Y (Inches)	Group	Tug Route	Passthrough	Stop	Delaytime
W_504468	16066.1664	3815.9578	UNASSIGNED	UNASSIGNED	No	No	0
W_505308	16066.1664	3837.3636	UNASSIGNED	UNASSIGNED	No	No	0
W_506245	16059.0254	3908.7147	UNASSIGNED	UNASSIGNED	No	No	0
W_506284	16062.5972	3947.9585	UNASSIGNED	UNASSIGNED	No	No	0
W_506562	16066.1664	3994.337	UNASSIGNED	UNASSIGNED	No	No	0
W_507208	16055.4561	4051.4179	UNASSIGNED	UNASSIGNED	No	No	0
W_508202	16066.1664	4090.6607	UNASSIGNED	UNASSIGNED	No	No	0
W_508686	16062.5972	4122.7689	UNASSIGNED	UNASSIGNED	No	No	0
W_508687	16198.2698	4144.1748	UNASSIGNED	UNASSIGNED	No	No	0
W_508709	16216.1212	4094.2285	UNASSIGNED	UNASSIGNED	No	No	0
W_508730	16194.698	4033.5798	UNASSIGNED	UNASSIGNED	No	No	0
W_508732	16205.4083	3994.337	UNASSIGNED	UNASSIGNED	No	No	0
W_508737	16216.1212	3940.8229	UNASSIGNED	UNASSIGNED	No	No	0
W_509145	16216.1212	3894.4445	UNASSIGNED	UNASSIGNED	No	No	0
W_509146	16201.8391	3844.4992	UNASSIGNED	UNASSIGNED	No	No	0
W_509147	16201.8391	3808.8232	UNASSIGNED	UNASSIGNED	No	No	0
W_509148	16205.4083	3773.1471	UNASSIGNED	UNASSIGNED	No	No	0

Table 38 Continued

Name	X (Inches)	Y (Inches)	Group	Tug Route	Passthrough	Stop	Delaytime
W_509149	16201.8391	3723.2019	UNASSIGNED	UNASSIGNED	No	No	0
W_509671	16219.6905	3694.6614	UNASSIGNED	UNASSIGNED	No	No	0
W_510081	16198.2698	3641.1474	UNASSIGNED	UNASSIGNED	No	No	0
W_511042	16291.096	3612.6069	UNASSIGNED	UNASSIGNED	No	No	0
W_511043	16283.9575	3666.12	UNASSIGNED	UNASSIGNED	No	No	0
W_511355	16283.9575	3701.7961	UNASSIGNED	UNASSIGNED	No	No	0
W_511870	16273.2446	3758.8769	UNASSIGNED	UNASSIGNED	No	No	0
W_512802	16276.8165	3808.8232	UNASSIGNED	UNASSIGNED	No	No	0
W_513009	16280.3857	3840.9314	UNASSIGNED	UNASSIGNED	No	No	0

Table 39. Second .csv File

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
1	506632	CASE	5		DSD_DOCK	DW_506632	1	1			DSD
2	506952	CASE	30		DSD_DOCK	DW_506952	1	1			DSD
3	506953	CASE	30		DSD_DOCK	DW_506953	1	1			DSD
4	509625	CASE	5		DSD_DOCK	DW_509625	1	1			DSD

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
5	100411	CASE	10		DSD_DOCK	DW_100411	1	1			DSD
6	100621	CASE	25		DSD_DOCK	DW_100621	1	1			DSD
7	505554	CASE	15		DSD_DOCK	DW_505554	1	1			DSD
8	510203	CASE	5		DSD_DOCK	DW_510203	1	1			DSD
9	509046	CASE	5		DSD_DOCK	DW_509046	1	1			DSD
10	503971	CASE	5		DSD_DOCK	DW_503971	1	1			DSD
11	503279	CASE	10		DSD_DOCK	DW_503279	1	1			DSD
12	507087	CASE	5		DSD_DOCK	DW_507087	1	1			DSD
13	831261	CASE	5		DSD_DOCK	DW_831261	1	1			DSD
14	836561	CASE	5		DSD_DOCK	DW_836561	1	1			DSD
15	832461	CASE	5		DSD_DOCK	DW_832461	1	1			DSD
16	834161	CASE	15		DSD_DOCK	DW_834161	1	1			DSD
17	835261	CASE	20		DSD_DOCK	DW_835261	1	1			DSD
18	836261	CASE	15		DSD_DOCK	DW_836261	1	1			DSD
19	505546	CASE	15		DSD_DOCK	DW_505546	1	1			DSD
20	505550	CASE	5		DSD_DOCK	DW_505550	1	1			DSD
21	505547	CASE	10		DSD_DOCK	DW_505547	1	1			DSD

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
22	505549	CASE	5		DSD_DOCK	DW_505549	1	1			DSD
23	505551	CASE	5		DSD_DOCK	DW_505551	1	1			DSD
24	510645	CASE	5		DSD_DOCK	DW_510645	1	1			DSD
25	510708	CASE	5		DSD_DOCK	DW_510708	1	1			DSD
26	506630	CASE	5		DSD_DOCK	DW_506630	1	1			DSD
27	509042	CASE	15		DSD_DOCK	DW_509042	1	1			DSD
30	505548	CASE	4		DSD_DOCK	DW_505548	2	1			DSD
31	506953	CASE	8		DSD_DOCK	DW_506953	2	1			DSD
32	503278	CASE	6		DSD_DOCK	DW_503278	2	1			DSD
33	509871	CASE	4		DSD_DOCK	DW_509871	2	1			DSD
34	100521	CASE	4		DSD_DOCK	DW_100521	2	1			DSD
35	100621	CASE	3		DSD_DOCK	DW_100621	2	1			DSD
36	505555	CASE	4		DSD_DOCK	DW_505555	2	1			DSD
37	505554	CASE	4		DSD_DOCK	DW_505554	2	1			DSD
38	503971	CASE	4		DSD_DOCK	DW_503971	2	1			DSD
39	831261	CASE	3		DSD_DOCK	DW_831261	2	1			DSD
40	834161	CASE	3		DSD_DOCK	DW_834161	2	1			DSD

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
41	831661	CASE	6		DSD_DOCK	DW_831661	2	1			DSD
42	836261	CASE	4		DSD_DOCK	DW_836261	2	1			DSD
43	839061	CASE	4		DSD_DOCK	DW_839061	2	1			DSD
44	509752	CASE	4		DSD_DOCK	DW_509752	2	1			DSD
45	505546	CASE	6		DSD_DOCK	DW_505546	2	1			DSD
46	505547	CASE	4		DSD_DOCK	DW_505547	2	1			DSD
47	505549	CASE	8		DSD_DOCK	DW_505549	2	1			DSD
48	510645	CASE	4		DSD_DOCK	DW_510645	2	1			DSD
49	510644	CASE	2		DSD_DOCK	DW_510644	2	1			DSD
50	511068	CASE	4		DSD_DOCK	DW_511068	2	1			DSD
51	506295	CASE	6		DSD_DOCK	DW_506295	2	1			DSD
52	506296	CASE	3		DSD_DOCK	DW_506296	2	1			DSD
53	506297	CASE	2		DSD_DOCK	DW_506297	2	1			DSD
54	506630	CASE	4		DSD_DOCK	DW_506630	2	1			DSD
55	508939	CASE	2		DSD_DOCK	DW_508939	2	1			DSD
56	510416	CASE	4		DSD_DOCK	DW_510416	2	1			DSD
57	510417	CASE	4		DSD_DOCK	DW_510417	2	1			DSD

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
58	510419	CASE	6		DSD_DOCK	DW_510419	2	1			DSD
59	510425	CASE	6		DSD_DOCK	DW_510425	2	1			DSD
60	512487	CASE	4		DSD_DOCK	DW_512487	2	1			DSD
61	512486	CASE	6		DSD_DOCK	DW_512486	2	1			DSD
62	512485	CASE	6		DSD_DOCK	DW_512485	2	1			DSD
63	513504	CASE	3		DSD_DOCK	DW_513504	2	1			DSD
64	510135	CASE	1		DSD_DOCK	DW_510135	2	1			DSD
65	510139	CASE	1		DSD_DOCK	DW_510139	2	1			DSD
66	510136	CASE	1		DSD_DOCK	DW_510136	2	1			DSD
68	506632	CASE	1		DSD_DOCK	DW_506632	3	1			DSD
69	506952	CASE	2		DSD_DOCK	DW_506952	3	1			DSD
70	506953	CASE	2		DSD_DOCK	DW_506953	3	1			DSD
71	509625	CASE	1		DSD_DOCK	DW_509625	3	1			DSD
72	100411	CASE	1		DSD_DOCK	DW_100411	3	1			DSD
73	100521	CASE	2		DSD_DOCK	DW_100521	3	1			DSD
74	100621	CASE	5		DSD_DOCK	DW_100621	3	1			DSD
75	505554	CASE	2		DSD_DOCK	DW_505554	3	1			DSD

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
76	509046	CASE	3		DSD_DOCK	DW_509046	3	1			DSD
77	503279	CASE	1		DSD_DOCK	DW_503279	3	1			DSD
78	831961	CASE	1		DSD_DOCK	DW_831961	3	1			DSD
79	834161	CASE	5		DSD_DOCK	DW_834161	3	1			DSD
80	835261	CASE	4		DSD_DOCK	DW_835261	3	1			DSD
81	831661	CASE	1		DSD_DOCK	DW_831661	3	1			DSD
82	836261	CASE	7		DSD_DOCK	DW_836261	3	1			DSD
83	509752	CASE	1		DSD_DOCK	DW_509752	3	1			DSD
84	505546	CASE	4		DSD_DOCK	DW_505546	3	1			DSD
85	505549	CASE	2		DSD_DOCK	DW_505549	3	1			DSD
86	505553	CASE	1		DSD_DOCK	DW_505553	3	1			DSD
87	510645	CASE	1		DSD_DOCK	DW_510645	3	1			DSD
88	506295	CASE	3		DSD_DOCK	DW_506295	3	1			DSD
89	506631	CASE	1		DSD_DOCK	DW_506631	3	1			DSD
90	506630	CASE	1		DSD_DOCK	DW_506630	3	1			DSD
91	506951	CASE	2		DSD_DOCK	DW_506951	3	1			DSD
92	506950	CASE	2		DSD_DOCK	DW_506950	3	1			DSD

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
92	506950	CASE	2		DSD_DOCK	DW_506950	3	1			DSD
93	510416	CASE	14		DSD_DOCK	DW_510416	3	1			DSD
94	510419	CASE	5		DSD_DOCK	DW_510419	3	1			DSD
95	510421	CASE	4		DSD_DOCK	DW_510421	3	1			DSD
96	510422	CASE	2		DSD_DOCK	DW_510422	3	1			DSD
97	510426	CASE	8		DSD_DOCK	DW_510426	3	1			DSD
98	512486	CASE	2		DSD_DOCK	DW_512486	3	1			DSD
99	512485	CASE	2		DSD_DOCK	DW_512485	3	1			DSD
101	505548	CASE	10		DSD_DOCK	DW_505548	4	1			DSD
102	506632	CASE	5		DSD_DOCK	DW_506632	4	1			DSD
103	509753	CASE	5		DSD_DOCK	DW_509753	4	1			DSD
104	503278	CASE	10		DSD_DOCK	DW_503278	4	1			DSD
105	509871	CASE	5		DSD_DOCK	DW_509871	4	1			DSD
106	100521	CASE	15		DSD_DOCK	DW_100521	4	1			DSD
107	511873	CASE	15		DSD_DOCK	DW_511873	4	1			DSD
108	505555	CASE	5		DSD_DOCK	DW_505555	4	1			DSD
109	505554	CASE	10		DSD_DOCK	DW_505554	4	1			DSD

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
110	513009	CASE	15		DSD_DOCK	W_513009	4	1			DSD
111	509046	CASE	5		DSD_DOCK	DW_509046	4	1			DSD
112	503971	CASE	10		DSD_DOCK	DW_503971	4	1			DSD
113	507087	CASE	5		DSD_DOCK	DW_507087	4	1			DSD
114	831261	CASE	10		DSD_DOCK	DW_831261	4	1			DSD
115	836261	CASE	14		DSD_DOCK	DW_836261	4	1			DSD
116	836561	CASE	5		DSD_DOCK	DW_836561	4	1			DSD
117	832461	CASE	10		DSD_DOCK	DW_832461	4	1			DSD
118	835261	CASE	15		DSD_DOCK	DW_835261	4	1			DSD
119	831661	CASE	5		DSD_DOCK	DW_831661	4	1			DSD
120	839061	CASE	10		DSD_DOCK	DW_839061	4	1			DSD
121	509752	CASE	5		DSD_DOCK	DW_509752	4	1			DSD
122	505546	CASE	25		DSD_DOCK	DW_505546	4	1			DSD
123	505547	CASE	10		DSD_DOCK	DW_505547	4	1			DSD
124	505549	CASE	5		DSD_DOCK	DW_505549	4	1			DSD
125	505638	CASE	3		DSD_DOCK	DW_505638	4	1			DSD
126	510645	CASE	10		DSD_DOCK	DW_510645	4	1			DSD

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
127	511068	CASE	5		DSD_DOCK	DW_511068	4	1			DSD
128	510706	CASE	5		DSD_DOCK	DW_510706	4	1			DSD
129	512730	CASE	5		DSD_DOCK	DW_512730	4	1			DSD
130	506295	CASE	20		DSD_DOCK	DW_506295	4	1			DSD
131	506296	CASE	10		DSD_DOCK	DW_506296	4	1			DSD
132	506297	CASE	10		DSD_DOCK	DW_506297	4	1			DSD
133	510708	CASE	5		DSD_DOCK	DW_510708	4	1			DSD
134	512487	CASE	5		DSD_DOCK	DW_512487	4	1			DSD
135	512486	CASE	5		DSD_DOCK	DW_512486	4	1			DSD
136	512485	CASE	8		DSD_DOCK	DW_512485	4	1			DSD
137	510052	CASE	3		DSD_DOCK	DW_510052	4	1			DSD
138	510053	CASE	3		DSD_DOCK	DW_510053	4	1			DSD
139	510138	CASE	5		DSD_DOCK	DW_510138	4	1			DSD
140	510135	CASE	5		DSD_DOCK	DW_510135	4	1			DSD
141	510139	CASE	5		DSD_DOCK	DW_510139	4	1			DSD
142	510136	CASE	5		DSD_DOCK	DW_510136	4	1			DSD
144	506284	CASE	12		RET_DOCK	R_506284	1	1			RETAIL

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
145	510141	CASE	1		RET_DOCK	RW_510141	1	1			RETAIL
146	508782	CASE	1		RET_DOCK	R_508782	1	1			RETAIL
147	513096	CASE	1		RET_DOCK	R_513096	1	1			RETAIL
148	508730	CASE	3		RET_DOCK	R_508730	1	1			RETAIL
149	511108	CASE	1		RET_DOCK	RW_511108	1	1			RETAIL
150	480077	CASE	1		RET_DOCK	R_480077	1	1			RETAIL
151	503890	CASE	1		RET_DOCK	R_503890	1	1			RETAIL
152	479006	CASE	2		RET_DOCK	R_479006	1	1			RETAIL
153	508687	CASE	1		RET_DOCK	R_508687	1	1			RETAIL
154	511309	CASE	1		RET_DOCK	RW_511309	1	1			RETAIL
155	666688	CASE	1		RET_DOCK	R_666688	1	1			RETAIL
156	511312	CASE	1		RET_DOCK	RW_511312	1	1			RETAIL
157	510646	CASE	1		RET_DOCK	RW_510646	1	1			RETAIL
158	510418	CASE	1		RET_DOCK	RW_510418	1	1			RETAIL
159	510419	CASE	1		RET_DOCK	RW_510419	1	1			RETAIL
160	510421	CASE	1		RET_DOCK	RW_510421	1	1			RETAIL
161	510426	CASE	2		RET_DOCK	RW_510426	1	1			RETAIL

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
163	509209	CASE	1		RET_DOCK	R_509209	2	1			RETAIL
164	509594	CASE	1		RET_DOCK	RW_509594	2	1			RETAIL
165	506284	CASE	5		RET_DOCK	R_506284	2	1			RETAIL
166	510138	CASE	1		RET_DOCK	RW_510138	2	1			RETAIL
167	510136	CASE	2		RET_DOCK	RW_510136	2	1			RETAIL
168	512988	CASE	1		RET_DOCK	RW_512988	2	1			RETAIL
169	500078	CASE	1		RET_DOCK	R_500078	2	1			RETAIL
170	509197	CASE	1		RET_DOCK	R_509197	2	1			RETAIL
171	509193	CASE	1		RET_DOCK	R_509193	2	1			RETAIL
172	509206	CASE	1		RET_DOCK	R_509206	2	1			RETAIL
173	509204	CASE	1		RET_DOCK	R_509204	2	1			RETAIL
174	504503	CASE	1		RET_DOCK	R_504503	2	1			RETAIL
175	513020	CASE	1		RET_DOCK	R_513020	2	1			RETAIL
176	508730	CASE	3		RET_DOCK	R_508730	2	1			RETAIL
177	510936	CASE	2		RET_DOCK	RW_510936	2	1			RETAIL
178	503791	CASE	1		RET_DOCK	R_503791	2	1			RETAIL
179	479006	CASE	1		RET_DOCK	R_479006	2	1			RETAIL

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
180	503760	CASE	1		RET_DOCK	R_503760	2	1			RETAIL
181	511312	CASE	2		RET_DOCK	RW_511312	2	1			RETAIL
183	506284	CASE	4		RET_DOCK	R_506284	3	1			RETAIL
184	473916	CASE	1		RET_DOCK	R_473916	3	1			RETAIL
185	507238	CASE	2		RET_DOCK	R_507238	3	1			RETAIL
186	509198	CASE	1		RET_DOCK	R_509198	3	1			RETAIL
187	509192	CASE	1		RET_DOCK	R_509192	3	1			RETAIL
188	410608	CASE	1		RET_DOCK	R_410608	3	1			RETAIL
189	508782	CASE	1		RET_DOCK	R_508782	3	1			RETAIL
190	511839	CASE	1		RET_DOCK	RW_511839	3	1			RETAIL
191	503791	CASE	1		RET_DOCK	R_503791	3	1			RETAIL
192	479006	CASE	3		RET_DOCK	R_479006	3	1			RETAIL
193	511309	CASE	1		RET_DOCK	RW_511309	3	1			RETAIL
194	666688	CASE	1		RET_DOCK	R_666688	3	1			RETAIL
196	506284	CASE	4		RET_DOCK	R_506284	4	1			RETAIL
197	513022	CASE	2		RET_DOCK	RW_513022	4	1			RETAIL
198	512728	CASE	1		RET_DOCK	RW_512728	4	1			RETAIL

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
199	510835	CASE	1		RET_DOCK	RW_510835	4	1			RETAIL
200	512986	CASE	1		RET_DOCK	RW_512986	4	1			RETAIL
201	506562	CASE	1		RET_DOCK	R_506562	4	1			RETAIL
202	504503	CASE	1		RET_DOCK	R_504503	4	1			RETAIL
203	508782	CASE	1		RET_DOCK	R_508782	4	1			RETAIL
204	513020	CASE	1		RET_DOCK	R_513020	4	1			RETAIL
205	513096	CASE	2		RET_DOCK	R_513096	4	1			RETAIL
206	508730	CASE	1		RET_DOCK	R_508730	4	1			RETAIL
207	511309	CASE	1		RET_DOCK	RW_511309	4	1			RETAIL
208	503760	CASE	1		RET_DOCK	R_503760	4	1			RETAIL
209	511312	CASE	2		RET_DOCK	RW_511312	4	1			RETAIL
210	510142	CASE	1		RET_DOCK	RW_510142	4	1			RETAIL
211	510422	CASE	1		RET_DOCK	RW_510422	4	1			RETAIL
212	510425	CASE	1		RET_DOCK	RW_510425	4	1			RETAIL
214	501919	CASE	1		WHL_DOCK	W_501919	1	1			WHOLE
215	500252	CASE	1		WHL_DOCK	W_500252	1	1			WHOLE
216	501684	CASE	1		WHL_DOCK	W_501684	1	1			WHOLE

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
217	501961	CASE	1		WHL_DOCK	W_501961	1	1			WHOLE
218	508737	CASE	1		WHL_DOCK	W_508737	1	1			WHOLE
219	511870	CASE	4		WHL_DOCK	W_511870	1	1			WHOLE
220	503106	CASE	1		WHL_DOCK	W_503106	1	1			WHOLE
221	509148	CASE	1		WHL_DOCK	W_509148	1	1			WHOLE
222	509145	CASE	1		WHL_DOCK	W_509145	1	1			WHOLE
223	509146	CASE	1		WHL_DOCK	W_509146	1	1			WHOLE
224	510139	CASE	1		WHL_DOCK	DW_510139	1	1			WHOLE
226	507208	CASE	2		WHL_DOCK	W_507208	2	1			WHOLE
227	501493	CASE	2		WHL_DOCK	W_501493	2	1			WHOLE
228	501627	CASE	2		WHL_DOCK	W_501627	2	1			WHOLE
229	501552	CASE	3		WHL_DOCK	W_501552	2	1			WHOLE
230	477080	CASE	1		WHL_DOCK	W_477080	2	1			WHOLE
231	510136	CASE	1		WHL_DOCK	DW_510136	2	1			WHOLE
232	512802	CASE	3		WHL_DOCK	W_512802	2	1			WHOLE
233	511355	CASE	1		WHL_DOCK	W_511355	2	1			WHOLE
234	503106	CASE	1		WHL_DOCK	W_503106	2	1			WHOLE

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
235	509148	CASE	1		WHL_DOCK	W_509148	2	1			WHOLE
236	509145	CASE	1		WHL_DOCK	W_509145	2	1			WHOLE
237	509146	CASE	1		WHL_DOCK	W_509146	2	1			WHOLE
238	509147	CASE	1		WHL_DOCK	W_509147	2	1			WHOLE
240	500252	CASE	7		WHL_DOCK	W_500252	3	1			WHOLE
241	510198	CASE	1		WHL_DOCK	RW_510198	3	1			WHOLE
242	10005	CASE	6		WHL_DOCK	W_10005	3	1			WHOLE
243	10003	CASE	6		WHL_DOCK	W_10003	3	1			WHOLE
244	10004	CASE	6		WHL_DOCK	W_10004	3	1			WHOLE
245	10001	CASE	6		WHL_DOCK	W_10001	3	1			WHOLE
246	10016	CASE	6		WHL_DOCK	W_10016	3	1			WHOLE
247	10008	CASE	6		WHL_DOCK	W_10008	3	1			WHOLE
248	503103	CASE	2		WHL_DOCK	W_503103	3	1			WHOLE
250	501919	CASE	1		WHL_DOCK	W_501919	4	1			WHOLE
251	501920	CASE	1		WHL_DOCK	W_501920	4	1			WHOLE
252	500252	CASE	1		WHL_DOCK	W_500252	4	1			WHOLE
253	500030	CASE	1		WHL_DOCK	W_500030	4	1			WHOLE

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
254	501961	CASE	1		WHL_DOCK	W_501961	4	1			WHOLE
255	477265	CASE	1		WHL_DOCK	W_477265	4	1			WHOLE
256	512986	CASE	1		WHL_DOCK	RW_512986	4	1			WHOLE
257	510140	CASE	2		WHL_DOCK	DW_510140	4	1			WHOLE
258	508730	CASE	2		WHL_DOCK	W_508730	4	1			WHOLE
259	508732	CASE	1		WHL_DOCK	W_508732	4	1			WHOLE
260	509671	CASE	2		WHL_DOCK	W_509671	4	1			WHOLE
261	476422	CASE	1		WHL_DOCK	W_476422	4	1			WHOLE
262	511043	CASE	1		WHL_DOCK	W_511043	4	1			WHOLE
263	511312	CASE	2		WHL_DOCK	RW_511312	4	1			WHOLE
264	510139	CASE	1		WHL_DOCK	DW_510139	4	1			WHOLE
266	506284	CASE	4		WHL_DOCK	W_506284	5	1			WHOLE
267	501919	CASE	1		WHL_DOCK	W_501919	5	1			WHOLE
268	501493	CASE	2		WHL_DOCK	W_501493	5	1			WHOLE
269	504468	CASE	2		WHL_DOCK	W_504468	5	1			WHOLE
270	501961	CASE	2		WHL_DOCK	W_501961	5	1			WHOLE
271	503565	CASE	4		WHL_DOCK	W_503565	5	1			WHOLE

