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9B18D007

HU-FRIEDY: EVALUATING TRANSPORTATION ALTERNATIVES

Maciek Nowak and Thomas Scanlan wrote this case solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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Luke Durand was the global procurement manager at Hu-Friedy Mfg. Co., LLC (Hu-Friedy), a dental instrument manufacturer. He was reviewing the company’s budget in August 2016 and was dismayed by the portion that was going toward transporting the company’s parts and finished goods throughout the network. Most of Hu-Friedy’s transportation needs were being provided through short-term contracts or through the commercial market, primarily using package express carriers such as Federal Express and United Parcel Service (UPS). While these companies were reliable, Durand felt that Hu-Friedy was paying a premium for a service that did not take into consideration the entire volume moving through the network. He thought there might be other options to consider, including entering into a long-term contract with a dedicated carrier, operating a private truck, or leasing a truck.

With these concerns in mind, Durand described the problem to one of his co-workers:

Currently, local suppliers ship product to us using a variety of different methods including UPS shipments and some LTL [less than truckload] freight carriers. The shipments to Hu-Friedy go to our Chicago or Des Plaines facilities. Those shipments can vary from small boxes to pallets of containers and boxes. We also ship components to suppliers in certain instances so additional work can be performed on the components. Do you think we might have enough volume in this local network to deliver our transportation needs using our own managed truck and permanent driver? Or should we hire a third-party logistics provider to handle our transportation needs for us?

Hu-Friedy

Founded in 1908, Hu-Friedy had become a world leader in dental instrument manufacturing, recognized for the high level of craftsmanship that went into each step of the manufacturing process (see Exhibit 1).[[1]](#footnote-1) The precision of its staff, who completed 80 per cent of the work by hand, along with the company’s proprietary processes and best-in-class materials, set Hu-Friedy apart from its competition. Hu-Friedy provided instruments for 97 per cent of dental schools in the United States and more than 97 per cent of U.S. dental hygiene schools. With 10,000 dental instruments and product solutions sold in over 100 countries, Hu-Friedy had more than 600 employees representing and growing its brand around the world.

The headquarters were in Chicago, Illinois, but Hu-Friedy had expanded to become a global company with offices and distribution centres in Des Plaines, Illinois; Rotterdam, The Netherlands; Tuttlingen, Germany; Shanghai, China; Tokyo, Japan; and Milan, Italy. The sales force was spread over 30 countries. But even with global sales and locations, Hu-Friedy proudly manufactured products deemed “Made in the USA.” Given the Made in the USA requirements and Hu-Friedy’s long history of being in Chicago, it was not a surprise that many of Hu-Friedy’s suppliers were located in and around Chicago, and were thus considered “local suppliers.”

With such a wide range of products, there were a variety of processes through which one of Hu-Friedy’s devices could be manufactured. A typical product would begin with the raw materials, including sheet metal, machined components, and plastic moulded components. Depending on the material quantity and the amount needed, the materials would be shipped from suppliers in the Chicago region (Chicagoland) to either the distribution centre in Des Plaines or directly to the manufacturing facility in Chicago. The Chicago facility held small quantities of inventory with the amount dependent on the material; inventory there was replenished daily from the Des Plaines facility. These materials were machined to Hu-Friedy’s exacting specifications, often involving considerable polishing and finishing by its experienced artisans. Some parts could require hours of polishing for just one unit. The parts were then assembled into the finished products seen in dental offices across the globe.

The transportation network

The two primary facilities that Hu-Friedy operated were a Chicago manufacturing plant (the Chicago Campus) and an inventory warehouse in Des Plaines (the West Campus), which was 13 miles away.[[2]](#footnote-2) Hu-Friedy received shipments from 12 suppliers in the Chicagoland area (see Exhibits 2 and 3), with some suppliers delivering to the manufacturing plant and others to the warehouse (see Exhibit 4).

