Solving the Curb Space Puzzle Through the Development of Arlington County's Curb Space Allocation Tool

National Capital Region
Transportation Planning Board
Freight Subcommittee Meeting

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Metropolitan Washington Council of Governments

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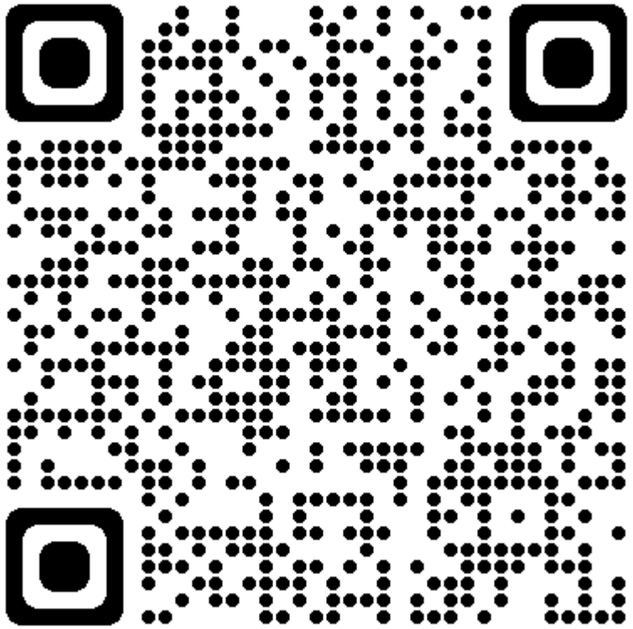
Access the Paper and Tool

Transportation Research Record Article



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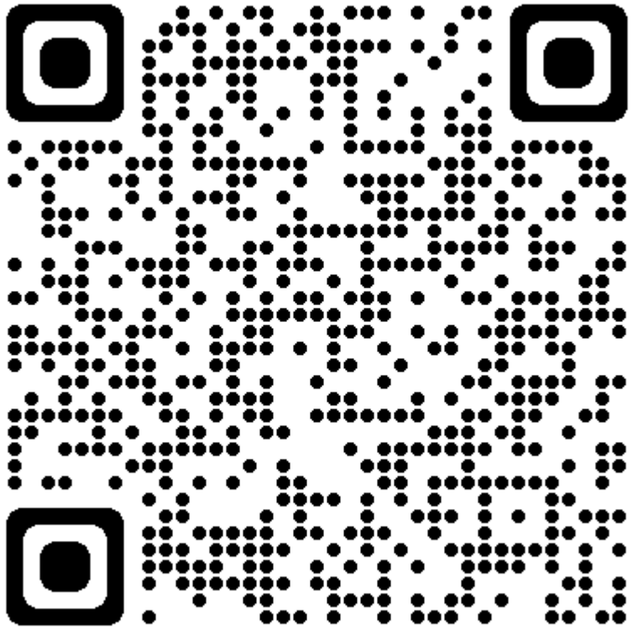
Online Tool



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Outline

- Background
- Developing the Curb Space Allocation Tool
- Using the Curb Space Allocation Tool
- Future Research and Identified Gaps

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Background

- Need
- Functionality
- Limits
- Modes

Need

- New modes and technologies have fundamentally changed the transportation landscape at the curbside
- On-street parking likely has less value than other uses, but how much?

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Functionality

Capabilities

Provides a mechanism to help **determine the optimal allocation of curb space** given a block's existing or proposed land uses and transportation services.

Helps County planners better manage their curb space by understanding the **demand** for various curb uses and the relative **value** of various curb allocations at the block level.

Delivers information for **decision-makers and the public** when presenting curb-allocation alternatives

Offers **an additional input for making decisions** on curbside regulations.

Usage Scenarios

Be utilized as a curb management tool to **understand the value** of curbside uses

Be used for **single-site**, **corridor** and **small-area planning** efforts that help define the best use of the curb space

Be **functional for the entire County**

Be able to **accommodate various geographies** and functions

Serve as the **foundation for future region-wide efforts**

Provide **results for various times of day**

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Limits

- **Limited resources and COVID-19 meant no new data was collected**
- **The focus was developing a methodology and framework that allows new data and mathematical models to be incorporated over time**

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Modes

Ride-hailing service

Commercial loading

On-street parking

Transit service

Micromobility

Non-transportation uses (parklets, streateries, etc.)

