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WALMART CHINA — SUPPLY CHAIN TRANSFORMATION

Professor Fraser Johnson wrote this case solely to provide material for class discussion. The author does not intend to illustrate either effective or ineffective handling of a managerial situation. The author may have disguised certain names and other identifying information to protect confidentiality.

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Distribution and transportation have been so successful at Wal-Mart because senior management views this part of the company as a competitive advantage, not as some afterthought or necessary evil. And they support it with capital investment. A lot of companies don't want to spend any money on distribution unless they have to. Ours spends because we continually demonstrate that it lowers our costs. This is a very important strategic point in understanding Wal-Mart.¹

Joe Hardin
Executive Vice President, Logistics and Personnel, Walmart, 1986–1997

As Lesley Smith, senior vice president of supply chain management at Walmart China, sat in her office in Futian District, Shenzhen, she reflected on the accomplishments of her team during the previous three years, but recognized that more work still needed to be done:

A great deal has been accomplished since I arrived in late 2011. We have completed an aggressive warehouse management system transition and converted our suppliers from a direct-to-store delivery to centralized shipping through a Walmart DC [distribution centre]. Improvements to our supply chain have created capabilities that provide improved quality and service to our customers at lower costs. The team has been recognized for their accomplishments, but the journey is far from over. Our next step is to build a supply chain for perishable products that is scalable and sustainable — our next generation of supply chain infrastructure.

It was Wednesday, August 26, 2015, and Lesley was preparing for a meeting in Bentonville, Arkansas, in late September, when she was expected to present a detailed plan for Walmart China's network of distribution centres for perishable products (perishable DC). The investment in infrastructure would be the next major step in the organization's supply chain transformation. However, Lesley needed to evaluate two distinct options before her plans could be finalized. Walmart used two different perishable DC models in its global operations. The traditional model used in United States was staple stock flow, whereas Walmart used the cross dock flow model in its European operations (ASDA Stores Limited in the United Kingdom).

¹ Sam Walton with John Huey, *Made in America: My Story*, Bantam, New York, 1993, p. 262.

The compelling arguments and trade-offs for both approaches needed to be balanced against Walmart China's needs for its supply chain operations. Lesley recognized that the decision to adopt either option needed to be carefully evaluated since it would commit the organization to infrastructure that would significantly impact both its supply chain capabilities and performance for the next 20 years.

WALMART STORES, INC.

Based in Bentonville, Arkansas, Walmart Stores Inc. (Walmart) was the world's largest retailer, with sales of \$482 billion² in fiscal year 2015. The company employed 2.2 million associates worldwide and operated approximately 11,000 stores, under 72 banners, in 27 countries. It also provided online shopping in 11 countries. Each week, Walmart served more than 260 million customers. Online shopping had become an important part of Walmart's strategy, and the company expected to invest more than \$1 billion on e-commerce in fiscal year 2016.³ In the late 1960s, Sam Walton, the company's legendary founder, had pioneered the strategy of providing a broad assortment of quality merchandise at "everyday low prices." Walmart's three operating segments were Walmart U.S., Walmart International and Sam's Club. Exhibit 1 provides a summary of Walmart's financial results for fiscal years 2011–2015.

Walmart China⁴

Walmart entered China in 1996, opening its first Supercenter and Sam's Club in Shenzhen, Guangdong Province. By August 2015, the company's Chinese presence had grown to 416 retail stores, consisting of 404 Supercenters and 12 Sam's Club stores, covering 166 cities among 19 provinces, two autonomous regions and four municipalities nationwide, and employing more than 100,000 associates. The Supercenters were approximately 17,000 square metres (182,000 square feet) and offered an assortment of approximately 20,000 items of general merchandise, consumables, grocery and fresh products. Sam's Club stores in China offered an assortment of approximately 5,000 items of bulk groceries, general merchandise and fresh products to its members in its stores that spanned 20,000 square metres (215,000 square feet).

The company was expanding its e-commerce presence in China. In May 2015, Walmart China announced the launch of its hypermarket online-to-offline (O2O) platform "Walmart To Go" in Shenzhen, where it had its highest concentration of Supercenters. The platform consisted of the newly launched Walmart mobile shopping app (application) and the "To Go Service Center" that allowed customers to place orders for pick-up or home delivery. In addition, in July 2015, Walmart had acquired Yihaodian, a Chinese online retailer, as part of its plans to accelerate development of its e-commerce business in China.

