

I2 – Delivery Operations Improvement

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Background

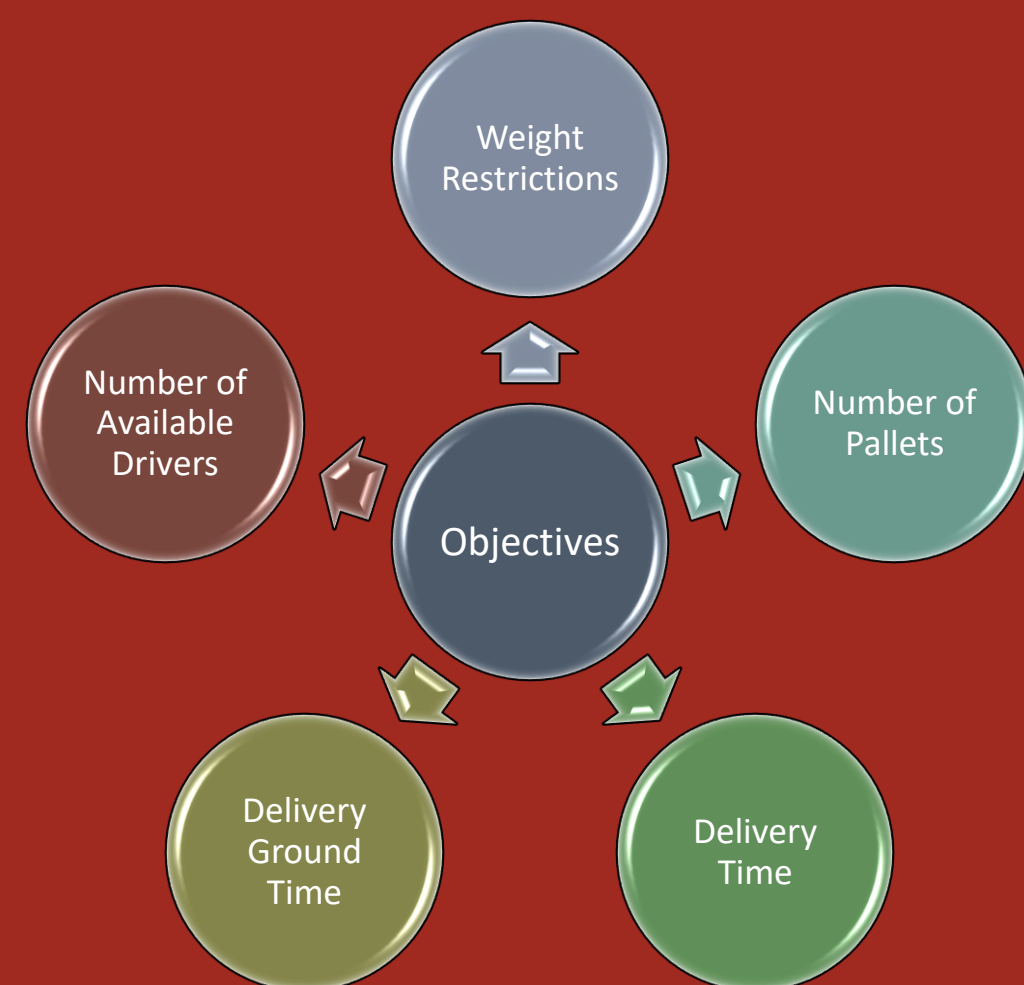
Founded in 1980, the San Antonio Food Bank serves as one of the largest service areas in Southwest Texas, focusing on meeting clients' needs to give a sustainable living in their regions. As the SAFB has grown to such an extent they're now experiencing issues with their current outbound scheduling system, with ensuring the accuracy and efficiency of their direct distribution programs.