Developing the Curb Space Allocation Tool

- **Demand calculations**
- **Allocating the curb space**

Ride-Hailing Service Demand

Data Inputs	Influencing Factors
Arlington County 2019 Census Data	Median Age
	Median Income
Arlington County 2019 TAZ Socio-Economic Data	Percent of The Population with a Bachelor's Degree or Higher
	Population Density
Arlington County 2019 Ride-hailing (TNC) Pick-Up & Drop-Off Data (provided by SharedStreets through a license to Arlington County)	Population to Employment Ratio
	Land Use Mix

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Commercial Loading Demand (Attempt)

Data Inputs

Arlington County 2019 TAZ Socio-Economic Data

parkDC: Penn Quarter/Chinatown Performance Parking Pilot Loading Zone Data

Influencing Factors

Freight Trips at Zone Level

Service Trips at Zone Level

Population

Industrial Employees

Commercial Employees

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Commercial Loading Demand (Utilized)

- Average commercial loading zone demand based on the parkDC commercial loading data
- Value is applied using a rate of commercial loading spaces per curb space length

Arlington County-specific loading zone data is likely the highest priority research gap in the current tool

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Transit Service Demand

Data Inputs

- Arlington County 2019 Census Data
- Arlington County 2019 TAZ Socio-Economic Data
- Arlington County Roadway Speed Limits
- WMATA and ART 2019 ridership data at the station level

Influencing Factors

- Median Age
- Median Income
- Household Car Ownership
- Population Density
- Commercial Land-Use Percentage
- Speed Limit

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On-Street Parking Demand

- Limited by the lack of available parking inventory data (this is not commonly available)
- Upper limit of 100 on-street spaces per hectare was applied based on the typical density of parking supply in major cities

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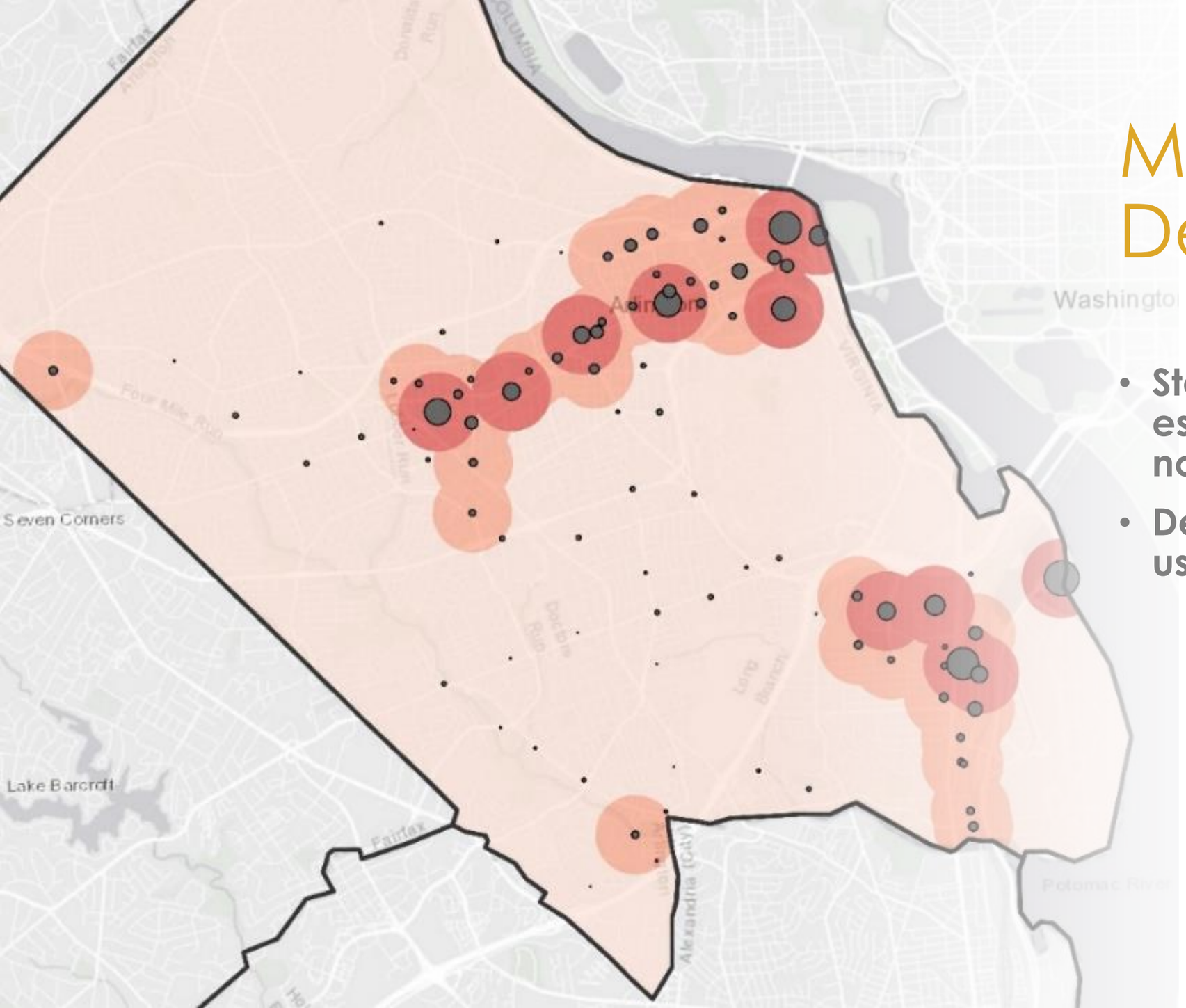
Micromobility Demand