DISTRIBUTION AT WALMART CHINA

At any given time, large retailers in China, such as Walmart, carried 15,000 to 20,000 stock keeping units (SKUs) in a typical store, and the assortment varied across stores. It was inefficient and impractical for suppliers to ship all products directly to stores even though many retailers and suppliers in China followed this ship-direct-to-store model in 2015. Walmart DCs allowed suppliers to ship products using full truckloads, full container loads or in economic order quantities. Shipments to stores were consolidated at the DC and shipped on the basis of individual store needs (e.g., forecasted requirements or customer orders). Therefore, DCs provided several value-added activities to retail supply chains that could reduce

² All currency amounts are shown in U.S. dollars unless otherwise indicated.

³ Walmart Stores, Inc. 2015 Annual Report.

⁴ The text in this section is based on company records and information on the "Walmart China Factsheet," www.walmartchina.com/english/walmart/index.htm, accessed August 28, 2015.

overall supply chain costs and improve customer service levels, by reducing transportation costs and optimizing inventory levels. The DCs also enabled consistent service and product fill-rates to every store regardless of its distance from suppliers and sales performance, resulting in increased in-stock positions and higher sales. Common DC functions included consolidation, break-bulk, cross-docking, seasonal storage and reverse logistics processing.

Walmart China operated two types of DCs in 2015: 11 perishable DCs and nine dry DCs. The latter, also referred to as "ambient DCs," handled dry grocery items, consumables and general merchandise products, such as electronics, apparel and toys. The volumes shipped through the dry DCs were primarily cross dock, which accounted for approximately 85 per cent of the total, with the balance as staple stock, which were pulled from inventory held in the DCs. Perishable DCs handled products that required temperature-controlled environments across three temperature zones: frozen (-8 degrees Celsius or below; e.g., frozen food and ice cream), chill (0 to 10 degrees Celsius; e.g., meat, dairy, deli and produce) and normal (12 to 18 degrees Celsius; e.g., tropical fruits, chocolate and eggs). These perishable DCs operated with a flow-through design that used cross-docking to bypass storage, transferring products directly from the receiving area to the outbound area for shipping to Walmart stores.

The Evolution of Walmart China's Supply Chain

Lesley Smith had arrived in China in late 2011 as the new senior vice president of supply chain management. She had previously worked for Walmart Canada as vice president of logistics at its head office in Mississauga, Ontario, and had agreed to move to China to lead the transformation of the company's supply chain network. Lesley reflected on the challenges that she faced:

Our challenges were not just a supply chain-related, but were much broader enterprise issues. Business transformation was necessary and supply chain was an important driver in this process.

The business was quite fragmented. We had 29 autonomous buying offices across the country, with a serviceable dry network made up of five DCs servicing all stores. Logistics charged a warehouse fee to suppliers for using our network, so suppliers and buyers were not interested in going through our DCs because of the high costs and horrible service. The logistics team's KPI [key performance indicator] was cost. As a result, we commissioned large cube trucks that could hold approximately 7,000 cases that were dispatched to the store only when completely full, which sometimes took more than two weeks. So while we kept our costs in line, our store shelves were often empty. To compensate, stores over-ordered and rented outside warehouses to hold the excess inventory.

We had over 20,000 suppliers, many of them distributors. Despite our large size, we had no leverage because most suppliers only received orders for volumes for six or so stores. As an example, a multinational supplier produced 18 items for us from its Chinese plant. However, this supplier sold exclusively to 144 distributors, which meant that we needed to place orders to 144 different sources for same 18 items, all with low order volumes. Often we did not meet minimum order quantity and the distributors would not deliver, affecting our order fill rates that cascaded into low in-stock and on-shelf availability. Or, we would overcompensate by ordering more inventory than needed, which affected our carrying costs. There was a general sense that this is the way it has always been and that it would likely stay this way.

In early 2012, our country president rolled out a three-year business transformation plan. One area of focus and investment would be supply chain. We were challenged to decrease direct-to-store

volume from suppliers, increase centralized shipment through DCs, increase service levels to stores and establish a fresh DC network, while keeping our costs in line.