Most of the shipments came in the form of four-foot square,[[3]](#footnote-3) 500-pound[[4]](#footnote-4) pallets that were not stackable. The height constraint on loading docks at the suppliers’ and Hu-Friedy’s locations was 8–10 feet. The transporting truck needed a lift gate for loading and unloading the pallets. Durand approximated that 20 minutes was generally sufficient time to load or unload a truck at any of the stops. The suppliers listed transportation as a separate line item on invoices so Hu-Friedy could calculate its transportation costs with each order. The total was almost US$190,000[[5]](#footnote-5) annually (see Exhibit 5).

In addition to receiving shipments from the suppliers, Hu-Friedy moved both finished goods and raw materials between the Chicago Campus and the West Campus. Some of the components moving between these locations were meant for final assembly and others for further manufacturing. Depending on the next steps in the part’s life, the components could be shipped again, this time to the other campus. The one to two pallets going between the Chicago and West campuses had product going both ways, with transport space needed for both directions.

Components from one supplier, Howard and Son Supply (Howard and Son), were handled differently. They were shipped to one of three companies that machined the components, which then delivered the machined components to Hu-Friedy (see Exhibit 6). Howard and Son did not necessarily need to ship its components directly to the machining companies; if necessary, the components could be temporarily stored at one of Hu-Friedy’s locations. Whatever route the components took, Hu-Friedy was responsible for the cost of transporting them from Howard and Son to all three companies.

Arrangements for transportation from the three companies to Hu-Friedy varied. Hu-Friedy assumed the costs of transporting machined parts from two of the companies—Woodson Manufacturing and Tool and Die LLC—to Hu-Friedy; however, Carter Design Group covered its own transportation costs, delivering its products ostensibly “free of cost” to Hu-Friedy. Durand had approached Carter Design about negotiating a price reduction if Hu-Friedy assumed the transportation needs. Unfortunately, Carter Design was not interested, so there would be no financial benefit for Hu-Friedy if it took on delivery of this product.

The other issue was that deliveries were not consistent or frequent, which would make it difficult to establish a regular delivery schedule. Also, the boxes shipped to and from Howard and Son Supply were long, not square. They could be stacked on the same side of the truck and were loaded and unloaded with a forklift, but the boxes consisted of wooden crates and were not, therefore, on skids or pallets.

Initial analysis

Durand sat down with this information during his lunch break to evaluate the transportation network and determine where improvements could be made. He quickly focused on the biggest expenditure: the shipments between the Chicago Campus and West Campus. He thought to himself, “Why do we have two shipments per day in both directions? Could we consolidate these shipments?”

Durand felt that two shipments per day met the company’s production needs and requirements based on its current process, but he wanted to discuss this issue with other team members, which he did after lunch. He soon realized that the company had sufficient capacity to handle additional inventory with fewer deliveries; therefore, there might be flexibility if he could show that consolidating these shipments would lead to significant savings. Also, the times set for the truck to leave either location were flexible so long as the truck was loaded and unloaded during the normal working hours of 8:00 a.m. to 5:00 p.m. The truck could even be loaded at the end of the day and then leave early the following morning.

While talking with his team members, Durand showed them the supplier table and speculated, “I’ve been wondering about some of these suppliers who send us deliveries a couple times a month or don’t have much transportation spend. I’m not sure that one truck would be enough to make all these deliveries, especially to Wisconsin.” Durand realized that the problem could be simplified if the company focused on the most significant transportation spend, but that it would need to justify excluding certain suppliers from its analysis, while still including the cost to service those lanes. “I’m seeing that one challenge will be coming up with a set of daily routes that most efficiently visits these suppliers and Hu-Friedy locations with the right frequency each week or month,” he added.

Purchasing a Delivery Vehicle

After evaluating the size of the largest shipments moved within the network, Durand determined that the minimum-sized truck should have interior dimensions of 8 feet wide by 10 feet high by 16 feet long and be rated to carry at least 5,000 pounds. Based on these dimensions, Durand considered several options. A new 2017 Isuzu N-Series 20-foot cargo truck that was 8.5 feet wide (sufficient to fit two pallets), rated to carry loads over 5,000 pounds, and included a built-in lift gate had an average cost of $58,295. Alternatively, a 2014 Isuzu 20-foot cargo truck with approximately 100,000 miles was listed for $29,750. Similar 2011 Isuzu trucks with 195,000 to 205,000 miles were listed for an average price of $18,500.[[6]](#footnote-6) Durand also learned that a new truck could be leased for $699 per month, for a total annual cost of $8,388.[[7]](#footnote-7) The expected fuel efficiency averaged out to 14 miles per gallon (mpg)[[8]](#footnote-8) for a new truck and 11 mpg for a used truck that was three to four years old.[[9]](#footnote-9) At the time, the average cost of diesel fuel in Chicagoland was $2.50 per gallon.[[10]](#footnote-10)