Problem Statement

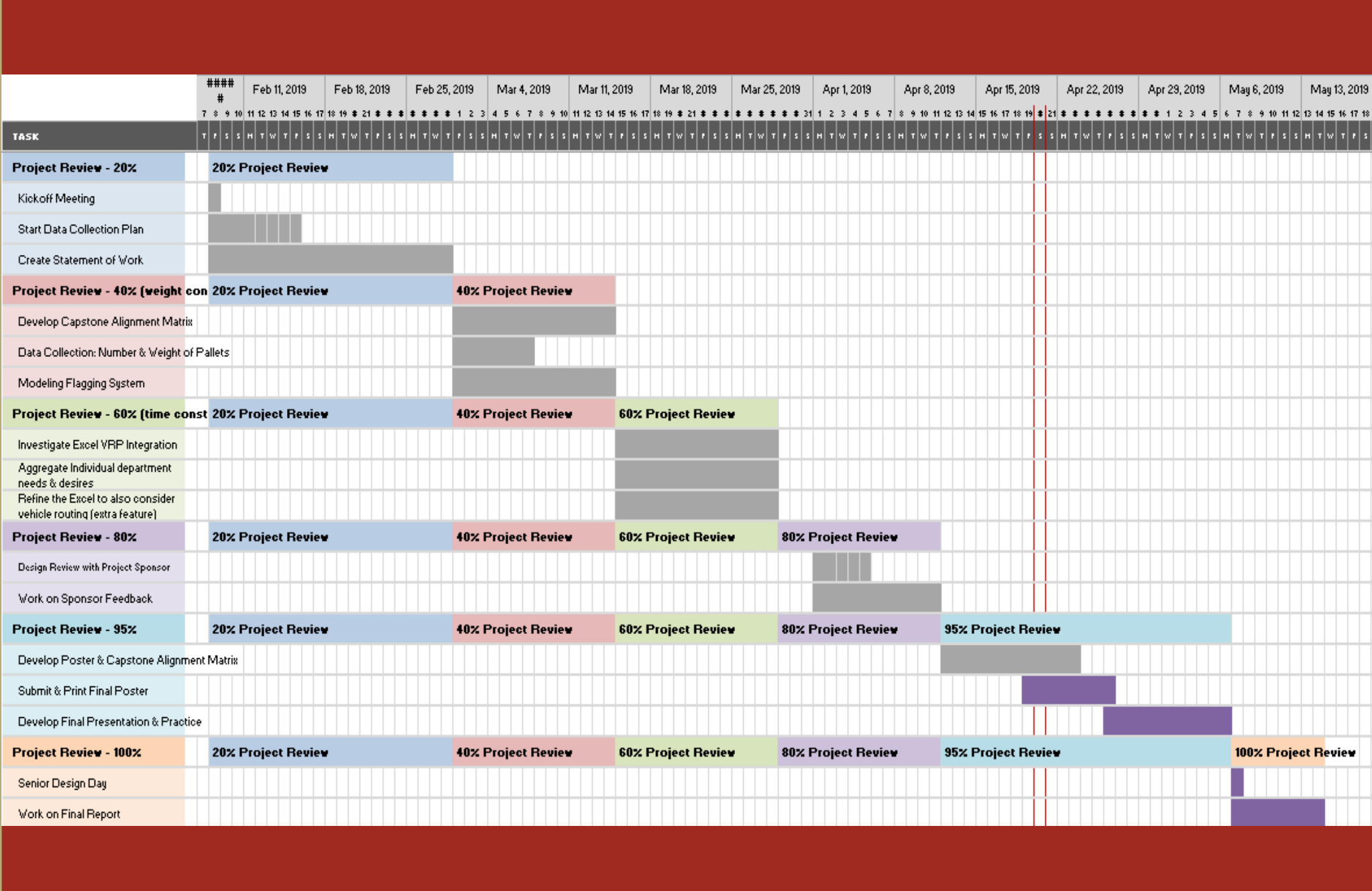
Assist in identifying a streamlined method across all relevant division to ensure accuracy of outbound scheduling as well as maximization of transportation resources.

Objective

Create an outbound scheduling system to streamline between all relevant divisions. The new system will include constraints for each order.



