Freight Advanced Traveler Information System (FRATIS)

Overview and Results

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Freight Advanced Traveler Information System Concepts and Potential Impacts

Freight Operations Problem Statement:

Lack of Freight Advanced Planning and Real-time Information has negative effect on:

- Efficient Movement of Freight Transportation
- Congestion on roads and long line on the gates
- Planning of freight daily work activities
- Environment of Neighboring Communities
- Energy Consumption
- Safety of the Traveling Public

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FRATIS Solution

- Drayage and Truck Routing Optimization
  - Optimize truck/load movements between freight facilities
  - Individual trucks are assigned best time windows for pick-up or drop-off
  - Utilizes travel information and information on port terminal conditions to optimize operations

- Freight-Specific Dynamic Travel Planning and Performance
  - Integrates data on wait times at intermodal facilities (e.g. ports), traffic conditions, incident alerts, road closures, work zones, routing restrictions (hazmat, oversize/overweight)
  - Adaptive Communication between Drayage Company, Drivers, and Intermodal Facilities
  - Real-time Information and Dynamic Routing for Drivers

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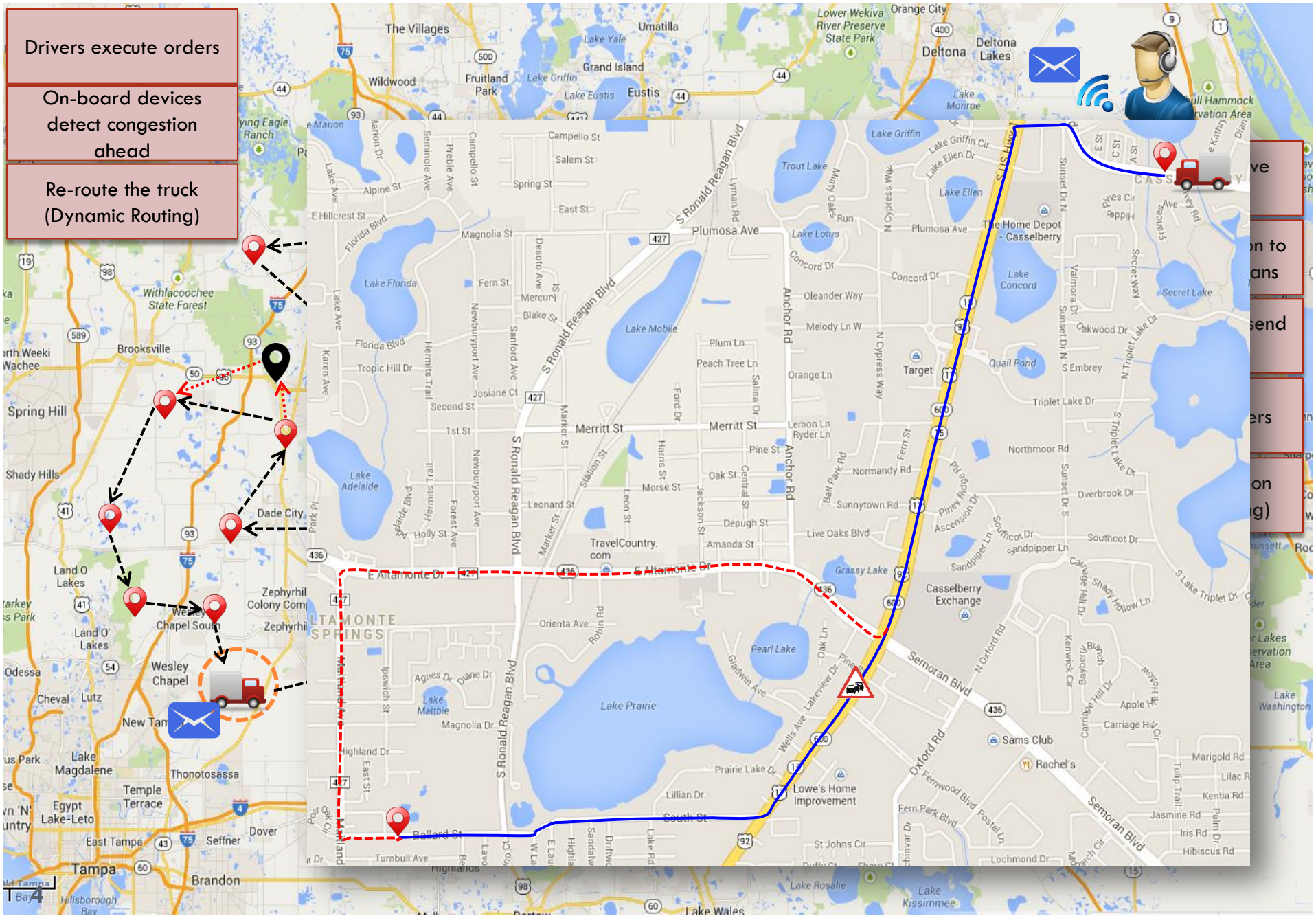
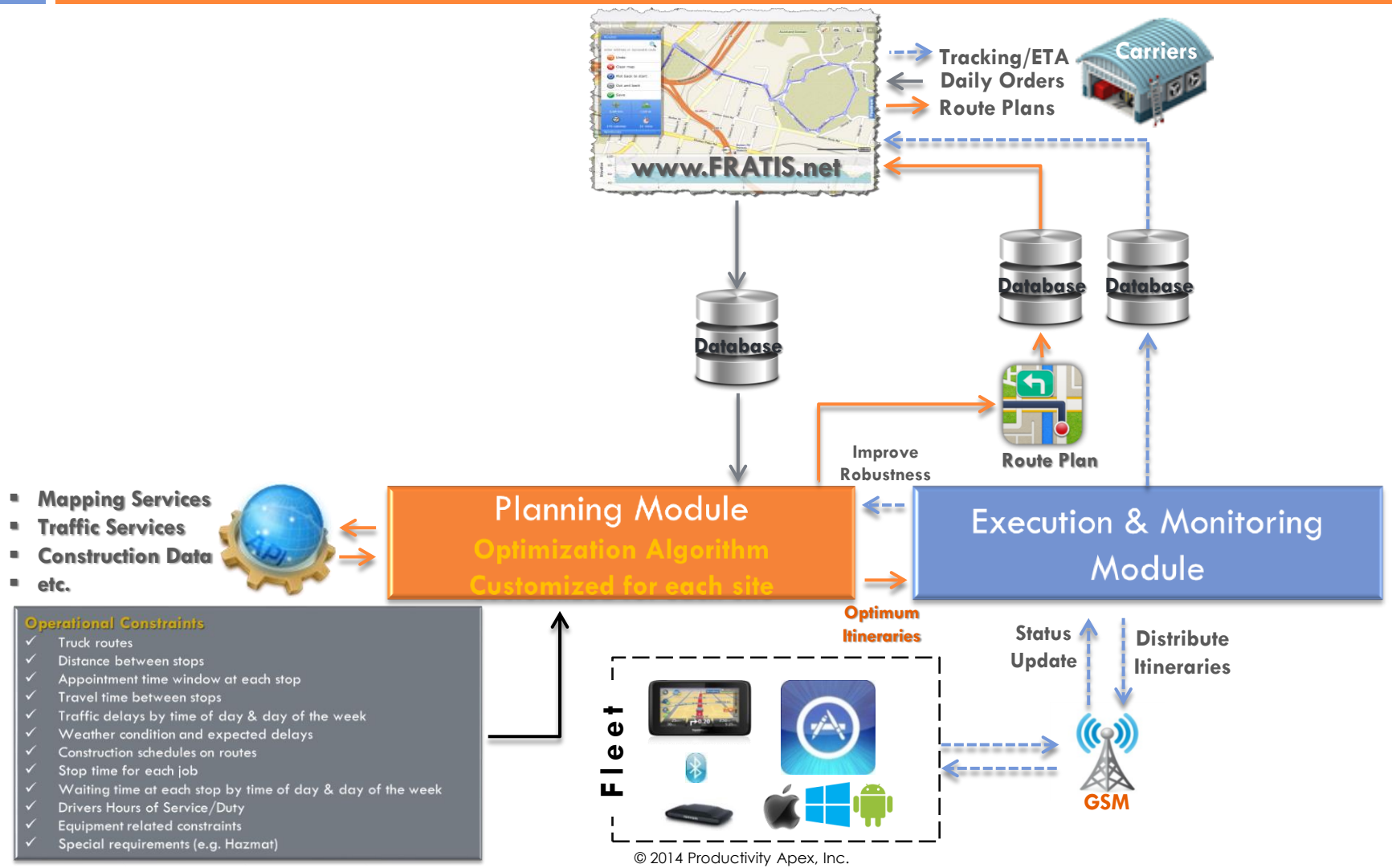