Durand considered dividing the maintenance costs into the various components such as tires and brake pads, but instead used an online maintenance costs calculator, which indicated that the average cost of maintenance for a new truck was $0.17 to $0.22 per mile, depending on the daily travel distance.[[11]](#footnote-11) He expected that those costs would be greater for a used truck, conservatively estimating a 20 per cent increase. For a leased truck, factory-recommended diesel maintenance would be covered for the first 60,000 miles. This coverage did not include some maintenance costs, such as the replacement of tires or brake pads.

The Illinois truck registration fees were based on the expected gross combined weight, which included the vehicle’s chassis, body, engine, engine fluids, fuel, accessories, driver, passengers, and cargo. Based on the weight rating of an Isuzu N-Series and the loads Durand expected would be transported, the weight would fall within the range of 12,001–16,000 pounds, which would make it a class F truck for licensing purposes.[[12]](#footnote-12) The registration fees were $751 for the initial annual registration and $711 per year thereafter. Durand checked with several insurance providers and concluded that the cost of insurance for the truck would be approximately $9,000 per year.

When Durand analyzed the possible routes for transport, he discovered that Hu-Friedy would incur tolls on many potential segments. He used the Illinois Tollway Trip Calculator[[13]](#footnote-13) to determine the cost of tolls for a two-axle, six-tire truck travelling the segments he expected the company might use (see Exhibit 7).

Salaries were another consideration. Durand’s research indicated that light or delivery service drivers in Chicago were paid an average of $16 per hour, with 90 per cent of drivers making less than $21 per hour.[[14]](#footnote-14) Durand expected that fringe benefits would be close to the private industry average of 30 per cent.[[15]](#footnote-15) Because the vehicle would weigh less than 26,000 pounds, the driver would not need a commercial driver’s licence.

Durand’s head swam with all of the different components of this problem. He thought to himself, “We haven’t even considered risk yet. What happens if our driver is out sick? Or if he’s in an accident?” Durand sighed, realizing that they would likely need some type of risk mitigation strategy, or at least a backup plan.

Outsourcing Delivery

To have an alternative, Durand also considered outsourcing all of Hu-Friedy’s transportation needs to one third-party logistics (3PL) provider. Using one company instead of the various firms that Hu-Friedy was using could reduce the transportation costs. Outsourcing would also allow Hu-Friedy to avoid the various difficulties associated with owning and operating its own truck. However, it would not give Hu-Friedy full control of its transportation, and it potentially did not capture all savings.

Durand reached out to several firms and requested quotes based on distance, volume, shipping frequency, and type of goods transported. He made note of the cost per trip for an average load on each segment as quoted by the 3PL company that provided Durand with the best overall rates (see Exhibit 8).

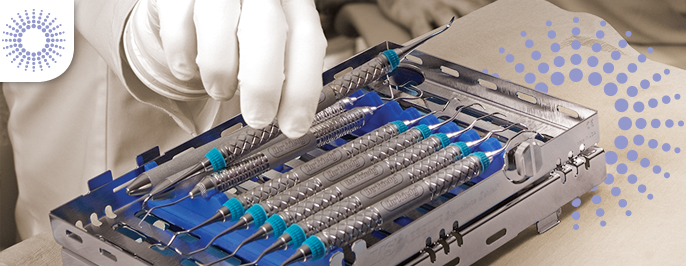
Making a Decision

After spending some time researching the various options and discussing them with the executive team, Durand felt that he had more direction. Hu-Friedy’s chief financial officer (CFO) had confirmed that there was more than sufficient capital on hand to purchase a new or used truck, and this decision would not put the company at risk financially. Given all of the costs associated with owning a truck, the CFO stressed that the expected annual depreciation of a truck needed to be considerably less than what Hu-Friedy was currently spending on transportation.