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
272	508730	CASE	1		WHL_DOCK	W_508730	5	1			WHOLE
273	509671	CASE	1		WHL_DOCK	W_509671	5	1			WHOLE
274	508202	CASE	1		WHL_DOCK	W_508202	5	1			WHOLE
275	479006	CASE	3		WHL_DOCK	W_479006	5	1			WHOLE
276	511309	CASE	1		WHL_DOCK	RW_511309	5	1			WHOLE
277	511042	CASE	1		WHL_DOCK	W_511042	5	1			WHOLE
278	511312	CASE	1		WHL_DOCK	RW_511312	5	1			WHOLE
280	507208	CASE	2		WHL_DOCK	W_507208	6	1			WHOLE
281	501919	CASE	4		WHL_DOCK	W_501919	6	1			WHOLE
282	500228	CASE	2		WHL_DOCK	W_500228	6	1			WHOLE
283	510081	CASE	2		WHL_DOCK	W_510081	6	1			WHOLE
284	501552	CASE	2		WHL_DOCK	W_501552	6	1			WHOLE
285	503565	CASE	2		WHL_DOCK	W_503565	6	1			WHOLE
286	503793	CASE	1		WHL_DOCK	W_503793	6	1			WHOLE
287	503794	CASE	1		WHL_DOCK	W_503794	6	1			WHOLE
288	500037	CASE	3		WHL_DOCK	W_500037	6	1			WHOLE
289	511309	CASE	2		WHL_DOCK	RW_511309	6	1			WHOLE

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
290	503106	CASE	3		WHL_DOCK	W_503106	6	1			WHOLE
291	509149	CASE	3		WHL_DOCK	W_509149	6	1			WHOLE
292	503760	CASE	1		WHL_DOCK	W_503760	6	1			WHOLE
293	508730	CASE	3		WHL_DOCK	W_508730	6	1			WHOLE
294	511043	CASE	4		WHL_DOCK	W_511043	6	1			WHOLE
295	511042	CASE	2		WHL_DOCK	W_511042	6	1			WHOLE
297	506284	CASE	12		WHL_DOCK	W_506284	7	1			WHOLE
298	507208	CASE	3		WHL_DOCK	W_507208	7	1			WHOLE
299	501919	CASE	2		WHL_DOCK	W_501919	7	1			WHOLE
300	504468	CASE	3		WHL_DOCK	W_504468	7	1			WHOLE
301	477265	CASE	1		WHL_DOCK	W_477265	7	1			WHOLE
302	510136	CASE	1		WHL_DOCK	DW_510136	7	1			WHOLE
303	508709	CASE	1		WHL_DOCK	W_508709	7	1			WHOLE
304	506562	CASE	1		WHL_DOCK	W_506562	7	1			WHOLE
305	509554	CASE	1		WHL_DOCK	RW_509554	7	1			WHOLE
306	505308	CASE	1		WHL_DOCK	W_505308	7	1			WHOLE
307	511542	CASE	1		WHL_DOCK	RW_511542	7	1			WHOLE

Table 39 Continued

*ID	Part	Container	ContQty	From	Stage	To	ETD	Direction	Load	Unload	Route
308	506245	CASE	1		WHL_DOCK	W_506245	7	1			WHOLE
309	510130	CASE	1		WHL_DOCK	RW_510130	7	1			WHOLE
310	509671	CASE	1		WHL_DOCK	W_509671	7	1			WHOLE
311	508686	CASE	4		WHL_DOCK	W_508686	7	1			WHOLE
312	503103	CASE	1		WHL_DOCK	W_503103	7	1			WHOLE
313	508687	CASE	1		WHL_DOCK	W_508687	7	1			WHOLE
314	503893	CASE	2		WHL_DOCK	W_503893	7	1			WHOLE
315	511312	CASE	1		WHL_DOCK	RW_511312	7	1			WHOLE
316	508730	CASE	2		WHL_DOCK	W_508730	7	1			WHOLE
317	510139	CASE	1		WHL_DOCK	DW_510139	7	1			WHOLE

Table 40. Initial Results Window Data Table by Aggregates

Aggregate	Dist (Ft)	Time (Hrs)	Cost	Travel%	TugVol %	Qty	Avg TripTime (Mins)	Min TripTime (Mins)	Max TripTime (Mins)	SDEV TripTime (Mins)
DSD¦01.0000	1314.8	1.07	$21.45	19.19%	16.49%	28	2.3	0.74	5.46	1.31
DSD¦02.0000	1443.7	0.76	$15.13	30.60%	8.80%	38	1.19	0.47	2.38	0.43
DSD¦03.0000	1307.3	0.56	$11.14	37.64%	5.38%	33	1.01	0.47	2.81	0.57
DSD¦04.0000	1597	1.34	$26.71	19.30%	20.02%	43	1.86	0.79	5.31	1
RETAIL¦01.0000	1489.8	0.37	$7.38	61.59%	1.91%	19	1.16	0.46	3.66	0.82
RETAIL¦02.0000	1548	0.37	$7.35	64.47%	1.62%	20	1.1	0.43	2.66	0.6
RETAIL¦03.0000	1105.7	0.25	$5.03	66.88%	1.04%	13	1.16	0.57	1.81	0.45
RETAIL¦04.0000	1499	0.34	$6.79	67.29%	1.33%	18	1.13	0.47	2.29	0.53
WHOLE¦01.0000	801.17	0.17	$3.40	73.05%	0.81%	12	0.85	0.43	1.77	0.49
WHOLE¦02.0000	683.33	0.16	$3.26	66.75%	1.16%	14	0.7	0.41	1.28	0.31
WHOLE¦03.0000	638.33	0.14	$2.73	72.54%	2.66%	10	0.82	0.4	1.82	0.46
WHOLE¦04.0000	1307.8	0.26	$5.22	76.07%	1.10%	16	0.98	0.43	2.43	0.52
WHOLE¦05.0000	950	0.2	$4.01	72.97%	1.39%	14	0.86	0.3	1.43	0.38
WHOLE¦06.0000	832.33	0.2	$3.96	66.32%	2.14%	17	0.7	0.3	1.52	0.38
WHOLE¦07.0000	1226.3	0.28	$5.61	68.80%	2.43%	22	0.76	0.4	1.52	0.38
Total	17745	6.46	$129.17	42.84%	4.55%	317				

Table 40 Continued

Aggregate	Avg Travel Time (Mins)	Min Travel Time (Mins)	Max Travel Time (Mins)	SDEV Travel Time (Mins)	Avg Handle Time (Mins)	Min Handle Time (Mins)	Max Handle Time (Mins)	SDEV Handle Time (Mins)	Container Qty
DSD¦01.0000	0.44	0.08	1.1	0.34	1.86	0	5.17	1.34	285
DSD¦02.0000	0.37	0.07	1.38	0.32	0.83	0	1.5	0.32	152
DSD¦03.0000	0.38	0.12	1.4	0.31	0.63	0	2.5	0.46	93
DSD¦04.0000	0.36	0.09	1.32	0.33	1.5	0	4.33	0.83	346
RETAIL¦01.0000	0.72	0.13	1.9	0.59	0.45	0	2.17	0.43	33
RETAIL¦02.0000	0.71	0.1	2.33	0.55	0.39	0	1	0.19	28
RETAIL¦03.0000	0.78	0.14	1.57	0.49	0.38	0	0.83	0.2	18
RETAIL¦04.0000	0.76	0.14	1.96	0.54	0.37	0	0.83	0.16	23
WHOLE¦01.0000	0.62	0.18	1.52	0.47	0.23	0	0.25	0.07	14
WHOLE¦02.0000	0.47	0.16	1.03	0.31	0.23	0	0.25	0.07	20
WHOLE¦03.0000	0.59	0.15	1.57	0.49	0.23	0	0.25	0.08	46
WHOLE¦04.0000	0.75	0.18	2.18	0.5	0.23	0	0.25	0.06	19
WHOLE¦05.0000	0.63	0.17	1.18	0.36	0.23	0	0.25	0.07	24
WHOLE¦06.0000	0.46	0.14	1.27	0.37	0.24	0	0.25	0.06	37
WHOLE¦07.0000	0.53	0.15	1.27	0.37	0.24	0	0.25	0.05	42

Table 41. Initial Results Window Data Table by Main Zone

Aggregate	Dist (Ft)	Time (Hrs)	Cost	Travel%	TugVol %	Qty	AvgTripTime (Mins)	Min TripTime (Mins)	Max TripTime (Mins)	SDEV TripTime (Mins)
DSD	5662.83	3.72	$74.42	24.31%	12.67%	4	55.82	33.41	80.13	20.61
RETAIL	5642.5	1.33	$26.55	64.85%	1.48%	4	19.91	15.1	22.13	3.31
WHOLE	6439.33	1.41	$28.19	71.03%	1.67%	7	12.08	8.19	16.83	3.15
Total	17744.67	6.46	$129.17	56.92%	4.55%	15				

Table 41 Continued

Aggregate	Avg Travel Time (Mins)	Min Travel Time (Mins)	Max Travel Time (Mins)	SDEV Travel Time (Mins)	Avg Handle Time (Mins)	Min Handle Time (Mins)	Max Handle Time (Mins)	SDEV Handle Time (Mins)	Container Qty
DSD	13.57	12.35	15.46	1.43	42.25	20.83	64.67	19.76	876
RETAIL	12.91	10.1	14.21	1.9	7	5	8.5	1.53	102
WHOLE	8.58	5.94	11.92	2.35	3.5	2.25	5.25	0.97	202
Total									1180

Table 42. DSD 1 Part Routings

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
505551	100	DSD_DOCK	DSD	CASE	5	-2	DW_505551			0	505551
100411	100	DW_505551	DSD	CASE	10	-2	DW_100411			0	100411
100621	100	DW_100411	DSD	CASE	25	-2	DW_100621			0	100621
505554	100	DW_100621	DSD	CASE	15	-2	DW_505554			0	505554
509625	100	DW_505554	DSD	CASE	5	-2	DW_509625			0	509625
509046	100	DW_509625	DSD	CASE	5	-2	DW_509046			0	509046
509042	100	DW_509046	DSD	CASE	15	-2	DW_509042			0	509042
503279	100	DW_509042	DSD	CASE	10	-2	DW_503279			0	503279
503971	100	DW_503279	DSD	CASE	5	-2	DW_503971			0	503971
505546	100	DW_503971	DSD	CASE	15	-2	DW_505546			0	505546
505547	100	DW_505546	DSD	CASE	10	-2	DW_505547			0	505547
506630	100	DW_505547	DSD	CASE	5	-2	DW_506630			0	506630
506632	100	DW_506630	DSD	CASE	5	-2	DW_506632			0	506632
505549	100	DW_506632	DSD	CASE	5	-2	DW_505549			0	505549
836261	100	DW_505549	DSD	CASE	15	-2	DW_836261			0	836261
832461	100	DW_836261	DSD	CASE	5	-2	DW_832461			0	832461
831261	100	DW_832461	DSD	CASE	5	-2	DW_831261			0	831261

Table 42 Continued

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
505550	100	DW_831261	DSD	CASE	5	-2	DW_505550			0	505550
510708	100	DW_505550	DSD	CASE	5	-2	DW_510708			0	510708
836561	100	DW_510708	DSD	CASE	5	-2	DW_836561			0	836561
835261	100	DW_836561	DSD	CASE	20	-2	DW_835261			0	835261
510645	100	DW_835261	DSD	CASE	5	-2	DW_510645			0	510645
834161	100	DW_510645	DSD	CASE	15	-2	DW_834161			0	834161
510203	100	DW_834161	DSD	CASE	5	-2	DW_510203			0	510203
507087	100	DW_510203	DSD	CASE	5	-2	DW_507087			0	507087
506953	100	DW_507087	DSD	CASE	30	-2	DW_506953			0	506953
506952	100	DW_506953	DSD	CASE	30	-2	DW_506952			0	506952
RETURN	100	DW_506952	DSD	!NA	1	-1	DSD_DOCK			0	

Table 43. DSD 2 Part Routings

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
100521	100	DSD_DOCK	DSD	CASE	4	-2	DW_100521			0	100521
100621	100	DW_100521	DSD	CASE	3	-2	DW_100621			0	100621
505554	100	DW_100621	DSD	CASE	4	-2	DW_505554			0	505554
503278	100	DW_505554	DSD	CASE	6	-2	DW_503278			0	503278
505555	100	DW_503278	DSD	CASE	4	-2	DW_505555			0	505555
506295	100	DW_505555	DSD	CASE	6	-2	DW_506295			0	506295
503971	100	DW_506295	DSD	CASE	4	-2	DW_503971			0	503971
506296	100	DW_503971	DSD	CASE	3	-2	DW_506296			0	506296
505546	100	DW_506296	DSD	CASE	6	-2	DW_505546			0	505546
506297	100	DW_505546	DSD	CASE	2	-2	DW_506297			0	506297
505547	100	DW_506297	DSD	CASE	4	-2	DW_505547			0	505547
506630	100	DW_505547	DSD	CASE	4	-2	DW_506630			0	506630
831661	100	DW_506630	DSD	CASE	6	-2	DW_831661			0	831661
836261	100	DW_831661	DSD	CASE	4	-2	DW_836261			0	836261
839061	100	DW_836261	DSD	CASE	4	-2	DW_839061			0	839061
831261	100	DW_839061	DSD	CASE	3	-2	DW_831261			0	831261
512485	100	DW_831261	DSD	CASE	6	-2	DW_512485			0	512485

Table 43 Continued

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
512486	100	DW_512485	DSD	CASE	6	-2	DW_512486			0	512486
510645	100	DW_512486	DSD	CASE	4	-2	DW_510645			0	510645
510644	100	DW_510645	DSD	CASE	2	-2	DW_510644			0	510644
511068	100	DW_510644	DSD	CASE	4	-2	DW_511068			0	511068
510425	100	DW_511068	DSD	CASE	6	-2	DW_510425			0	510425
505549	100	DW_510425	DSD	CASE	8	-2	DW_505549			0	505549
505548	100	DW_505549	DSD	CASE	4	-2	DW_505548			0	505548
510416	100	DW_505548	DSD	CASE	4	-2	DW_510416			0	510416
510417	100	DW_510416	DSD	CASE	4	-2	DW_510417			0	510417
510419	100	DW_510417	DSD	CASE	6	-2	DW_510419			0	510419
512487	100	DW_510419	DSD	CASE	4	-2	DW_512487			0	512487
834161	100	DW_512487	DSD	CASE	3	-2	DW_834161			0	834161
513504	100	DW_834161	DSD	CASE	3	-2	DW_513504			0	513504
510139	100	DW_513504	DSD	CASE	1	-2	DW_510139			0	510139
510136	100	DW_510139	DSD	CASE	1	-2	DW_510136			0	510136
510135	100	DW_510136	DSD	CASE	1	-2	DW_510135			0	510135
509871	100	DW_510135	DSD	CASE	4	-2	DW_509871			0	509871

Table 43 Continued

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
509752	100	DW_509871	DSD	CASE	4	-2	DW_509752			0	509752
508939	100	DW_509752	DSD	CASE	2	-2	DW_508939			0	508939
506953	100	DW_508939	DSD	CASE	8	-2	DW_506953			0	506953
RETURN	100	DW_506953	DSD	!NA	1	-1	DSD_DOCK			0	

Table 44. DSD 3 Part Routings

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
100411	100	DSD_DOCK	DSD	CASE	1	-2	DW_100411			0	100411
505553	100	DW_100411	DSD	CASE	1	-2	DW_505553			0	505553
100521	100	DW_505553	DSD	CASE	2	-2	DW_100521			0	100521
505554	100	DW_100521	DSD	CASE	2	-2	DW_505554			0	505554
100621	100	DW_505554	DSD	CASE	5	-2	DW_100621			0	100621
506295	100	DW_100621	DSD	CASE	3	-2	DW_506295			0	506295
503279	100	DW_506295	DSD	CASE	1	-2	DW_503279			0	503279
505546	100	DW_503279	DSD	CASE	4	-2	DW_505546			0	505546
506630	100	DW_505546	DSD	CASE	1	-2	DW_506630			0	506630

Table 44 Continued

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
506631	100	DW_506630	DSD	CASE	1	-2	DW_506631			0	506631
506632	100	DW_506631	DSD	CASE	1	-2	DW_506632			0	506632
505549	100	DW_506632	DSD	CASE	2	-2	DW_505549			0	505549
510422	100	DW_505549	DSD	CASE	2	-2	DW_510422			0	510422
510426	100	DW_510422	DSD	CASE	8	-2	DW_510426			0	510426
510645	100	DW_510426	DSD	CASE	1	-2	DW_510645			0	510645
835261	100	DW_510645	DSD	CASE	4	-2	DW_835261			0	835261
834161	100	DW_835261	DSD	CASE	5	-2	DW_834161			0	834161
510419	100	DW_834161	DSD	CASE	5	-2	DW_510419			0	510419
510416	100	DW_510419	DSD	CASE	14	-2	DW_510416			0	510416
510421	100	DW_510416	DSD	CASE	4	-2	DW_510421			0	510421
512486	100	DW_510421	DSD	CASE	2	-2	DW_512486			0	512486
512485	100	DW_512486	DSD	CASE	2	-2	DW_512485			0	512485
831661	100	DW_512485	DSD	CASE	1	-2	DW_831661			0	831661
836261	100	DW_831661	DSD	CASE	7	-2	DW_836261			0	836261
831961	100	DW_836261	DSD	CASE	1	-2	DW_831961			0	831961
506953	100	DW_831961	DSD	CASE	2	-2	DW_506953			0	506953

Table 44 Continued

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
506952	100	DW_506953	DSD	CASE	2	-2	DW_506952			0	506952
509752	100	DW_506952	DSD	CASE	1	-2	DW_509752			0	509752
509625	100	DW_509752	DSD	CASE	1	-2	DW_509625			0	509625
509046	100	DW_509625	DSD	CASE	3	-2	DW_509046			0	509046
506951	100	DW_509046	DSD	CASE	2	-2	DW_506951			0	506951
506950	100	DW_506951	DSD	CASE	2	-2	DW_506950			0	506950
RETURN	100	DW_506950	DSD	!NA	1	-1	DSD_DOCK			0	

Table 45. DSD 4 Part Routings

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
100521	100	DSD_DOCK	DSD	CASE	15	-2	DW_100521			0	100521
505554	100	DW_100521	DSD	CASE	10	-2	DW_505554			0	505554
505555	100	DW_505554	DSD	CASE	5	-2	DW_505555			0	505555
503278	100	DW_505555	DSD	CASE	10	-2	DW_503278			0	503278
505638	100	DW_503278	DSD	CASE	3	-2	DW_505638			0	505638

Table 45 Continued

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
506295	100	DW_505638	DSD	CASE	20	-2	DW_506295			0	506295
503971	100	DW_506295	DSD	CASE	10	-2	DW_503971			0	503971
506296	100	DW_503971	DSD	CASE	10	-2	DW_506296			0	506296
836261	100	DW_506296	DSD	CASE	14	-2	DW_836261			0	836261
831661	100	DW_836261	DSD	CASE	5	-2	DW_831661			0	831661
832461	100	DW_831661	DSD	CASE	10	-2	DW_832461			0	832461
839061	100	DW_832461	DSD	CASE	10	-2	DW_839061			0	839061
831261	100	DW_839061	DSD	CASE	10	-2	DW_831261			0	831261
512486	100	DW_831261	DSD	CASE	5	-2	DW_512486			0	512486
512730	100	DW_512486	DSD	CASE	5	-2	DW_512730			0	512730
512485	100	DW_512730	DSD	CASE	8	-2	DW_512485			0	512485
505546	100	DW_512485	DSD	CASE	25	-2	DW_505546			0	505546
506297	100	DW_505546	DSD	CASE	10	-2	DW_506297			0	506297
505547	100	DW_506297	DSD	CASE	10	-2	DW_505547			0	505547
505548	100	DW_505547	DSD	CASE	10	-2	DW_505548			0	505548
506632	100	DW_505548	DSD	CASE	5	-2	DW_506632			0	506632
505549	100	DW_506632	DSD	CASE	5	-2	DW_505549			0	505549

Table 45 Continued

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
510706	100	DW_505549	DSD	CASE	5	-2	DW_510706			0	510706
510708	100	DW_510706	DSD	CASE	5	-2	DW_510708			0	510708
511068	100	DW_510708	DSD	CASE	5	-2	DW_511068			0	511068
836561	100	DW_511068	DSD	CASE	5	-2	DW_836561			0	836561
835261	100	DW_836561	DSD	CASE	15	-2	DW_835261			0	835261
510645	100	DW_835261	DSD	CASE	10	-2	DW_510645			0	510645
511873	100	DW_510645	DSD	CASE	15	-2	DW_511873			0	511873
512487	100	DW_511873	DSD	CASE	5	-2	DW_512487			0	512487
513009	100	DW_512487	DSD	CASE	15	-2	W_513009			0	513009
510139	100	W_513009	DSD	CASE	5	-2	DW_510139			0	510139
510138	100	DW_510139	DSD	CASE	5	-2	DW_510138			0	510138
510135	100	DW_510138	DSD	CASE	5	-2	DW_510135			0	510135
510136	100	DW_510135	DSD	CASE	5	-2	DW_510136			0	510136
510053	100	DW_510136	DSD	CASE	3	-2	DW_510053			0	510053
510052	100	DW_510053	DSD	CASE	3	-2	DW_510052			0	510052
509871	100	DW_510052	DSD	CASE	5	-2	DW_509871			0	509871
509753	100	DW_509871	DSD	CASE	5	-2	DW_509753			0	509753

Table 45 Continued

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
509752	100	DW_509753	DSD	CASE	5	-2	DW_509752			0	509752
509046	100	DW_509752	DSD	CASE	5	-2	DW_509046			0	509046
507087	100	DW_509046	DSD	CASE	5	-2	DW_507087			0	507087
RETURN	100	DW_507087	DSD	!NA	1	-1	DSD_DOCK			0	

Table 46. Retail 1 Part Routings

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
503890	100	RET_DOCK	RETAIL	CASE	1	-2	R_503890			0	503890
508782	100	R_503890	RETAIL	CASE	1	-2	R_508782			0	508782
508730	100	R_508782	RETAIL	CASE	3	-2	R_508730			0	508730
508687	100	R_508730	RETAIL	CASE	1	-2	R_508687			0	508687
506284	100	R_508687	RETAIL	CASE	12	-2	R_506284			0	506284
513096	100	R_506284	RETAIL	CASE	1	-2	R_513096			0	513096
479006	100	R_513096	RETAIL	CASE	2	-2	R_479006			0	479006
666688	100	R_479006	RETAIL	CASE	1	-2	R_666688			0	666688

Table 46 Continued

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
510418	100	R_666688	RETAIL	CASE	1	-2	RW_510418			0	510418
510646	100	RW_510418	RETAIL	CASE	1	-2	RW_510646			0	510646
510141	100	RW_510646	RETAIL	CASE	1	-2	RW_510141			0	510141
511312	100	RW_510141	RETAIL	CASE	1	-2	RW_511312			0	511312
511309	100	RW_511312	RETAIL	CASE	1	-2	RW_511309			0	511309
511108	100	RW_511309	RETAIL	CASE	1	-2	RW_511108			0	511108
510426	100	RW_511108	RETAIL	CASE	2	-2	RW_510426			0	510426
510419	100	RW_510426	RETAIL	CASE	1	-2	RW_510419			0	510419
510421	100	RW_510419	RETAIL	CASE	1	-2	RW_510421			0	510421
480077	100	RW_510421	RETAIL	CASE	1	-2	R_480077			0	480077
RETURN	100	R_480077	RETAIL	!NA	1	-1	RET_DOCK			0	

Table 47. Retail 2 Part Routing

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
509193	100	RET_DOCK	RETAIL	CASE	1	-2	R_509193			0	509193
504503	100	R_509193	RETAIL	CASE	1	-2	R_504503			0	504503
509197	100	R_504503	RETAIL	CASE	1	-2	R_509197			0	509197
510936	100	R_509197	RETAIL	CASE	2	-2	RW_510936			0	510936
511312	100	RW_510936	RETAIL	CASE	2	-2	RW_511312			0	511312
510138	100	RW_511312	RETAIL	CASE	1	-2	RW_510138			0	510138
510136	100	RW_510138	RETAIL	CASE	2	-2	RW_510136			0	510136
512988	100	RW_510136	RETAIL	CASE	1	-2	RW_512988			0	512988
513020	100	RW_512988	RETAIL	CASE	1	-2	R_513020			0	513020
503791	100	R_513020	RETAIL	CASE	1	-2	R_503791			0	503791
509206	100	R_503791	RETAIL	CASE	1	-2	R_509206			0	509206
509209	100	R_509206	RETAIL	CASE	1	-2	R_509209			0	509209
509594	100	R_509209	RETAIL	CASE	1	-2	RW_509594			0	509594
508730	100	RW_509594	RETAIL	CASE	3	-2	R_508730			0	508730
503760	100	R_508730	RETAIL	CASE	1	-2	R_503760			0	503760
500078	100	R_503760	RETAIL	CASE	1	-2	R_500078			0	500078
509204	100	R_500078	RETAIL	CASE	1	-2	R_509204			0	509204

Table 47 Continued

Part	**%**	**From**	**Method**	**(C)ontainer**	**C/Trip**	**Parts/C**	**To Loc**	**Via Loc**	**Via Method**	**Via C/Trip**	**Description**
479006	100	R_509204	RETAIL	CASE	1	-2	R_479006			0	479006
506284	100	R_479006	RETAIL	CASE	5	-2	R_506284			0	506284
RETURN	100	R_506284	RETAIL	!NA	1	-1	RET_DOCK			0	

