

SUMMARY OF RESEARCH

Project: **Planning Data Analytical Support Services #1 (FY24-25)**

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Overview of the Past Year

This section provides highlights and overview of the research and status.

Working with traffic measures at a small scale is crucial to travel demand modeling, these are the actual field measures being used in relation to the effects of the land use. Processing and referencing of traffic data included year 2023 and 2024 preparations of time enabled traffic data for TMC locations, short term counts, and the State Fleet Vehicle Survey. Methods are discussed in the project white paper "Time Enabled Traffic Data". A goal of the research is to demonstrate how these sources and a number of other sources of traffic performance data that are emerging, can be preserved and integrated, and more easily used in analysis.

The statewide speed survey generated from the State Fleet Vehicles created in 2019-20 proved to be very useful. It has provided a detailed resolution for speed estimates as used for DeIDOT bicycle and pedestrian planning. An update has been requested, and is underway. All routing and speed assignment to the network is complete. Now the data is being collected, screened, and speed estimates generated by time of day (hourly), day of week, month, and season. We are looking forward to working with the results and comparing with other speed data.

Web based data analysis sites could have a very large impact on transportation planning and data development. Streetlight was investigated to see how well it might provide trip generation estimates. Residential housing group productions, attractions for various types of destinations, multiunit productions, and traffic zone attractions and productions, were generated using Streetlight and compared to travel demand forecasting estimates. Results have been summarized in the white paper, "Investigation of the Use of Streetlight for Estimating Travel Demand". Results indicate that web based analysis sites like Streetlight could be very useful, especially where combined with other measures. As part of this work OpenStreetMap locations were translated to Delaware Centerline LRS locations. Systems like Streetlight can generate massive amounts of estimates and to reuse results beyond a particular view requires a strong data management strategy and locational integration between other data sources.

This research demonstrates the association of high resolution land use with transportation system access points in the network. GIS layers have been created statewide for access points that can reference to the tax parcel level. Demand data in terms of housing and trips are associated with access points and accessibility is calculated with road and path networks from those demand points. Land use groupings for residential and commercial development were

created relative to access points. Update continued for high resolution demand data including those for housing units, tax parcel based land use, addresses, and destinations

Work with travel networks used to reference traffic and demand and to calculate accessibility continued, with a focus on the process of building and using the DelDOT Bike and Pedestrian Network to examine accessibility by various levels of stress for multimodal travel. Current work is examining 2025 updates to the Bike/Ped Network and adopting the mile pointing and segmentation as a standard. There is a focus on developing toward a standard network while also accommodating other transportation networks such as Open Streets Map which is being used by online data providers for spatial data so conversions The DART Service Specification (GTFS March 2025) was processed to update transit networks to calculate door to door travel time.

The research involves the use and study of state-of-the-art GIS and database systems. The incorporation of many types of GIS applications, the structure and management within internet based spatial repositories, the management of data production and analysis work flows, and the coordination of personnel an editing and analysis tasks, are applicable and interesting research results in themselves.

CADSR has been the primary consultant developing official State estimates of future population growth in Delaware for the Delaware Population Consortium, and this project supports work to provide the estimates.

See [The Delaware Population Consortium - Information - Office of State Planning Coordination \(OSPC\) - State of Delaware](#)

As part of this project, CADSR provides ongoing assistance, and with the Division of Planning considers and implements methods of developing resources and approaches to respond more completely and effectively to planning questions and data needs. Work this year included assistance to consultants working with DelDOT Corridor Capacity, examination and discussion of Bike/Ped network, and update of accessibility data for a DelDOT Pedestrian Access Route Prioritization application.

Each year this project funds 3 to 5 part time undergraduate students who are exposed to a wide range of spatial data and analysis . Students update data, perform land use analysis, update and run road network models, produce maps and web sites for presentation, write programs for data transfer and compilation, and many other activities that build their experience and help them advance in their fields, and they have made large contributions to the work. Over the years the internships were offered, almost all interns continued on after University of Delaware in jobs involving spatial data analysis.

Research Products and Technology Transfer

For this research to have the best chance of finding useful applications it is very important to develop means of communicating research and results. Products include:

- Preparation and dissemination of white papers on research topics.
- The research has been very information intensive, creating numerous GIS layers, data tables, graphics and analysis. These need to be packaged and made conveniently available.
- Presentations and meetings with members of the transportation and planning community.

Project papers, data sets, and presentations are listed on the back pages of this report. Most papers are available on UDSPACE (<https://udspace.udel.edu>). Mr. Racca is happy to discuss or present any topic. Some of this data can be hosted on ARCGIS.Online and other sites. Options are being considered with DelDOT.

Activities For The Next Year of Research

As a project that offers analytical support, meetings with DelDOT are suggested to discuss priorities and the most helpful focus of the research. Some items planned and underway include:

- Work with DelDOT toward technology transfer activities. Identify data to be distributed and how. Perform usual outreach with announcements or presentations. Review all completed documents to ensure availability (see listing at the end of this report). Most have been uploaded to UDSPACE (<https://udspace.udel.edu>) Complete working papers in progress (listing below).
- Populate network access points with trip and land use data and prepare demonstrations relating that information to traffic measures.
- Complete 2024, 2023 speed survey interpretation from State of Delaware Fleet Vehicles. Routing and assignment of speeds to road segments has been completed, next step is to compile and work with distributions to define typical speed by time of day, day of week, month, and season. Estimates of values for free flow speeds will be produced. Share/publish. While doing this processing, an impedance set to serve time of day, day of week routing will be created for various time values
- Address future development using historical tax parcel and assessment data.
- Present, demonstrate, and make available a framework used for reference of transportation data

- Update the Delaware Population Consortium estimates.
- Make available time enabled map layers for years TMC and short term counts for 2023 and 2024.
- Complete a review of current DeIDOT Pedestrian and Bicycle Network. Be able to translate location and data from CADSR, OpenStreetsMap, Travel Demand Forecasting and other networks.
- Update a statewide multi-modal accessibility estimate.
- Update layers for access to destinations at the housing unit level (destinations within a quarter mile)
- Update transit accessibility to destinations at the housing unit level. Focus will be on door to door trips that can be accomplished. .
- Using intersection counts and Streetlight, develop a specification of travel direction bias by time of day at intersections. This will start with one of the counties and extended to the entire state as time allows. Explore use of this to investigate methods of estimations where data is scarce.
- Consider an update to Bluetooth time enabled data sets.
- Assistance as requested from the DeIDOT Division of Planning.

