While the share of truck traffic is typically less than 1 percent on small residential streets, truck trips may provide a third of all vehicles on Interstate Highways passing through urban areas. The truck model currently used by NORPC is somewhat dated, and it is in need of updating current freight data and modeling theory.

The NORPC region generates a substantial number of truck trips. With over 1.1 million employees\(^1\), of which 7 percent work in manufacturing and another 10 percent work in trade/transportation/utilities, there is a substantial demand for freight movements within the region. Furthermore, the ports of South Louisiana and of New Orleans are important freight hubs for the South and beyond. With the widening of the Panama Canal, the volumes of freight being shipped through these two ports is expected to substantially increase. Finally, due to its geographic location, the NORPC study area has to handle a large amount of through trips that have neither their origin nor their destination within the NORPC area. In particular, Interstate 10 carries a large number of trucks serving the Gulf Coast states. With roughly 25 percent of all vehicles traveling I-10 north of New Orleans, trucks contribute significantly to congestion and emissions.

To account for both local and regional truck traffic, RPC is seeking technical assistance in the development of a two-layer truck model. The first layer covers the United States to simulate long-distance truck trips, including trips into the NORPC region, trips out of the NORPC region, and through trips. The second layer models local truck trips that have both trip ends within the NORPC study area.

Two truck types will be distinguished, namely single-unit trucks (FHWA vehicle classes 5-7) and multi-unit trucks (FHWA vehicle classes 8-14). While single-unit trucks tend to be used for shorter distances and lighter weights, multi-unit trucks cover long-distance trips and larger loads. This truck classification is beneficial as truck counts by these two vehicle classes commonly are available.

The truck model shall be developed and calibrated for the 2013-2014 base year working in coordination with RPC. The model setup and results for a future year (probably 2040) will also be provided by the consultant. The steps required to develop a two-layer truck model will be organized into nine tasks as described below.

*Task 1: Development of a local truck model*

The local truck model will simulate truck trips that have both their origin and destination within the NORPC model area. Due to the absence of a local truck survey, the Quick Response Freight
Manual (QRFM\textsuperscript{2}) methodology will be implemented. QRFM is an FHWA publication that provides a structure for generic short-distance truck models. Though parameters in this report are somewhat dated, QRFM is widely considered to be a feasible truck model concept. Experience shows that some QRFM parameters need to be scaled to local conditions, which is included in this task. The QRFM methodology will be applied to implement truck trip generation and truck trip distribution. Truck trip generation is based on employment by type and households. The NORPC will assemble the needed socio-economic data at the zonal level for at least these five categories:

- Agriculture, mining and construction employment
- Manufacturing, transportation, communications, utilities and wholesale employment
- Retail employment
- Office and services employment
- Total households

In line with the QRFM methodology, truck trip distribution shall be implemented as a gravity model based on travel distances. If there are any truck restrictions implemented or planned to be implemented in the NORPC area, specific truck skim tables that exclude highway links with truck restrictions should be used. The local truck model will be implemented in TransCAD and will be integrated into the existing regional model.

**Task 2: Development of a national truck model**

The national truck model will be based on the Freight Analysis Framework 3.1 (FAF3), published by the Federal Highway Administration\textsuperscript{3}. FAF3 provides commodity flows between 123 FAF zones across the United States. Louisiana is represented by four FAF zones, namely New Orleans, Baton Rouge, Lake Charles, and the remainder of the State (Figure 2). As this resolution is too coarse to simulate truck flows, these flows are disaggregated from 123 FAF zones to 3,241 U.S. counties/parishes; employment by type and make/use coefficients are used for this disaggregation process. Because flows are disaggregated to counties/parishes, it is irrelevant that the FAF zone for New Orleans does not encompass the entire NORPC study area. After disaggregating flows to counties/parishes, the model becomes independent of FAF zones. Subsequently, commodity flows in tons are converted into trucks by using payload factors. An average number of empty trucks are added. It is anticipated that an external module will be developed to process the large amount of data. Said module will need to be integrated into the existing regional model and called from the TransCAD GISDK platform.