Table 48. Retail 3 Part Routings

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
509192	100	RET_DOCK	RETAIL	CASE	1	-2	R_509192			0	509192
503791	100	R_509192	RETAIL	CASE	1	-2	R_503791			0	503791
506284	100	R_503791	RETAIL	CASE	4	-2	R_506284			0	506284
509198	100	R_506284	RETAIL	CASE	1	-2	R_509198			0	509198
479006	100	R_509198	RETAIL	CASE	3	-2	R_479006			0	479006
666688	100	R_479006	RETAIL	CASE	1	-2	R_666688			0	666688
473916	100	R_666688	RETAIL	CASE	1	-2	R_473916			0	473916
507238	100	R_473916	RETAIL	CASE	2	-2	R_507238			0	507238
508782	100	R_507238	RETAIL	CASE	1	-2	R_508782			0	508782

Table 48 Continued

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
410608	100	R_508782	RETAIL	CASE	1	-2	R_410608			0	410608
511839	100	R_410608	RETAIL	CASE	1	-2	RW_511839			0	511839
511309	100	RW_511839	RETAIL	CASE	1	-2	RW_511309			0	511309
RETURN	100	RW_511309	RETAIL	!NA	1	-1	RET_DOCK			0	

Table 49. Retail 4 Part Routings

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
506284	100	RET_DOCK	RETAIL	CASE	4	-2	R_506284			0	506284
513096	100	R_506284	RETAIL	CASE	2	-2	R_513096			0	513096
513020	100	R_513096	RETAIL	CASE	1	-2	R_513020			0	513020
506562	100	R_513020	RETAIL	CASE	1	-2	R_506562			0	506562
508730	100	R_506562	RETAIL	CASE	1	-2	R_508730			0	508730
508782	100	R_508730	RETAIL	CASE	1	-2	R_508782			0	508782
503760	100	R_508782	RETAIL	CASE	1	-2	R_503760			0	503760
510835	100	R_503760	RETAIL	CASE	1	-2	RW_510835			0	510835

Table 49 Continued

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
512986	100	RW_510835	RETAIL	CASE	1	-2	RW_512986			0	512986
511312	100	RW_512986	RETAIL	CASE	2	-2	RW_511312			0	511312
511309	100	RW_511312	RETAIL	CASE	1	-2	RW_511309			0	511309
510425	100	RW_511309	RETAIL	CASE	1	-2	RW_510425			0	510425
513022	100	RW_510425	RETAIL	CASE	2	-2	RW_513022			0	513022
510422	100	RW_513022	RETAIL	CASE	1	-2	RW_510422			0	510422
504503	100	RW_510422	RETAIL	CASE	1	-2	R_504503			0	504503
510142	100	R_504503	RETAIL	CASE	1	-2	RW_510142			0	510142
512728	100	RW_510142	RETAIL	CASE	1	-2	RW_512728			0	512728
RETURN	100	RW_512728	RETAIL	!NA	1	-1	RET_DOCK			0	

Table 50. WHOLE 1 Part Routings

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
509146	100	WHL_DOCK	WHOLE	CASE	1	-2	W_509146			0	509146
501684	100	W_509146	WHOLE	CASE	1	-2	W_501684			0	501684
501919	100	W_501684	WHOLE	CASE	1	-2	W_501919			0	501919
509145	100	W_501919	WHOLE	CASE	1	-2	W_509145			0	509145
508737	100	W_509145	WHOLE	CASE	1	-2	W_508737			0	508737
501961	100	W_508737	WHOLE	CASE	1	-2	W_501961			0	501961
510139	100	W_501961	WHOLE	CASE	1	-2	DW_510139			0	510139
503106	100	DW_510139	WHOLE	CASE	1	-2	W_503106			0	503106
511870	100	W_503106	WHOLE	CASE	4	-2	W_511870			0	511870
500252	100	W_511870	WHOLE	CASE	1	-2	W_500252			0	500252
509148	100	W_500252	WHOLE	CASE	1	-2	W_509148			0	509148
RETURN	100	W_509148	WHOLE	!NA	1	-1	WHL_DOCK			0	

Table 51. WHOLE 2 Part Routings

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
509148	100	WHL_DOCK	WHOLE	CASE	1	-2	W_509148			0	509148
509147	100	W_509148	WHOLE	CASE	1	-2	W_509147			0	509147
501627	100	W_509147	WHOLE	CASE	2	-2	W_501627			0	501627
501552	100	W_501627	WHOLE	CASE	3	-2	W_501552			0	501552
507208	100	W_501552	WHOLE	CASE	2	-2	W_507208			0	507208
501493	100	W_507208	WHOLE	CASE	2	-2	W_501493			0	501493
511355	100	W_501493	WHOLE	CASE	1	-2	W_511355			0	511355
512802	100	W_511355	WHOLE	CASE	3	-2	W_512802			0	512802
503106	100	W_512802	WHOLE	CASE	1	-2	W_503106			0	503106
510136	100	W_503106	WHOLE	CASE	1	-2	DW_510136			0	510136
477080	100	DW_510136	WHOLE	CASE	1	-2	W_477080			0	477080
509145	100	W_477080	WHOLE	CASE	1	-2	W_509145			0	509145
509146	100	W_509145	WHOLE	CASE	1	-2	W_509146			0	509146
RETURN	100	W_509146	WHOLE	!NA	1	-1	WHL_DOCK			0	

Table 52. WHOLE 3 Part Routings

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
500252	100	WHL_DOCK	WHOLE	CASE	7	-2	W_500252			0	500252
503103	100	W_500252	WHOLE	CASE	2	-2	W_503103			0	503103
10016	100	W_503103	WHOLE	CASE	6	-2	W_10016			0	10016
10005	100	W_10016	WHOLE	CASE	6	-2	W_10005			0	10005
10004	100	W_10005	WHOLE	CASE	6	-2	W_10004			0	10004
10001	100	W_10004	WHOLE	CASE	6	-2	W_10001			0	10001
10008	100	W_10001	WHOLE	CASE	6	-2	W_10008			0	10008
10003	100	W_10008	WHOLE	CASE	6	-2	W_10003			0	10003
510198	100	W_10003	WHOLE	CASE	1	-2	RW_510198			0	510198
RETURN	100	RW_510198	WHOLE	!NA	1	-1	WHL_DOCK			0	

Table 53. WHOLE 4 part routings

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
511043	100	WHL_DOCK	WHOLE	CASE	1	-2	W_511043			0	511043
501919	100	W_511043	WHOLE	CASE	1	-2	W_501919			0	501919
500030	100	W_501919	WHOLE	CASE	1	-2	W_500030			0	500030
476422	100	W_500030	WHOLE	CASE	1	-2	W_476422			0	476422
477265	100	W_476422	WHOLE	CASE	1	-2	W_477265			0	477265
508732	100	W_477265	WHOLE	CASE	1	-2	W_508732			0	508732
501961	100	W_508732	WHOLE	CASE	1	-2	W_501961			0	501961
512986	100	W_501961	WHOLE	CASE	1	-2	RW_512986			0	512986
508730	100	RW_512986	WHOLE	CASE	2	-2	W_508730			0	508730
511312	100	W_508730	WHOLE	CASE	2	-2	RW_511312			0	511312
510140	100	RW_511312	WHOLE	CASE	2	-2	DW_510140			0	510140
510139	100	DW_510140	WHOLE	CASE	1	-2	DW_510139			0	510139
501920	100	DW_510139	WHOLE	CASE	1	-2	W_501920			0	501920
500252	100	W_501920	WHOLE	CASE	1	-2	W_500252			0	500252
509671	100	W_500252	WHOLE	CASE	2	-2	W_509671			0	509671
RETURN	100	W_509671	WHOLE	!NA	1	-1	WHL_DOCK			0	

Table 54. WHOLE 5 Part Routings

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
506284	100	WHL_DOCK	WHOLE	CASE	4	-2	W_506284			0	506284
511042	100	W_506284	WHOLE	CASE	1	-2	W_511042			0	511042
509671	100	W_511042	WHOLE	CASE	1	-2	W_509671			0	509671
501493	100	W_509671	WHOLE	CASE	2	-2	W_501493			0	501493
508730	100	W_501493	WHOLE	CASE	1	-2	W_508730			0	508730
511309	100	W_508730	WHOLE	CASE	1	-2	RW_511309			0	511309
511312	100	RW_511309	WHOLE	CASE	1	-2	RW_511312			0	511312
501961	100	RW_511312	WHOLE	CASE	2	-2	W_501961			0	501961
508202	100	W_501961	WHOLE	CASE	1	-2	W_508202			0	508202
479006	100	W_508202	WHOLE	CASE	3	-2	W_479006			0	479006
501919	100	W_479006	WHOLE	CASE	1	-2	W_501919			0	501919
504468	100	W_501919	WHOLE	CASE	2	-2	W_504468			0	504468
503565	100	W_504468	WHOLE	CASE	4	-2	W_503565			0	503565
RETURN	100	W_503565	WHOLE	!NA	1	-1	WHL_DOCK			0	

Table 55. WHOLE 6 Part Routings

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
500228	100	WHL_DOCK	WHOLE	CASE	2	-2	W_500228			0	500228
503106	100	W_500228	WHOLE	CASE	3	-2	W_503106			0	503106
503760	100	W_503106	WHOLE	CASE	1	-2	W_503760			0	503760
511042	100	W_503760	WHOLE	CASE	2	-2	W_511042			0	511042
503794	100	W_511042	WHOLE	CASE	1	-2	W_503794			0	503794
510081	100	W_503794	WHOLE	CASE	2	-2	W_510081			0	510081
507208	100	W_510081	WHOLE	CASE	2	-2	W_507208			0	507208
501552	100	W_507208	WHOLE	CASE	2	-2	W_501552			0	501552
503793	100	W_501552	WHOLE	CASE	1	-2	W_503793			0	503793
508730	100	W_503793	WHOLE	CASE	3	-2	W_508730			0	508730
511309	100	W_508730	WHOLE	CASE	2	-2	RW_511309			0	511309
500037	100	RW_511309	WHOLE	CASE	3	-2	W_500037			0	500037
509149	100	W_500037	WHOLE	CASE	3	-2	W_509149			0	509149
501919	100	W_509149	WHOLE	CASE	4	-2	W_501919			0	501919
511043	100	W_501919	WHOLE	CASE	4	-2	W_511043			0	511043
503565	100	W_511043	WHOLE	CASE	2	-2	W_503565			0	503565
RETURN	100	W_503565	WHOLE	!NA	1	-1	WHL_DOCK			0	

Table 56. WHOLE 7 Part Routings

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
508686	100	WHL_DOCK	WHOLE	CASE	4	-2	W_508686			0	508686
504468	100	W_508686	WHOLE	CASE	3	-2	W_504468			0	504468
501919	100	W_504468	WHOLE	CASE	2	-2	W_501919			0	501919
509671	100	W_501919	WHOLE	CASE	1	-2	W_509671			0	509671
505308	100	W_509671	WHOLE	CASE	1	-2	W_505308			0	505308
508709	100	W_505308	WHOLE	CASE	1	-2	W_508709			0	508709
503103	100	W_508709	WHOLE	CASE	1	-2	W_503103			0	503103
506245	100	W_503103	WHOLE	CASE	1	-2	W_506245			0	506245
506562	100	W_506245	WHOLE	CASE	1	-2	W_506562			0	506562
507208	100	W_506562	WHOLE	CASE	3	-2	W_507208			0	507208
508730	100	W_507208	WHOLE	CASE	2	-2	W_508730			0	508730
508687	100	W_508730	WHOLE	CASE	1	-2	W_508687			0	508687
510130	100	W_508687	WHOLE	CASE	1	-2	RW_510130			0	510130
511312	100	RW_510130	WHOLE	CASE	1	-2	RW_511312			0	511312
511542	100	RW_511312	WHOLE	CASE	1	-2	RW_511542			0	511542
509554	100	RW_511542	WHOLE	CASE	1	-2	RW_509554			0	509554
477265	100	RW_509554	WHOLE	CASE	1	-2	W_477265			0	477265

Table 56 Continued

Part	%	From	Method	(C)ontainer	C/Trip	Parts/C	To Loc	Via Loc	Via Method	Via C/Trip	Description
510139	100	W_477265	WHOLE	CASE	1	-2	DW_510139			0	510139
510136	100	DW_510139	WHOLE	CASE	1	-2	DW_510136			0	510136
503893	100	DW_510136	WHOLE	CASE	2	-2	W_503893			0	503893
506284	100	W_503893	WHOLE	CASE	12	-2	W_506284			0	506284
RETURN	100	W_506284	WHOLE	!NA	1	-1	WHL_DOCK			0	

Table 57. Paths Tab Data Table

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦01.0000	DSD_DOCK	DW_505551	1	50'-11"	50'-11"	None	0.01	0.02	0	WALKER
DSD¦01.0000	DW_505551	DW_100411	1	28'-11"	28'-11"	None	0	0.03	1	WALKER
DSD¦01.0000	DW_100411	DW_100621	1	10'-10"	10'-10"	None	0	0.07	1	WALKER
DSD¦01.0000	DW_100621	DW_505554	1	12'-10"	12'-10"	None	0	0.04	1	WALKER
DSD¦01.0000	DW_505554	DW_509625	1	120'-11"	120'-11"	None	0.02	0.02	1	WALKER
DSD¦01.0000	DW_509625	DW_509046	1	21'-2"	21'-2"	None	0	0.02	0	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦01.0000	DW_509046	DW_509042	1	11'-9"	11'-9"	None	0	0.04	1	WALKER
DSD¦01.0000	DW_509042	DW_503279	1	102'-4"	102'-4"	None	0.02	0.03	1	WALKER
DSD¦01.0000	DW_503279	DW_503971	1	7'-4"	7'-4"	None	0	0.02	0	WALKER
DSD¦01.0000	DW_503971	DW_505546	1	6'-3"	6'-3"	None	0	0.04	1	WALKER
DSD¦01.0000	DW_505546	DW_505547	1	6'-1"	6'-1"	None	0	0.03	1	WALKER
DSD¦01.0000	DW_505547	DW_506630	1	12'-10"	12'-10"	None	0	0.02	0	WALKER
DSD¦01.0000	DW_506630	DW_506632	1	30'-10"	30'-10"	None	0.01	0.02	0	WALKER
DSD¦01.0000	DW_506632	DW_505549	1	13'-4"	13'-4"	None	0	0.02	0	WALKER
DSD¦01.0000	DW_505549	DW_836261	1	124'-1"	124'-1"	None	0.02	0.04	1	WALKER
DSD¦01.0000	DW_836261	DW_832461	1	26'-0"	26'-0"	None	0	0.02	0	WALKER
DSD¦01.0000	DW_832461	DW_831261	1	23'-9"	23'-9"	None	0	0.02	0	WALKER
DSD¦01.0000	DW_831261	DW_505550	1	106'-8"	106'-8"	None	0.02	0.02	1	WALKER
DSD¦01.0000	DW_505550	DW_510708	1	20'-11"	20'-11"	None	0	0.02	0	WALKER
DSD¦01.0000	DW_510708	DW_836561	1	80'-11"	80'-11"	None	0.01	0.02	1	WALKER
DSD¦01.0000	DW_836561	DW_835261	1	29'-0"	29'-0"	None	0	0.06	1	WALKER
DSD¦01.0000	DW_835261	DW_510645	1	71'-3"	71'-3"	None	0.01	0.02	1	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦01.0000	DW_510645	DW_834161	1	101'-0"	101'-0"	None	0.02	0.04	1	WALKER
DSD¦01.0000	DW_834161	DW_510203	1	92'-7"	92'-7"	None	0.01	0.02	1	WALKER
DSD¦01.0000	DW_510203	DW_507087	1	66'-1"	66'-1"	None	0.01	0.02	1	WALKER
DSD¦01.0000	DW_507087	DW_506953	1	28'-2"	28'-2"	None	0	0.09	2	WALKER
DSD¦01.0000	DW_506953	DW_506952	1	29'-7"	29'-7"	None	0	0.09	2	WALKER
DSD¦01.0000	DW_506952	DSD_DOCK	1	78'-6"	78'-6"	None	0.01	0	0	WALKER
DSD¦02.0000	DSD_DOCK	DW_100521	1	67'-8"	67'-8"	None	0.01	0.01	0	WALKER
DSD¦02.0000	DW_100521	DW_100621	1	7'-2"	7'-2"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_100621	DW_505554	1	12'-10"	12'-10"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_505554	DW_503278	1	20'-1"	20'-1"	None	0	0.02	0	WALKER
DSD¦02.0000	DW_503278	DW_505555	1	15'-6"	15'-6"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_505555	DW_506295	1	29'-7"	29'-7"	None	0	0.02	0	WALKER
DSD¦02.0000	DW_506295	DW_503971	1	16'-8"	16'-8"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_503971	DW_506296	1	14'-3"	14'-3"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_506296	DW_505546	1	15'-2"	15'-2"	None	0	0.02	0	WALKER
DSD¦02.0000	DW_505546	DW_506297	1	12'-7"	12'-7"	None	0	0.01	0	WALKER

Table 57 Continued

Aggregate Name	**From**	**To**	**Freq**	**Calc Dist/Trip (Ft)**	**Eff. Dist/Trip (Ft)**	**User Dist/Trip (Ft)**	**Total Travel Time (Hrs)**	**Total L/UL Time (Hrs)**	**Total $**	**Method Type**
DSD¦02.0000	DW_506297	DW_505547	1	16'-8"	16'-8"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_505547	DW_506630	1	12'-10"	12'-10"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_506630	DW_831661	1	136'-2"	136'-2"	None	0.02	0.02	1	WALKER
DSD¦02.0000	DW_831661	DW_836261	1	17'-5"	17'-5"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_836261	DW_839061	1	22'-10"	22'-10"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_839061	DW_831261	1	19'-1"	19'-1"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_831261	DW_512485	1	24'-10"	24'-10"	None	0	0.02	0	WALKER
DSD¦02.0000	DW_512485	DW_512486	1	21'-11"	21'-11"	None	0	0.02	0	WALKER
DSD¦02.0000	DW_512486	DW_510645	1	47'-0"	47'-0"	None	0.01	0.01	0	WALKER
DSD¦02.0000	DW_510645	DW_510644	1	45'-4"	45'-4"	None	0.01	0.01	0	WALKER
DSD¦02.0000	DW_510644	DW_511068	1	13'-2"	13'-2"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_511068	DW_510425	1	30'-1"	30'-1"	None	0	0.02	0	WALKER
DSD¦02.0000	DW_510425	DW_505549	1	30'-0"	30'-0"	None	0	0.03	1	WALKER
DSD¦02.0000	DW_505549	DW_505548	1	5'-8"	5'-8"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_505548	DW_510416	1	129'-9"	129'-9"	None	0.02	0.01	1	WALKER
DSD¦02.0000	DW_510416	DW_510417	1	26'-2"	26'-2"	None	0	0.01	0	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦02.0000	DW_510417	DW_510419	1	28'-4"	28'-4"	None	0	0.02	0	WALKER
DSD¦02.0000	DW_510419	DW_512487	1	51'-9"	51'-9"	None	0.01	0.01	0	WALKER
DSD¦02.0000	DW_512487	DW_834161	1	50'-9"	50'-9"	None	0.01	0.01	0	WALKER
DSD¦02.0000	DW_834161	DW_513504	1	155'-0"	155'-0"	None	0.02	0.01	1	WALKER
DSD¦02.0000	DW_513504	DW_510139	1	102'-10"	102'-10"	None	0.02	0.01	0	WALKER
DSD¦02.0000	DW_510139	DW_510136	1	12'-9"	12'-9"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_510136	DW_510135	1	10'-8"	10'-8"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_510135	DW_509871	1	22'-2"	22'-2"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_509871	DW_509752	1	24'-2"	24'-2"	None	0	0.01	0	WALKER
DSD¦02.0000	DW_509752	DW_508939	1	32'-1"	32'-1"	None	0.01	0.01	0	WALKER
DSD¦02.0000	DW_508939	DW_506953	1	57'-6"	57'-6"	None	0.01	0.03	1	WALKER
DSD¦02.0000	DW_506953	DSD_DOCK	1	85'-3"	85'-3"	None	0.01	0	0	WALKER
DSD¦03.0000	DSD_DOCK	DW_100411	1	63'-4"	63'-4"	None	0.01	0.01	0	WALKER
DSD¦03.0000	DW_100411	DW_505553	1	16'-6"	16'-6"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_505553	DW_100521	1	13'-6"	13'-6"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_100521	DW_505554	1	16'-10"	16'-10"	None	0	0.01	0	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦03.0000	DW_505554	DW_100621	1	12'-10"	12'-10"	None	0	0.02	0	WALKER
DSD¦03.0000	DW_100621	DW_506295	1	24'-6"	24'-6"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_506295	DW_503279	1	13'-2"	13'-2"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_503279	DW_505546	1	10'-5"	10'-5"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_505546	DW_506630	1	15'-9"	15'-9"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_506630	DW_506631	1	28'-1"	28'-1"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_506631	DW_506632	1	26'-3"	26'-3"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_506632	DW_505549	1	13'-4"	13'-4"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_505549	DW_510422	1	23'-2"	23'-2"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_510422	DW_510426	1	36'-0"	36'-0"	None	0.01	0.03	1	WALKER
DSD¦03.0000	DW_510426	DW_510645	1	57'-3"	57'-3"	None	0.01	0.01	0	WALKER
DSD¦03.0000	DW_510645	DW_835261	1	71'-3"	71'-3"	None	0.01	0.01	0	WALKER
DSD¦03.0000	DW_835261	DW_834161	1	152'-7"	152'-7"	None	0.02	0.02	1	WALKER
DSD¦03.0000	DW_834161	DW_510419	1	79'-10"	79'-10"	None	0.01	0.02	1	WALKER
DSD¦03.0000	DW_510419	DW_510416	1	31'-8"	31'-8"	None	0.01	0.04	1	WALKER
DSD¦03.0000	DW_510416	DW_510421	1	48'-2"	48'-2"	None	0.01	0.01	0	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦03.0000	DW_510421	DW_512486	1	42'-0"	42'-0"	None	0.01	0.01	0	WALKER
DSD¦03.0000	DW_512486	DW_512485	1	21'-11"	21'-11"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_512485	DW_831661	1	31'-10"	31'-10"	None	0.01	0.01	0	WALKER
DSD¦03.0000	DW_831661	DW_836261	1	17'-5"	17'-5"	None	0	0.02	1	WALKER
DSD¦03.0000	DW_836261	DW_831961	1	21'-6"	21'-6"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_831961	DW_506953	1	157'-6"	157'-6"	None	0.02	0.01	1	WALKER
DSD¦03.0000	DW_506953	DW_506952	1	29'-7"	29'-7"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_506952	DW_509752	1	76'-6"	76'-6"	None	0.01	0.01	0	WALKER
DSD¦03.0000	DW_509752	DW_509625	1	11'-5"	11'-5"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_509625	DW_509046	1	21'-2"	21'-2"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_509046	DW_506951	1	54'-7"	54'-7"	None	0.01	0.01	0	WALKER
DSD¦03.0000	DW_506951	DW_506950	1	18'-3"	18'-3"	None	0	0.01	0	WALKER
DSD¦03.0000	DW_506950	DSD_DOCK	1	49'-3"	49'-3"	None	0.01	0	0	WALKER
DSD¦04.0000	DSD_DOCK	DW_100521	1	67'-8"	67'-8"	None	0.01	0.04	1	WALKER
DSD¦04.0000	DW_100521	DW_505554	1	16'-10"	16'-10"	None	0	0.03	1	WALKER
DSD¦04.0000	DW_505554	DW_505555	1	27'-1"	27'-1"	None	0	0.02	0	WALKER