Summary of Project Datasets

The following data is described in the discussion of activities in the report sections that follow. Prior to any distribution DeIDOT will review and provide any guidelines

Transportation Data Framework GIS Data

- Linear referencing system centerline
- Cartographic directional layers
- Turning movements cartographic layers
- Turn tables
- Junctions
- Tax parcel based access points to the travel network

Location and travel network association of Traffic Data Sets (GIS Files)

- Bluetooth sensors
- TMC devices
- Tubecounts/48 hour counts

GIS and Time Enabled Traffic Data (to be updated in 24-25)

- Time enabled, typical hourly summaries by day of week, hour of day, and season
- 2019 thru 2024 TMC Devices
- 2019 thru 2022 Bluetooth
- 2019 thru 2024 Tubecounts
- 2015 thru 2024 vehicle GPS (2023,2024 in November 2025)

Transportation Networks

- GTFS DART transit network used for transit trip routing
- DELDOT Travel Demand Forecasting Network with DE LRS
- Open Streets Network with DE LRS

Travel Demand and Land Use Data

- Parcel based land use categorization for land use
- Parcel 20 year time series for Delaware
- Housing Unit Based Accessibility To Destinations
- Housing Unit Based Accessibility to Low Wage Centers by Transit
- Employment cluster locations
- Housing Unit based Accessibility
- Low wage employment centers
- Delaware Multiunit Tax Parcels, residential and commercial

Delaware Population Consortium Estimates

See [The Delaware Population Consortium - Information - Office of State Planning Coordination \(OSPC\) - State of Delaware](#)

Project Documents and Available Presentations

Except where noted, documents are available on UDSPACE (<https://udspace.udel.edu>).

Summary of Research for Planning Data Analytical Support Services #1 FY24-25

This report

Time Enabled Traffic Data

Discusses processing of traffic counter data and preparation as GIS time enabled layers

Investigation of the Use of Streetlight for Estimating Travel Demand

An examination of Streetlight data and applications to travel demand and trip generation including topics on data management and expected error.

Integration of Traffic and Travel Demand Data in Delaware

A description of a data framework for managing and integrating transportation data of many types

Proposed Change in Delivery Format for Traffic Counts

Data formats that enable easier incorporation into databases

Processing of Delaware Bluetooth Data

Describes processing and products from raw Bluetooth measures

Estimating Accessibility for Transit

Discusses development of door to door transit accessibility estimation

Land Use Categorization and Tax Parcel Time Series

Discussion of a land use classification method and the creation of a tax parcel time series 20 year time series

STROAD Presentation

An examination of crash data as it related to “stroads” , a presentation for Bike Delaware

Strat multi-modal Trip Generation Rates by OSPC Investment Levels

Evaluates potential correlations that may exist between multimodal trip generation rates, mode choice trends, and travel patterns in relation to the five level designations in Office of State Planning Coordination (OSPC) Investment Strategy Levels

Documents and Presentations in Progress

Below are documents and presentations in progress about project topics that were researched and developed. Data and documents lists will be updated regularly as additional papers are made available.

Creation of Tax Parcel Accessibility Data Structures

Outlines a data framework for tax parcel access point to the travel network

Comparison of Origin-Destination Data for Delaware

Sources of origin-destination information will be discussed and presented including Travel Demand Forecasting Model outputs, Bluetooth, Streetlight, and other sources

Estimating Directional Traffic Flow by Time of Day

Describes the use of several data sets to estimate directional bias by time of day

Comparison of Transportation Networks

Discussion of DeIDOT, CADSR network, Travel Demand Forecast Modeling Network, Open Streets, and GTFS Transit network

Using ESRI Products (ARCPRO, ArcGIS.COM, ArcHub) for Transportation Research

Discussion of data management, presentation and workflow for traffic and travel demand information

Summary of Project Goals

This research conducted numerous efforts to develop information resources that can support traffic and travel demand data collection, management, processing, integration, and presentation.

Research goals include:

- Develop and integrate traffic and travel demand data from many sources to facilitate the understanding and prediction of travel in time.
- Be able to easily relate field traffic measurements to high resolution land use characteristics and travel demand estimates. Reference data in time and location in a way to allow comparative consideration and verification.
- Achieve a best understanding and prediction of the trips people make, accomplished through a development of high-resolution land use and demographics, incorporation of travel demand model output and trip generation, and collection and processing of measures from various sources.
- Get the most out of data we have. Develop greater access and ability to realize value in existing data from many sources.
- Be able to estimate travel where data is sparse and be able to suggest priorities for measurement.
- Development of a dynamic assessment of travel throughout Delaware's transportation network that updates with available data and estimates from several sources.

The project also includes activities, services, and data development to:

- Offer technical assistance to DelDOT as needed, particularly in the area of demographics and spatial data.
- Provide assistance related to transportation issues and information systems to emergency management agencies as needed
- Provide GIS Internship opportunities for undergraduates