Drivers execute orders
On-board devices detect congestion ahead
Re-route the truck (Dynamic Routing)
Semoran Blvd
Merritt St
Plumosa Ave
S Ronald Reagan Blvd
Anchor Rd
Oxford Rd
Lake Prairie
Lake Florida
Lake Mobile
Lake Adelaide
Pearl Lake
Grassy Lake
Lake Griffin
Lake Ellen
Lake Lotus
Lake Concord
Quail Pond
Secret Lake
Casselberry Exchange
Target
The Home Depot - Casselberry
Lowe's Home Improvement
Sams Club
Rachel's
TravelCountry.com
E Altamonte Dr
Live Oaks Blvd
Orange Ave
Brooksville
Spring Hill
Shady Hills
Dade City
Land O Lakes
Wesley Chapel
Zephyrhills
Odessa
Cheval
Lutz
Lake Magdalene
Thonotosassa
Temple Terrace
Egypt Lake-Leto
East Tampa
Seffner
Dover
Tampa
Brandon
Withlacoochee State Forest
The Villages
Wildwood
Fruitland Park
Umatilla
Grand Island
Eustis
Deltona
Deltona Lakes
Orange City
Lake Monroe
Lower Wekiva River Preserve State Park
Lake Kissimmee
Lake Wales
Lake Rosalie

FRATIS Architecture



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FRATIS

Drayage Optimization Proof of Concept Application - Memphis

- The goal of the project was to develop and test the drayage optimization application
- The objectives of the application are to
  - Minimize total travel time
  - Minimize Required fleet size
  - Minimize unproductive moves
  - Maximize truck productivity
- The application provides the user with daily route plans considering
  - Customers' locations
  - Customers' time windows
  - Depots/RRY time windows
  - Drivers' driving & duty hours limits
  - Load matches

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FRATIS

Drayage Optimization Proof of Concept Application Process

- Generate optimal plan
  - The optimization recommends best feasible plan that maximizes operational efficiency of freight pickups and deliveries of the entire fleet
- Review the optimal plan and approve
  - The optimal plan will be displayed to the dispatcher including:
    - Plan details for each driver, truck, and shipment
    - Plan summary statistics including miles, time, cost, status miles, utilization, fleet size, etc.
  - The dispatcher can make changes to the plan. The system will update the plan summary statistics and provide a comparison between modified and optimal plans.
- Communicate the plan to drivers