Table 57 Continued

Aggregate Name	**From**	**To**	**Freq**	**Calc Dist/Trip (Ft)**	**Eff. Dist/Trip (Ft)**	**User Dist/Trip (Ft)**	**Total Travel Time (Hrs)**	**Total L/UL Time (Hrs)**	**Total $**	**Method Type**
DSD¦04.0000	DW_505555	DW_503278	1	15'-6"	15'-6"	None	0	0.03	1	WALKER
DSD¦04.0000	DW_503278	DW_505638	1	13'-0"	13'-0"	None	0	0.01	0	WALKER
DSD¦04.0000	DW_505638	DW_506295	1	25'-11"	25'-11"	None	0	0.06	1	WALKER
DSD¦04.0000	DW_506295	DW_503971	1	16'-8"	16'-8"	None	0	0.03	1	WALKER
DSD¦04.0000	DW_503971	DW_506296	1	14'-3"	14'-3"	None	0	0.03	1	WALKER
DSD¦04.0000	DW_506296	DW_836261	1	149'-2"	149'-2"	None	0.02	0.04	1	WALKER
DSD¦04.0000	DW_836261	DW_831661	1	17'-5"	17'-5"	None	0	0.02	0	WALKER
DSD¦04.0000	DW_831661	DW_832461	1	19'-9"	19'-9"	None	0	0.03	1	WALKER
DSD¦04.0000	DW_832461	DW_839061	1	19'-0"	19'-0"	None	0	0.03	1	WALKER
DSD¦04.0000	DW_839061	DW_831261	1	19'-1"	19'-1"	None	0	0.03	1	WALKER
DSD¦04.0000	DW_831261	DW_512486	1	35'-7"	35'-7"	None	0.01	0.02	0	WALKER
DSD¦04.0000	DW_512486	DW_512730	1	25'-7"	25'-7"	None	0	0.02	0	WALKER
DSD¦04.0000	DW_512730	DW_512485	1	19'-4"	19'-4"	None	0	0.03	1	WALKER
DSD¦04.0000	DW_512485	DW_505546	1	108'-9"	108'-9"	None	0.02	0.07	2	WALKER
DSD¦04.0000	DW_505546	DW_506297	1	12'-7"	12'-7"	None	0	0.03	1	WALKER
DSD¦04.0000	DW_506297	DW_505547	1	16'-8"	16'-8"	None	0	0.03	1	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦04.0000	DW_505547	DW_505548	1	7'-0"	7'-0"	None	0	0.03	1	WALKER
DSD¦04.0000	DW_505548	DW_506632	1	15'-10"	15'-10"	None	0	0.02	0	WALKER
DSD¦04.0000	DW_506632	DW_505549	1	13'-4"	13'-4"	None	0	0.02	0	WALKER
DSD¦04.0000	DW_505549	DW_510706	1	16'-4"	16'-4"	None	0	0.02	0	WALKER
DSD¦04.0000	DW_510706	DW_510708	1	11'-5"	11'-5"	None	0	0.02	0	WALKER
DSD¦04.0000	DW_510708	DW_511068	1	13'-10"	13'-10"	None	0	0.02	0	WALKER
DSD¦04.0000	DW_511068	DW_836561	1	69'-5"	69'-5"	None	0.01	0.02	1	WALKER
DSD¦04.0000	DW_836561	DW_835261	1	29'-0"	29'-0"	None	0	0.04	1	WALKER
DSD¦04.0000	DW_835261	DW_510645	1	71'-3"	71'-3"	None	0.01	0.03	1	WALKER
DSD¦04.0000	DW_510645	DW_511873	1	126'-0"	126'-0"	None	0.02	0.04	1	WALKER
DSD¦04.0000	DW_511873	DW_512487	1	75'-9"	75'-9"	None	0.01	0.02	1	WALKER
DSD¦04.0000	DW_512487	W_513009	1	122'-9"	122'-9"	None	0.02	0.04	1	WALKER
DSD¦04.0000	W_513009	DW_510139	1	98'-8"	98'-8"	None	0.02	0.02	1	WALKER
DSD¦04.0000	DW_510139	DW_510138	1	8'-8"	8'-8"	None	0	0.02	0	WALKER
DSD¦04.0000	DW_510138	DW_510135	1	15'-1"	15'-1"	None	0	0.02	0	WALKER
DSD¦04.0000	DW_510135	DW_510136	1	10'-8"	10'-8"	None	0	0.02	0	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦04.0000	DW_510136	DW_510053	1	18'-2"	18'-2"	None	0	0.01	0	WALKER
DSD¦04.0000	DW_510053	DW_510052	1	9'-0"	9'-0"	None	0	0.01	0	WALKER
DSD¦04.0000	DW_510052	DW_509871	1	9'-0"	9'-0"	None	0	0.02	0	WALKER
DSD¦04.0000	DW_509871	DW_509753	1	19'-11"	19'-11"	None	0	0.02	0	WALKER
DSD¦04.0000	DW_509753	DW_509752	1	10'-7"	10'-7"	None	0	0.02	0	WALKER
DSD¦04.0000	DW_509752	DW_509046	1	24'-5"	24'-5"	None	0	0.02	0	WALKER
DSD¦04.0000	DW_509046	DW_507087	1	70'-6"	70'-6"	None	0.01	0.02	1	WALKER
DSD¦04.0000	DW_507087	DSD_DOCK	1	90'-7"	90'-7"	None	0.01	0	0	WALKER
RETAIL¦01.0000	RET_DOCK	R_503890	1	69'-8"	69'-8"	None	0.01	0.01	0	WALKER
RETAIL¦01.0000	R_503890	R_508782	1	152'-8"	152'-8"	None	0.02	0.01	1	WALKER
RETAIL¦01.0000	R_508782	R_508730	1	10'-3"	10'-3"	None	0	0.01	0	WALKER
RETAIL¦01.0000	R_508730	R_508687	1	9'-6"	9'-6"	None	0	0.01	0	WALKER
RETAIL¦01.0000	R_508687	R_506284	1	168'-10"	168'-10"	None	0.02	0.04	1	WALKER
RETAIL¦01.0000	R_506284	R_513096	1	23'-1"	23'-1"	None	0	0.01	0	WALKER
RETAIL¦01.0000	R_513096	R_479006	1	86'-11"	86'-11"	None	0.01	0.01	0	WALKER
RETAIL¦01.0000	R_479006	R_666688	1	68'-2"	68'-2"	None	0.01	0.01	0	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
RETAIL¦01.0000	R_666688	RW_510418	1	206'-2"	206'-2"	None	0.03	0.01	1	WALKER
RETAIL¦01.0000	RW_510418	RW_510646	1	217'-8"	217'-8"	None	0.03	0.01	1	WALKER
RETAIL¦01.0000	RW_510646	RW_510141	1	147'-0"	147'-0"	None	0.02	0.01	1	WALKER
RETAIL¦01.0000	RW_510141	RW_511312	1	53'-4"	53'-4"	None	0.01	0.01	0	WALKER
RETAIL¦01.0000	RW_511312	RW_511309	1	15'-6"	15'-6"	None	0	0.01	0	WALKER
RETAIL¦01.0000	RW_511309	RW_511108	1	24'-0"	24'-0"	None	0	0.01	0	WALKER
RETAIL¦01.0000	RW_511108	RW_510426	1	20'-6"	20'-6"	None	0	0.01	0	WALKER
RETAIL¦01.0000	RW_510426	RW_510419	1	33'-5"	33'-5"	None	0.01	0.01	0	WALKER
RETAIL¦01.0000	RW_510419	RW_510421	1	16'-6"	16'-6"	None	0	0.01	0	WALKER
RETAIL¦01.0000	RW_510421	R_480077	1	113'-0"	113'-0"	None	0.02	0.01	0	WALKER
RETAIL¦01.0000	R_480077	RET_DOCK	1	53'-8"	53'-8"	None	0.01	0	0	WALKER
RETAIL¦02.0000	RET_DOCK	R_509193	1	56'-8"	56'-8"	None	0.01	0.01	0	WALKER
RETAIL¦02.0000	R_509193	R_504503	1	7'-2"	7'-2"	None	0	0.01	0	WALKER
RETAIL¦02.0000	R_504503	R_509197	1	11'-10"	11'-10"	None	0	0.01	0	WALKER
RETAIL¦02.0000	R_509197	RW_510936	1	142'-9"	142'-9"	None	0.02	0.01	1	WALKER
RETAIL¦02.0000	RW_510936	RW_511312	1	29'-8"	29'-8"	None	0	0.01	0	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
RETAIL¦02.0000	RW_511312	RW_510138	1	76'-7"	76'-7"	None	0.01	0.01	0	WALKER
RETAIL¦02.0000	RW_510138	RW_510136	1	17'-6"	17'-6"	None	0	0.01	0	WALKER
RETAIL¦02.0000	RW_510136	RW_512988	1	116'-10"	116'-10"	None	0.02	0.01	0	WALKER
RETAIL¦02.0000	RW_512988	R_513020	1	269'-1"	269'-1"	None	0.04	0.01	1	WALKER
RETAIL¦02.0000	R_513020	R_503791	1	21'-1"	21'-1"	None	0	0.01	0	WALKER
RETAIL¦02.0000	R_503791	R_509206	1	40'-3"	40'-3"	None	0.01	0.01	0	WALKER
RETAIL¦02.0000	R_509206	R_509209	1	15'-4"	15'-4"	None	0	0.01	0	WALKER
RETAIL¦02.0000	R_509209	RW_509594	1	141'-2"	141'-2"	None	0.02	0.01	1	WALKER
RETAIL¦02.0000	RW_509594	R_508730	1	161'-6"	161'-6"	None	0.02	0.01	1	WALKER
RETAIL¦02.0000	R_508730	R_503760	1	78'-5"	78'-5"	None	0.01	0.01	0	WALKER
RETAIL¦02.0000	R_503760	R_500078	1	37'-1"	37'-1"	None	0.01	0.01	0	WALKER
RETAIL¦02.0000	R_500078	R_509204	1	87'-9"	87'-9"	None	0.01	0.01	0	WALKER
RETAIL¦02.0000	R_509204	R_479006	1	72'-5"	72'-5"	None	0.01	0.01	0	WALKER
RETAIL¦02.0000	R_479006	R_506284	1	78'-6"	78'-6"	None	0.01	0.02	1	WALKER
RETAIL¦02.0000	R_506284	RET_DOCK	1	86'-5"	86'-5"	None	0.01	0	0	WALKER
RETAIL¦03.0000	RET_DOCK	R_509192	1	45'-4"	45'-4"	None	0.01	0.01	0	WALKER

Table 57 Continued

Aggregate Name	**From**	**To**	**Freq**	**Calc Dist/Trip (Ft)**	**Eff. Dist/Trip (Ft)**	**User Dist/Trip (Ft)**	**Total Travel Time (Hrs)**	**Total L/UL Time (Hrs)**	**Total $**	**Method Type**
RETAIL¦03.0000	R_509192	R_503791	1	38'-2"	38'-2"	None	0.01	0.01	0	WALKER
RETAIL¦03.0000	R_503791	R_506284	1	100'-1"	100'-1"	None	0.02	0.01	1	WALKER
RETAIL¦03.0000	R_506284	R_509198	1	64'-4"	64'-4"	None	0.01	0.01	0	WALKER
RETAIL¦03.0000	R_509198	R_479006	1	28'-10"	28'-10"	None	0.01	0.01	0	WALKER
RETAIL¦03.0000	R_479006	R_666688	1	68'-2"	68'-2"	None	0.01	0.01	0	WALKER
RETAIL¦03.0000	R_666688	R_473916	1	157'-0"	157'-0"	None	0.02	0.01	1	WALKER
RETAIL¦03.0000	R_473916	R_507238	1	11'-4"	11'-4"	None	0	0.01	0	WALKER
RETAIL¦03.0000	R_507238	R_508782	1	22'-5"	22'-5"	None	0	0.01	0	WALKER
RETAIL¦03.0000	R_508782	R_410608	1	104'-10"	104'-10"	None	0.02	0.01	0	WALKER
RETAIL¦03.0000	R_410608	RW_511839	1	167'-1"	167'-1"	None	0.02	0.01	1	WALKER
RETAIL¦03.0000	RW_511839	RW_511309	1	119'-2"	119'-2"	None	0.02	0.01	0	WALKER
RETAIL¦03.0000	RW_511309	RET_DOCK	1	178'-11"	178'-11"	None	0.03	0	1	WALKER
RETAIL¦04.0000	RET_DOCK	R_506284	1	86'-5"	86'-5"	None	0.01	0.01	1	WALKER
RETAIL¦04.0000	R_506284	R_513096	1	23'-1"	23'-1"	None	0	0.01	0	WALKER
RETAIL¦04.0000	R_513096	R_513020	1	82'-9"	82'-9"	None	0.01	0.01	0	WALKER
RETAIL¦04.0000	R_513020	R_506562	1	143'-5"	143'-5"	None	0.02	0.01	1	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
RETAIL¦04.0000	R_506562	R_508730	1	20'-11"	20'-11"	None	0	0.01	0	WALKER
RETAIL¦04.0000	R_508730	R_508782	1	10'-3"	10'-3"	None	0	0.01	0	WALKER
RETAIL¦04.0000	R_508782	R_503760	1	82'-0"	82'-0"	None	0.01	0.01	0	WALKER
RETAIL¦04.0000	R_503760	RW_510835	1	159'-8"	159'-8"	None	0.02	0.01	1	WALKER
RETAIL¦04.0000	RW_510835	RW_512986	1	225'-3"	225'-3"	None	0.03	0.01	1	WALKER
RETAIL¦04.0000	RW_512986	RW_511312	1	142'-6"	142'-6"	None	0.02	0.01	1	WALKER
RETAIL¦04.0000	RW_511312	RW_511309	1	15'-6"	15'-6"	None	0	0.01	0	WALKER
RETAIL¦04.0000	RW_511309	RW_510425	1	35'-10"	35'-10"	None	0.01	0.01	0	WALKER
RETAIL¦04.0000	RW_510425	RW_513022	1	22'-8"	22'-8"	None	0	0.01	0	WALKER
RETAIL¦04.0000	RW_513022	RW_510422	1	14'-4"	14'-4"	None	0	0.01	0	WALKER
RETAIL¦04.0000	RW_510422	R_504503	1	121'-11"	121'-11"	None	0.02	0.01	0	WALKER
RETAIL¦04.0000	R_504503	RW_510142	1	68'-1"	68'-1"	None	0.01	0.01	0	WALKER
RETAIL¦04.0000	RW_510142	RW_512728	1	91'-11"	91'-11"	None	0.01	0.01	0	WALKER
RETAIL¦04.0000	RW_512728	RET_DOCK	1	152'-6"	152'-6"	None	0.02	0	0	WALKER
WHOLE¦01.0000	WHL_DOCK	W_509146	1	47'-5"	47'-5"	None	0.01	0	0	WALKER
WHOLE¦01.0000	W_509146	W_501684	1	15'-8"	15'-8"	None	0	0	0	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
WHOLE¦01.0000	W_501684	W_501919	1	15'-1"	15'-1"	None	0	0	0	WALKER
WHOLE¦01.0000	W_501919	W_509145	1	17'-2"	17'-2"	None	0	0	0	WALKER
WHOLE¦01.0000	W_509145	W_508737	1	172'-7"	172'-7"	None	0.03	0	1	WALKER
WHOLE¦01.0000	W_508737	W_501961	1	136'-5"	136'-5"	None	0.02	0	0	WALKER
WHOLE¦01.0000	W_501961	DW_510139	1	120'-8"	120'-8"	None	0.02	0	0	WALKER
WHOLE¦01.0000	DW_510139	W_503106	1	106'-11"	106'-11"	None	0.02	0	0	WALKER
WHOLE¦01.0000	W_503106	W_511870	1	32'-8"	32'-8"	None	0.01	0	0	WALKER
WHOLE¦01.0000	W_511870	W_500252	1	16'-6"	16'-6"	None	0	0	0	WALKER
WHOLE¦01.0000	W_500252	W_509148	1	76'-6"	76'-6"	None	0.01	0	0	WALKER
WHOLE¦01.0000	W_509148	WHL_DOCK	1	43'-7"	43'-7"	None	0.01	0	0	WALKER
WHOLE¦02.0000	WHL_DOCK	W_509148	1	43'-7"	43'-7"	None	0.01	0	0	WALKER
WHOLE¦02.0000	W_509148	W_509147	1	16'-1"	16'-1"	None	0	0	0	WALKER
WHOLE¦02.0000	W_509147	W_501627	1	80'-3"	80'-3"	None	0.01	0	0	WALKER
WHOLE¦02.0000	W_501627	W_501552	1	22'-9"	22'-9"	None	0	0	0	WALKER
WHOLE¦02.0000	W_501552	W_507208	1	18'-7"	18'-7"	None	0	0	0	WALKER
WHOLE¦02.0000	W_507208	W_501493	1	14'-0"	14'-0"	None	0	0	0	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
WHOLE¦02.0000	W_501493	W_511355	1	107'-6"	107'-6"	None	0.02	0	0	WALKER
WHOLE¦02.0000	W_511355	W_512802	1	33'-7"	33'-7"	None	0.01	0	0	WALKER
WHOLE¦02.0000	W_512802	W_503106	1	20'-7"	20'-7"	None	0	0	0	WALKER
WHOLE¦02.0000	W_503106	DW_510136	1	113'-4"	113'-4"	None	0.02	0	0	WALKER
WHOLE¦02.0000	DW_510136	W_477080	1	48'-7"	48'-7"	None	0.01	0	0	WALKER
WHOLE¦02.0000	W_477080	W_509145	1	92'-6"	92'-6"	None	0.01	0	0	WALKER
WHOLE¦02.0000	W_509145	W_509146	1	24'-7"	24'-7"	None	0	0	0	WALKER
WHOLE¦02.0000	W_509146	WHL_DOCK	1	47'-5"	47'-5"	None	0.01	0	0	WALKER
WHOLE¦03.0000	WHL_DOCK	W_500252	1	48'-1"	48'-1"	None	0.01	0	0	WALKER
WHOLE¦03.0000	W_500252	W_503103	1	104'-8"	104'-8"	None	0.02	0	0	WALKER
WHOLE¦03.0000	W_503103	W_10016	1	69'-11"	69'-11"	None	0.01	0	0	WALKER
WHOLE¦03.0000	W_10016	W_10005	1	28'-4"	28'-4"	None	0	0	0	WALKER
WHOLE¦03.0000	W_10005	W_10004	1	13'-3"	13'-3"	None	0	0	0	WALKER
WHOLE¦03.0000	W_10004	W_10001	1	26'-4"	26'-4"	None	0	0	0	WALKER
WHOLE¦03.0000	W_10001	W_10008	1	19'-1"	19'-1"	None	0	0	0	WALKER
WHOLE¦03.0000	W_10008	W_10003	1	14'-11"	14'-11"	None	0	0	0	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
WHOLE¦03.0000	W_10003	RW_510198	1	178'-1"	178'-1"	None	0.03	0	1	WALKER
WHOLE¦03.0000	RW_510198	WHL_DOCK	1	135'-8"	135'-8"	None	0.02	0	0	WALKER
WHOLE¦04.0000	WHL_DOCK	W_511043	1	34'-1"	34'-1"	None	0.01	0	0	WALKER
WHOLE¦04.0000	W_511043	W_501919	1	31'-11"	31'-11"	None	0.01	0	0	WALKER
WHOLE¦04.0000	W_501919	W_500030	1	43'-1"	43'-1"	None	0.01	0	0	WALKER
WHOLE¦04.0000	W_500030	W_476422	1	22'-0"	22'-0"	None	0	0	0	WALKER
WHOLE¦04.0000	W_476422	W_477265	1	16'-7"	16'-7"	None	0	0	0	WALKER
WHOLE¦04.0000	W_477265	W_508732	1	73'-11"	73'-11"	None	0.01	0	0	WALKER
WHOLE¦04.0000	W_508732	W_501961	1	108'-11"	108'-11"	None	0.02	0	0	WALKER
WHOLE¦04.0000	W_501961	RW_512986	1	127'-2"	127'-2"	None	0.02	0	0	WALKER
WHOLE¦04.0000	RW_512986	W_508730	1	105'-0"	105'-0"	None	0.02	0	0	WALKER
WHOLE¦04.0000	W_508730	RW_511312	1	107'-6"	107'-6"	None	0.02	0	0	WALKER
WHOLE¦04.0000	RW_511312	DW_510140	1	251'-5"	251'-5"	None	0.04	0	1	WALKER
WHOLE¦04.0000	DW_510140	DW_510139	1	104'-9"	104'-9"	None	0.02	0	0	WALKER
WHOLE¦04.0000	DW_510139	W_501920	1	114'-7"	114'-7"	None	0.02	0	0	WALKER
WHOLE¦04.0000	W_501920	W_500252	1	30'-0"	30'-0"	None	0.01	0	0	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
WHOLE¦04.0000	W_500252	W_509671	1	84'-11"	84'-11"	None	0.01	0	0	WALKER
WHOLE¦04.0000	W_509671	WHL_DOCK	1	52'-0"	52'-0"	None	0.01	0	0	WALKER
WHOLE¦05.0000	WHL_DOCK	W_506284	1	52'-1"	52'-1"	None	0.01	0	0	WALKER
WHOLE¦05.0000	W_506284	W_511042	1	113'-2"	113'-2"	None	0.02	0	0	WALKER
WHOLE¦05.0000	W_511042	W_509671	1	37'-1"	37'-1"	None	0.01	0	0	WALKER
WHOLE¦05.0000	W_509671	W_501493	1	77'-5"	77'-5"	None	0.01	0	0	WALKER
WHOLE¦05.0000	W_501493	W_508730	1	56'-11"	56'-11"	None	0.01	0	0	WALKER
WHOLE¦05.0000	W_508730	RW_511309	1	110'-10"	110'-10"	None	0.02	0	0	WALKER
WHOLE¦05.0000	RW_511309	RW_511312	1	15'-6"	15'-6"	None	0	0	0	WALKER
WHOLE¦05.0000	RW_511312	W_501961	1	129'-8"	129'-8"	None	0.02	0	0	WALKER
WHOLE¦05.0000	W_501961	W_508202	1	131'-9"	131'-9"	None	0.02	0	0	WALKER
WHOLE¦05.0000	W_508202	W_479006	1	94'-3"	94'-3"	None	0.01	0	0	WALKER
WHOLE¦05.0000	W_479006	W_501919	1	57'-2"	57'-2"	None	0.01	0	0	WALKER
WHOLE¦05.0000	W_501919	W_504468	1	27'-4"	27'-4"	None	0	0	0	WALKER
WHOLE¦05.0000	W_504468	W_503565	1	14'-8"	14'-8"	None	0	0	0	WALKER
WHOLE¦05.0000	W_503565	WHL_DOCK	1	32'-2"	32'-2"	None	0.01	0	0	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
WHOLE¦06.0000	WHL_DOCK	W_500228	1	44'-11"	44'-11"	None	0.01	0	0	WALKER
WHOLE¦06.0000	W_500228	W_503106	1	42'-0"	42'-0"	None	0.01	0	0	WALKER
WHOLE¦06.0000	W_503106	W_503760	1	135'-7"	135'-7"	None	0.02	0	0	WALKER
WHOLE¦06.0000	W_503760	W_511042	1	15'-7"	15'-7"	None	0	0	0	WALKER
WHOLE¦06.0000	W_511042	W_503794	1	14'-3"	14'-3"	None	0	0	0	WALKER
WHOLE¦06.0000	W_503794	W_510081	1	34'-5"	34'-5"	None	0.01	0	0	WALKER
WHOLE¦06.0000	W_510081	W_507208	1	79'-10"	79'-10"	None	0.01	0	0	WALKER
WHOLE¦06.0000	W_507208	W_501552	1	18'-7"	18'-7"	None	0	0	0	WALKER
WHOLE¦06.0000	W_501552	W_503793	1	25'-9"	25'-9"	None	0	0	0	WALKER
WHOLE¦06.0000	W_503793	W_508730	1	32'-1"	32'-1"	None	0.01	0	0	WALKER
WHOLE¦06.0000	W_508730	RW_511309	1	110'-10"	110'-10"	None	0.02	0	0	WALKER
WHOLE¦06.0000	RW_511309	W_500037	1	142'-9"	142'-9"	None	0.02	0	1	WALKER
WHOLE¦06.0000	W_500037	W_509149	1	14'-4"	14'-4"	None	0	0	0	WALKER
WHOLE¦06.0000	W_509149	W_501919	1	44'-9"	44'-9"	None	0.01	0	0	WALKER
WHOLE¦06.0000	W_501919	W_511043	1	31'-11"	31'-11"	None	0.01	0	0	WALKER
WHOLE¦06.0000	W_511043	W_503565	1	12'-7"	12'-7"	None	0	0	0	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
WHOLE¦06.0000	W_503565	WHL_DOCK	1	32'-2"	32'-2"	None	0.01	0	0	WALKER
WHOLE¦07.0000	WHL_DOCK	W_508686	1	33'-6"	33'-6"	None	0.01	0	0	WALKER
WHOLE¦07.0000	W_508686	W_504468	1	16'-10"	16'-10"	None	0	0	0	WALKER
WHOLE¦07.0000	W_504468	W_501919	1	27'-4"	27'-4"	None	0	0	0	WALKER
WHOLE¦07.0000	W_501919	W_509671	1	88'-6"	88'-6"	None	0.01	0	0	WALKER
WHOLE¦07.0000	W_509671	W_505308	1	20'-10"	20'-10"	None	0	0	0	WALKER
WHOLE¦07.0000	W_505308	W_508709	1	15'-3"	15'-3"	None	0	0	0	WALKER
WHOLE¦07.0000	W_508709	W_503103	1	22'-2"	22'-2"	None	0	0	0	WALKER
WHOLE¦07.0000	W_503103	W_506245	1	90'-6"	90'-6"	None	0.01	0	0	WALKER
WHOLE¦07.0000	W_506245	W_506562	1	17'-1"	17'-1"	None	0	0	0	WALKER
WHOLE¦07.0000	W_506562	W_507208	1	12'-5"	12'-5"	None	0	0	0	WALKER
WHOLE¦07.0000	W_507208	W_508730	1	54'-5"	54'-5"	None	0.01	0	0	WALKER
WHOLE¦07.0000	W_508730	W_508687	1	22'-7"	22'-7"	None	0	0	0	WALKER
WHOLE¦07.0000	W_508687	RW_510130	1	142'-1"	142'-1"	None	0.02	0	1	WALKER
WHOLE¦07.0000	RW_510130	RW_511312	1	138'-2"	138'-2"	None	0.02	0	0	WALKER
WHOLE¦07.0000	RW_511312	RW_511542	1	31'-9"	31'-9"	None	0.01	0	0	WALKER

