Exhibit D – Research Project Requirement Template

System Diagnosis and Strategic Framing for Transportation Congestion Management in Miami Beach

Recipient/Grant (Contract) Number: The University of Texas at Austin/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): Chandra R. Bhat

Project Partners: City of Miami Beach

Research Project Funding: $100,000 ($65,000 Federal + $35,000 matching funds)

Project Start and End Date: 9/1/2026 - 8/31/2027

Project Description: The City of Miami Beach presents a unique and highly constrained transportation environment in which congestion is driven not only by infrastructure constraints, but also by the interaction of highly variable travel demand, limited access points, curbside activity, signal coordination conditions, commuter and recreational travel interactions, and traveler behavioral responses within a tightly coupled urban network. Unlike conventional urban congestion settings, localized operational disruptions within Miami Beach can rapidly propagate across the broader transportation system because of the limited number of access points serving the island and the substantial fluctuations in daily population associated with employment, tourism, events, and recreational travel activity. Accordingly, effective congestion mitigation strategies for Miami Beach require a system-level understanding of how congestion forms, how queues propagate across the network, how different travel purposes interact temporally and spatially, how curbside activity and operational friction reduce effective roadway capacity, and how traveler behavior contributes to overall network performance. Therefore, the purpose of this research project is to establish a collaborative effort with the City of Miami Beach to:

1. Develop a comprehensive understanding of network behavior under varying operational conditions
2. Establish a framework for evaluating future congestion mitigation strategies
3. Identify critical operational and behavioral contributors to system-wide congestion
4. Refine the scope and priorities for subsequent strategy development and implementation phases

The effort will begin with a site visit and extensive discussions with City staff to identify transportation constraints and challenges, and to observe operating conditions. This will be followed by a data collection and analysis period, with a specific focus on system-level characterization. Specific network dynamics and failure mechanisms related to access point saturation, queue spillback, signal coordination, micromobility operations, curbside activity, and interactions among multiple travel purposes will be analyzed. Behavioral factors relating to mode choice, departure timing decisions, route selection, access-point selection, and responses to congestion will be analyzed to complete the picture at the network level. To aid in network characterization, specific evaluation metrics at key locations and time periods will be developed. Finally, these insights will be applied to propose strategic solutions designed to mitigate congestion at specific hotspots as well as throughout the network. Future opportunities to implement pilot programs will be determined in collaboration with the City, and their success will be evaluated using the metrics developed during this phase of work.

The City of Miami Beach represents a highly distinctive and nationally important transportation setting in which congestion management must occur within severe physical and operational constraints. The proposed research is intended to establish a rigorous and operationally grounded understanding of how congestion dynamics emerge across the broader transportation system, thereby supporting the implementation of realistic and effective congestion management strategies in future phases of work. The effort also has the potential to contribute more broadly to the understanding of transportation system management in constrained, high-demand urban environments characterized by strong tourism, recreational activity, and limited network access.

US DOT Priorities: This project aligns with the TBD Center's core research thrusts through the use of data modeling and analytic tools, which will be employed to develop an understanding of the underlying causes of congestion within the Miami Beach network. These empirical findings will then be analyzed through a behavioral lens to understand user needs, providing guidance on how best to implement policies and investments to meet the needs of the heterogeneous population using the City of Miami Beach network. Finally, the development and future deployment of pilot interventions within the City provide a valuable opportunity to expand our understanding of traffic interactions within a constrained urban network.

Outputs: This research project is expected to produce innovative strategic solutions that blend behavioral demand management with operational and infrastructure-based approaches to address the network-level congestion issues experienced in constrained urban environments. This may include solutions specifically related to access/egress management, queue management strategies, signal coordination schemes, curbside activity management, and congestion limitations related to the mixing of multi-purpose travel. Additionally, metrics to evaluate the performance of the proposed pilot strategies will be developed. A report summarizing the methods, findings, metrics, and proposed pilot projects will be created. In addition to these valuable outputs, the proposed project will establish a close collaboration between the TBD Center and the City of Miami Beach staff. This partnership will enable the sharing of data and knowledge to establish an analytical and operational foundation for understanding network-level trends. In future stages, the TBD Center and City of Miami Beach will work together closely to implement and assess the performance of pilot projects identified during the proposed research.

Outcomes/Impacts: The proposed research is expected to improve our understanding of how congestion develops and spreads within constrained urban networks characterized by limited access points and variable demand. Results will directly support effective congestion management in the City of Miami Beach through the development of strategic solutions and future implementation of pilot programs in collaboration with the City. This represents a unique opportunity to design, deploy, and evaluate novel strategies for congestion management, moving beyond technical analysis to achieve measurable improvements in network performance, access, and reliability.

Beyond the specific context of Miami Beach, the project will provide transportation agencies with practical tools and performance metrics to analyze the unique transportation constraints found in urban networks facing similar challenges across the country. These tools will aid in identifying congestion sources, developing both physical and behavioral interventions, and evaluating operational improvements. Additionally, the strategic solutions developed may be broadly applicable to areas facing similar challenges relating to access/egress constraints, queue spillback, signal coordination, micromobility operations, curbside activity, or interactions among multiple travel purposes.

The impact of this work, both within and outside of the City of Miami Beach, is expected to strengthen the transportation planning and operations process by providing a framework for identifying and evaluating network-level congestion management strategies under real-world constraints. By improving the ability of transportation agencies to understand the behavioral and infrastructural causes of congestion within a complex system, the proposed research supports targeted interventions, investment prioritization, and behaviorally informed policies to improve network performance.

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