Schedule

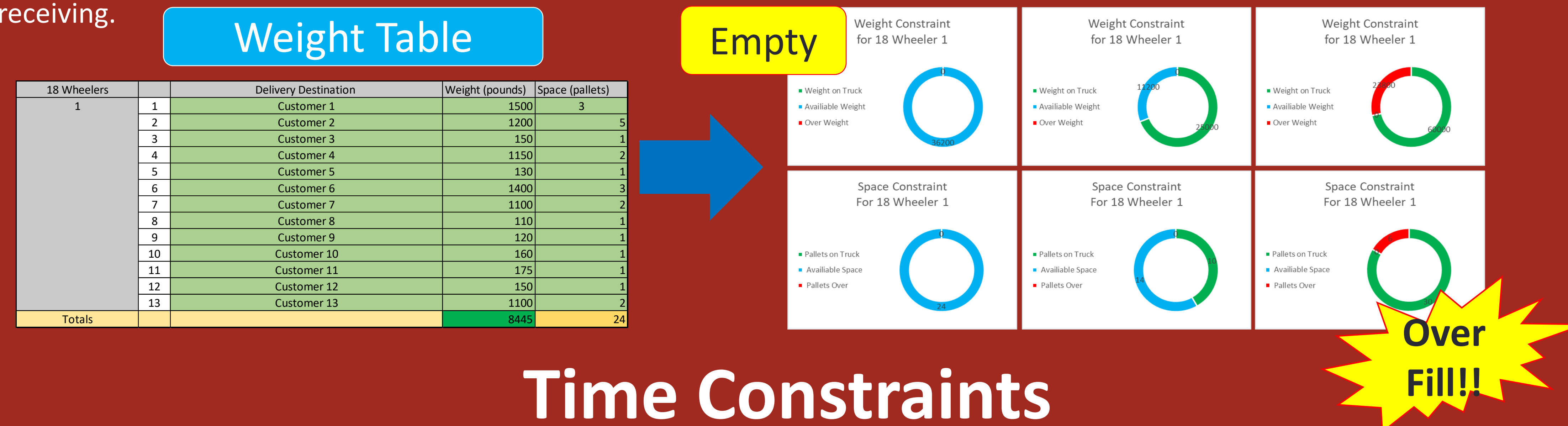


Methodology

The model was constructed into two main parts, part one was the evaluation and application of the weight and space constraints into the excel file made. Part two was the evaluation and application of the time constraints into the Excel file made previously.

Weight and Space Constraints

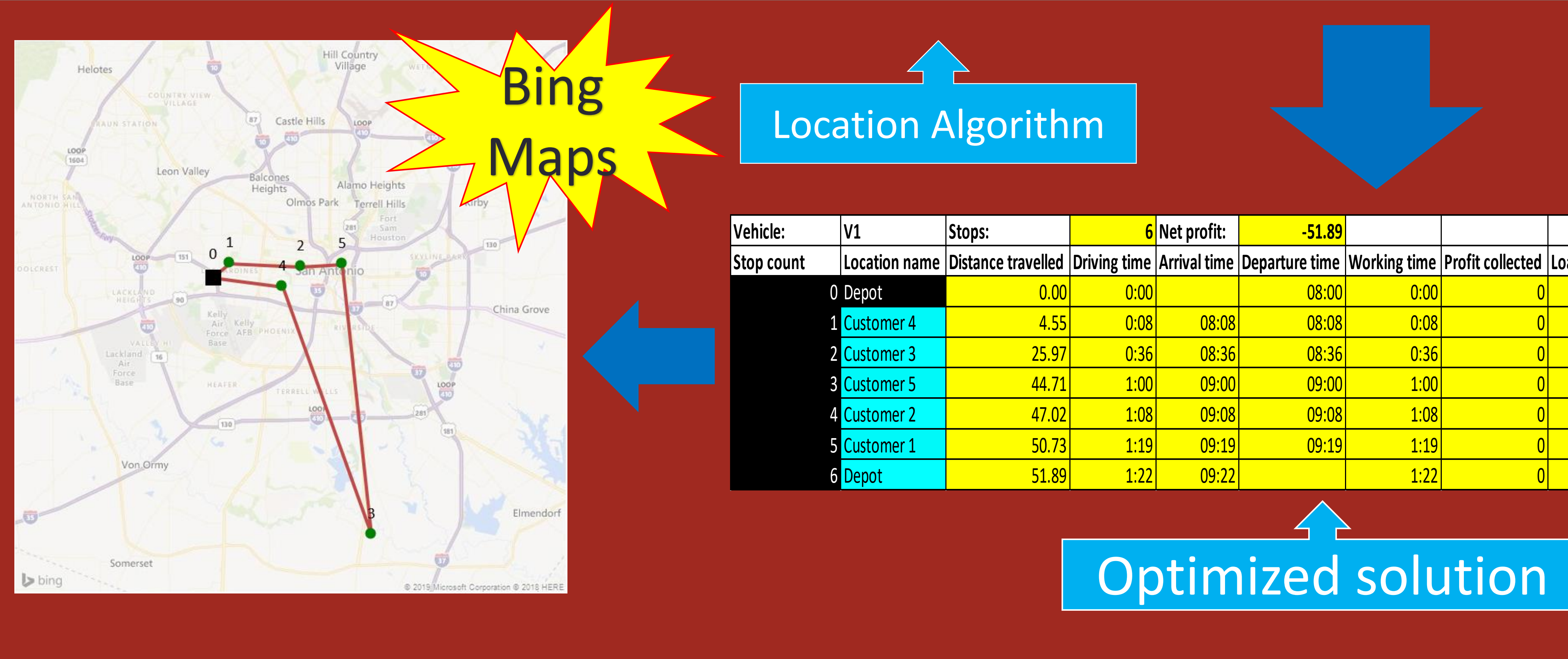
The evaluation of the weight and space constraints gave three parameters: the weight each truck can handle, the weight of each of the pallets that are loaded onto the trucks, and the or number of pallets each truck can hold. The SAFB uses three different trucks in their fleet: 18 wheelers that hold up to 36,000 pounds and 24 pallets, 26' bobtails that hold up to 12,200 pounds and 12 pallets, and finally 16' refrigerated box trucks that hold up to 4,000 pounds and 4 pallets. With these constraints the Excel file was made to allow the workers to input the destination, how much weight of food and how many pallets each location is receiving.