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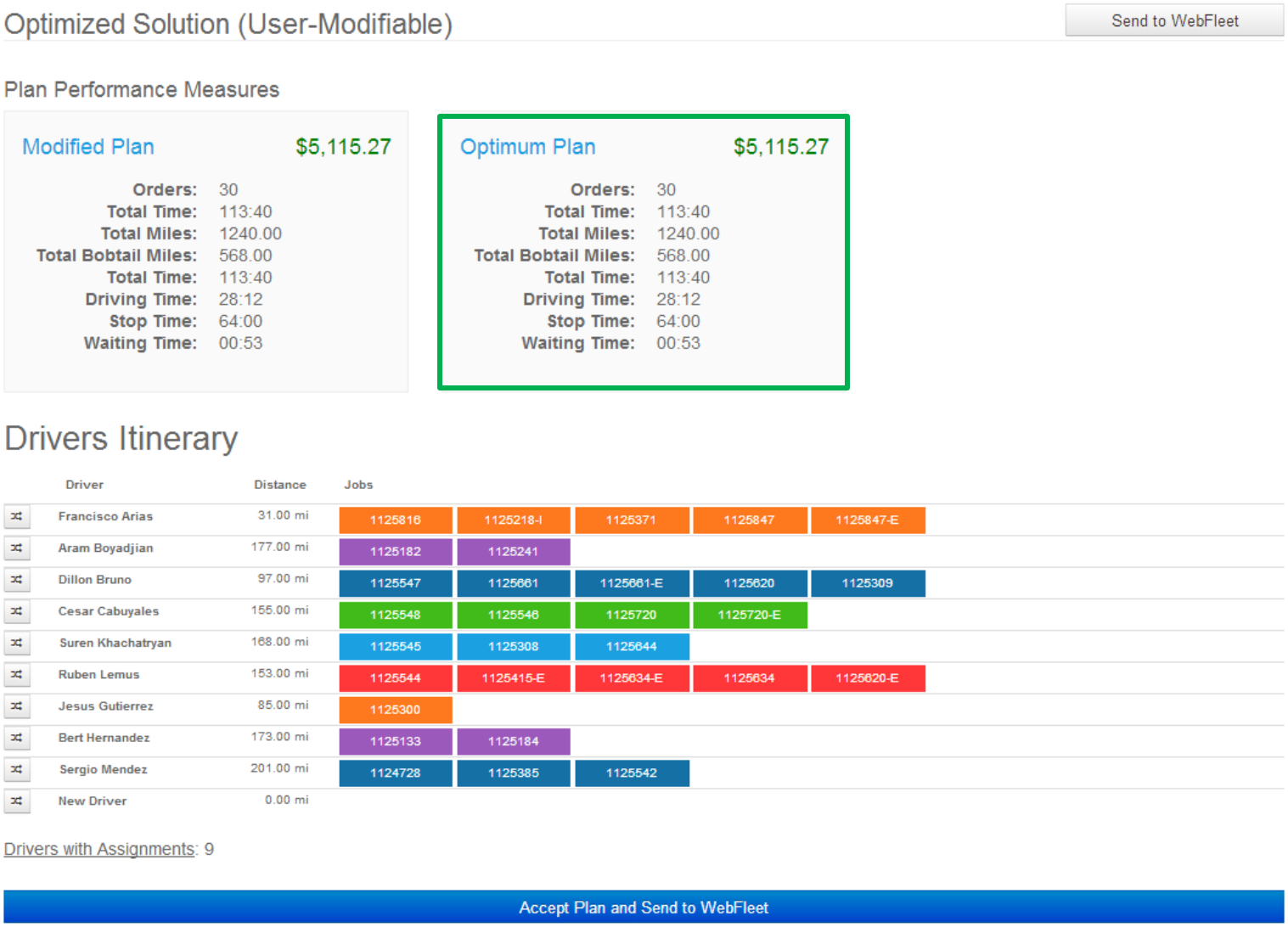