Current Situation

Between early 2012 and mid-2015, Lesley and the supply chain team made several changes that transformed the supply chain at Walmart China. The centralization of the buying organization in Walmart China reduced the number of regional buying offices and suppliers for both dry and perishable products; at the same time, the supply chain team significantly improved the volume shipped to the DC network, by strengthening the capacity and capabilities of the DC network and collaborating with suppliers to change their shipment models. The initial capital investments in infrastructure focused on the supply chain for dry products (ambient DCs); and, in 2015, Lesley started to focus on the design of the perishable DC network (see Exhibit 2). She commented:

We are currently operating a total of 20 DC locations for perishable and dry and have completed an aggressive warehouse management system transition. Supplier fill rates are up and so is in-stock performance. We are fairly comfortable with our ambient DC network, including processes. We run an ambient DC model similar to that of Walmart in U.S., with a combination of staple stock and cross dock. To better manage the infrastructure cost, we maintain the volume of staple stock in our ambient DC network at around 15 per cent, whereas in U.S., it is 50 per cent.

Most of the nine ambient DC operations are operated by Walmart exclusively, but all of our 11 fresh operations are run by 3PLs.⁵ They are all flow through operations and we share the space with other users that the 3PLs support. We recognized that this was the only way we could get the fresh operation established quickly to service all of our stores. This approach also required a much less initial capital investment. However, capacity is limited in many of these sites and they are not terribly efficient, with physical constraints at some of the sites, manual systems and processes. In addition, we are training our 3PLs how to operate in this environment. Our current fresh operation is not scalable and not sustainable for the long term. We have decided that our strategy is to take this business in-house and build our own infrastructure.

Lesley wanted to start with the construction of a new perishable DC in Dongguan, with a planned opening in early 2018. It would replace the Guangzhou and Shenzhen 3PL operations, which were expected to run out of capacity by late 2017 and 2018 respectively. South China was the most strategic geographical region for Walmart China in terms of business performance and concentration of stores; to support this region, it was critically important to have a DC with sufficient capacity and the appropriate capabilities. The new facility would support Walmart China's approximately 128 stores in Guangdong and Guangxi provinces, with a weighted average distance to store of approximately 170 kilometres. Walmart China's headquarters were in Shenzhen, close to Dongguan, providing opportunities to leverage management and systems. The new DC would be the model for future investments in perishable DCs in China; however, Lesley needed to determine the appropriate facility design that would be the most effective for Walmart China's needs in the future.

Operating seven days a week on two shifts, the Dongguan DC would have capacity to ship approximately 150,000 cases per day, with an average value of \$24.50 per case; peak demand was estimated at approximately 90,000 cases per day for the launch in 2018 (see Exhibit 3). Daily average throughput at the DC was expected to be approximately 70 per cent of peak demand and the product mix would consist of

⁵ 3PLs refers to third-party logistics service providers.

about 3,500 SKUs across a broad range of product categories, such as deli, seafood, dairy, frozen meat, produce, bakery, flowers, grocery, chocolate, ice cream and tropical fruits. Smith anticipated that approximately 300 suppliers would be shipping products to the new DC. By 2025, the DC would support approximately 200 stores and a peak day volume of 142,000 cases per day (see Exhibit 3).

Lesley identified two options for Walmart China's new perishable DC network: "staple stock flow" and "cross dock flow" models. These two DC models had unique advantages, and Walmart used both models in its global perishable supply chain. Staple stock flow DCs were the dominant model in Walmart's U.S. perishable product supply chain, while its European operations most frequently used cross dock flow DCs.

Staple stock flow DCs offered capacity for short-term storage of inventory, whereas the cross dock flow DCs used a flow-through model that did not maintain inventory. In a cross dock system, product was shipped to the DC in full truckloads, unloaded from inbound trucks and loaded directly onto outbound trucks for same-day delivery to stores. Consequently, the staple stock model required a warehouse with a larger physical footprint and thus a greater capital investment, including building construction costs and investments in equipment, such as racks and forklift trucks. Notwithstanding the additional costs of setting up a staple stock flow DC, the design provided better utilization of the total cubic footprint since racking exploited space up to the full ceiling height. Cross dock flow DCs did not require space for inventory storage, which resulted in a smaller footprint and a lower ceiling height.