Table 57 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
WHOLE¦07.0000	RW_511542	RW_509554	1	76'-9"	76'-9"	None	0.01	0	0	WALKER
WHOLE¦07.0000	RW_509554	W_477265	1	118'-0"	118'-0"	None	0.02	0	0	WALKER
WHOLE¦07.0000	W_477265	DW_510139	1	85'-8"	85'-8"	None	0.01	0	0	WALKER
WHOLE¦07.0000	DW_510139	DW_510136	1	12'-9"	12'-9"	None	0	0	0	WALKER
WHOLE¦07.0000	DW_510136	W_503893	1	105'-8"	105'-8"	None	0.02	0	0	WALKER
WHOLE¦07.0000	W_503893	W_506284	1	42'-0"	42'-0"	None	0.01	0	0	WALKER
WHOLE¦07.0000	W_506284	WHL_DOCK	1	52'-1"	52'-1"	None	0.01	0	0	WALKER

Table 58. Tuggers Tab Data Table

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
1	506632	CASE	5		DSD_DOCK	DW_506632	1	1			DSD
2	506952	CASE	30		DSD_DOCK	DW_506952	1	1			DSD
3	506953	CASE	30		DSD_DOCK	DW_506953	1	1			DSD
4	509625	CASE	5		DSD_DOCK	DW_509625	1	1			DSD
5	100411	CASE	10		DSD_DOCK	DW_100411	1	1			DSD
6	100621	CASE	25		DSD_DOCK	DW_100621	1	1			DSD
7	505554	CASE	15		DSD_DOCK	DW_505554	1	1			DSD
8	510203	CASE	5		DSD_DOCK	DW_510203	1	1			DSD
9	509046	CASE	5		DSD_DOCK	DW_509046	1	1			DSD
10	503971	CASE	5		DSD_DOCK	DW_503971	1	1			DSD
11	503279	CASE	10		DSD_DOCK	DW_503279	1	1			DSD
12	507087	CASE	5		DSD_DOCK	DW_507087	1	1			DSD
13	831261	CASE	5		DSD_DOCK	DW_831261	1	1			DSD
14	836561	CASE	5		DSD_DOCK	DW_836561	1	1			DSD
15	832461	CASE	5		DSD_DOCK	DW_832461	1	1			DSD
16	834161	CASE	15		DSD_DOCK	DW_834161	1	1			DSD
17	835261	CASE	20		DSD_DOCK	DW_835261	1	1			DSD

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
18	836261	CASE	15		DSD_DOCK	DW_836261	1	1			DSD
19	505546	CASE	15		DSD_DOCK	DW_505546	1	1			DSD
20	505550	CASE	5		DSD_DOCK	DW_505550	1	1			DSD
21	505547	CASE	10		DSD_DOCK	DW_505547	1	1			DSD
22	505549	CASE	5		DSD_DOCK	DW_505549	1	1			DSD
23	505551	CASE	5		DSD_DOCK	DW_505551	1	1			DSD
24	510645	CASE	5		DSD_DOCK	DW_510645	1	1			DSD
25	510708	CASE	5		DSD_DOCK	DW_510708	1	1			DSD
26	506630	CASE	5		DSD_DOCK	DW_506630	1	1			DSD
27	509042	CASE	15		DSD_DOCK	DW_509042	1	1			DSD
30	505548	CASE	4		DSD_DOCK	DW_505548	2	1			DSD
31	506953	CASE	8		DSD_DOCK	DW_506953	2	1			DSD
32	503278	CASE	6		DSD_DOCK	DW_503278	2	1			DSD
33	509871	CASE	4		DSD_DOCK	DW_509871	2	1			DSD
34	100521	CASE	4		DSD_DOCK	DW_100521	2	1			DSD
35	100621	CASE	3		DSD_DOCK	DW_100621	2	1			DSD
36	505555	CASE	4		DSD_DOCK	DW_505555	2	1			DSD

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
37	505554	CASE	4		DSD_DOCK	DW_505554	2	1			DSD
38	503971	CASE	4		DSD_DOCK	DW_503971	2	1			DSD
39	831261	CASE	3		DSD_DOCK	DW_831261	2	1			DSD
40	834161	CASE	3		DSD_DOCK	DW_834161	2	1			DSD
41	831661	CASE	6		DSD_DOCK	DW_831661	2	1			DSD
42	836261	CASE	4		DSD_DOCK	DW_836261	2	1			DSD
43	839061	CASE	4		DSD_DOCK	DW_839061	2	1			DSD
44	509752	CASE	4		DSD_DOCK	DW_509752	2	1			DSD
45	505546	CASE	6		DSD_DOCK	DW_505546	2	1			DSD
46	505547	CASE	4		DSD_DOCK	DW_505547	2	1			DSD
47	505549	CASE	8		DSD_DOCK	DW_505549	2	1			DSD
48	510645	CASE	4		DSD_DOCK	DW_510645	2	1			DSD
49	510644	CASE	2		DSD_DOCK	DW_510644	2	1			DSD
50	511068	CASE	4		DSD_DOCK	DW_511068	2	1			DSD
51	506295	CASE	6		DSD_DOCK	DW_506295	2	1			DSD
52	506296	CASE	3		DSD_DOCK	DW_506296	2	1			DSD
53	506297	CASE	2		DSD_DOCK	DW_506297	2	1			DSD

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
54	506630	CASE	4		DSD_DOCK	DW_506630	2	1			DSD
55	508939	CASE	2		DSD_DOCK	DW_508939	2	1			DSD
56	510416	CASE	4		DSD_DOCK	DW_510416	2	1			DSD
57	510417	CASE	4		DSD_DOCK	DW_510417	2	1			DSD
58	510419	CASE	6		DSD_DOCK	DW_510419	2	1			DSD
59	510425	CASE	6		DSD_DOCK	DW_510425	2	1			DSD
60	512487	CASE	4		DSD_DOCK	DW_512487	2	1			DSD
61	512486	CASE	6		DSD_DOCK	DW_512486	2	1			DSD
62	512485	CASE	6		DSD_DOCK	DW_512485	2	1			DSD
63	513504	CASE	3		DSD_DOCK	DW_513504	2	1			DSD
64	510135	CASE	1		DSD_DOCK	DW_510135	2	1			DSD
65	510139	CASE	1		DSD_DOCK	DW_510139	2	1			DSD
66	510136	CASE	1		DSD_DOCK	DW_510136	2	1			DSD
68	506632	CASE	1		DSD_DOCK	DW_506632	3	1			DSD
69	506952	CASE	2		DSD_DOCK	DW_506952	3	1			DSD
70	506953	CASE	2		DSD_DOCK	DW_506953	3	1			DSD
71	509625	CASE	1		DSD_DOCK	DW_509625	3	1			DSD

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
72	100411	CASE	1		DSD_DOCK	DW_100411	3	1			DSD
73	100521	CASE	2		DSD_DOCK	DW_100521	3	1			DSD
74	100621	CASE	5		DSD_DOCK	DW_100621	3	1			DSD
75	505554	CASE	2		DSD_DOCK	DW_505554	3	1			DSD
76	509046	CASE	3		DSD_DOCK	DW_509046	3	1			DSD
77	503279	CASE	1		DSD_DOCK	DW_503279	3	1			DSD
78	831961	CASE	1		DSD_DOCK	DW_831961	3	1			DSD
79	834161	CASE	5		DSD_DOCK	DW_834161	3	1			DSD
80	835261	CASE	4		DSD_DOCK	DW_835261	3	1			DSD
81	831661	CASE	1		DSD_DOCK	DW_831661	3	1			DSD
82	836261	CASE	7		DSD_DOCK	DW_836261	3	1			DSD
83	509752	CASE	1		DSD_DOCK	DW_509752	3	1			DSD
84	505546	CASE	4		DSD_DOCK	DW_505546	3	1			DSD
85	505549	CASE	2		DSD_DOCK	DW_505549	3	1			DSD
86	505553	CASE	1		DSD_DOCK	DW_505553	3	1			DSD
87	510645	CASE	1		DSD_DOCK	DW_510645	3	1			DSD
88	506295	CASE	3		DSD_DOCK	DW_506295	3	1			DSD

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
89	506631	CASE	1		DSD_DOCK	DW_506631	3	1			DSD
90	506630	CASE	1		DSD_DOCK	DW_506630	3	1			DSD
91	506951	CASE	2		DSD_DOCK	DW_506951	3	1			DSD
92	506950	CASE	2		DSD_DOCK	DW_506950	3	1			DSD
93	510416	CASE	14		DSD_DOCK	DW_510416	3	1			DSD
94	510419	CASE	5		DSD_DOCK	DW_510419	3	1			DSD
95	510421	CASE	4		DSD_DOCK	DW_510421	3	1			DSD
96	510422	CASE	2		DSD_DOCK	DW_510422	3	1			DSD
97	510426	CASE	8		DSD_DOCK	DW_510426	3	1			DSD
98	512486	CASE	2		DSD_DOCK	DW_512486	3	1			DSD
99	512485	CASE	2		DSD_DOCK	DW_512485	3	1			DSD
101	505548	CASE	10		DSD_DOCK	DW_505548	4	1			DSD
102	506632	CASE	5		DSD_DOCK	DW_506632	4	1			DSD
103	509753	CASE	5		DSD_DOCK	DW_509753	4	1			DSD
104	503278	CASE	10		DSD_DOCK	DW_503278	4	1			DSD
105	509871	CASE	5		DSD_DOCK	DW_509871	4	1			DSD
106	100521	CASE	15		DSD_DOCK	DW_100521	4	1			DSD

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
107	511873	CASE	15		DSD_DOCK	DW_511873	4	1			DSD
108	505555	CASE	5		DSD_DOCK	DW_505555	4	1			DSD
109	505554	CASE	10		DSD_DOCK	DW_505554	4	1			DSD
110	513009	CASE	15		DSD_DOCK	W_513009	4	1			DSD
111	509046	CASE	5		DSD_DOCK	DW_509046	4	1			DSD
112	503971	CASE	10		DSD_DOCK	DW_503971	4	1			DSD
113	507087	CASE	5		DSD_DOCK	DW_507087	4	1			DSD
114	831261	CASE	10		DSD_DOCK	DW_831261	4	1			DSD
115	836261	CASE	14		DSD_DOCK	DW_836261	4	1			DSD
116	836561	CASE	5		DSD_DOCK	DW_836561	4	1			DSD
117	832461	CASE	10		DSD_DOCK	DW_832461	4	1			DSD
118	835261	CASE	15		DSD_DOCK	DW_835261	4	1			DSD
119	831661	CASE	5		DSD_DOCK	DW_831661	4	1			DSD
120	839061	CASE	10		DSD_DOCK	DW_839061	4	1			DSD
121	509752	CASE	5		DSD_DOCK	DW_509752	4	1			DSD
122	505546	CASE	25		DSD_DOCK	DW_505546	4	1			DSD
123	505547	CASE	10		DSD_DOCK	DW_505547	4	1			DSD

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
124	505549	CASE	5		DSD_DOCK	DW_505549	4	1			DSD
125	505638	CASE	3		DSD_DOCK	DW_505638	4	1			DSD
126	510645	CASE	10		DSD_DOCK	DW_510645	4	1			DSD
127	511068	CASE	5		DSD_DOCK	DW_511068	4	1			DSD
128	510706	CASE	5		DSD_DOCK	DW_510706	4	1			DSD
129	512730	CASE	5		DSD_DOCK	DW_512730	4	1			DSD
130	506295	CASE	20		DSD_DOCK	DW_506295	4	1			DSD
131	506296	CASE	10		DSD_DOCK	DW_506296	4	1			DSD
132	506297	CASE	10		DSD_DOCK	DW_506297	4	1			DSD
133	510708	CASE	5		DSD_DOCK	DW_510708	4	1			DSD
134	512487	CASE	5		DSD_DOCK	DW_512487	4	1			DSD
135	512486	CASE	5		DSD_DOCK	DW_512486	4	1			DSD
136	512485	CASE	8		DSD_DOCK	DW_512485	4	1			DSD
137	510052	CASE	3		DSD_DOCK	DW_510052	4	1			DSD
138	510053	CASE	3		DSD_DOCK	DW_510053	4	1			DSD
139	510138	CASE	5		DSD_DOCK	DW_510138	4	1			DSD
140	510135	CASE	5		DSD_DOCK	DW_510135	4	1			DSD

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
141	510139	CASE	5		DSD_DOCK	DW_510139	4	1			DSD
142	510136	CASE	5		DSD_DOCK	DW_510136	4	1			DSD
144	506284	CASE	12		RET_DOCK	R_506284	1	1			RETAIL
145	510141	CASE	1		RET_DOCK	RW_510141	1	1			RETAIL
146	508782	CASE	1		RET_DOCK	R_508782	1	1			RETAIL
147	513096	CASE	1		RET_DOCK	R_513096	1	1			RETAIL
148	508730	CASE	3		RET_DOCK	R_508730	1	1			RETAIL
149	511108	CASE	1		RET_DOCK	RW_511108	1	1			RETAIL
150	480077	CASE	1		RET_DOCK	R_480077	1	1			RETAIL
151	503890	CASE	1		RET_DOCK	R_503890	1	1			RETAIL
152	479006	CASE	2		RET_DOCK	R_479006	1	1			RETAIL
153	508687	CASE	1		RET_DOCK	R_508687	1	1			RETAIL
154	511309	CASE	1		RET_DOCK	RW_511309	1	1			RETAIL
155	666688	CASE	1		RET_DOCK	R_666688	1	1			RETAIL
156	511312	CASE	1		RET_DOCK	RW_511312	1	1			RETAIL
157	510646	CASE	1		RET_DOCK	RW_510646	1	1			RETAIL
158	510418	CASE	1		RET_DOCK	RW_510418	1	1			RETAIL

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
159	510419	CASE	1		RET_DOCK	RW_510419	1	1			RETAIL
160	510421	CASE	1		RET_DOCK	RW_510421	1	1			RETAIL
161	510426	CASE	2		RET_DOCK	RW_510426	1	1			RETAIL
163	509209	CASE	1		RET_DOCK	R_509209	2	1			RETAIL
164	509594	CASE	1		RET_DOCK	RW_509594	2	1			RETAIL
165	506284	CASE	5		RET_DOCK	R_506284	2	1			RETAIL
166	510138	CASE	1		RET_DOCK	RW_510138	2	1			RETAIL
167	510136	CASE	2		RET_DOCK	RW_510136	2	1			RETAIL
168	512988	CASE	1		RET_DOCK	RW_512988	2	1			RETAIL
169	500078	CASE	1		RET_DOCK	R_500078	2	1			RETAIL
170	509197	CASE	1		RET_DOCK	R_509197	2	1			RETAIL
171	509193	CASE	1		RET_DOCK	R_509193	2	1			RETAIL
172	509206	CASE	1		RET_DOCK	R_509206	2	1			RETAIL
173	509204	CASE	1		RET_DOCK	R_509204	2	1			RETAIL
174	504503	CASE	1		RET_DOCK	R_504503	2	1			RETAIL
175	513020	CASE	1		RET_DOCK	R_513020	2	1			RETAIL
176	508730	CASE	3		RET_DOCK	R_508730	2	1			RETAIL

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
177	510936	CASE	2		RET_DOCK	RW_510936	2	1			RETAIL
178	503791	CASE	1		RET_DOCK	R_503791	2	1			RETAIL
179	479006	CASE	1		RET_DOCK	R_479006	2	1			RETAIL
180	503760	CASE	1		RET_DOCK	R_503760	2	1			RETAIL
181	511312	CASE	2		RET_DOCK	RW_511312	2	1			RETAIL
183	506284	CASE	4		RET_DOCK	R_506284	3	1			RETAIL
184	473916	CASE	1		RET_DOCK	R_473916	3	1			RETAIL
185	507238	CASE	2		RET_DOCK	R_507238	3	1			RETAIL
186	509198	CASE	1		RET_DOCK	R_509198	3	1			RETAIL
187	509192	CASE	1		RET_DOCK	R_509192	3	1			RETAIL
188	410608	CASE	1		RET_DOCK	R_410608	3	1			RETAIL
189	508782	CASE	1		RET_DOCK	R_508782	3	1			RETAIL
190	511839	CASE	1		RET_DOCK	RW_511839	3	1			RETAIL
191	503791	CASE	1		RET_DOCK	R_503791	3	1			RETAIL
192	479006	CASE	3		RET_DOCK	R_479006	3	1			RETAIL
193	511309	CASE	1		RET_DOCK	RW_511309	3	1			RETAIL
194	666688	CASE	1		RET_DOCK	R_666688	3	1			RETAIL

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
196	506284	CASE	4		RET_DOCK	R_506284	4	1			RETAIL
197	513022	CASE	2		RET_DOCK	RW_513022	4	1			RETAIL
198	512728	CASE	1		RET_DOCK	RW_512728	4	1			RETAIL
199	510835	CASE	1		RET_DOCK	RW_510835	4	1			RETAIL
200	512986	CASE	1		RET_DOCK	RW_512986	4	1			RETAIL
201	506562	CASE	1		RET_DOCK	R_506562	4	1			RETAIL
202	504503	CASE	1		RET_DOCK	R_504503	4	1			RETAIL
203	508782	CASE	1		RET_DOCK	R_508782	4	1			RETAIL
204	513020	CASE	1		RET_DOCK	R_513020	4	1			RETAIL
205	513096	CASE	2		RET_DOCK	R_513096	4	1			RETAIL
206	508730	CASE	1		RET_DOCK	R_508730	4	1			RETAIL
207	511309	CASE	1		RET_DOCK	RW_511309	4	1			RETAIL
208	503760	CASE	1		RET_DOCK	R_503760	4	1			RETAIL
209	511312	CASE	2		RET_DOCK	RW_511312	4	1			RETAIL
210	510142	CASE	1		RET_DOCK	RW_510142	4	1			RETAIL
211	510422	CASE	1		RET_DOCK	RW_510422	4	1			RETAIL
212	510425	CASE	1		RET_DOCK	RW_510425	4	1			RETAIL

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
214	501919	CASE	1		WHL_DOCK	W_501919	1	1			WHOLE
215	500252	CASE	1		WHL_DOCK	W_500252	1	1			WHOLE
216	501684	CASE	1		WHL_DOCK	W_501684	1	1			WHOLE
217	501961	CASE	1		WHL_DOCK	W_501961	1	1			WHOLE
218	508737	CASE	1		WHL_DOCK	W_508737	1	1			WHOLE
219	511870	CASE	4		WHL_DOCK	W_511870	1	1			WHOLE
220	503106	CASE	1		WHL_DOCK	W_503106	1	1			WHOLE
221	509148	CASE	1		WHL_DOCK	W_509148	1	1			WHOLE
222	509145	CASE	1		WHL_DOCK	W_509145	1	1			WHOLE
223	509146	CASE	1		WHL_DOCK	W_509146	1	1			WHOLE
224	510139	CASE	1		WHL_DOCK	DW_510139	1	1			WHOLE
226	507208	CASE	2		WHL_DOCK	W_507208	2	1			WHOLE
227	501493	CASE	2		WHL_DOCK	W_501493	2	1			WHOLE
228	501627	CASE	2		WHL_DOCK	W_501627	2	1			WHOLE
229	501552	CASE	3		WHL_DOCK	W_501552	2	1			WHOLE
230	477080	CASE	1		WHL_DOCK	W_477080	2	1			WHOLE
231	510136	CASE	1		WHL_DOCK	DW_510136	2	1			WHOLE

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
232	512802	CASE	3		WHL_DOCK	W_512802	2	1			WHOLE
233	511355	CASE	1		WHL_DOCK	W_511355	2	1			WHOLE
234	503106	CASE	1		WHL_DOCK	W_503106	2	1			WHOLE
235	509148	CASE	1		WHL_DOCK	W_509148	2	1			WHOLE
236	509145	CASE	1		WHL_DOCK	W_509145	2	1			WHOLE
237	509146	CASE	1		WHL_DOCK	W_509146	2	1			WHOLE
238	509147	CASE	1		WHL_DOCK	W_509147	2	1			WHOLE
240	500252	CASE	7		WHL_DOCK	W_500252	3	1			WHOLE
241	510198	CASE	1		WHL_DOCK	RW_510198	3	1			WHOLE
242	10005	CASE	6		WHL_DOCK	W_10005	3	1			WHOLE
243	10003	CASE	6		WHL_DOCK	W_10003	3	1			WHOLE
244	10004	CASE	6		WHL_DOCK	W_10004	3	1			WHOLE
245	10001	CASE	6		WHL_DOCK	W_10001	3	1			WHOLE
246	10016	CASE	6		WHL_DOCK	W_10016	3	1			WHOLE
247	10008	CASE	6		WHL_DOCK	W_10008	3	1			WHOLE
248	503103	CASE	2		WHL_DOCK	W_503103	3	1			WHOLE
250	501919	CASE	1		WHL_DOCK	W_501919	4	1			WHOLE

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
251	501920	CASE	1		WHL_DOCK	W_501920	4	1			WHOLE
252	500252	CASE	1		WHL_DOCK	W_500252	4	1			WHOLE
253	500030	CASE	1		WHL_DOCK	W_500030	4	1			WHOLE
254	501961	CASE	1		WHL_DOCK	W_501961	4	1			WHOLE
255	477265	CASE	1		WHL_DOCK	W_477265	4	1			WHOLE
256	512986	CASE	1		WHL_DOCK	RW_512986	4	1			WHOLE
257	510140	CASE	2		WHL_DOCK	DW_510140	4	1			WHOLE
258	508730	CASE	2		WHL_DOCK	W_508730	4	1			WHOLE
259	508732	CASE	1		WHL_DOCK	W_508732	4	1			WHOLE
260	509671	CASE	2		WHL_DOCK	W_509671	4	1			WHOLE
261	476422	CASE	1		WHL_DOCK	W_476422	4	1			WHOLE
262	511043	CASE	1		WHL_DOCK	W_511043	4	1			WHOLE
263	511312	CASE	2		WHL_DOCK	RW_511312	4	1			WHOLE
264	510139	CASE	1		WHL_DOCK	DW_510139	4	1			WHOLE
266	506284	CASE	4		WHL_DOCK	W_506284	5	1			WHOLE
267	501919	CASE	1		WHL_DOCK	W_501919	5	1			WHOLE
268	501493	CASE	2		WHL_DOCK	W_501493	5	1			WHOLE

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
269	504468	CASE	2		WHL_DOCK	W_504468	5	1			WHOLE
270	501961	CASE	2		WHL_DOCK	W_501961	5	1			WHOLE
271	503565	CASE	4		WHL_DOCK	W_503565	5	1			WHOLE
272	508730	CASE	1		WHL_DOCK	W_508730	5	1			WHOLE
273	509671	CASE	1		WHL_DOCK	W_509671	5	1			WHOLE
274	508202	CASE	1		WHL_DOCK	W_508202	5	1			WHOLE
275	479006	CASE	3		WHL_DOCK	W_479006	5	1			WHOLE
276	511309	CASE	1		WHL_DOCK	RW_511309	5	1			WHOLE
277	511042	CASE	1		WHL_DOCK	W_511042	5	1			WHOLE
278	511312	CASE	1		WHL_DOCK	RW_511312	5	1			WHOLE
280	507208	CASE	2		WHL_DOCK	W_507208	6	1			WHOLE
281	501919	CASE	4		WHL_DOCK	W_501919	6	1			WHOLE
282	500228	CASE	2		WHL_DOCK	W_500228	6	1			WHOLE
283	510081	CASE	2		WHL_DOCK	W_510081	6	1			WHOLE
284	501552	CASE	2		WHL_DOCK	W_501552	6	1			WHOLE
285	503565	CASE	2		WHL_DOCK	W_503565	6	1			WHOLE
286	503793	CASE	1		WHL_DOCK	W_503793	6	1			WHOLE

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
287	503794	CASE	1		WHL_DOCK	W_503794	6	1			WHOLE
288	500037	CASE	3		WHL_DOCK	W_500037	6	1			WHOLE
289	511309	CASE	2		WHL_DOCK	RW_511309	6	1			WHOLE
290	503106	CASE	3		WHL_DOCK	W_503106	6	1			WHOLE
291	509149	CASE	3		WHL_DOCK	W_509149	6	1			WHOLE
292	503760	CASE	1		WHL_DOCK	W_503760	6	1			WHOLE
293	508730	CASE	3		WHL_DOCK	W_508730	6	1			WHOLE
294	511043	CASE	4		WHL_DOCK	W_511043	6	1			WHOLE
295	511042	CASE	2		WHL_DOCK	W_511042	6	1			WHOLE
297	506284	CASE	12		WHL_DOCK	W_506284	7	1			WHOLE
298	507208	CASE	3		WHL_DOCK	W_507208	7	1			WHOLE
299	501919	CASE	2		WHL_DOCK	W_501919	7	1			WHOLE
300	504468	CASE	3		WHL_DOCK	W_504468	7	1			WHOLE
301	477265	CASE	1		WHL_DOCK	W_477265	7	1			WHOLE
302	510136	CASE	1		WHL_DOCK	DW_510136	7	1			WHOLE
303	508709	CASE	1		WHL_DOCK	W_508709	7	1			WHOLE
304	506562	CASE	1		WHL_DOCK	W_506562	7	1			WHOLE