Fundamentally, Durand realized that a proposal could not be implemented unless there was a marked improvement from the current state, both operationally and financially. As with any project, Hu-Friedy’s decision-making process considered, in order of importance, quality, delivery, costs, and inventory. Optimizing the pickup and delivery schedule to support production demands would be key to this project. However, the proposed solution costs would need to reduce the current quantified spend for shipments made by local suppliers.

Durand thought, “I know where we want to be, but I’m still not sure if that means we should buy a truck, lease a truck, keep doing what we’re doing, or try something completely different.”

exhibit 1: Finished periodontal instruments manufactured by hu-friedy



Source: Company documents.

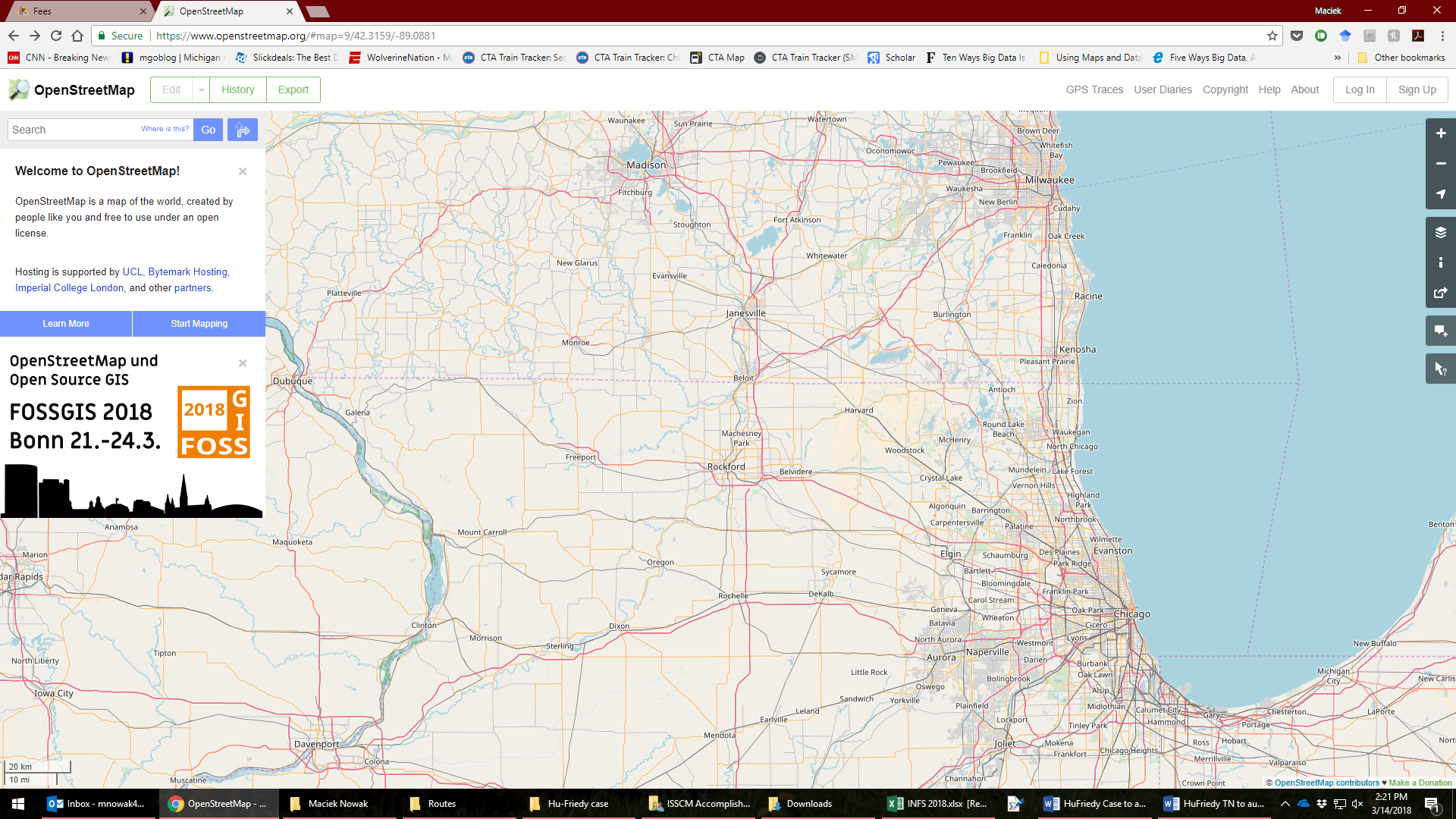
Exhibit 2: Hu-Friedy’s suppliers and Type of Material Shipped

