Memorandum

To: CRC A-88 Project Team
Brent Bailey, CRC
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From: Heather Perez, ERG
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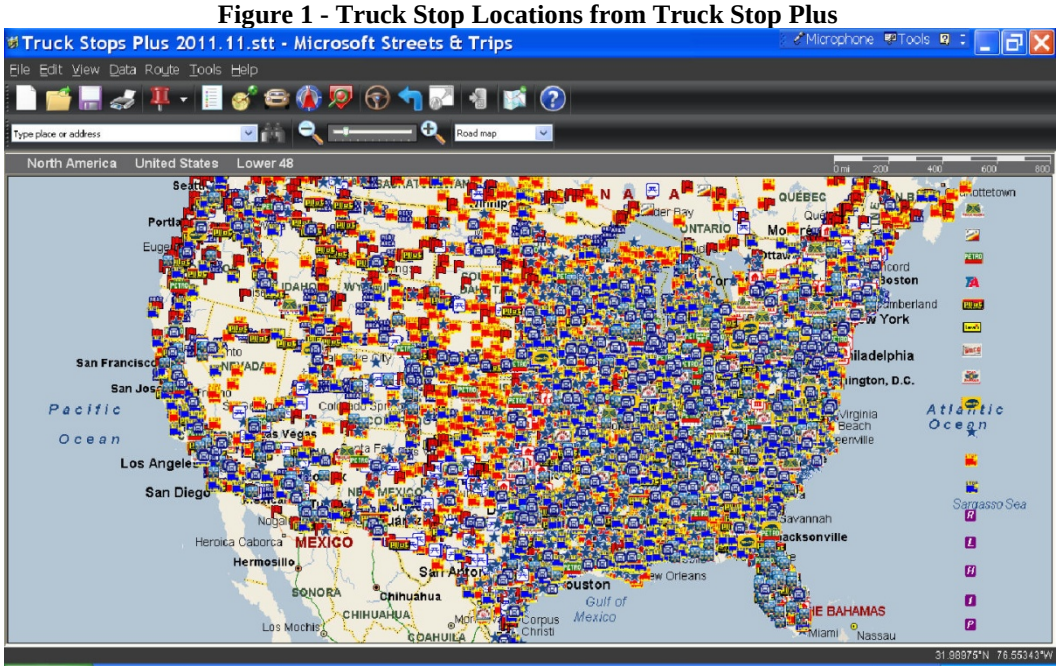
Date: May 5, 2014

Re: Processing of Truck Stop Plus Database

Under Task 1 of CRC A-88, ERG evaluated using truck stop databases to improve the spatial allocation of heavy-duty truck extended idle activity and emissions. ERG proposed the generation of a consistent set of idle allocation factors for MOVES at the county level, and for SMOKE at the grid-cell level, using a GIS-based analysis of truck idling demand and supply. As part of Task 1 evaluation, ERG purchased the commercially available Truck Stop Plus database and performed some clean-up of the data to remove incomplete data points, etc. Ultimately, as similar work is already being pursued by EPA and several states, this work was deemed low priority for A-88 by the CRC project panel. Though ERG will not continue this analysis as part of A-88, CRC requested the cleaned-up Truck Stop Plus database to aid in quality assurance of related work that states and EPA are undertaking. The database was delivered to CRC May 2nd; this memo provides documentation of the database and the processing steps taken in developing it. Questions should be directed to Heather Perez of ERG (phone: 919-468-7892 email: heather.perez@erg.com).

After evaluating several potential sources of truck stop data, ERG concluded that Truck Stops Plus provides the most comprehensive and detailed database for the analysis at a nominal cost ($39.99). The Truck Stops Plus add-on template for Streets and Trips includes 7,347 rest areas and trucks stops, including all major chain truck stops as well as independent truck stops (Figure 1). This dataset includes the size category of each truck stop (less than 20 parking spaces, 20-70 parking spaces, and more than 70 parking spaces), and details such as whether or parking is allowed, whether there is a charge for overnight parking, and what services and facilities (e.g. showers) are offered.

Figure 1 - Truck Stop Locations from Truck Stop Plus



The Truck Stops Plus 2014 Template was opened in Microsoft Streets and Trips, and the points of interest (POIs) were exported to a GPS file format (.gpx). This file was then imported as features into ArcGIS for additional processing. The raw database contained 15,825 records and the following attribute data:

- Name
- Description
- Type
- Comment
- Symbol
- DateTime
- Elevation

Most fields contained no or useless data. The pertinent data elements were entered in either the Name or Description fields or split between them both in a format similar to the following:

Valero Truck Stop, I-95, X273, MWR, SH, Ormand Beach, FL 386-677-1352

In addition to providing address and telephone information, the entry may contain a highway and exit number as well as a code which indicates additional properties and amenities of the truck stop:

- "S" indicates a small truck stop with 20 or fewer parking spaces.
- "M" indicates a medium truck stop with 20 to 70 parking spaces.
- "L" indicates a large truck stop with 70 or more parking spaces.
- "$" indicates that the truck stop charges for overnight parking.
- "W" indicates the truck stop has a truck scale.
- "R" indicates that the truck stop does major & minor repairs.
- "r" indicates that the truck stop does minor repairs only.
- "No Parking" indicates fuel only and no parking.
- "SH" indicates the truck stop has showers.

Note that the dataset lacked consistency in data entry, such that many records did not resemble the example shown above. Many records have empty Name and Description fields, whereas others are too generic to be useful (i.e., "Truck Stop"). The irregular formatting and missing data elements provided a challenging environment for automated data processing. As ERG's aim was to identify preferred truck idling locations, priority was given to processing the most detailed entries that provided additional information on stop amenities or that did not require significant processing. As a result, this database represents a fair proportion of the desirable truck idling locations but does not include the universe of potential idling locations. Further processing could provide a substantial number of additional idling locations, though they may lack amenity information.

The features were assigned to the World Geodetic System 1984 coordinate system, and new fields were added to calculate latitude and longitude for each point. Unfortunately, the attribute data was not fully populated and required substantial processing for use in this effort, using ArcGIS, MSAccess, and MSExcel as needed to maximize data quality.

Entries not valuable for this study were removed from the database including stops in Canada or otherwise outside of the United States, duplicate records, and "dummy" records created by the database originator for legend purposes in Streets and Trips. Records indicating "No Trucks" or closed locations were also removed.

Additional fields were created to facilitate easier review of the data and their completeness. These fields include the following:

- Indication of parking size (< 20 spaces, 21-69 spaces, >70 spaces, No Parking, or Unknown)
- Truck scale (presence/absence)
- Showers (presence/absence)
- Repairs available (presence/absence)
- Fees for overnight parking (presence/absence)

The Name and Description fields were searched for the truck codes listed above, and the new fields were updated to indicate the status of each amenity at each location. Whereas missing codes or data elements do not necessarily indicate that the location lacks the related amenity, the database only indicates presence of the amenity where expressly listed.

The resulting database contains over 6,600 potential long-haul truck idling locations and additional properties that may be useful in assessing not just the location of truck and rest stops but also their available supply of idling vis a vis number of parking spaces, restrictions, preferred amenities, charges on overnight parking, etc.

ERG compiled these data into both MS Excel format (including lat/long coordinates), and KMZ format to allow visualization within mapping browsers and programs (e.g. Google Earth). These files were delivered to CRC via email on May 2nd.