Table 58 Continued

ID	Part	Container	Cont. Qty	From	Stage	To	ETD	Dir	Load	Unload	Route
305	509554	CASE	1		WHL_DOCK	RW_509554	7	1			WHOLE
306	505308	CASE	1		WHL_DOCK	W_505308	7	1			WHOLE
307	511542	CASE	1		WHL_DOCK	RW_511542	7	1			WHOLE
308	506245	CASE	1		WHL_DOCK	W_506245	7	1			WHOLE
309	510130	CASE	1		WHL_DOCK	RW_510130	7	1			WHOLE
310	509671	CASE	1		WHL_DOCK	W_509671	7	1			WHOLE
311	508686	CASE	4		WHL_DOCK	W_508686	7	1			WHOLE
312	503103	CASE	1		WHL_DOCK	W_503103	7	1			WHOLE
313	508687	CASE	1		WHL_DOCK	W_508687	7	1			WHOLE
314	503893	CASE	2		WHL_DOCK	W_503893	7	1			WHOLE
315	511312	CASE	1		WHL_DOCK	RW_511312	7	1			WHOLE
316	508730	CASE	2		WHL_DOCK	W_508730	7	1			WHOLE
317	510139	CASE	1		WHL_DOCK	DW_510139	7	1			WHOLE

Table 59. Report Data Table Time Focus

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦01.0000	DSD_DOCK	DW_506952	1	942	942	None	0.012	0.086	1.968	WALKER
DSD¦01.0000	DW_506952	DW_506953	1	355	355	None	0.005	0.086	1.821	WALKER
DSD¦01.0000	DW_506953	DW_507087	1	338	338	None	0.005	0.017	0.428	WALKER
DSD¦01.0000	DW_507087	DW_509042	1	781	781	None	0.01	0.044	1.097	WALKER
DSD¦01.0000	DW_509042	DW_509046	1	141	141	None	0.002	0.017	0.383	WALKER
DSD¦01.0000	DW_509046	DW_509625	1	254	254	None	0.004	0.017	0.409	WALKER
DSD¦01.0000	DW_509625	DW_510203	1	1309	1309	None	0.017	0.017	0.664	WALKER
DSD¦01.0000	DW_510203	DW_510645	1	971	971	None	0.012	0.017	0.58	WALKER
DSD¦01.0000	DW_510645	DW_831261	1	731	731	None	0.01	0.017	0.525	WALKER
DSD¦01.0000	DW_831261	DW_835261	1	1350	1350	None	0.017	0.058	1.507	WALKER
DSD¦01.0000	DW_835261	DW_836261	1	1509	1509	None	0.019	0.044	1.264	WALKER
DSD¦01.0000	DW_836261	DW_836561	1	1577	1577	None	0.02	0.017	0.725	WALKER
DSD¦01.0000	DW_836561	DW_834161	1	1899	1899	None	0.023	0.044	1.356	WALKER
DSD¦01.0000	DW_834161	DW_832461	1	1530	1530	None	0.019	0.017	0.714	WALKER
DSD¦01.0000	DW_832461	DW_510708	1	1170	1170	None	0.015	0.017	0.626	WALKER
DSD¦01.0000	DW_510708	DW_505550	1	251	251	None	0.003	0.017	0.403	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦01.0000	DW_505550	DW_505549	1	78	78	None	0.001	0.017	0.362	WALKER
DSD¦01.0000	DW_505549	DW_505547	1	132	132	None	0.002	0.031	0.651	WALKER
DSD¦01.0000	DW_505547	DW_505546	1	73	73	None	0.001	0.044	0.915	WALKER
DSD¦01.0000	DW_505546	DW_503971	1	75	75	None	0.001	0.017	0.362	WALKER
DSD¦01.0000	DW_503971	DW_503279	1	88	88	None	0.001	0.031	0.641	WALKER
DSD¦01.0000	DW_503279	DW_100621	1	174	174	None	0.003	0.072	1.495	WALKER
DSD¦01.0000	DW_100621	DW_100411	1	130	130	None	0.002	0.031	0.652	WALKER
DSD¦01.0000	DW_100411	DW_505551	1	347	347	None	0.005	0.017	0.433	WALKER
DSD¦01.0000	DW_505551	DW_505554	1	555	555	None	0.008	0.044	1.04	WALKER
DSD¦01.0000	DW_505554	DW_506630	1	546	546	None	0.007	0.017	0.476	WALKER
DSD¦01.0000	DW_506630	DW_506632	1	370	370	None	0.005	0.017	0.436	WALKER
DSD¦01.0000	DW_506632	DSD_DOCK	1	1344	1344	None	0.017	0	0.339	WALKER
DSD¦02.0000	DSD_DOCK	DW_506953	1	1023	1023	None	0.013	0.025	0.765	WALKER
DSD¦02.0000	DW_506953	DW_505554	1	1265	1265	None	0.016	0.014	0.598	WALKER
DSD¦02.0000	DW_505554	DW_505555	1	325	325	None	0.005	0.014	0.37	WALKER
DSD¦02.0000	DW_505555	DW_506295	1	355	355	None	0.005	0.019	0.486	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦02.0000	DW_506295	DW_506296	1	333	333	None	0.005	0.011	0.316	WALKER
DSD¦02.0000	DW_506296	DW_506297	1	313	313	None	0.004	0.008	0.254	WALKER
DSD¦02.0000	DW_506297	DW_506630	1	316	316	None	0.004	0.014	0.368	WALKER
DSD¦02.0000	DW_506630	DW_505549	1	248	248	None	0.003	0.025	0.57	WALKER
DSD¦02.0000	DW_505549	DW_505548	1	68	68	None	0.001	0.014	0.302	WALKER
DSD¦02.0000	DW_505548	DW_505547	1	84	84	None	0.002	0.014	0.308	WALKER
DSD¦02.0000	DW_505547	DW_505546	1	73	73	None	0.001	0.019	0.415	WALKER
DSD¦02.0000	DW_505546	DW_503971	1	75	75	None	0.001	0.014	0.306	WALKER
DSD¦02.0000	DW_503971	DW_503278	1	127	127	None	0.002	0.019	0.428	WALKER
DSD¦02.0000	DW_503278	DW_100621	1	125	125	None	0.002	0.011	0.262	WALKER
DSD¦02.0000	DW_100621	DW_100521	1	86	86	None	0.002	0.014	0.308	WALKER
DSD¦02.0000	DW_100521	DW_510425	1	788	788	None	0.01	0.019	0.585	WALKER
DSD¦02.0000	DW_510425	DW_511068	1	361	361	None	0.005	0.014	0.375	WALKER
DSD¦02.0000	DW_511068	DW_510645	1	424	424	None	0.006	0.014	0.394	WALKER
DSD¦02.0000	DW_510645	DW_510644	1	544	544	None	0.007	0.008	0.315	WALKER
DSD¦02.0000	DW_510644	DW_510416	1	1226	1226	None	0.016	0.014	0.589	WALKER

Table 59 Continued

Aggregate Name	**From**	**To**	**Freq**	**Calc Dist/Trip (Ft)**	**Eff. Dist/Trip (Ft)**	**User Dist/Trip (Ft)**	**Total Travel Time (Hrs)**	**Total L/UL Time (Hrs)**	**Total $**	**Method Type**
DSD¦02.0000	DW_510416	DW_510417	1	314	314	None	0.004	0.014	0.367	WALKER
DSD¦02.0000	DW_510417	DW_510419	1	340	340	None	0.005	0.019	0.484	WALKER
DSD¦02.0000	DW_510419	DW_512486	1	856	856	None	0.011	0.019	0.615	WALKER
DSD¦02.0000	DW_512486	DW_512487	1	913	913	None	0.012	0.014	0.517	WALKER
DSD¦02.0000	DW_512487	DW_512485	1	916	916	None	0.012	0.019	0.629	WALKER
DSD¦02.0000	DW_512485	DW_831261	1	298	298	None	0.004	0.011	0.308	WALKER
DSD¦02.0000	DW_831261	DW_839061	1	229	229	None	0.003	0.014	0.347	WALKER
DSD¦02.0000	DW_839061	DW_836261	1	274	274	None	0.004	0.014	0.355	WALKER
DSD¦02.0000	DW_836261	DW_831661	1	209	209	None	0.003	0.019	0.45	WALKER
DSD¦02.0000	DW_831661	DW_834161	1	1501	1501	None	0.019	0.011	0.597	WALKER
DSD¦02.0000	DW_834161	DW_513504	1	1860	1860	None	0.023	0.011	0.681	WALKER
DSD¦02.0000	DW_513504	DW_510139	1	1234	1234	None	0.015	0.006	0.413	WALKER
DSD¦02.0000	DW_510139	DW_510136	1	153	153	None	0.003	0.006	0.163	WALKER
DSD¦02.0000	DW_510136	DW_510135	1	128	128	None	0.002	0.006	0.157	WALKER
DSD¦02.0000	DW_510135	DW_509871	1	266	266	None	0.004	0.014	0.356	WALKER
DSD¦02.0000	DW_509871	DW_509752	1	290	290	None	0.004	0.014	0.362	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦02.0000	DW_509752	DW_508939	1	385	385	None	0.005	0.008	0.272	WALKER
DSD¦02.0000	DW_508939	DSD_DOCK	1	939	939	None	0.012	0	0.245	WALKER
DSD¦03.0000	DSD_DOCK	DW_506950	1	591	591	None	0.008	0.008	0.326	WALKER
DSD¦03.0000	DW_506950	DW_506951	1	219	219	None	0.003	0.008	0.23	WALKER
DSD¦03.0000	DW_506951	DW_506952	1	566	566	None	0.008	0.008	0.32	WALKER
DSD¦03.0000	DW_506952	DW_506953	1	355	355	None	0.005	0.008	0.266	WALKER
DSD¦03.0000	DW_506953	DW_509046	1	782	782	None	0.01	0.011	0.431	WALKER
DSD¦03.0000	DW_509046	DW_509625	1	254	254	None	0.004	0.006	0.187	WALKER
DSD¦03.0000	DW_509625	DW_509752	1	137	137	None	0.002	0.006	0.159	WALKER
DSD¦03.0000	DW_509752	DW_510416	1	1191	1191	None	0.015	0.042	1.137	WALKER
DSD¦03.0000	DW_510416	DW_510419	1	380	380	None	0.005	0.017	0.438	WALKER
DSD¦03.0000	DW_510419	DW_510421	1	478	478	None	0.007	0.014	0.411	WALKER
DSD¦03.0000	DW_510421	DW_512486	1	504	504	None	0.007	0.008	0.306	WALKER
DSD¦03.0000	DW_512486	DW_512485	1	263	263	None	0.004	0.008	0.244	WALKER
DSD¦03.0000	DW_512485	DW_831661	1	382	382	None	0.005	0.006	0.216	WALKER
DSD¦03.0000	DW_831661	DW_831961	1	187	187	None	0.003	0.006	0.169	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦03.0000	DW_831961	DW_834161	1	1554	1554	None	0.019	0.017	0.721	WALKER
DSD¦03.0000	DW_834161	DW_836261	1	1576	1576	None	0.02	0.022	0.835	WALKER
DSD¦03.0000	DW_836261	DW_835261	1	1509	1509	None	0.019	0.014	0.653	WALKER
DSD¦03.0000	DW_835261	DW_510645	1	855	855	None	0.011	0.006	0.331	WALKER
DSD¦03.0000	DW_510645	DW_510426	1	687	687	None	0.009	0.025	0.681	WALKER
DSD¦03.0000	DW_510426	DW_510422	1	432	432	None	0.006	0.008	0.282	WALKER
DSD¦03.0000	DW_510422	DW_506632	1	410	410	None	0.006	0.006	0.221	WALKER
DSD¦03.0000	DW_506632	DW_506631	1	315	315	None	0.004	0.006	0.201	WALKER
DSD¦03.0000	DW_506631	DW_506630	1	337	337	None	0.005	0.006	0.204	WALKER
DSD¦03.0000	DW_506630	DW_505549	1	248	248	None	0.003	0.008	0.237	WALKER
DSD¦03.0000	DW_505549	DW_505546	1	167	167	None	0.002	0.014	0.324	WALKER
DSD¦03.0000	DW_505546	DW_503279	1	125	125	None	0.002	0.006	0.15	WALKER
DSD¦03.0000	DW_503279	DW_100621	1	174	174	None	0.003	0.017	0.384	WALKER
DSD¦03.0000	DW_100621	DW_100521	1	86	86	None	0.002	0.008	0.197	WALKER
DSD¦03.0000	DW_100521	DW_100411	1	90	90	None	0.001	0.006	0.141	WALKER
DSD¦03.0000	DW_100411	DW_505553	1	198	198	None	0.003	0.006	0.171	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦03.0000	DW_505553	DW_505554	1	318	318	None	0.004	0.008	0.256	WALKER
DSD¦03.0000	DW_505554	DW_506295	1	410	410	None	0.006	0.011	0.332	WALKER
DSD¦03.0000	DW_506295	DSD_DOCK	1	1108	1108	None	0.014	0	0.283	WALKER
DSD¦04.0000	DSD_DOCK	DW_509046	1	1031	1031	None	0.013	0.017	0.6	WALKER
DSD¦04.0000	DW_509046	DW_509752	1	293	293	None	0.004	0.017	0.418	WALKER
DSD¦04.0000	DW_509752	DW_509753	1	127	127	None	0.002	0.017	0.379	WALKER
DSD¦04.0000	DW_509753	DW_509871	1	239	239	None	0.004	0.017	0.405	WALKER
DSD¦04.0000	DW_509871	DW_510052	1	108	108	None	0.002	0.011	0.264	WALKER
DSD¦04.0000	DW_510052	DW_510053	1	108	108	None	0.002	0.011	0.264	WALKER
DSD¦04.0000	DW_510053	DW_510135	1	174	174	None	0.003	0.017	0.39	WALKER
DSD¦04.0000	DW_510135	DW_510136	1	128	128	None	0.002	0.017	0.38	WALKER
DSD¦04.0000	DW_510136	DW_510138	1	129	129	None	0.002	0.017	0.38	WALKER
DSD¦04.0000	DW_510138	DW_510139	1	104	104	None	0.002	0.017	0.374	WALKER
DSD¦04.0000	DW_510139	DW_512486	1	848	848	None	0.011	0.017	0.557	WALKER
DSD¦04.0000	DW_512486	DW_512487	1	913	913	None	0.012	0.017	0.572	WALKER
DSD¦04.0000	DW_512487	DW_512485	1	916	916	None	0.012	0.025	0.74	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦04.0000	DW_512485	DW_512730	1	232	232	None	0.004	0.017	0.404	WALKER
DSD¦04.0000	DW_512730	DW_831261	1	396	396	None	0.005	0.031	0.719	WALKER
DSD¦04.0000	DW_831261	DW_839061	1	229	229	None	0.003	0.031	0.681	WALKER
DSD¦04.0000	DW_839061	DW_835261	1	1407	1407	None	0.018	0.044	1.242	WALKER
DSD¦04.0000	DW_835261	DW_836261	1	1509	1509	None	0.019	0.042	1.209	WALKER
DSD¦04.0000	DW_836261	DW_836561	1	1577	1577	None	0.02	0.017	0.725	WALKER
DSD¦04.0000	DW_836561	DW_831661	1	1502	1502	None	0.019	0.017	0.709	WALKER
DSD¦04.0000	DW_831661	DW_832461	1	237	237	None	0.004	0.031	0.683	WALKER
DSD¦04.0000	DW_832461	DW_511873	1	1830	1830	None	0.022	0.044	1.339	WALKER
DSD¦04.0000	DW_511873	W_513009	1	2110	2110	None	0.026	0.044	1.405	WALKER
DSD¦04.0000	W_513009	DW_510645	1	1670	1670	None	0.02	0.031	1.02	WALKER
DSD¦04.0000	DW_510645	DW_511068	1	424	424	None	0.006	0.017	0.45	WALKER
DSD¦04.0000	DW_511068	DW_510708	1	166	166	None	0.002	0.017	0.381	WALKER
DSD¦04.0000	DW_510708	DW_510706	1	137	137	None	0.002	0.017	0.376	WALKER
DSD¦04.0000	DW_510706	DW_505549	1	196	196	None	0.003	0.017	0.39	WALKER
DSD¦04.0000	DW_505549	DW_505548	1	68	68	None	0.001	0.031	0.635	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
DSD¦04.0000	DW_505548	DW_505547	1	84	84	None	0.002	0.031	0.641	WALKER
DSD¦04.0000	DW_505547	DW_505546	1	73	73	None	0.001	0.072	1.471	WALKER
DSD¦04.0000	DW_505546	DW_503971	1	75	75	None	0.001	0.031	0.639	WALKER
DSD¦04.0000	DW_503971	DW_503278	1	127	127	None	0.002	0.031	0.65	WALKER
DSD¦04.0000	DW_503278	DW_100521	1	173	173	None	0.003	0.044	0.94	WALKER
DSD¦04.0000	DW_100521	DW_505554	1	202	202	None	0.003	0.031	0.671	WALKER
DSD¦04.0000	DW_505554	DW_505555	1	325	325	None	0.005	0.017	0.425	WALKER
DSD¦04.0000	DW_505555	DW_505638	1	314	314	None	0.004	0.011	0.31	WALKER
DSD¦04.0000	DW_505638	DW_506295	1	311	311	None	0.004	0.058	1.254	WALKER
DSD¦04.0000	DW_506295	DW_506296	1	333	333	None	0.005	0.031	0.705	WALKER
DSD¦04.0000	DW_506296	DW_506297	1	313	313	None	0.004	0.031	0.699	WALKER
DSD¦04.0000	DW_506297	DW_506632	1	416	416	None	0.006	0.017	0.446	WALKER
DSD¦04.0000	DW_506632	DW_507087	1	1705	1705	None	0.021	0.017	0.756	WALKER
DSD¦04.0000	DW_507087	DSD_DOCK	1	1087	1087	None	0.014	0	0.279	WALKER
RETAIL¦01.0000	RET_DOCK	R_480077	1	644	644	None	0.009	0.006	0.288	WALKER
RETAIL¦01.0000	R_480077	RW_510419	1	1316	1316	None	0.017	0.006	0.444	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
RETAIL¦01.0000	RW_510419	RW_510421	1	198	198	None	0.003	0.006	0.174	WALKER
RETAIL¦01.0000	RW_510421	RW_510426	1	361	361	None	0.005	0.008	0.267	WALKER
RETAIL¦01.0000	RW_510426	RW_511108	1	246	246	None	0.004	0.006	0.185	WALKER
RETAIL¦01.0000	RW_511108	RW_511309	1	288	288	None	0.004	0.006	0.194	WALKER
RETAIL¦01.0000	RW_511309	RW_511312	1	186	186	None	0.003	0.006	0.171	WALKER
RETAIL¦01.0000	RW_511312	RW_510141	1	640	640	None	0.009	0.006	0.281	WALKER
RETAIL¦01.0000	RW_510141	RW_510646	1	1764	1764	None	0.022	0.006	0.542	WALKER
RETAIL¦01.0000	RW_510646	RW_510418	1	2612	2612	None	0.032	0.006	0.744	WALKER
RETAIL¦01.0000	RW_510418	R_508782	1	2127	2127	None	0.026	0.006	0.631	WALKER
RETAIL¦01.0000	R_508782	R_508730	1	123	123	None	0.002	0.011	0.267	WALKER
RETAIL¦01.0000	R_508730	R_508687	1	114	114	None	0.002	0.006	0.154	WALKER
RETAIL¦01.0000	R_508687	R_666688	1	2068	2068	None	0.025	0.006	0.618	WALKER
RETAIL¦01.0000	R_666688	R_479006	1	818	818	None	0.011	0.008	0.378	WALKER
RETAIL¦01.0000	R_479006	R_503890	1	1113	1113	None	0.014	0.006	0.391	WALKER
RETAIL¦01.0000	R_503890	R_506284	1	1223	1223	None	0.016	0.036	1.033	WALKER
RETAIL¦01.0000	R_506284	R_513096	1	277	277	None	0.004	0.006	0.192	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
RETAIL¦01.0000	R_513096	RET_DOCK	1	938	938	None	0.012	0	0.245	WALKER
RETAIL¦02.0000	RET_DOCK	R_509197	1	736	736	None	0.01	0.006	0.309	WALKER
RETAIL¦02.0000	R_509197	R_509193	1	110	110	None	0.002	0.006	0.148	WALKER
RETAIL¦02.0000	R_509193	R_504503	1	86	86	None	0.002	0.006	0.145	WALKER
RETAIL¦02.0000	R_504503	R_513020	1	767	767	None	0.01	0.006	0.316	WALKER
RETAIL¦02.0000	R_513020	R_503791	1	253	253	None	0.004	0.006	0.186	WALKER
RETAIL¦02.0000	R_503791	R_506284	1	1201	1201	None	0.015	0.017	0.639	WALKER
RETAIL¦02.0000	R_506284	R_509206	1	1500	1500	None	0.019	0.006	0.486	WALKER
RETAIL¦02.0000	R_509206	R_509209	1	184	184	None	0.003	0.006	0.17	WALKER
RETAIL¦02.0000	R_509209	R_503760	1	697	697	None	0.009	0.006	0.3	WALKER
RETAIL¦02.0000	R_503760	R_500078	1	445	445	None	0.006	0.006	0.236	WALKER
RETAIL¦02.0000	R_500078	R_479006	1	282	282	None	0.004	0.006	0.193	WALKER
RETAIL¦02.0000	R_479006	R_509204	1	869	869	None	0.011	0.006	0.334	WALKER
RETAIL¦02.0000	R_509204	R_508730	1	2153	2153	None	0.026	0.011	0.748	WALKER
RETAIL¦02.0000	R_508730	RW_509594	1	1938	1938	None	0.024	0.006	0.587	WALKER
RETAIL¦02.0000	RW_509594	RW_512988	1	3091	3091	None	0.037	0.006	0.854	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
RETAIL¦02.0000	RW_512988	RW_510138	1	1352	1352	None	0.017	0.006	0.452	WALKER
RETAIL¦02.0000	RW_510138	RW_510136	1	210	210	None	0.003	0.008	0.232	WALKER
RETAIL¦02.0000	RW_510136	RW_511312	1	969	969	None	0.013	0.008	0.419	WALKER
RETAIL¦02.0000	RW_511312	RW_510936	1	356	356	None	0.005	0.008	0.266	WALKER
RETAIL¦02.0000	RW_510936	RET_DOCK	1	1973	1973	None	0.024	0	0.484	WALKER
RETAIL¦03.0000	RET_DOCK	RW_511309	1	2147	2147	None	0.026	0.006	0.636	WALKER
RETAIL¦03.0000	RW_511309	RW_511839	1	1430	1430	None	0.018	0.006	0.47	WALKER
RETAIL¦03.0000	RW_511839	R_410608	1	2005	2005	None	0.025	0.006	0.603	WALKER
RETAIL¦03.0000	R_410608	R_473916	1	997	997	None	0.013	0.006	0.37	WALKER
RETAIL¦03.0000	R_473916	R_507238	1	136	136	None	0.002	0.008	0.215	WALKER
RETAIL¦03.0000	R_507238	R_508782	1	269	269	None	0.004	0.006	0.19	WALKER
RETAIL¦03.0000	R_508782	R_666688	1	2145	2145	None	0.026	0.006	0.635	WALKER
RETAIL¦03.0000	R_666688	R_479006	1	818	818	None	0.011	0.011	0.434	WALKER
RETAIL¦03.0000	R_479006	R_509198	1	346	346	None	0.005	0.006	0.213	WALKER
RETAIL¦03.0000	R_509198	R_503791	1	1233	1233	None	0.016	0.006	0.424	WALKER
RETAIL¦03.0000	R_503791	R_506284	1	1201	1201	None	0.015	0.014	0.584	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
RETAIL¦03.0000	R_506284	R_509192	1	931	931	None	0.012	0.006	0.354	WALKER
RETAIL¦03.0000	R_509192	RET_DOCK	1	544	544	None	0.007	0	0.143	WALKER
RETAIL¦04.0000	RET_DOCK	R_504503	1	712	712	None	0.01	0.006	0.304	WALKER
RETAIL¦04.0000	R_504503	R_513020	1	767	767	None	0.01	0.006	0.316	WALKER
RETAIL¦04.0000	R_513020	R_513096	1	993	993	None	0.013	0.008	0.424	WALKER
RETAIL¦04.0000	R_513096	R_506284	1	277	277	None	0.004	0.014	0.359	WALKER
RETAIL¦04.0000	R_506284	R_503760	1	1289	1289	None	0.016	0.006	0.437	WALKER
RETAIL¦04.0000	R_503760	R_506562	1	744	744	None	0.009	0.006	0.3	WALKER
RETAIL¦04.0000	R_506562	R_508730	1	251	251	None	0.004	0.006	0.186	WALKER
RETAIL¦04.0000	R_508730	R_508782	1	123	123	None	0.002	0.006	0.156	WALKER
RETAIL¦04.0000	R_508782	RW_510835	1	2730	2730	None	0.033	0.006	0.771	WALKER
RETAIL¦04.0000	RW_510835	RW_512986	1	2703	2703	None	0.033	0.006	0.765	WALKER
RETAIL¦04.0000	RW_512986	RW_511312	1	1710	1710	None	0.021	0.008	0.59	WALKER
RETAIL¦04.0000	RW_511312	RW_511309	1	186	186	None	0.003	0.006	0.171	WALKER
RETAIL¦04.0000	RW_511309	RW_510425	1	430	430	None	0.006	0.006	0.227	WALKER
RETAIL¦04.0000	RW_510425	RW_510422	1	264	264	None	0.004	0.006	0.187	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
RETAIL¦04.0000	RW_510422	RW_512728	1	865	865	None	0.011	0.006	0.339	WALKER
RETAIL¦04.0000	RW_512728	RW_513022	1	887	887	None	0.012	0.008	0.398	WALKER
RETAIL¦04.0000	RW_513022	RW_510142	1	1042	1042	None	0.013	0.006	0.379	WALKER
RETAIL¦04.0000	RW_510142	RET_DOCK	1	1101	1101	None	0.014	0	0.283	WALKER
WHOLE¦01.0000	WHL_DOCK	W_509148	1	523	523	None	0.007	0.004	0.229	WALKER
WHOLE¦01.0000	W_509148	W_501684	1	922	922	None	0.012	0.004	0.325	WALKER
WHOLE¦01.0000	W_501684	W_501919	1	181	181	None	0.003	0.004	0.142	WALKER
WHOLE¦01.0000	W_501919	W_509145	1	206	206	None	0.003	0.004	0.148	WALKER
WHOLE¦01.0000	W_509145	W_501961	1	1354	1354	None	0.017	0.004	0.425	WALKER
WHOLE¦01.0000	W_501961	W_508737	1	1637	1637	None	0.02	0.004	0.49	WALKER
WHOLE¦01.0000	W_508737	DW_510139	1	2165	2165	None	0.026	0.004	0.612	WALKER
WHOLE¦01.0000	DW_510139	W_503106	1	1283	1283	None	0.016	0.004	0.408	WALKER
WHOLE¦01.0000	W_503106	W_509146	1	1258	1258	None	0.016	0.004	0.402	WALKER
WHOLE¦01.0000	W_509146	W_511870	1	1004	1004	None	0.013	0.004	0.342	WALKER
WHOLE¦01.0000	W_511870	W_500252	1	198	198	None	0.003	0.004	0.144	WALKER
WHOLE¦01.0000	W_500252	WHL_DOCK	1	577	577	None	0.008	0	0.158	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
WHOLE¦02.0000	WHL_DOCK	W_511355	1	553	553	None	0.008	0.004	0.234	WALKER
WHOLE¦02.0000	W_511355	W_512802	1	403	403	None	0.005	0.004	0.192	WALKER
WHOLE¦02.0000	W_512802	W_509146	1	1163	1163	None	0.015	0.004	0.379	WALKER
WHOLE¦02.0000	W_509146	W_509145	1	295	295	None	0.004	0.004	0.168	WALKER
WHOLE¦02.0000	W_509145	W_503106	1	1377	1377	None	0.017	0.004	0.43	WALKER
WHOLE¦02.0000	W_503106	DW_510136	1	1360	1360	None	0.017	0.004	0.426	WALKER
WHOLE¦02.0000	DW_510136	W_477080	1	583	583	None	0.008	0.004	0.241	WALKER
WHOLE¦02.0000	W_477080	W_501627	1	1629	1629	None	0.02	0.004	0.483	WALKER
WHOLE¦02.0000	W_501627	W_501552	1	273	273	None	0.004	0.004	0.163	WALKER
WHOLE¦02.0000	W_501552	W_501493	1	253	253	None	0.004	0.004	0.157	WALKER
WHOLE¦02.0000	W_501493	W_507208	1	168	168	None	0.003	0.004	0.136	WALKER
WHOLE¦02.0000	W_507208	W_509148	1	826	826	None	0.011	0.004	0.301	WALKER
WHOLE¦02.0000	W_509148	W_509147	1	193	193	None	0.003	0.004	0.145	WALKER
WHOLE¦02.0000	W_509147	WHL_DOCK	1	494	494	None	0.007	0	0.139	WALKER
WHOLE¦03.0000	WHL_DOCK	W_500252	1	577	577	None	0.008	0.004	0.242	WALKER
WHOLE¦03.0000	W_500252	W_503103	1	1256	1256	None	0.016	0.004	0.402	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
WHOLE¦03.0000	W_503103	W_10016	1	839	839	None	0.011	0.004	0.3	WALKER
WHOLE¦03.0000	W_10016	W_10004	1	311	311	None	0.004	0.004	0.171	WALKER
WHOLE¦03.0000	W_10004	W_10005	1	159	159	None	0.003	0.004	0.134	WALKER
WHOLE¦03.0000	W_10005	W_10008	1	424	424	None	0.006	0.004	0.201	WALKER
WHOLE¦03.0000	W_10008	W_10003	1	179	179	None	0.003	0.004	0.139	WALKER
WHOLE¦03.0000	W_10003	W_10001	1	196	196	None	0.003	0.004	0.145	WALKER
WHOLE¦03.0000	W_10001	RW_510198	1	2099	2099	None	0.026	0.004	0.597	WALKER
WHOLE¦03.0000	RW_510198	WHL_DOCK	1	1628	1628	None	0.02	0	0.402	WALKER
WHOLE¦04.0000	WHL_DOCK	W_511043	1	409	409	None	0.005	0.004	0.19	WALKER
WHOLE¦04.0000	W_511043	W_500252	1	804	804	None	0.011	0.004	0.295	WALKER
WHOLE¦04.0000	W_500252	W_501920	1	360	360	None	0.005	0.004	0.183	WALKER
WHOLE¦04.0000	W_501920	W_501919	1	1217	1217	None	0.015	0.004	0.393	WALKER
WHOLE¦04.0000	W_501919	W_508730	1	1596	1596	None	0.02	0.004	0.481	WALKER
WHOLE¦04.0000	W_508730	W_477265	1	1118	1118	None	0.014	0.004	0.37	WALKER
WHOLE¦04.0000	W_477265	W_476422	1	199	199	None	0.003	0.004	0.143	WALKER
WHOLE¦04.0000	W_476422	W_500030	1	264	264	None	0.004	0.004	0.16	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
WHOLE¦04.0000	W_500030	DW_510139	1	1135	1135	None	0.014	0.004	0.372	WALKER
WHOLE¦04.0000	DW_510139	DW_510140	1	1257	1257	None	0.016	0.004	0.402	WALKER
WHOLE¦04.0000	DW_510140	W_508732	1	2336	2336	None	0.028	0.004	0.652	WALKER
WHOLE¦04.0000	W_508732	W_501961	1	1307	1307	None	0.017	0.004	0.414	WALKER
WHOLE¦04.0000	W_501961	RW_512986	1	1526	1526	None	0.019	0.004	0.464	WALKER
WHOLE¦04.0000	RW_512986	RW_511312	1	1710	1710	None	0.021	0.004	0.507	WALKER
WHOLE¦04.0000	RW_511312	W_509671	1	1796	1796	None	0.022	0.004	0.527	WALKER
WHOLE¦04.0000	W_509671	WHL_DOCK	1	624	624	None	0.008	0	0.169	WALKER
WHOLE¦05.0000	WHL_DOCK	W_503565	1	386	386	None	0.005	0.004	0.185	WALKER
WHOLE¦05.0000	W_503565	W_504468	1	176	176	None	0.003	0.004	0.139	WALKER
WHOLE¦05.0000	W_504468	W_501919	1	328	328	None	0.005	0.004	0.176	WALKER
WHOLE¦05.0000	W_501919	W_511042	1	1353	1353	None	0.017	0.004	0.423	WALKER
WHOLE¦05.0000	W_511042	W_479006	1	1123	1123	None	0.014	0.004	0.371	WALKER
WHOLE¦05.0000	W_479006	W_508202	1	1131	1131	None	0.014	0.004	0.362	WALKER
WHOLE¦05.0000	W_508202	W_501961	1	1581	1581	None	0.02	0.004	0.477	WALKER
WHOLE¦05.0000	W_501961	W_508730	1	1106	1106	None	0.014	0.004	0.367	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
WHOLE¦05.0000	W_508730	RW_511312	1	1290	1290	None	0.016	0.004	0.41	WALKER
WHOLE¦05.0000	RW_511312	RW_511309	1	186	186	None	0.003	0.004	0.143	WALKER
WHOLE¦05.0000	RW_511309	W_501493	1	1603	1603	None	0.02	0.004	0.482	WALKER
WHOLE¦05.0000	W_501493	W_509671	1	929	929	None	0.012	0.004	0.326	WALKER
WHOLE¦05.0000	W_509671	W_506284	1	1067	1067	None	0.014	0.004	0.358	WALKER
WHOLE¦05.0000	W_506284	WHL_DOCK	1	625	625	None	0.008	0	0.169	WALKER
WHOLE¦06.0000	WHL_DOCK	W_503565	1	386	386	None	0.005	0.004	0.185	WALKER
WHOLE¦06.0000	W_503565	W_511043	1	151	151	None	0.002	0.004	0.131	WALKER
WHOLE¦06.0000	W_511043	W_500228	1	766	766	None	0.01	0.004	0.287	WALKER
WHOLE¦06.0000	W_500228	W_503106	1	504	504	None	0.007	0.004	0.215	WALKER
WHOLE¦06.0000	W_503106	W_501919	1	1309	1309	None	0.017	0.004	0.414	WALKER
WHOLE¦06.0000	W_501919	W_511042	1	1353	1353	None	0.017	0.004	0.423	WALKER
WHOLE¦06.0000	W_511042	W_503760	1	187	187	None	0.003	0.004	0.14	WALKER
WHOLE¦06.0000	W_503760	W_503794	1	194	194	None	0.003	0.004	0.143	WALKER
WHOLE¦06.0000	W_503794	W_501552	1	1302	1302	None	0.016	0.004	0.412	WALKER
WHOLE¦06.0000	W_501552	W_510081	1	1043	1043	None	0.013	0.004	0.353	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
WHOLE¦06.0000	W_510081	W_507208	1	958	958	None	0.012	0.004	0.331	WALKER
WHOLE¦06.0000	W_507208	W_503793	1	340	340	None	0.005	0.004	0.179	WALKER
WHOLE¦06.0000	W_503793	RW_511309	1	1521	1521	None	0.019	0.004	0.463	WALKER
WHOLE¦06.0000	RW_511309	W_508730	1	1330	1330	None	0.017	0.004	0.419	WALKER
WHOLE¦06.0000	W_508730	W_509149	1	1237	1237	None	0.016	0.004	0.396	WALKER
WHOLE¦06.0000	W_509149	W_500037	1	172	172	None	0.003	0.004	0.137	WALKER
WHOLE¦06.0000	W_500037	WHL_DOCK	1	1013	1013	None	0.012	0	0.247	WALKER
WHOLE¦07.0000	WHL_DOCK	W_508686	1	402	402	None	0.005	0.004	0.19	WALKER
WHOLE¦07.0000	W_508686	W_504468	1	202	202	None	0.003	0.004	0.145	WALKER
WHOLE¦07.0000	W_504468	W_503103	1	1113	1113	None	0.014	0.004	0.369	WALKER
WHOLE¦07.0000	W_503103	W_507208	1	1164	1164	None	0.015	0.004	0.379	WALKER
WHOLE¦07.0000	W_507208	W_506562	1	149	149	None	0.002	0.004	0.132	WALKER
WHOLE¦07.0000	W_506562	W_506245	1	205	205	None	0.003	0.004	0.146	WALKER
WHOLE¦07.0000	W_506245	W_509671	1	849	849	None	0.011	0.004	0.308	WALKER
WHOLE¦07.0000	W_509671	W_505308	1	250	250	None	0.004	0.004	0.158	WALKER
WHOLE¦07.0000	W_505308	W_508709	1	183	183	None	0.003	0.004	0.142	WALKER