|  |  |  |
| --- | --- | --- |
| **Map Key** | **Company Name** | **Material Being Shipped** |
| 8 | BOS Metal Supplies | Fabricated sheet metal parts (various sizes) |
| 10 | TB Grinding | Fabricated sheet metal parts (various sizes) |
| 4 | Harmon Supplies Ltd. | Various “purchase for resale” products (e.g., hand cleaning supplies and wipes) |
| 11 | Woodson Manufacturing | Small machined components (shipped in bulk boxes on pallets) |
| 2 | Tool and Die LLC | Small machined components (shipped in bulk boxes on pallets) |
| 13 | Precision Manufacturing | Grinding belts, wheels, and polishing wheels |
| 7 | Peppers Fabrication | Fabricated sheet metal parts (various sizes) |
| 3 | Howard and Son Supply | 12-foot raw bar |
| 6 | Grinding Technologies | Small turnings to make dental points for instruments |
| 12 | Industrial Supply | Small turnings to make dental points for instruments |
| 9 | Molding Design | Plastic moulded components, usually less than 5 inches long, shipped in bulk |
| 5 | Hu-Friedy, West Campus | Various (e.g., finished instruments, raw material) |
| 1 | Hu-Friedy, Chicago Campus | Various (e.g., finished instruments, raw material) |
| 14 | Piping Supply | 12-foot raw bar |

Note: Map keys refer to Exhibit 3; 1 foot = 0.3048 metres; 1 inch = 2.54 centimetres

Source: Created by the case author using internal company documents. Names have been anonymized.

exhibit 3: Map of Region Showing suppliers and hu-Friedy locations



**4**

**13**

**14**

**8**

**1**

**3**

**11**

**12**

**10**

**9**

**7**

**6**

**5**

**2**

20 miles

Note: 1 mile = 1.609 kilometres

Source: Created by the case author using OpenStreetMap. Used with permission.

exhibit 4: Shipment information for supplier and hu-friedy locations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Company Name** | **Shipment Frequency** | **Shipment Size** | **Maximum Shipment Weight** | **Drop Off Location** |
| BOS Metal Supplies | 1× per month | 1–2 pallets | 500 lbs/pallet | Des Plaines |
| TB Grinding | 1× per week | 2–4 pallets | 500 lbs/pallet | Des Plaines |
| Harmon Supplies Ltd. | 1× per month | 1–2 pallets | 50 lbs/pallet | Des Plaines |
| Woodson Manufacturing | 2× per week | 1–2 pallets | 700 lbs/pallet | Chicago |
| Tool and Die LLC | 2× per week | 1–2 pallets | 700 lbs/pallet | Chicago |
| Precision Manufacturing | 2× per month | 1–2 pallets | 500 lbs/pallet | Des Plaines |
| Peppers Fabrication | 2× per month | 1–4 pallets | 50 lbs | Chicago |
| Howard and Son Supply | See Exhibit 6 | See Exhibit 6 | See Exhibit 6 | See Exhibit 6 |
| Grinding Technologies | 1× per week | one box,  10 x 10 x 10 inches | 10 lbs | Chicago |
| Industrial Supply | 2× per month | 1 pallet or various sized boxes | 250 lbs | Chicago |
| Molding Design | 2× per week | one box,  6 x 4 x 10 inches | 1 lb | Chicago |
| Hu-Friedy,  West Campus | 2× per day  (11 a.m. & 2 p.m.) | 1–2 pallets | 500 lbs/pallet | Chicago Campus |
| Hu-Friedy,  Chicago Campus | 2× per day  (8 a.m. & 1 p.m.) | 1–2 pallets | 500 lbs/pallet | West Campus,  Des Plaines |
| Piping Supply | 1× per week | one box,  2 x 2 x 14 feet | 2,202 lbs | Howard and Son Supply |

Note: lbs = pounds; 1 pound = 0.4536 kilograms; 1 inch = 2.54 centimetres; 1 foot = 0.3048 metres.