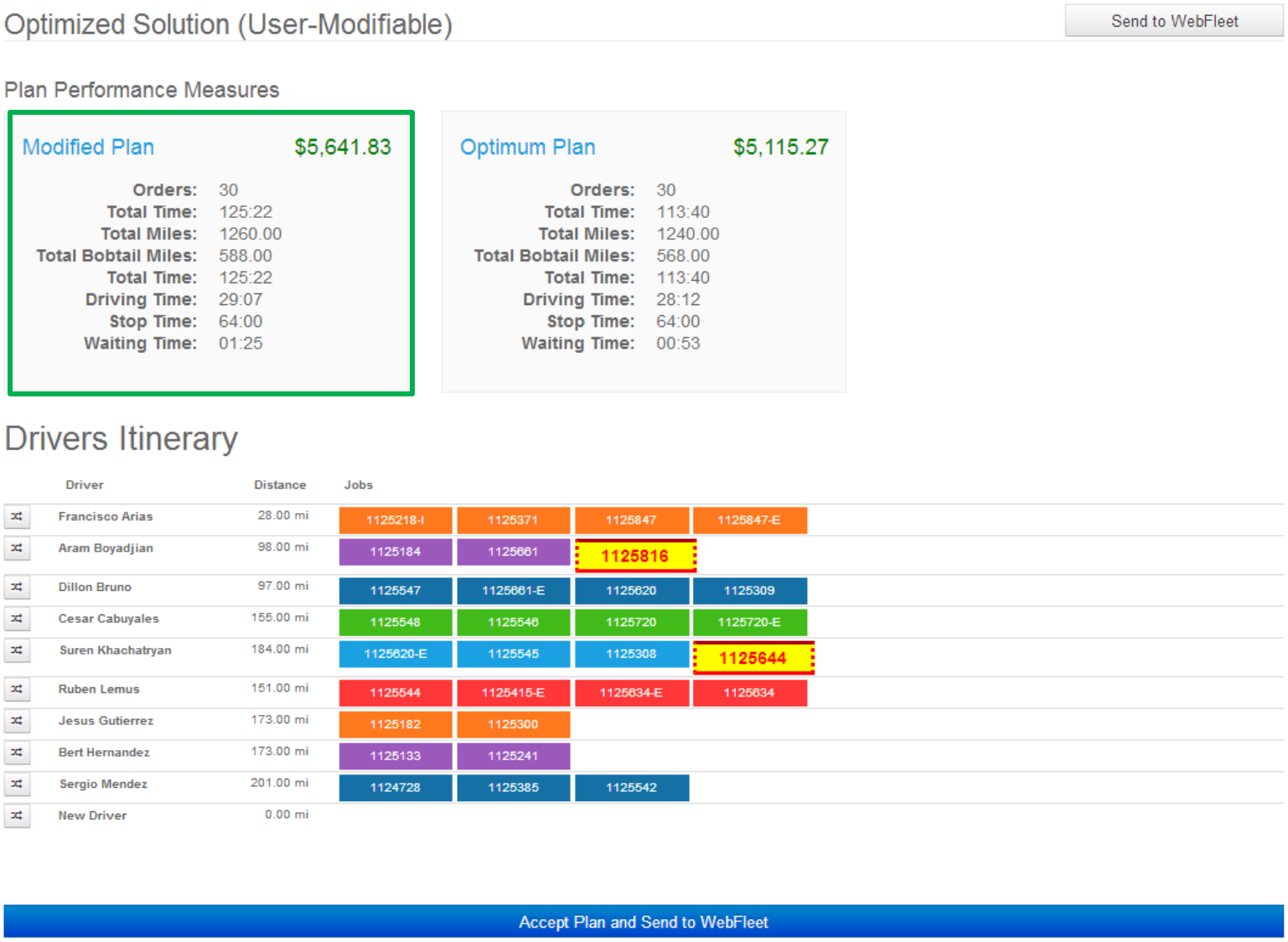
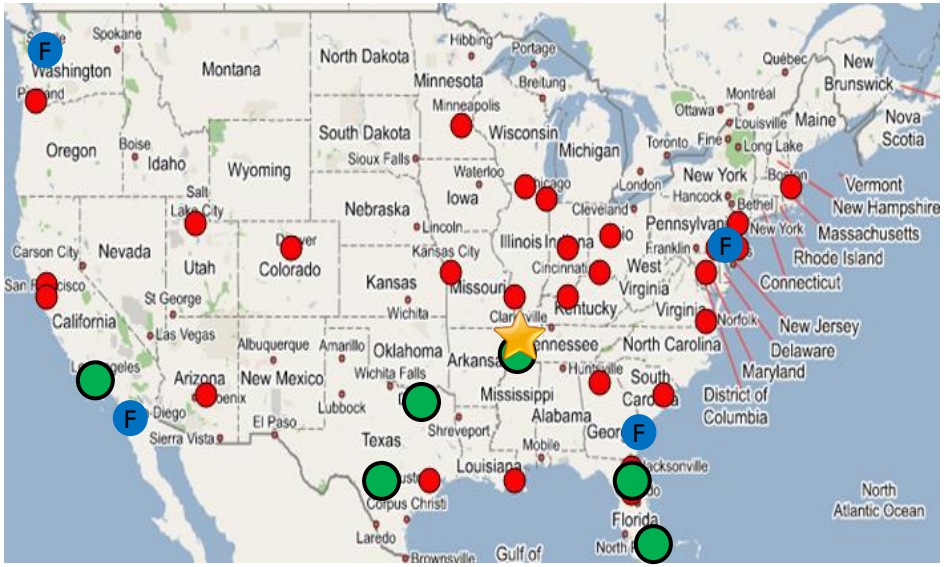
Generated Optimal Plan