Table 59 Continued

Aggregate Name	From	To	Freq	Calc Dist/Trip (Ft)	Eff. Dist/Trip (Ft)	User Dist/Trip (Ft)	Total Travel Time (Hrs)	Total L/UL Time (Hrs)	Total $	Method Type
WHOLE¦07.0000	W_508709	W_501919	1	1195	1195	None	0.015	0.004	0.388	WALKER
WHOLE¦07.0000	W_501919	W_503893	1	1393	1393	None	0.018	0.004	0.434	WALKER
WHOLE¦07.0000	W_503893	W_477265	1	1117	1117	None	0.014	0.004	0.37	WALKER
WHOLE¦07.0000	W_477265	W_508730	1	1118	1118	None	0.014	0.004	0.37	WALKER
WHOLE¦07.0000	W_508730	W_508687	1	271	271	None	0.004	0.004	0.163	WALKER
WHOLE¦07.0000	W_508687	RW_509554	1	1215	1215	None	0.015	0.004	0.392	WALKER
WHOLE¦07.0000	RW_509554	RW_511312	1	1168	1168	None	0.015	0.004	0.381	WALKER
WHOLE¦07.0000	RW_511312	RW_511542	1	381	381	None	0.005	0.004	0.188	WALKER
WHOLE¦07.0000	RW_511542	RW_510130	1	1411	1411	None	0.018	0.004	0.438	WALKER
WHOLE¦07.0000	RW_510130	DW_510139	1	2422	2422	None	0.029	0.004	0.672	WALKER
WHOLE¦07.0000	DW_510139	DW_510136	1	153	153	None	0.003	0.004	0.135	WALKER
WHOLE¦07.0000	DW_510136	W_506284	1	1614	1614	None	0.02	0.004	0.483	WALKER
WHOLE¦07.0000	W_506284	WHL_DOCK	1	625	625	None	0.008	0	0.169	WALKER

Table 60. Advanced Report Aggregated by Product

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
DSD¦01.0000	DSD_DOCK	DW_506952	1	78.50	44.25	310	354.25	1.97
DSD¦01.0000	DW_506952	DW_506953	1	29.58	17.79	310	327.79	1.82
DSD¦01.0000	DW_506953	DW_507087	1	28.17	17.08	60	77.08	0.43
DSD¦01.0000	DW_507087	DW_509042	1	65.08	37.54	160	197.54	1.1
DSD¦01.0000	DW_509042	DW_509046	1	11.75	8.88	60	68.88	0.38
DSD¦01.0000	DW_509046	DW_509625	1	21.17	13.58	60	73.58	0.41
DSD¦01.0000	DW_509625	DW_510203	1	109.08	59.54	60	119.54	0.66
DSD¦01.0000	DW_510203	DW_510645	1	80.92	44.46	60	104.46	0.58
DSD¦01.0000	DW_510645	DW_831261	1	60.92	34.46	60	94.46	0.52
DSD¦01.0000	DW_831261	DW_835261	1	112.50	61.25	210	271.25	1.51
DSD¦01.0000	DW_835261	DW_836261	1	125.75	67.58	160	227.58	1.26
DSD¦01.0000	DW_836261	DW_836561	1	131.42	70.41	60	130.41	0.72
DSD¦01.0000	DW_836561	DW_834161	1	158.25	84.13	160	244.13	1.36
DSD¦01.0000	DW_834161	DW_832461	1	127.50	68.49	60	128.49	0.71
DSD¦01.0000	DW_832461	DW_510708	1	97.50	52.73	60	112.73	0.63
DSD¦01.0000	DW_510708	DW_505550	1	20.92	12.45	60	72.45	0.4

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
DSD¦01.0000	DW_505550	DW_505549	1	6.50	5.24	60	65.24	0.36
DSD¦01.0000	DW_505549	DW_505547	1	11.00	7.21	110	117.21	0.65
DSD¦01.0000	DW_505547	DW_505546	1	6.08	4.71	160	164.71	0.92
DSD¦01.0000	DW_505546	DW_503971	1	6.25	5.09	60	65.09	0.36
DSD¦01.0000	DW_503971	DW_503279	1	7.33	5.34	110	115.34	0.64
DSD¦01.0000	DW_503279	DW_100621	1	14.50	9.18	260	269.18	1.5
DSD¦01.0000	DW_100621	DW_100411	1	10.83	7.35	110	117.35	0.65
DSD¦01.0000	DW_100411	DW_505551	1	28.92	17.92	60	77.92	0.43
DSD¦01.0000	DW_505551	DW_505554	1	46.25	27.13	160	187.13	1.04
DSD¦01.0000	DW_505554	DW_506630	1	45.50	25.75	60	85.75	0.48
DSD¦01.0000	DW_506630	DW_506632	1	30.83	18.42	60	78.42	0.44
DSD¦01.0000	DW_506632	DSD_DOCK	1	112.00	61	0	61	0.34
SUB TOTAL			**28**	**1,585.00**	**888.96**	**3,120.00**	**4,008.96**	**22.27**

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
DSD¦02.0000	DSD_DOCK	DW_506953	1	85.25	47.63	90	137.63	0.76
DSD¦02.0000	DW_506953	DW_505554	1	105.42	57.71	50	107.71	0.6
DSD¦02.0000	DW_505554	DW_505555	1	27.08	16.54	50	66.54	0.37
DSD¦02.0000	DW_505555	DW_506295	1	29.58	17.53	70	87.53	0.49
DSD¦02.0000	DW_506295	DW_506296	1	27.75	16.88	40	56.88	0.32
DSD¦02.0000	DW_506296	DW_506297	1	26.08	15.75	30	45.75	0.25
DSD¦02.0000	DW_506297	DW_506630	1	26.33	16.17	50	66.17	0.37
DSD¦02.0000	DW_506630	DW_505549	1	20.67	12.58	90	102.58	0.57
DSD¦02.0000	DW_505549	DW_505548	1	5.67	4.32	50	54.32	0.3
DSD¦02.0000	DW_505548	DW_505547	1	7.00	5.46	50	55.46	0.31
DSD¦02.0000	DW_505547	DW_505546	1	6.08	4.71	70	74.71	0.42
DSD¦02.0000	DW_505546	DW_503971	1	6.25	5.09	50	55.09	0.31
DSD¦02.0000	DW_503971	DW_503278	1	10.58	7	70	77	0.43
DSD¦02.0000	DW_503278	DW_100621	1	10.42	7.17	40	47.17	0.26
DSD¦02.0000	DW_100621	DW_100521	1	7.17	5.48	50	55.48	0.31
DSD¦02.0000	DW_100521	DW_510425	1	65.67	35.26	70	105.26	0.58

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
DSD¦02.0000	DW_510425	DW_511068	1	30.08	17.54	50	67.54	0.38
DSD¦02.0000	DW_511068	DW_510645	1	35.33	20.91	50	70.91	0.39
DSD¦02.0000	DW_510645	DW_510644	1	45.33	26.67	30	56.67	0.31
DSD¦02.0000	DW_510644	DW_510416	1	102.17	56.08	50	106.08	0.59
DSD¦02.0000	DW_510416	DW_510417	1	26.17	16.08	50	66.08	0.37
DSD¦02.0000	DW_510417	DW_510419	1	28.33	17.17	70	87.17	0.48
DSD¦02.0000	DW_510419	DW_512486	1	71.33	40.67	70	110.67	0.61
DSD¦02.0000	DW_512486	DW_512487	1	76.08	43.04	50	93.04	0.52
DSD¦02.0000	DW_512487	DW_512485	1	76.33	43.17	70	113.17	0.63
DSD¦02.0000	DW_512485	DW_831261	1	24.83	15.42	40	55.42	0.31
DSD¦02.0000	DW_831261	DW_839061	1	19.08	12.54	50	62.54	0.35
DSD¦02.0000	DW_839061	DW_836261	1	22.83	13.86	50	63.86	0.35
DSD¦02.0000	DW_836261	DW_831661	1	17.42	11.03	70	81.03	0.45
DSD¦02.0000	DW_831661	DW_834161	1	125.08	67.54	40	107.54	0.6
DSD¦02.0000	DW_834161	DW_513504	1	155.00	82.5	40	122.5	0.68
DSD¦02.0000	DW_513504	DW_510139	1	102.83	54.42	20	74.42	0.41

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
DSD¦02.0000	DW_510139	DW_510136	1	12.75	9.38	20	29.38	0.16
DSD¦02.0000	DW_510136	DW_510135	1	10.67	8.33	20	28.33	0.16
DSD¦02.0000	DW_510135	DW_509871	1	22.17	14.08	50	64.08	0.36
DSD¦02.0000	DW_509871	DW_509752	1	24.17	15.08	50	65.08	0.36
DSD¦02.0000	DW_509752	DW_508939	1	32.08	19.04	30	49.04	0.27
DSD¦02.0000	DW_508939	DSD_DOCK	1	78.25	44.13	0	44.13	0.25
SUB TOTAL			**38**	**1,605.31**	**923.96**	**1,890.00**	**2,813.96**	**15.64**

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
DSD¦03.0000	DSD_DOCK	DW_506950	1	49.25	28.63	30	58.63	0.33
DSD¦03.0000	DW_506950	DW_506951	1	18.25	11.45	30	41.45	0.23
DSD¦03.0000	DW_506951	DW_506952	1	47.17	27.58	30	57.58	0.32
DSD¦03.0000	DW_506952	DW_506953	1	29.58	17.79	30	47.79	0.27
DSD¦03.0000	DW_506953	DW_509046	1	65.17	37.58	40	77.58	0.43
DSD¦03.0000	DW_509046	DW_509625	1	21.17	13.58	20	33.58	0.19
DSD¦03.0000	DW_509625	DW_509752	1	11.42	8.71	20	28.71	0.16
DSD¦03.0000	DW_509752	DW_510416	1	99.25	54.63	150	204.63	1.14
DSD¦03.0000	DW_510416	DW_510419	1	31.67	18.83	60	78.83	0.44
DSD¦03.0000	DW_510419	DW_510421	1	39.83	23.92	50	73.92	0.41
DSD¦03.0000	DW_510421	DW_512486	1	42.00	25	30	55	0.31
DSD¦03.0000	DW_512486	DW_512485	1	21.92	13.96	30	43.96	0.24
DSD¦03.0000	DW_512485	DW_831661	1	31.83	18.92	20	38.92	0.22
DSD¦03.0000	DW_831661	DW_831961	1	15.58	10.5	20	30.5	0.17
DSD¦03.0000	DW_831961	DW_834161	1	129.50	69.75	60	129.75	0.72
DSD¦03.0000	DW_834161	DW_836261	1	131.33	70.37	80	150.37	0.84

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
DSD¦03.0000	DW_836261	DW_835261	1	125.75	67.58	50	117.58	0.65
DSD¦03.0000	DW_835261	DW_510645	1	71.25	39.63	20	59.63	0.33
DSD¦03.0000	DW_510645	DW_510426	1	57.25	32.63	90	122.63	0.68
DSD¦03.0000	DW_510426	DW_510422	1	36.00	20.75	30	50.75	0.28
DSD¦03.0000	DW_510422	DW_506632	1	34.17	19.83	20	39.83	0.22
DSD¦03.0000	DW_506632	DW_506631	1	26.25	16.13	20	36.13	0.2
DSD¦03.0000	DW_506631	DW_506630	1	28.08	16.79	20	36.79	0.2
DSD¦03.0000	DW_506630	DW_505549	1	20.67	12.58	30	42.58	0.24
DSD¦03.0000	DW_505549	DW_505546	1	13.92	8.4	50	58.4	0.32
DSD¦03.0000	DW_505546	DW_503279	1	10.42	6.91	20	26.91	0.15
DSD¦03.0000	DW_503279	DW_100621	1	14.50	9.18	60	69.18	0.38
DSD¦03.0000	DW_100621	DW_100521	1	7.17	5.48	30	35.48	0.2
DSD¦03.0000	DW_100521	DW_100411	1	7.50	5.38	20	25.38	0.14
DSD¦03.0000	DW_100411	DW_505553	1	16.50	10.72	20	30.72	0.17
DSD¦03.0000	DW_505553	DW_505554	1	26.50	15.99	30	45.99	0.26
DSD¦03.0000	DW_505554	DW_506295	1	34.17	19.82	40	59.82	0.33

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
DSD¦03.0000	DW_506295	DSD_DOCK	1	92.33	50.91	0	50.91	0.28
SUB TOTAL			**33**	**1,407.35**	**809.91**	**1,250.00**	**2,059.91**	**11.45**

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
DSD¦04.0000	DSD_DOCK	DW_509046	1	85.92	47.96	60	107.96	0.6
DSD¦04.0000	DW_509046	DW_509752	1	24.42	15.21	60	75.21	0.42
DSD¦04.0000	DW_509752	DW_509753	1	10.58	8.29	60	68.29	0.38
DSD¦04.0000	DW_509753	DW_509871	1	19.92	12.96	60	72.96	0.41
DSD¦04.0000	DW_509871	DW_510052	1	9.00	7.5	40	47.5	0.26
DSD¦04.0000	DW_510052	DW_510053	1	9.00	7.5	40	47.5	0.26
DSD¦04.0000	DW_510053	DW_510135	1	14.50	10.25	60	70.25	0.39

