Spelled out TITLE of Application (Abbreviation or Acronym)

# Metadata information

1. Select the most relevant categories with respect to the function of this open source application:

|  |  |
| --- | --- |
| Arterial management  Freeway management  Roadway operations & maintenance  Crash prevention & safety  Road weather management  Transit management  Traffic incident management  Emergency management | Information management  Commercial vehicle operations  Electronic payment & pricing  Traveler information  Intermodal freight  Driver assistance  Collision notification  Collision avoidance |

1. List up to 5 keywords that are relevant to this open source application, separated by comma:

*FRATIS, DRAYAGE, OPTIMIZATION, INTERMODAL, FREIGHT*

1. Check ALL computing operating systems and environments this open source application will operate in:

Windows

Mac

Linux

Android mobile

iOS mobile

Windows mobile

Other: Web-based

# Content for Application Page

*Try and use plain English were possible, avoid lingo and include adequate explanation for new terms. Spell out initial acronyms when first used. Please include one or more relevant graphic images for the application. If none is available from existing documentation, the OSADP administrator will improvise a graphic for association with your application.*

*Samples of applications input for each of the sections can be found on the* [*OSADP website*](https://www.itsforge.net/index.php/community/explore-applications#/all) *(You don’t need to be registered to view application information)*

## Tab 1: Overview Tab

In 2013 Productivity Apex implemented the Cross Town Improvement Project (C-TIP) Drayage Optimization Proof of Concept Application in Memphis, Tennessee and in 2014 the Los Angeles-Gateway Freight Advance Traveler Information System was deployed by Cambridge Systematic in partnership with Productivity Apex to improve truck operations in and around ports and other freight intermodal facilities. Implementation of the current C-TIP project included targeted system enhancements based on learnings from these previous deployments. Some of the key system enhancements are listed below:

* Integration with participants’ legacy systems.
* Development of a Driver Mobile Application.
* Integration with Traffic Services for algorithm travel time calculations.
* Inclusion of CoPilot® GPS for truck vehicle’s routing considering real-time traffic conditions.
* Development of dynamic planning functionalities within the optimization engine.
* Development of an Online Portal and Open API for Marine Terminal Notification.

## Tab 2: Description

The Los Angeles Enhancement of Cross Town Improvement Project (C-TIP) Drayage Optimization Proof of Concept Application evolved from previously deployed systems funded by the US Department of Transportation such as C-TIP in Memphis, Tennessee and FRATIS in Los Angeles, California. These systems were developed and deployed with the common purpose of improving freight operations subject to many constraints that different environments experience (e.g., congestion, insufficient communication among parties, etc.) and constitute the base for this application.

Deployment of this technology in multiple locations led to many lessons learned that served as the genesis for the development of the C-TIP application. Major enhancements were made to the prior systems based on the lessons learned and the deployment was expanded to include the participation of multiple stakeholders.

It is important to note that different stakeholders use the word C-TIP and FRATIS interchangeably – this is valid given that the FRATIS tool is just an evolution of the C-TIP Application. In the balance of this document we will be using FRATIS when we refer to the system that comprises this project.

The following section describes the major enhancements that were implemented in FRATIS based on experience gained from prior deployments and interactions with multiple stakeholders.

### Integration with LMC’s dispatching and transportation management systems

During the project a standard approach was develop that would satisfy data migration from any TMS (Transportation Management System) using a comma-separated value (csv) or Excel formatted file report. Following this approach, a feature was developed for FRATIS users to upload a csv or Excel file to import orders, allowing the upload of multiple orders at once to populate the tool.

In addition to the development of data import capability in the tool, a data export functionality was also developed. This new feature allowed system users to generate a report containing the resulting order assignment and schedule plan from running the optimization algorithm. With this capability, users could print a file containing all the assignments and sequences and even upload it to their dispatching system to expedite the status update and order assignment in their systems.

The development of this new feature in FRATIS eliminated the need for data double entry that was experienced in prior deployments and provided a more streamlined operation of the tool.

### Development of a Driver Mobile Application

During the development phase of the project, a mobile application was developed to provide drivers with an on-board system to receive their assignments and itineraries in real time. This application also allowed drivers to have access to their assigned orders in the optimized sequence for execution. Additionally, using the mobile application, drivers were now able to update orders status and location information for the assigned orders.