The ability to store inventory in the staple stock flow DC model provided additional advantages. Inventory could be held either for three to seven days, depending on the shelf life of the products before shipping, or for a single day, after which all inventory was forced out for items with very short shelf life. The latter was sometimes referred to as "pick to zero."

Whereas staple stock flow DCs provided greater flexibility in terms of adding stores, cross dock flow DCs were more flexible at adding SKU capacity. The number of SKUs that could be allocated to staple stock would be limited by the number of slots assigned, which was based on the availability of racking. Cross dock flow DCs had no such limit, making them ideal for handling seasonal assortments. Efficiency in cross dock flow DCs was dependent on suppliers' adherence to delivery schedules, making this option best suited for facilities with large volumes that were located close to the stores to which they delivered. Scheduling and capacity management could be more challenging in cross dock flow DCs because of the simultaneous arrival, unloading, loading and dispatch of goods for all stores serviced. Cross dock processing was unable to be completed to match the travel distance to stores. That is, the deliveries for all stores were prepared at the same time.

The new DC would be designed and constructed to Walmart's specifications by a Chinese commercial real estate firm. The site development and building costs would be built into the lease agreement, and Walmart would commit to a 20-year lease for \$10.8 per square metre per month, with an annual price escalation equivalent to the rate of inflation. As part of the agreement, Walmart had the option to extend the term at the end of the 20-year lease. Walmart would be responsible for costs related to interior construction, information system hardware, software and infrastructure, materials handling equipment and office furnishings. Exhibit 4 summarizes the facility costs (excluding lease payments and operating costs) for the two options, either the staple stock DC or cross dock flow DC, which would be the responsibility of Walmart.

The cross dock flow DC option also had the advantage of a smaller building footprint and lower handling costs. Based on expected volumes, Lesley estimated that Walmart would need a staple stock DC of 35,000 square metres, whereas a cross dock DC to handle a comparable volume would need to be 24,000 square metres. Handling costs also differed since the cross dock DC would not have capability for inventory

storage. The cost per case for the cross dock operation would be \$1.02 compared with \$1.35 for a staple stock DC operation. Lesley commented on the relative advantages of the two options:

Cross docking has the advantages of lower construction, capital and handling costs. It has the ability to handle an infinite number of SKUs, but becomes inefficient with a high number of stores, because the pick path becomes too large and complex. Furthermore, scheduling is complicated in a cross dock DC. All stores generally start and finish picking at the same time, and the schedule is completely dependent on supplier delivery reliability and fill rate accuracy. Our suppliers will need to adhere to strict schedules and quantities [see Exhibit 5 for a sample of "pick-by-line" grids and pick path for cross-dock].

Scheduling is simpler for a staple stock DC. It will allow us to pick for stores that are further away first and dispatch the trucks out. Inventory will allow us to buffer against supply problems, such as short shipments and delays in deliveries. This is a critical consideration since local suppliers in China are still far from mature in planning and demand fulfillment capabilities, leading to unstable fill rates. The staple stock DC model provides an in-stock position and thus we are able to protect our stores when the flow of goods is disrupted due to supplier fill issues. This is especially important for events, festivals and season changes, when sales period is short. We cannot afford to lose sales because we are not able to deliver the goods that our customers want to our stores.

Although the number of SKUs that we can carry is defined by the number of floor locations in racking, a staple stock DC can service a higher number of stores and new formats more easily. The staple stock DC also places our inventory closer to the stores. Since most stores receive daily shipments from the DC, they can draw and receive inventory when needed, so lead-time is only one day in most situations.

Staple stock DCs allows us the ability to react quickly to sales increase to keep in stock. It also supports volume buying and other buying opportunities, such as seasonal and direct import. For direct import, Walmart China imports goods directly from suppliers overseas, which after the custom clearance process, is delivered through our DC network to the stores. This is a strategic initiative to drive our future growth in China.

The recently launched "Walmart To Go" O2O initiative in Shenzhen stores requires fulfillment of orders and picking of goods at stores. It does not change the operations at our DCs. However, a staple stock DC model will help protect our in-stock position better at stores.

PREPARING FOR THE MEETING IN BENTONVILLE

As Lesley prepared for her meeting in Bentonville, she sifted through the data that her team had collected. The Walmart country president had given the supply chain organization three mandates as part of the transformation process: To be the best-in-market perishable operator (e.g., in terms of productivity, efficiency, product safety and compliance); to be able to support business growth and to provide the best quality selection to customers (e.g., to maximize product shelf life). Lesley needed to carefully weigh the relative advantages and disadvantages of both options in the context of this mandate when making her recommendation at the management meeting the following month.

