Exhibit D

Research Project Requirement Template

Recipient/Grant (Contract) Number: University of Texas at Austin/Grant # 69A3552344815 and 69A3552348320

City-Wide Strategic EV Charging Network Design: Demand-Supply Integration via Market

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

Research Priority: Improving Mobility of People and Goods

Principal Investigator(s): Xuesong Zhou and Michael Kuby

Project Partners: N/A

Research Project Funding: $150,000 (Federal + non-Federal funding)

Project Start and End Date: 9/1/2023 - 5/30/2025

Project Description: The transportation sector accounts for a massive portion of greenhouse gas emissions and air pollution, making the adoption of sustainable and low-emission alternatives crucial for mitigating climate change and improving air quality. Electric vehicles (EVs) have emerged as a promising solution, offering reduced emissions and lower operating costs compared to conventional internal combustion engine vehicles. As a result, many cities and regions around the world are transitioning towards incorporating EVs into their transportation systems. One of the critical challenges in promoting EV adoption is the availability and accessibility of a well-established charging infrastructure. An efficient and strategically located charging network is essential to alleviate range anxiety among EV users and encourage the widespread adoption of electric mobility. However, the deployment of EV charging stations requires careful planning and decision-making, considering factors such as demand distribution, traffic patterns, existing infrastructure, and accessibility for users. The Electric Vehicle Location Selection Problem (EVLSP) addresses the task of identifying optimal locations for installing EV charging stations to achieve maximum coverage, minimize the cost of infrastructure development, and enhance the convenience and accessibility for EV users. To tackle this complex problem, researchers have explored various algorithms and methodologies from operations research and optimization fields. In this project, we present a comprehensive study on the EVLSP with a specific focus on the city of Avondale, AZ. Avondale, like many other urban areas, faces challenges related to sustainable transportation and seeks to improve its urban mobility while reducing environmental impact. Our research aims to provide valuable insights into the strategic deployment of EV charging stations in Avondale, considering the city's unique characteristics and transportation needs.

US DOT Priorities: This project includes three of the US DOT's research priorities: transformation research, equity, and sustainability. First contribution in Data-Driven Insight. By performing multiple location algorithms, this support objectives of “Develop and make accessible data sources, data analysis, and visualization tools to support transportation stakeholders and researchers; Support the development and integration of open geospatial data to support implementation of emerging technologies to inform research, planning, and policies.” (pages 58-59). Second contribution in Equity. When decision-makers considering justice forty in location selection, this supports the objective of “developing data and analytical methodologies to measure the transportation needs of underserved and disadvantaged communities, page 33”. And more EV in the market, this will reduce greenhouse gas emission and support the objective of “Develop and promote the use of tools and data to improve understanding of the environmental impacts of transportation projects and activities and to evaluate mitigation strategies, page 41”.

Outputs: The following outputs are anticipated for this project:

- Development of a Novel Algorithmic Framework: The project will produce new methodologies and algorithms for the Electric Vehicle Location Selection Problem (EVLSP). This framework will integrate advanced computational techniques, including aspects of quantum computing or AI, tailored to optimize the placement of EV charging stations in urban settings.
- Publications and Conference Presentations: Findings from the research will be disseminated through academic papers, policy papers, and presentations at relevant conferences. These will provide insights into the methodologies used, data analysis, and conclusions drawn from the study.
- Open-Source Software and Database: A major output will be the development of open-source software, available on platforms like GitHub, for implementing the proposed location selection algorithms. Alongside, a comprehensive database of the study's findings, including data on traffic patterns, user demand, and infrastructure capabilities, will be made publicly accessible.

Outcomes/Impacts: The outcomes of this research will significantly impact urban transportation. The new EV charging station placement strategies will inform and influence urban planning policies, leading to more sustainable city infrastructures. Increased awareness and knowledge dissemination through publications and an interactive platform will guide policymakers and professionals in making informed decisions. The open-source tools and educational resources developed will facilitate the adoption of advanced practices in transportation planning, enhancing skills and processes in the sector. This project will contribute to a progressive shift towards environmentally friendly transportation systems and improved urban planning methodologies.

The project's impacts extend across environmental, societal, and scientific domains. Optimized EV charging station placement will encourage electric vehicle usage, reducing emissions and enhancing air quality. These improvements in urban transportation contribute to environmental sustainability and public health. In the scientific realm, the project enriches the knowledge base in urban planning and sustainable transportation, fostering innovation. Additionally, the outputs and outcomes of the research will nurture a more skilled and knowledgeable transportation workforce. Collectively, these impacts signify a pivotal shift towards more efficient, sustainable, and health-conscious urban environments, demonstrating the project's profound influence on both transportation systems and societal wellbeing.

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