Source: Created by the case author using internal company documents. Names have been anonymized and values have been modified.

exhibit 5: Address and Transportation costs for hu-friedy’s suppliers and hu-Friedy’s Locations

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Company Name** | **Street Address** | **City** | **State** | | **Approximate Annual Cost (US$)** |
| BOS Metal Supplies | 98 Thacker St. | Des Plaines | IL | 990 | |
| TB Grinding | 1115 N. Hunt Club Rd. | Gurnee | IL | 7,300 | |
| Harmon Supplies Ltd. | 825 Central Ave. | University Park | IL | 500 | |
| Woodson Manufacturing | 1005 Atlantic Dr. | West Chicago | IL | 9,100 | |
| Tool and Die LLC | 7950 N. Caldwell Ave. | Niles | IL | 32,000 | |
| Precision Manufacturing | W260N6395 Mary Hill Rd. | Sussex | WI | 2,800 | |
| Peppers Fabrication | 490 Supreme Dr. | Bensenville | IL | 3,500 | |
| Howard and Son Supply | 4600 Lake St. | Melrose Park | IL | 3,400 | |
| Grinding Technologies | 200 Touhy Ave. | Des Plaines | IL | 630 | |
| Industrial Supply | 200 E. Fabyan Pkwy. | Batavia | IL | 1,050 | |
| Molding Design | 499 Lake Cook Rd. | Deerfield | IL | 952 | |
| Hu-Friedy, West Campus | 1666 E. Touhy Ave. | Des Plaines | IL | 107,000 | |
| Hu-Friedy, Chicago Campus | 3232 N. Rockwell St. | Chicago | IL |
| Piping Supply | 704 1st St. W. | Lyndon | IL | 20,700 | |

Note: IL = Illinois; WI = Wisconsin.

Source: Created by the case author using internal company documents. Names and addresses have been anonymized and values have been modified.

exhibit 6: Destination of materials shipped from Howard and son supply

|  |  |  |  |
| --- | --- | --- | --- |
| **Drop-Off Company** | **Drop-Off Address** | **Frequency** | **Shipment Size** |
| Woodson Manufacturing | 1005 Atlantic Dr., West Chicago, IL | 1x per week | 2 x 2 x 14 foot box |
| Tool and Die LLC | 7950 N. Caldwell Ave., Niles, IL | 1x per month | 1 x 1 x 14 foot box |
| Carter Design Group | 460 W. Hintz Rd., Wheeling, IL | 1x per month | 1 x 1 x 14 foot box |

Note: IL = Illinois; 1 foot = 0.3048 metres.

Source: Created by the case author using internal company documents. Names and addresses have been anonymized and values have been modified.

Exhibit 7: Toll for a small truck (2 axles, 6 tires) during daytime Hours on Potential route segments

|  |  |  |
| --- | --- | --- |
| **Origin** | **Destination** | **Toll (US$)** |
| Tool and Die LLC | TB Grinding | 3.05 |
| TB Grinding | Hu-Friedy, West Campus | 2.40 |
| Hu-Friedy, Chicago Campus | Woodson Manufacturing | 6.70 |
| Woodson Manufacturing | Hu-Friedy, West Campus | 5.55 |
| Hu-Friedy, Chicago Campus | Piping Supply | 18.70 |
| Piping Supply | Howard and Son Supply | 16.30 |
| Howard and Son Supply | Hu-Friedy, West Campus | 3.05 |

Note: All other potential route segments do not have an associated toll.

Source: Created by author using internal company documents and Illinois Tollway, “Trip Calculator,” accessed March 18, 2017, www.getipass.com/trip-calculator. Names have been anonymized.