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
DSD¦04.0000	DW_510135	DW_510136	1	10.67	8.33	60	68.33	0.38
DSD¦04.0000	DW_510136	DW_510138	1	10.75	8.38	60	68.38	0.38
DSD¦04.0000	DW_510138	DW_510139	1	8.67	7.33	60	67.33	0.37
DSD¦04.0000	DW_510139	DW_512486	1	70.67	40.33	60	100.33	0.56
DSD¦04.0000	DW_512486	DW_512487	1	76.08	43.04	60	103.04	0.57
DSD¦04.0000	DW_512487	DW_512485	1	76.33	43.17	90	133.17	0.74
DSD¦04.0000	DW_512485	DW_512730	1	19.33	12.67	60	72.67	0.4
DSD¦04.0000	DW_512730	DW_831261	1	33.00	19.5	110	129.5	0.72
DSD¦04.0000	DW_831261	DW_839061	1	19.08	12.54	110	122.54	0.68
DSD¦04.0000	DW_839061	DW_835261	1	117.25	63.63	160	223.63	1.24
DSD¦04.0000	DW_835261	DW_836261	1	125.75	67.58	150	217.58	1.21
DSD¦04.0000	DW_836261	DW_836561	1	131.42	70.41	60	130.41	0.72
DSD¦04.0000	DW_836561	DW_831661	1	125.17	67.58	60	127.58	0.71
DSD¦04.0000	DW_831661	DW_832461	1	19.75	12.88	110	122.88	0.68
DSD¦04.0000	DW_832461	DW_511873	1	152.50	80.99	160	240.99	1.34
DSD¦04.0000	DW_511873	W_513009	1	175.83	92.92	160	252.92	1.41

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
DSD¦04.0000	W_513009	DW_510645	1	139.17	73.58	110	183.58	1.02
DSD¦04.0000	DW_510645	DW_511068	1	35.33	20.91	60	80.91	0.45
DSD¦04.0000	DW_511068	DW_510708	1	13.83	8.66	60	68.66	0.38
DSD¦04.0000	DW_510708	DW_510706	1	11.42	7.69	60	67.69	0.38
DSD¦04.0000	DW_510706	DW_505549	1	16.33	10.15	60	70.15	0.39
DSD¦04.0000	DW_505549	DW_505548	1	5.67	4.32	110	114.32	0.64
DSD¦04.0000	DW_505548	DW_505547	1	7.00	5.46	110	115.46	0.64
DSD¦04.0000	DW_505547	DW_505546	1	6.08	4.71	260	264.71	1.47
DSD¦04.0000	DW_505546	DW_503971	1	6.25	5.09	110	115.09	0.64
DSD¦04.0000	DW_503971	DW_503278	1	10.58	7	110	117	0.65
DSD¦04.0000	DW_503278	DW_100521	1	14.42	9.13	160	169.13	0.94
DSD¦04.0000	DW_100521	DW_505554	1	16.83	10.84	110	120.84	0.67
DSD¦04.0000	DW_505554	DW_505555	1	27.08	16.54	60	76.54	0.43
DSD¦04.0000	DW_505555	DW_505638	1	26.17	15.83	40	55.83	0.31
DSD¦04.0000	DW_505638	DW_506295	1	25.92	15.7	210	225.7	1.25
DSD¦04.0000	DW_506295	DW_506296	1	27.75	16.88	110	126.88	0.7

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
DSD¦04.0000	DW_506296	DW_506297	1	26.08	15.75	110	125.75	0.7
DSD¦04.0000	DW_506297	DW_506632	1	34.67	20.33	60	80.33	0.45
DSD¦04.0000	DW_506632	DW_507087	1	142.08	76.04	60	136.04	0.76
DSD¦04.0000	DW_507087	DSD_DOCK	1	90.58	50.29	0	50.29	0.28
SUB TOTAL			**43**	**2,028.83**	**1,155.85**	**3,880.00**	**5,035.85**	**27.98**

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
RETAIL¦01.0000	RET_DOCK	R_480077	1	53.67	31.83	20	51.83	0.29
RETAIL¦01.0000	R_480077	RW_510419	1	109.67	59.83	20	79.83	0.44
RETAIL¦01.0000	RW_510419	RW_510421	1	16.50	11.25	20	31.25	0.17
RETAIL¦01.0000	RW_510421	RW_510426	1	30.08	18.04	30	48.04	0.27
RETAIL¦01.0000	RW_510426	RW_511108	1	20.50	13.25	20	33.25	0.18

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
RETAIL¦01.0000	RW_511108	RW_511309	1	24.00	15	20	35	0.19
RETAIL¦01.0000	RW_511309	RW_511312	1	15.50	10.75	20	30.75	0.17
RETAIL¦01.0000	RW_511312	RW_510141	1	53.33	30.67	20	50.67	0.28
RETAIL¦01.0000	RW_510141	RW_510646	1	147.00	77.5	20	97.5	0.54
RETAIL¦01.0000	RW_510646	RW_510418	1	217.67	113.83	20	133.83	0.74
RETAIL¦01.0000	RW_510418	R_508782	1	177.25	93.63	20	113.63	0.63
RETAIL¦01.0000	R_508782	R_508730	1	10.25	8.13	40	48.13	0.27
RETAIL¦01.0000	R_508730	R_508687	1	9.50	7.75	20	27.75	0.15
RETAIL¦01.0000	R_508687	R_666688	1	172.33	91.17	20	111.17	0.62
RETAIL¦01.0000	R_666688	R_479006	1	68.17	38.08	30	68.08	0.38
RETAIL¦01.0000	R_479006	R_503890	1	92.75	50.38	20	70.38	0.39
RETAIL¦01.0000	R_503890	R_506284	1	101.92	55.96	130	185.96	1.03
RETAIL¦01.0000	R_506284	R_513096	1	23.08	14.54	20	34.54	0.19
RETAIL¦01.0000	R_513096	RET_DOCK	1	78.17	44.08	0	44.08	0.24
SUB TOTAL			**19**	**1,421.34**	**785.67**	**510**	**1,295.67**	**7.17**

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
RETAIL¦02.0000	RET_DOCK	R_509197	1	61.33	35.67	20	55.67	0.31
RETAIL¦02.0000	R_509197	R_509193	1	9.17	6.58	20	26.58	0.15
RETAIL¦02.0000	R_509193	R_504503	1	7.17	6.02	20	26.02	0.14
RETAIL¦02.0000	R_504503	R_513020	1	63.92	36.96	20	56.96	0.32
RETAIL¦02.0000	R_513020	R_503791	1	21.08	13.54	20	33.54	0.19
RETAIL¦02.0000	R_503791	R_506284	1	100.08	55.04	60	115.04	0.64
RETAIL¦02.0000	R_506284	R_509206	1	125.00	67.5	20	87.5	0.49
RETAIL¦02.0000	R_509206	R_509209	1	15.33	10.67	20	30.67	0.17
RETAIL¦02.0000	R_509209	R_503760	1	58.08	34.04	20	54.04	0.3
RETAIL¦02.0000	R_503760	R_500078	1	37.08	22.54	20	42.54	0.24
RETAIL¦02.0000	R_500078	R_479006	1	23.50	14.75	20	34.75	0.19
RETAIL¦02.0000	R_479006	R_509204	1	72.42	40.21	20	60.21	0.33
RETAIL¦02.0000	R_509204	R_508730	1	179.42	94.71	40	134.71	0.75
RETAIL¦02.0000	R_508730	RW_509594	1	161.50	85.75	20	105.75	0.59
RETAIL¦02.0000	RW_509594	RW_512988	1	257.58	133.79	20	153.79	0.85
RETAIL¦02.0000	RW_512988	RW_510138	1	112.67	61.33	20	81.33	0.45

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
RETAIL¦02.0000	RW_510138	RW_510136	1	17.50	11.75	30	41.75	0.23
RETAIL¦02.0000	RW_510136	RW_511312	1	80.75	45.38	30	75.38	0.42
RETAIL¦02.0000	RW_511312	RW_510936	1	29.67	17.83	30	47.83	0.27
RETAIL¦02.0000	RW_510936	RET_DOCK	1	164.42	87.21	0	87.21	0.48
SUB TOTAL			**20**	**1,597.67**	**881.27**	**470**	**1,351.27**	**7.51**

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
RETAIL¦03.0000	RET_DOCK	RW_511309	1	178.92	94.46	20	114.46	0.64
RETAIL¦03.0000	RW_511309	RW_511839	1	119.17	64.58	20	84.58	0.47
RETAIL¦03.0000	RW_511839	R_410608	1	167.08	88.54	20	108.54	0.6
RETAIL¦03.0000	R_410608	R_473916	1	83.08	46.54	20	66.54	0.37
RETAIL¦03.0000	R_473916	R_507238	1	11.33	8.67	30	38.67	0.21
RETAIL¦03.0000	R_507238	R_508782	1	22.42	14.21	20	34.21	0.19
RETAIL¦03.0000	R_508782	R_666688	1	178.75	94.38	20	114.38	0.64
RETAIL¦03.0000	R_666688	R_479006	1	68.17	38.08	40	78.08	0.43
RETAIL¦03.0000	R_479006	R_509198	1	28.83	18.42	20	38.42	0.21
RETAIL¦03.0000	R_509198	R_503791	1	102.75	56.38	20	76.38	0.42
RETAIL¦03.0000	R_503791	R_506284	1	100.08	55.04	50	105.04	0.58
RETAIL¦03.0000	R_506284	R_509192	1	77.58	43.79	20	63.79	0.35
RETAIL¦03.0000	R_509192	RET_DOCK	1	45.33	25.67	0	25.67	0.14
SUB TOTAL			**13**	**1,183.49**	**648.76**	**300**	**948.76**	**5.25**

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
RETAIL¦04.0000	RET_DOCK	R_504503	1	59.33	34.67	20	54.67	0.3
RETAIL¦04.0000	R_504503	R_513020	1	63.92	36.96	20	56.96	0.32
RETAIL¦04.0000	R_513020	R_513096	1	82.75	46.38	30	76.38	0.42
RETAIL¦04.0000	R_513096	R_506284	1	23.08	14.54	50	64.54	0.36
RETAIL¦04.0000	R_506284	R_503760	1	107.42	58.71	20	78.71	0.44
RETAIL¦04.0000	R_503760	R_506562	1	62.00	34	20	54	0.3
RETAIL¦04.0000	R_506562	R_508730	1	20.92	13.46	20	33.46	0.19
RETAIL¦04.0000	R_508730	R_508782	1	10.25	8.13	20	28.13	0.16
RETAIL¦04.0000	R_508782	RW_510835	1	227.50	118.75	20	138.75	0.77
RETAIL¦04.0000	RW_510835	RW_512986	1	225.25	117.63	20	137.63	0.76
RETAIL¦04.0000	RW_512986	RW_511312	1	142.50	76.25	30	106.25	0.59
RETAIL¦04.0000	RW_511312	RW_511309	1	15.50	10.75	20	30.75	0.17
RETAIL¦04.0000	RW_511309	RW_510425	1	35.83	20.92	20	40.92	0.23
RETAIL¦04.0000	RW_510425	RW_510422	1	22.00	13.75	20	33.75	0.19
RETAIL¦04.0000	RW_510422	RW_512728	1	72.08	41.04	20	61.04	0.34
RETAIL¦04.0000	RW_512728	RW_513022	1	73.92	41.71	30	71.71	0.4

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
DSD¦02.0000	DW_510425	DW_511068	1	30.08	17.54	50	67.54	0.38
DSD¦02.0000	DW_511068	DW_510645	1	35.33	20.91	50	70.91	0.39
DSD¦02.0000	DW_510645	DW_510644	1	45.33	26.67	30	56.67	0.31
DSD¦02.0000	DW_510644	DW_510416	1	102.17	56.08	50	106.08	0.59
DSD¦02.0000	DW_510416	DW_510417	1	26.17	16.08	50	66.08	0.37
DSD¦02.0000	DW_510417	DW_510419	1	28.33	17.17	70	87.17	0.48
DSD¦02.0000	DW_510419	DW_512486	1	71.33	40.67	70	110.67	0.61
DSD¦02.0000	DW_512486	DW_512487	1	76.08	43.04	50	93.04	0.52
DSD¦02.0000	DW_512487	DW_512485	1	76.33	43.17	70	113.17	0.63
DSD¦02.0000	DW_512485	DW_831261	1	24.83	15.42	40	55.42	0.31
DSD¦02.0000	DW_831261	DW_839061	1	19.08	12.54	50	62.54	0.35
DSD¦02.0000	DW_839061	DW_836261	1	22.83	13.86	50	63.86	0.35
DSD¦02.0000	DW_836261	DW_831661	1	17.42	11.03	70	81.03	0.45
DSD¦02.0000	DW_831661	DW_834161	1	125.08	67.54	40	107.54	0.6
DSD¦02.0000	DW_834161	DW_513504	1	155.00	82.5	40	122.5	0.68
DSD¦02.0000	DW_513504	DW_510139	1	102.83	54.42	20	74.42	0.41

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
RETAIL¦04.0000	RW_513022	RW_510142	1	86.83	48.17	20	68.17	0.38
RETAIL¦04.0000	RW_510142	RET_DOCK	1	91.75	50.88	0	50.88	0.28
SUB TOTAL			**18**	**1,422.83**	**786.7**	**400**	**1,186.70**	**6.6**

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
WHOLE¦01.0000	WHL_DOCK	W_509148	1	43.58	26.23	15	41.23	0.23
WHOLE¦01.0000	W_509148	W_501684	1	76.83	43.42	15	58.42	0.32
WHOLE¦01.0000	W_501684	W_501919	1	15.08	10.54	15	25.54	0.14
WHOLE¦01.0000	W_501919	W_509145	1	17.17	11.58	15	26.58	0.15
WHOLE¦01.0000	W_509145	W_501961	1	112.83	61.42	15	76.42	0.42
WHOLE¦01.0000	W_501961	W_508737	1	136.42	73.21	15	88.21	0.49
WHOLE¦01.0000	W_508737	DW_510139	1	180.42	95.21	15	110.21	0.61
WHOLE¦01.0000	DW_510139	W_503106	1	106.92	58.46	15	73.46	0.41
WHOLE¦01.0000	W_503106	W_509146	1	104.83	57.42	15	72.42	0.4
WHOLE¦01.0000	W_509146	W_511870	1	83.67	46.56	15	61.56	0.34
WHOLE¦01.0000	W_511870	W_500252	1	16.50	10.98	15	25.98	0.14
WHOLE¦01.0000	W_500252	WHL_DOCK	1	48.08	28.48	0	28.48	0.16
SUB TOTAL			**12**	**942.33**	**523.51**	**165**	**688.51**	**3.81**

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
WHOLE¦02.0000	WHL_DOCK	W_511355	1	46.08	27.21	15	42.21	0.23
WHOLE¦02.0000	W_511355	W_512802	1	33.58	19.53	15	34.53	0.19
WHOLE¦02.0000	W_512802	W_509146	1	96.92	53.2	15	68.2	0.38
WHOLE¦02.0000	W_509146	W_509145	1	24.58	15.29	15	30.29	0.17
WHOLE¦02.0000	W_509145	W_503106	1	114.75	62.38	15	77.38	0.43
WHOLE¦02.0000	W_503106	DW_510136	1	113.33	61.67	15	76.67	0.43
WHOLE¦02.0000	DW_510136	W_477080	1	48.58	28.29	15	43.29	0.24
WHOLE¦02.0000	W_477080	W_501627	1	135.75	71.88	15	86.88	0.48
WHOLE¦02.0000	W_501627	W_501552	1	22.75	14.38	15	29.38	0.16
WHOLE¦02.0000	W_501552	W_501493	1	21.08	13.28	15	28.28	0.16
WHOLE¦02.0000	W_501493	W_507208	1	14.00	9.47	15	24.47	0.14
WHOLE¦02.0000	W_507208	W_509148	1	68.83	39.15	15	54.15	0.3
WHOLE¦02.0000	W_509148	W_509147	1	16.08	11.04	15	26.04	0.14
WHOLE¦02.0000	W_509147	WHL_DOCK	1	41.17	25.02	0	25.02	0.14
SUB TOTAL			**14**	**797.48**	**451.79**	**195**	**646.79**	**3.59**

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
WHOLE¦03.0000	WHL_DOCK	W_500252	1	48.08	28.48	15	43.48	0.24
WHOLE¦03.0000	W_500252	W_503103	1	104.67	57.33	15	72.33	0.4
WHOLE¦03.0000	W_503103	W_10016	1	69.92	38.96	15	53.96	0.3
WHOLE¦03.0000	W_10016	W_10004	1	25.92	15.7	15	30.7	0.17
WHOLE¦03.0000	W_10004	W_10005	1	13.25	9.04	15	24.04	0.13
WHOLE¦03.0000	W_10005	W_10008	1	35.33	21.15	15	36.15	0.2
WHOLE¦03.0000	W_10008	W_10003	1	14.92	9.94	15	24.94	0.14
WHOLE¦03.0000	W_10003	W_10001	1	16.33	11.17	15	26.17	0.15
WHOLE¦03.0000	W_10001	RW_510198	1	174.92	92.46	15	107.46	0.6
WHOLE¦03.0000	RW_510198	WHL_DOCK	1	135.67	72.27	0	72.27	0.4
SUB TOTAL			**10**	**639.01**	**356.5**	**135**	**491.5**	**2.73**

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
WHOLE¦04.0000	WHL_DOCK	W_511043	1	34.08	19.14	15	34.14	0.19
WHOLE¦04.0000	W_511043	W_500252	1	67.00	38.16	15	53.16	0.3
WHOLE¦04.0000	W_500252	W_501920	1	30.00	18	15	33	0.18
WHOLE¦04.0000	W_501920	W_501919	1	101.42	55.71	15	70.71	0.39
WHOLE¦04.0000	W_501919	W_508730	1	133.00	71.5	15	86.5	0.48
WHOLE¦04.0000	W_508730	W_477265	1	93.17	51.58	15	66.58	0.37
WHOLE¦04.0000	W_477265	W_476422	1	16.58	10.74	15	25.74	0.14
WHOLE¦04.0000	W_476422	W_500030	1	22.00	13.74	15	28.74	0.16
WHOLE¦04.0000	W_500030	DW_510139	1	94.58	52.03	15	67.03	0.37
WHOLE¦04.0000	DW_510139	DW_510140	1	104.75	57.38	15	72.38	0.4
WHOLE¦04.0000	DW_510140	W_508732	1	194.67	102.33	15	117.33	0.65
WHOLE¦04.0000	W_508732	W_501961	1	108.92	59.46	15	74.46	0.41
WHOLE¦04.0000	W_501961	RW_512986	1	127.17	68.58	15	83.58	0.46
WHOLE¦04.0000	RW_512986	RW_511312	1	142.50	76.25	15	91.25	0.51

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
WHOLE¦04.0000	RW_511312	W_509671	1	149.67	79.83	15	94.83	0.53
WHOLE¦04.0000	W_509671	WHL_DOCK	1	52.00	30.44	0	30.44	0.17
SUB TOTAL			**16**	**1,471.51**	**804.87**	**225**	**1,029.87**	**5.71**

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
WHOLE¦05.0000	WHL_DOCK	W_503565	1	32.17	18.27	15	33.27	0.18
WHOLE¦05.0000	W_503565	W_504468	1	14.67	10	15	25	0.14
WHOLE¦05.0000	W_504468	W_501919	1	27.33	16.67	15	31.67	0.18
WHOLE¦05.0000	W_501919	W_511042	1	112.75	61.12	15	76.12	0.42
WHOLE¦05.0000	W_511042	W_479006	1	93.58	51.79	15	66.79	0.37
WHOLE¦05.0000	W_479006	W_508202	1	94.25	50.13	15	65.13	0.36
WHOLE¦05.0000	W_508202	W_501961	1	131.75	70.88	15	85.88	0.48
WHOLE¦05.0000	W_501961	W_508730	1	92.17	51.08	15	66.08	0.37
WHOLE¦05.0000	W_508730	RW_511312	1	107.50	58.75	15	73.75	0.41
WHOLE¦05.0000	RW_511312	RW_511309	1	15.50	10.75	15	25.75	0.14
WHOLE¦05.0000	RW_511309	W_501493	1	133.58	71.79	15	86.79	0.48
WHOLE¦05.0000	W_501493	W_509671	1	77.42	43.71	15	58.71	0.33
WHOLE¦05.0000	W_509671	W_506284	1	88.92	49.46	15	64.46	0.36
WHOLE¦05.0000	W_506284	WHL_DOCK	1	52.08	30.48	0	30.48	0.17
SUB TOTAL			**14**	**1,073.67**	**594.88**	**195**	**789.88**	**4.39**

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
WHOLE¦06.0000	WHL_DOCK	W_503565	1	32.17	18.27	15	33.27	0.18
WHOLE¦06.0000	W_503565	W_511043	1	12.58	8.54	15	23.54	0.13
WHOLE¦06.0000	W_511043	W_500228	1	63.83	36.58	15	51.58	0.29
WHOLE¦06.0000	W_500228	W_503106	1	42.00	23.73	15	38.73	0.22
WHOLE¦06.0000	W_503106	W_501919	1	109.08	59.54	15	74.54	0.41
WHOLE¦06.0000	W_501919	W_511042	1	112.75	61.12	15	76.12	0.42
WHOLE¦06.0000	W_511042	W_503760	1	15.58	10.27	15	25.27	0.14
WHOLE¦06.0000	W_503760	W_503794	1	16.17	10.82	15	25.82	0.14
WHOLE¦06.0000	W_503794	W_501552	1	108.50	59.25	15	74.25	0.41
WHOLE¦06.0000	W_501552	W_510081	1	86.92	48.46	15	63.46	0.35
WHOLE¦06.0000	W_510081	W_507208	1	79.83	44.65	15	59.65	0.33
WHOLE¦06.0000	W_507208	W_503793	1	28.33	17.17	15	32.17	0.18
WHOLE¦06.0000	W_503793	RW_511309	1	126.75	68.38	15	83.38	0.46
WHOLE¦06.0000	RW_511309	W_508730	1	110.83	60.42	15	75.42	0.42
WHOLE¦06.0000	W_508730	W_509149	1	103.08	56.28	15	71.28	0.4

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
WHOLE¦06.0000	W_509149	W_500037	1	14.33	9.58	15	24.58	0.14
WHOLE¦06.0000	W_500037	WHL_DOCK	1	84.42	44.39	0	44.39	0.25
SUB TOTAL			**17**	**1,147.15**	**637.45**	**240**	**877.45**	**4.87**

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
WHOLE¦07.0000	WHL_DOCK	W_508686	1	33.50	19.19	15	34.19	0.19
WHOLE¦07.0000	W_508686	W_504468	1	16.83	11.16	15	26.16	0.15
WHOLE¦07.0000	W_504468	W_503103	1	92.75	51.38	15	66.38	0.37
WHOLE¦07.0000	W_503103	W_507208	1	97.00	53.23	15	68.23	0.38
WHOLE¦07.0000	W_507208	W_506562	1	12.42	8.7	15	23.7	0.13
WHOLE¦07.0000	W_506562	W_506245	1	17.08	11.28	15	26.28	0.15
WHOLE¦07.0000	W_506245	W_509671	1	70.75	40.38	15	55.38	0.31
WHOLE¦07.0000	W_509671	W_505308	1	20.83	13.42	15	28.42	0.16
WHOLE¦07.0000	W_505308	W_508709	1	15.25	10.63	15	25.63	0.14
WHOLE¦07.0000	W_508709	W_501919	1	99.58	54.79	15	69.79	0.39
WHOLE¦07.0000	W_501919	W_503893	1	116.08	63.04	15	78.04	0.43
WHOLE¦07.0000	W_503893	W_477265	1	93.08	51.54	15	66.54	0.37
WHOLE¦07.0000	W_477265	W_508730	1	93.17	51.58	15	66.58	0.37
WHOLE¦07.0000	W_508730	W_508687	1	22.58	14.29	15	29.29	0.16
WHOLE¦07.0000	W_508687	RW_509554	1	101.25	55.63	15	70.63	0.39
WHOLE¦07.0000	RW_509554	RW_511312	1	97.33	53.67	15	68.67	0.38

Table 60 Continued

AGGREGATE	FROM	TO	FREQUENCY	TRIP DISTANCE FEET	TRAVEL TIME SECONDS	L/UL TIME SECONDS	TOTAL TIME SECONDS	COST $
WHOLE¦07.0000	RW_511312	RW_511542	1	31.75	18.88	15	33.88	0.19
WHOLE¦07.0000	RW_511542	RW_510130	1	117.58	63.79	15	78.79	0.44
WHOLE¦07.0000	RW_510130	DW_510139	1	201.83	105.92	15	120.92	0.67
WHOLE¦07.0000	DW_510139	DW_510136	1	12.75	9.38	15	24.38	0.14
WHOLE¦07.0000	DW_510136	W_506284	1	134.50	71.98	15	86.98	0.48
WHOLE¦07.0000	W_506284	WHL_DOCK	1	52.08	30.48	0	30.48	0.17
SUB TOTAL			**22**	**1,549.97**	**864.34**	**315**	**1,179.34**	**6.56**
TOTAL			**317**	**19,872.94**	**11,114.42**	**13,290.00**	**24,404.42**	**135.5**