Below are the list of features and requirements developed in the mobile application:

* **The mobile application was developed for both Apple operating system (iOS) and Android operating system. Hence, drivers from participant companies could access the mobile application from iOS and Android tablets and cell phones.**
* **The mobile application required that devices have data plan or internet connectivity through Wi-Fi to send and receive order data from the FRATIS tool. However, the application could operate without data signal with the only limitation of not being able to send and receive data in real time. Once data signal was available, the mobile application would synchronize with the web dashboard and update order status and driver information.**
* **The mobile application allowed drivers to access their assigned orders as well as the sequence in which they should be executed.**
* **The mobile application allowed drivers to update the status of the orders by indicating, when they were en route to an order, when an order was in progress, and when the order had been completed. All updates were synchronized with the dashboard tool, informing dispatchers of the order status.**
* **The mobile application captured GPS coordinates from the mobile device to locate drivers and use the data for dynamic planning (plan re-optimization) throughout the day with real-time driver information.**

### Integration with Traffic Services for algorithm travel time calculations

**The project team integrated the FRATIS tool with historical traffic information in order to reduce the estimated travel time between locations. The team was granted access to the Regional Integration of Intelligent Transportation Systems (RIITS) database. The RIITS network is sponsored by the Los Angeles County Metropolitan Transportation Agency (Metro), and agencies like Caltrans, City of Los Angeles Department of Transportation (LADOT), California Highway Patrol (CHP), Long Beach Transit (LBT), Foothill Transit (FHT), and Metro contribute information collected through their own Intelligent Transportation Systems (ITS) to the network using the Los Angeles County Regional ITS Architecture and National ITS Standards. The network supports information exchange in real-time between freeway, traffic, transit and emergency service agencies to improve management of the Los Angeles County transportation system and better serve the traveling public (https://www.riits.net/).**

**The RIITS traffic data was selected because it contains thousands of data points throughout the region classified by date and time of the day. This information was key for its use in the FRATIS tool, given that historical data was needed to predict the travel time between two locations on specific day of the week and during each hour of the day. The tool used historical data from the previous 4 weeks to estimate travel times between locations on a given day and hour.**

**To accomplish this, the project team developed special queries to the traffic database so the required data could be obtained within the needed timeframe. This data was then processed and mapped to the route engine used by FRATIS in order to match the road waypoints from the two systems. Finally, a file was generated containing all the average delays categorized per day and time of day; this file was used by the FRATIS optimization algorithm to calculate the proper travel distances between** locations when generating the optimized plan solutions.

### Provision of truck navigation with real-time traffic capability

**Additional functionality developed in this enhanced version of the tool consisted of using real-time traffic information to navigate between stops. The project team used the third-party application Copilot® Mobile Navigation by ALK Technologies to provide this capability. This third-party application was integrated into the FRATIS mobile application so that drivers could easily navigate to different locations in their itinerary with the click of a button. When drivers click on the navigation button for the corresponding location, the Copilot® app opens and provides step-by-step directions considering real-time traffic, road closures, and accidents** information in order to minimize travel time.

### Development of Dynamic planning feature for the optimization

The FRATIS dynamic planning feature was one of the most requested functionalities from previous pilot projects. This feature was developed in this phase and allowed users to re-optimize their plans at any time during the day considering the latest location of drivers, the updated status of each assigned order, and the remaining duty and driving time for each of the drivers in the plan.

Additionally, users could add and remove orders as well as drivers on a plan. This capability allowed for the incorporation of same-day or emergency orders on a day’s plan, removal of drivers who cannot complete their assignment for any reason, and the reassignment of those orders to new drivers in the most efficient manner.

### Development of an Online Marine Terminal Notification Portal and Open API

The new solution involved the development of the Online Marine Terminal Notification Portal and an Open API as part of a system enhancement in this project. Terminals can be given access to this portal which provides detailed information including estimated arrival time of upcoming orders to their facilities. The portal also provides access to an open API that operators can use to integrate with their systems and access the same information as on the portal. This solution allows marine terminals to estimate the number of potential transactions at their facilities in advance categorized by type, carrier, shift, and steamship line. The information in the online portal is also updated once trucks start navigating towards the terminal taking current traffic conditions into consideration as long as drivers use the FRATIS mobile application. With this system MTO’s can also identify LMC’s transactions cancellations or no-shows in advance.

## Tab 3: Release Notes:

**This documentation is included as Text files with the source code.**

1. *Release Notes*
2. *License information*
3. *Installation instructions*
4. *Operating requirements*
5. *Related websites/references*

*If using Apache Version 2.0 this is the standard language that can be re-used for your application.*

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## Tab 3: Documentation

*Provide documents or links to documents if online with your application submission. Example of possible documents could include:*

1. *Systems Engineering Deliverables; for example:*
   * 1. *Concept of Operations*
     2. *System Requirements*
     3. *System Architecture and Design*
     4. *Release Plan*
2. *Installation/set-up instructions*
3. *User Guide/FAQs*
4. *Development documents:*
   * 1. *Release Plan*
     2. *Evaluation/Impact Assessment plan*
     3. *Test Plans/Procedures*
5. *Project information and background:*
   * 1. *Scope Statement*
   1. *Final Report/summary of results*

## Tab 4 and 5: Discussion and Similar Applications

*Created by OSADP admin. No need for information here.*