Manually Modified Plan



Memphis Implementation Results



- Identified FRATIS Sites
- Completed and In-Progress Sites
- F Potential Future Sites

Average Improvements and Operational Impacts:

Fleet Size Reduction: **16%**

Orders/Truck Increase: **9%**

Total Miles Reduction: **1%**

Unproductive Miles Reduction (Bobtail Miles): **12%**

Fuel Consumption Improvement : **8%**

Emission Reduction: **10%**

Driving Time Utilization % Improvement: **15%**

Total Time Utilization % Improvement: **16%**

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FRATIS – LA/Long Beach Implementation

Site specific features:

- Waiting time at marine terminal gate
  - Collect time specific wait time data at the marine terminal gate
- Real travel time using traffic services
  - NAVTEQ traffic services to get the actual traveling distances and times between different locations
- Communication with the marine terminals
  - Notifying the marine terminals with the expected arrival time

Benefits:

- Develop more robust plans using real travel time data
- Avoid long waiting times in front of marine terminal gates

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FRATIS - Miami Implementation

Site specific features:

- Integration with Company's Legacy System
  - Eliminate double entry of the data
- Real travel time using traffic services
- Considering Railway schedule for dispatching

Benefits:

- Retrieve orders' information automatically from FEC legacy system
- Avoid missing railroad terminal cutoff times

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FRATIS - Central Florida Implementation

Site specific features:

- Incorporate off-peak/off hours delivery concept to find best dispatching time for the truck to avoid congestion
  - Improve freight flow to congested urban areas
  - Minimize trucks waiting time
  - Minimize carbon footprint
- Real traffic conditions
- Receivers' docks – Capacity and availability

Benefits:

- Avoid trucks long waiting times at receivers' docks due to unavailability
- Improve customer satisfaction

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FRATIS - Texas Implementation

Site specific features:

- Optimize freight flow on transportation corridors – I-35
- Utilize I-35 Traveler Information During Construction (TIDC) system for high quality traffic and construction data
  - Historical data regarding average speed and average travel times on the different segments of the freight corridor
  - Data feeds for all current and future lane closures or construction activities

Benefits:

- More robust plans using real travel times and expected delays due to construction activities

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Private Benefits

- Improve productivity and efficiency of the fleet
- Empower dispatchers with real-time information for faster and better decisions
- Generate near optimal trucks itinerary taking into consideration travel times with traffic, waiting times at the terminal, weather conditions, driver availability, etc.
- Access to real time Terminal Waiting Times and Turn-Times
- Dynamic routing to avoid heavy traffic, incidents and congestion

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Benefits to Intermodal Facilities and Freight Hubs

- Receive pre-notifications notices from trucking companies
- Reduce waiting time and turn around time at the facility
- Reduce unproductive pickups/drop-offs
- Communicate directly with dispatcher to notify about terminal closures, incidents, or any other operational status

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Public Benefits

- Promote better transportation planning and policy
- Improve air quality by reducing CO2 emissions
- Better utilization of existing infrastructure and capacity
- Improve safety of traveling public

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