Exhibit D

Research Project Requirement Template

Measuring the Last-Mile: A Comprehensive Evaluation of Synthesis Approaches to Address Data Gaps for Local Freight Decision-Making (Phase 1)

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

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

Research Priority: Improving Mobility of People and Goods

Principal Investigator(s): Alison Conway

Project Partners: New York City Department of Transportation

Research Project Funding: $479,936 (Federal + non-Federal funding)

Project Start and End Date: 12/1/2023 - 5/31/2025

Project Description: Currently, few municipal or regional authorities have access to the disaggregate freight activity data needed for planning, operational decision-making, freight externality evaluation (e.g. air pollution, collision risk), or equity analysis. Due to stakeholder privacy concerns, freight data are often aggregated by geography and/or commodity, limiting direct applicability of published data for local analysis. As a result, local freight planning and analysis typically rely on one of three approaches to approximate local activity: (1) disaggregation of large national commodity flow datasets (e.g. Commodity Flow Survey and Freight Analysis Framework) using general estimates of economic activity; (2) modeling (e.g. freight trip generation, facility location, agent-based simulation, and route optimization models); or (3) direct estimation of activities using limited sensor and probe datasets, often obtained or purchased from private sector operators or commercial data providers. Each of these approaches suffers from severe limitations such as lack of timeliness, bias, lack of representativeness, reliance on unrealistic or unverifiable assumptions, and/or inability to validate results. Machine learning-based synthetic data generation methods may offer a potential approach to overcome limitations as well as operator privacy concerns to produce realistic data for local planning. This project represents the first phase of an expected multi-year effort to design and construct one or more synthetic last-mile freight datasets that can address existing data gaps to inform planning and operational decision-making by local transportation agencies.

US DOT Priorities: This project directly addresses the USDOT's **Freight Planning and Performance** research objective (*p. 24*) to "develop data and tools to assess freight system performance and support performance-based freight planning and policies." Specifically, this project supports the USDOT goals to "improve the ability to measure current and future conditions and support operation of the freight transportation network through the incorporation of more accurate, real-time, and **localized freight data**" as well as "provide **data**, tools, and technical assistance to support the integration of freight considerations in the transportation planning and programming process." Successful synthesis of last-mile freight data would also address USDOT's **Freight Safety and Operations** objective (*p. 24*), as local freight data is a critical input to "identify strategies to mitigate the negative impacts of freight transportation on communities and the environment."

This project addresses the following USDOT technology transfer priorities (p. 64):

"work closely with current and potential users of research products in the public and private sectors to accelerate T2 and deployment": This project is being conducted in collaboration (with in-kind support) from the New York City Department of Transportation.

"evaluating the performance of new technologies and identifying and assessing best practices and lessons learned from the application of innovations in the field."

"help stakeholders make informed decisions about whether to adopt new technologies, policies, or practices."

"publish technical papers and guides; present webinars and deliver presentations to stakeholders; create websites; develop and deliver training courses and workshops; engage in standards development activities, and distribute newsletters and other outreach materials highlighting research results."

Outputs: The aim of this project is to conduct the first phase of information collection and analysis toward development of one or more synthetic granular last-mile freight datasets that could inform urban and local freight policy decision-making. Results from this phase will directly inform the future development of synthetical local freight data by this project team. Stand-alone results from this project phase will also be shared with the research and practitioner communities to (1) inform other future freight data synthesis projects and (2) enable informed freight-data procurement and application decisions by local freight data users.

A synthesis of results will be submitted for publication in an appropriate journal, such as the *Transportation Research Record,* the *ASCE Journal of Urban Planning and Development,* or *Transport Reviews*. Result will also be presented at relevant conferences and workshops such as the *International Urban Freight Conference*, the *TRB Innovations in Freight Data Workshop*, and/or the *ASCE International Conference on Transportation and Development*.

Outcomes/Impacts: This project directly addresses a critical gap for data-driven local freight planning and decision-making. Granular freight data is needed to inform land-use decisions (such as rezoning as well as loading dock and parking requirements), curb management (such as curb pricing and time-of-day regulation), and infrastructure design decisions (such as route designation, street geometries, and parking locations).

This project will engage faculty and students from Civil Engineering, who possess expertise in transportation/freight system operations, and faculty and students from Computer Science, who possess expertise in machine learning applications. Through this collaborative work, both sets of researchers will significantly expand their domain knowledge.

This project will aid in the design of policies and infrastructure that support efficient local freight operations. Currently, last-mile freight inefficiencies result in local externalities, such as congestion, air pollution, and collision risk, that are detrimental to the community. Poorly designed or managed freight infrastructure also results in significant delays and productivity losses for private freight operators. By enabling improved freight decision-making, this protect has potential to contribute to improvements in local emissions, safety, and economic competitiveness.

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