Time Constraints

Using a Vehicle Routing Program gives a simple solution to simple routing issues. The user only needs to provide the customers' addresses, time window, and service time and the solver will provide a solution to optimize their routes. The program permits the user with a feasible solution by using a "Bing Key" which gives the program access to the Bing Maps. It tracks down the longitude and latitude of each location and can provide real time traffic patterns. Each department can use this program to optimize their drives and allocate their resources.

| Location ID | Name | Address | Latitude (y) | Longitude (x) | Time window start | Time window end | Must be visited? | Service time |
|-------------|------------|---|--------------|---------------|-------------------|-----------------|-------------------|--------------|
| 0 | Depot | 5200 Enrique M. Barrera Pkwy, San Antonio, TX 78227 | 29.4183738 | -98.5923908 | 00:00 | 23:59 | Starting location | 0:00 |
| 1 | Customer 1 | 339 SW 39th St, San Antonio, TX 78237 | 29.4281808 | -98.5790284 | 00:00 | 23:59 | Must be visited | 0:00 |
| 2 | Customer 2 | 1801 W César E Chávez Blvd, San Antonio, TX 78207 | 29.4258900 | -98.5227737 | 00:00 | 23:59 | Must be visited | 0:00 |
| 3 | Customer 3 | 18502 Leal Rd, San Antonio, TX 78221 | 29.2404616 | -98.4663445 | 00:00 | 23:59 | Must be visited | 0:00 |
| 4 | Customer 4 | 1515 Saltillo St, San Antonio, TX 78207 | 29.4118477 | -98.5370768 | 00:00 | 23:59 | Must be visited | 0:00 |
| 5 | Customer 5 | 300 E Travis St, San Antonio, TX 78205 | 29.4275500 | -98.4895700 | 00:00 | 23:59 | Must be visited | 0:00 |



Summary of Results

After a semester of learning and data collection and the occasional readjustments, we've offered our sponsor an Excel solution that satisfies the initial project objectives. At the ordering/scheduling stage of deliveries, the Excel solution provides a helpful preview of the resource constraints: 1. weight and space constraints of the trucks and 2. time constraints based on delivery addresses. On a department-by-department basis, this can help save time and more accurately predict the ability to fulfill deliveries and plan for shared-allocations or extra shipments. This benefit can be maximized if multiple departments use this solution and share among one another.

Conclusions & Recommendations

Considering the overall desire for more seamless communication across different departments and projects at the San Antonio Food Bank, there are a few recommendations we'd make in order to advance this goal:

- A **standard file-sharing system** would help reduce the disconnect between different groups. We'd recommend that all departments use the Office365 platform for live-shared and updating sheets and forms.
- The Food Bank would like to optimize available resources to maximize the amount of food distributed and clients served; to accomplish this goal, **the programs need to be more flexible with the allocation of resources** and become less territorial about "their trucks & drivers".
- The Excel solution we provided aims to provide a useful pre-check on the allocation of resources by weight and delivery destination. For the sake of longevity, there needs to be a **firm commitment to use the Excel solution**.

Acknowledgments

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