The resulting truck trips are assigned in TransCAD to a national network. Finally, a subarea analysis is performed to extract flows in the NORPC study area. To disaggregate the trip ends of Internal-External (IE) and External-Internal (EI) flows within the NORPC study area, a gravity model is applied to connect flows at external stations with NORPC zones (TAZs). External-External (EE) trips are reported as flows from external station to external station. The output of this task is a long-distance truck trip table with truck trips between zones and external stations of the RPC model area.
Task 3: Routing of long-distance flows through distribution centers and intermodal facilities
Due to “just-in-time” deliveries and more efficient trucking companies, distribution centers play a crucial role in delivering goods. Commonly, distribution centers are used for goods being shipped into a region, and less so for outgoing goods flows. Distribution centers are used for selected commodities, particularly food and consumer products. It is proposed to route these selected commodities that are shipped into the NORPC region (External-to-Internal flows) through distribution centers. In order to complete this task, NORPC will provide data on distribution centers throughout the region, including their geo-referenced location and a size term (such as floorspace or tons shipped through the distribution center).

Similarly, flows being shipped by air, train or water need to be delivered to their final destination in the NORPC region. The model shall read flows by these modes in the FAF3 data and ship them by truck from an intermodal facility (such as airport, rail yard or marine port) to their final destination within the NORPC area. For the opposite direction, flows given by FAF3 would be picked up at their origin and be shipped by truck to an intermodal facility that serves the given mode. To complete this task, NORPC will provide data on intermodal facilities, including their geo-referenced location, a size term (such as tons shipped or employment) and which modes (air/train/water) are served by each facility. Cooperation with the New Orleans Public Belt Railroad, the airport, and the two ports would be desirable to improve input data for this task.

Task 4: Rubber-tire transfer
Because of the two international ports operating in the New Orleans region, rubber-tire transfers are likely to generate an important share of truck traffic. For example, rubber-tire transfers may occur when goods connect from a vessel to rail. If the rail yard is not at the port, containers are loaded on trucks and transferred to the rail yard. Though it is unknown what portion of truck traffic is generated by rubber transfers, it is worth analyzing their actual impact on traffic flows. To complete this task it would be required to team with the port authorities of the two ports in the region, namely the Port of South Louisiana and the Port of New Orleans. NORPC will coordinate the necessary meetings with the ports to gather information on their respective truck movements for input into NORPC’s model. To complete this task, the consultant will assist NORPC in collecting information on how many goods of which commodity type go through the two ports and which connecting modes are used.

Task 5: Time-of-day split
Both the national and the local truck model provide daily truck flows. To provide traffic flows for the different time-of-day periods, hourly traffic count data will be used to split truck trips into AM peak, PM peak, Mid-day and Night. The consultant will need to budget for collecting traffic and truck classification data by time-of-day along the region’s principal truck routes.

Task 6: Model calibration
There are few data available for truck model calibration. Average truck trip lengths from other surveys shall be used to calibrate the trip length of the local truck model. Truck traffic counts at external stations will be used to scale the national truck model. If truck VMT estimates by parish are available, those will be used to fine-tune the local truck model.
Task 7: Model validation
The validation task ensures that the truck model reasonably replicates observed traffic flows. Truck counts are used for this comparison, and therefore, it is expected that the consultant will provide counts throughout the NORPC study area (see Task E above), including external station counts. Counts shall be developed for the base year (or a year close to the base year). Of particular interest are truck counts at Weigh-In-Motion (WIM) stations, as they provide daily counts by vehicle type over a longer period of time. By calculating the average and the standard deviation at WIM stations, irregularities in traffic flows of single days can be excluded. It is important to provide the source of the count data (such as WIM, loop detector, manual count, estimate). The consultant shall provide these truck counts geo-referenced to the model network.

Task 8: Model Integration
The truck model as described above will be integrated into the existing regional travel model that runs in TransCAD. The components of the existing truck sub-model will be removed and the revised truck model components will be inserted. The assignment module will be revised to do a multi-class assignment so that trucks and autos can be summarized separately.

Task 9: Documentation and training
To ensure that NORPC is familiar with the structure and fully able to use the truck model, the existing documentation will be revised such that references to the current truck model will be removed and documentation on the models and the application procedure will be provided. The budget includes time for an on-site demonstration and working session at NORPC.

Timeline: 12 months

Budget: $145,000