Exhibit 8: cost of using a Third-Party Logistics Provider for each Origin and destination pair

|  |  |  |
| --- | --- | --- |
| **Origin** | **Destination** | **Cost per Trip (US$)** |
| Hu-Friedy, Chicago Campus | Hu-Friedy, West Campus | 94 |
| Hu-Friedy, West Campus | Hu-Friedy, Chicago Campus | 94 |
| BOS Metal Supplies | Hu-Friedy, West Campus | 70 |
| TB Grinding | Hu-Friedy, West Campus | 94 |
| Harmon Supplies Ltd. | Hu-Friedy, West Campus | 108 |
| Woodson Manufacturing | Hu-Friedy, Chicago Campus | 82 |
| Tool and Die LLC | Hu-Friedy, Chicago Campus | 94 |
| Precision Manufacturing | Hu-Friedy, West Campus | 240 |
| Peppers Fabrication | Hu-Friedy, Chicago Campus | 94 |
| Grinding Technologies | Hu-Friedy, Chicago Campus | 70 |
| Industrial Supply | Hu-Friedy, Chicago Campus | 94 |
| Molding Design | Hu-Friedy, Chicago Campus | 82 |
| Piping Supply | Howard and Son Supply | 240 |
| Howard and Son Supply | Woodson Manufacturing | 94 |
| Howard and Son Supply | Tool and Die LLC | 82 |
| Howard and Son Supply | Carter Design Group | 94 |

Source: Created by the case author using internal company documents and data from a third-party logistics provider. Names have been anonymized and values have been modified.

1. Hu-Friedy, “Company Profile,” accessed March 1, 2017, www.hu-friedy.com/about. [↑](#footnote-ref-1)
2. 1 mile = 1.609 kilometres [↑](#footnote-ref-2)
3. Four feet square was a square measuring four feet on each side, or 4 feet × 4 feet × 4 feet; 1 foot = 0.3048 metres [↑](#footnote-ref-3)
4. 1 pound = 0.4536 kilograms [↑](#footnote-ref-4)
5. All currency amounts are in U.S. dollars. [↑](#footnote-ref-5)
6. Commercial Truck Trader, “Medium Duty Box Truck,” accessed March 16, 2017, www.commercialtrucktrader.com. [↑](#footnote-ref-6)
7. Isuzu Truck, “Isuzu Commercial Vehicles,” accessed March 16, 2017, www.isuzucv.com/en/npr-hd. [↑](#footnote-ref-7)
8. 1 gallon = 4.546 litres [↑](#footnote-ref-8)
9. Fuelly, “Isuzu NPR MPG,” accessed March 1, 2017, www.fuelly.com/truck/isuzu/npr. [↑](#footnote-ref-9)
10. Gas Buddy, “Chicago,” accessed March 12, 2017, www.chicagogasprices.com/index.aspx?fuel=D. [↑](#footnote-ref-10)
11. Freight Metrics, “Maintenance Costs Calculator,” accessed March 16, 2017, www.freightmetrics.com.au/Calculators%7CRoad/MaintenanceCosts/tabid/106/Default.aspx. [↑](#footnote-ref-11)
12. Office of the Illinois Secretary of State, “Fees—Commercial and Farm Trucks,” Cyber Drive Illinois, accessed March 18, 2017, www.cyberdriveillinois.com/departments/vehicles/cft/fees.html#truck. [↑](#footnote-ref-12)
13. Illinois Tollway, “Trip Calculator,” accessed March 18, 2017, www.getipass.com/trip-calculator. [↑](#footnote-ref-13)
14. PayScale, “Truck Driver, Light or Delivery Services in Chicago, Illinois Salary,” accessed February 27, 2017, www.payscale.com/research/US/Job=Truck\_Driver%2c\_Light\_Or\_Delivery\_Services/Hourly\_Rate/2f135f58/Chicago-IL. [↑](#footnote-ref-14)
15. Bureau of Labor Statistics, United States Department of Labor, “Employer Costs for Employee Compensation,” press release, March 17, 2017, accessed March 20, 2017, www.bls.gov/news.release/ecec.nr0.htm. [↑](#footnote-ref-15)