EXHIBIT 1: WALMART FINANCIAL RESULTS, FISCAL YEARS 2011–2015
(amounts in US\$ millions, except gross profit margin)

	2015	2014	2013	2012	2011
Net sales	482,229	473,076	465,604	443,416	418,500
Cost of sales	365,086	358,069	352,297	335,127	314,946
Gross profit margin (%)	24.3	24.3	24.3	24.5	24.8
Operating, selling and general administrative expenses	93,418	91,353	88,629	85,265	81,361
Operating income	27,147	26,872	27,725	26,558	25,542
Income from continuing operations before tax	24,799	24,656	25,662	24,398	23,538
Net income	16,363	16,022	16,999	15,699	16,389
Inventories	45,141	44,858	43,803	40,714	36,437
Property, equipment and capital lease assets	116,117	117,907	116,681	112,324	107,878
Total assets	203,706	204,751	203,105	193,406	180,782
Long-term debt and capital lease obligations	43,692	44,559	41,417	47,079	43,842
Shareholders' equity	81,394	76,255	76,343	71,315	68,542

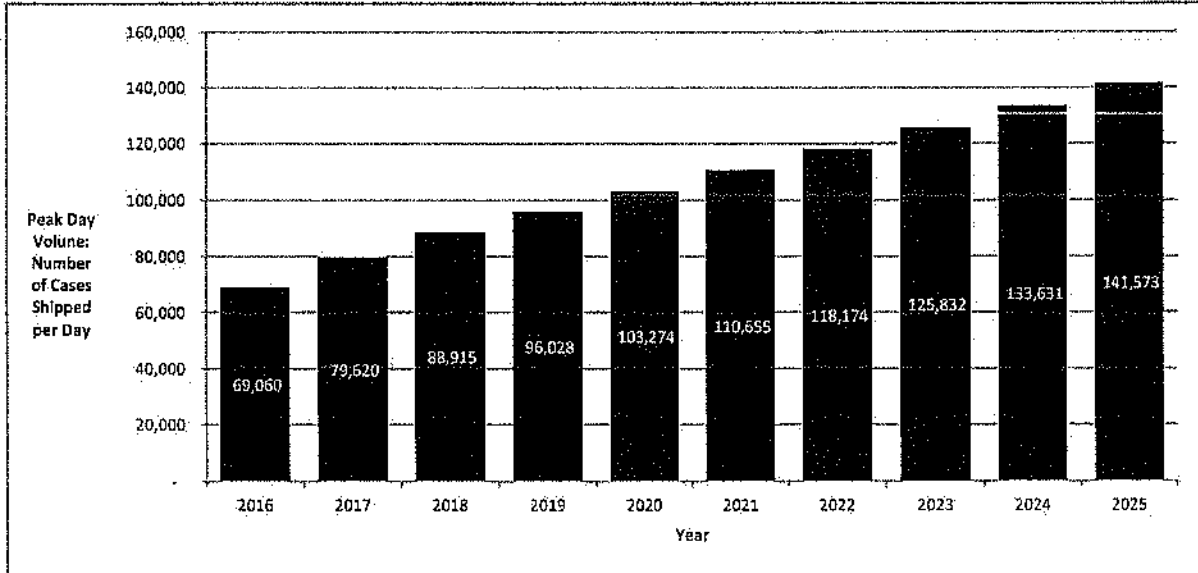
Source: Walmart Stores, Inc. 2015 Annual Report.

EXHIBIT 2: TRANSFORMATION OF WALMART CHINA'S PERISHABLE SUPPLY CHAIN

	2012	2015
Buying strategy	Localized	Centralized
Number of regional buying offices	28	0
Number of suppliers	2,658	820
Distribution centre volume as percentage of total	3%	60%
Number of distribution centres	0	11
Store coverage	72	416
Daily average volume (cases)	5,833	120,000
Category coverage	5	12
Systems	Fully manual	Partially automatic
Quality control systems	None – handled by stores	Standardized
Replenishment visibility	None	Standardized
Number of temperature zones	1	3

Source: Company files.

