Exhibit D – Research Project Requirement Template

From Reactive to Predictive: Modeling Urban Event Impacts on Transportation Systems

Recipient/Grant (Contract) Number: The University of Texas at Austin; The City College of New York/Grant # 69A3552344815 and 69A3552348320

Center Name: National Center for Understanding Future Travel Behavior and Demand (TBD)

Research Priority: Improving Mobility of People and Goods

Principal Investigator(s): Mahdieh Allahviranloo

Project Partners: N/A

Research Project Funding: $130,001

Project Start and End Date: 06/01/2025 – 08/31/2026

Project Description: Every day, New York City hosts countless events ranging from street festivals and protest marches to unexpected incidents and major sporting events. Each of these events may create ripples through the city's complex transportation network, affecting how millions of New Yorkers move around their city. But what if we could predict these ripples? This proposal investigates how events change traffic patterns in New York City.

To address this objective, we will use three sources of data: GDELT data, road traffic count data, and subway ridership data. GDELT is a vast database that captures events happening around the world, including every significant happening in New York City. Traffic count data contains information on how many vehicles flow through different streets at different times. Finally, we are incorporating MTA ridership numbers, showing us how people use the subway system. Advanced data mining and machine learning tools will be used to conduct research tasks.

US DOT Priorities: This project strongly supports US DOT priorities and RD&T strategic goals by aligning with the "new and novel technologies" research priority theme. It introduces innovative use of the GDELT dataset, previously untapped in transportation research, and combines it with traditional transportation data using advanced machine learning and deep learning techniques. The project's transformative approach shifts urban transportation management from reactive to predictive strategies, creating new methodologies for understanding and forecasting event impacts on transportation systems. The comprehensive approach to data integration, advanced analytics, and predictive modeling positions the research at the forefront of transportation innovation, directly supporting US DOT's goals for breakthrough discoveries and novel technological approaches in transportation research.

Outputs: The results of the work performed in this research project are expected to produce an array of impactful outputs. Academic publications and conference presentations will be generated that will disseminate the project's innovative methodologies and findings to the broader research community. A comprehensive GitHub repository will be established to serve as a centralized hub for all developed code. This repository will house data processing pipelines for integrating GDELT, traffic count, and subway ridership data, as well as the advanced machine learning and time series analysis models and specialized tools for querying and mining large-scale datasets.

Furthermore, the research will yield new and novel methodologies and techniques that represent significant advancements in transportation research. These include efficient approaches for querying and mining GDELT data, innovative methods for merging GDELT data with traditional transportation data sources, and the application of machine learning and time series analysis for event-impact prediction. The research

may also result in the development of specialized software applications or tools designed for predicting the impacts of events on urban transportation systems. Additionally, the project will generate comprehensive datasets that integrate GDELT event data with New York City's traffic and transit information, providing a rich resource for future research. Lastly, the project's innovative nature may foster new partnerships with NYC transportation agencies or other urban planning organizations interested in implementing the developed tools and methodologies, further extending the project's impact.

Outcomes/Impacts: The application of the research outputs from this project is expected to catalyze transformative changes in the way urban transportation systems are managed, leading to significant outcomes and impacts. The project will enable a shift from reactive to proactive management of urban transportation systems during events, resulting in markedly improved resource allocation and congestion management. City planners and transit officials will gain an unprecedented ability to predict and manage event-related disruptions, leading to more streamlined operations and reduced costs. Furthermore, the research will deepen the understanding of the relationship between urban events and transportation system performance, providing valuable insights that can inform policy decisions related to event planning and management.

The impacts of this research extend beyond operational improvements. The development of new protocols for proactive traffic management during events has the potential to influence regulatory frameworks governing urban transportation management. The integration of predictive analytics into standard operating procedures for transportation agencies will foster more data-driven decision-making processes, leading to smarter, more responsive urban systems. On a practical level, these advancements are expected to yield further benefits such as reductions in congestion, travel delays, and operational costs associated with event-related transportation disruptions. The enhanced reliability and efficiency of public transit services during events will improve overall system performance and user experience. By establishing a framework that other cities can adopt, this research has the potential to drive widespread improvements in urban transportation management practices, ultimately contributing to the development of more resilient, efficient, and adaptive urban transportation systems across multiple cities.

Final Research Report: A URL link to the final report will be provided upon completion of the project.