EXHIBIT 3: DONGGUAN DISTRIBUTION CENTRE PEAK DAILY VOLUME PROJECTION⁶
(in cases per day)



Source: Company files.

EXHIBIT 4: DISTRIBUTION CENTRE FACILITY COSTS FOR STAPLE STOCK AND CROSS DOCK OPTIONS
(in US\$ million)

	Staple Stock Distribution Centre	Cross Dock Distribution Centre
Interior construction	1.54	1.20
Management Information Systems (MIS)		
Equipment, servers, printers, etc.	1.00	1.00
Cabling, uninterruptible power supply, etc.	0.46	0.32
Total MIS	1.46	1.32
Materials Handling Equipment (MHE)		
Forklift and other MHE	6.72	4.59
Racking	1.99	—
Office furniture	0.09	0.09
Total MHE	8.80	4.68
Total	\$ 11.80	\$ 7.20

Source: Company files.

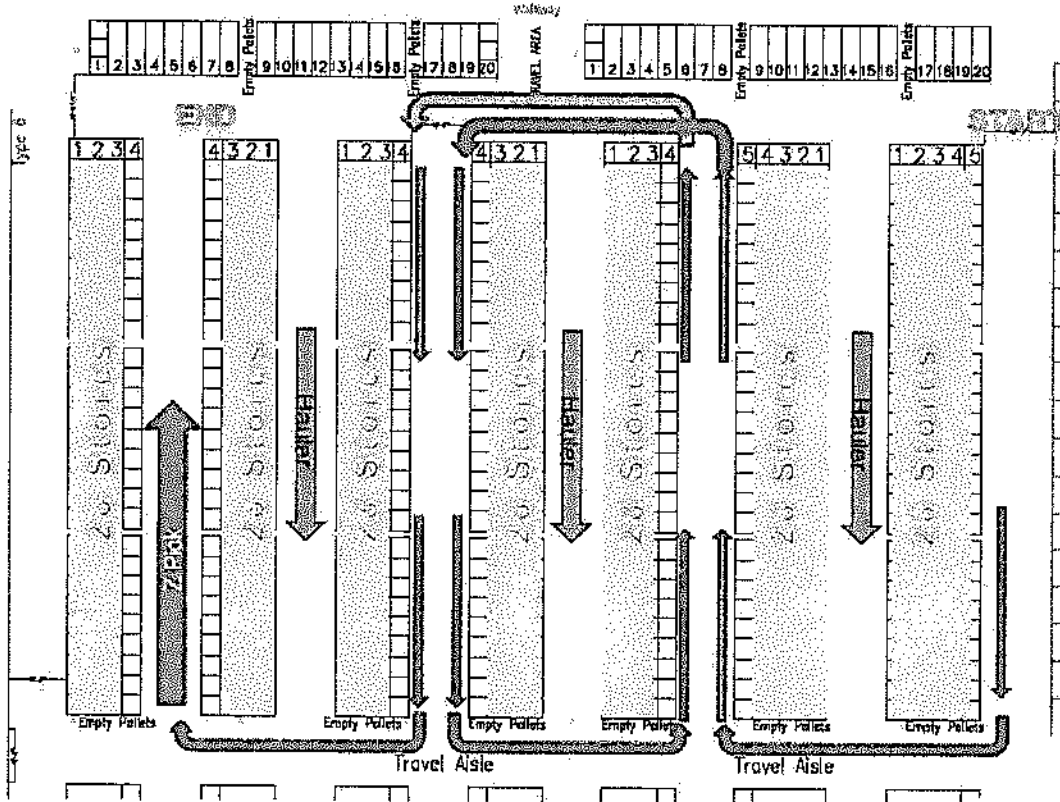
⁶ Daily average throughput volume was forecasted to be 70 per cent of peak daily volume.

EXHIBIT 5: AN EXAMPLE OF PICK-BY-LINE GRID/ PICK PATH FOR A CROSS DOCK DISTRIBUTION CENTRE

Pick By Line Grid / Pick Path

An Example showing a pick grid for 196 stores with 56 stores allocated with 5 pallet space per store, and 140 stores allocated with 4 pallet space per store.

# of Stores	Pallets/Store	Case/Pallet
56	5	32
140	4	32



Note : Hauler takes full pallets from back of pick aisles for loading

Source: Company files.



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