- **Statistical models for estimating demand were not easily replicable**
- **Demand typologies were used instead**



TYPOLOGY

- HIGH RIDERSHIP DEMAND
- MODERTE RIDERSHIP DEMAND
- LOW RIDERSHIP DEMAND
- EXISTING CAPITAL BIKESHARE STATIONS

Non-Transportation Uses (Parklets, Streateries, etc.) Demand

- **Data is largely unavailable for parklets/streateries**
- **Demand for parklet/streatery is typically dependent on the fronting business type**
- **Currently, user input determines the parklet/streatery demand constraints**

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Curb Space Requirements

Use	Arlington County Curb Space Standard	Curb Length Used in Allocation Tool	Notes
Ride-hailing Service	25 feet (Farside) 30 feet (Nearside) 40 feet (Mid-block)	40 feet	Assumptions based on guidance in the ITE Curbside Management Practitioners Guide
Commercial Loading	40 feet	40 feet	Forty feet is long enough for either one single-unit 30-foot truck (SU-30) or two standard vehicles.
Transit Service	40 feet (Stop in travel lane) 70 feet (Farside) 100 feet (Nearside) 130 feet (Mid-block)	100 feet	Space is required for a bus to pull in and out of the bus stop.
Micromobility	10 feet	10 feet	No current standards or guidelines exist. These are generally installed in leftover space that wouldn't fit a parking stall.
On-Street Parking	20 feet	20 feet	ADA stalls require 26 feet
Non-Transportation Uses (Parklets, Streateries, etc.)	40 feet	40 feet	40 feet includes a minimum of a 30-foot long parklet and a 5-foot buffer on both sides of the parklet per County requirements
Walking (Not included in the model)	Not applicable	Not applicable	Not applicable

Effective Capacity of Curb Space Uses

Use	Effective Capacity
Ride-hailing Service	18.91 pick-up/drop-offs per hour *(3 minutes, 10 seconds per pick-up/drop-off)*
Commercial Loading	0.83 deliveries/ hour *(50 minutes per delivery)*
Transit Service	25 stops/hour *(2 minutes, 24 seconds per stop)*
Micromobility	200 trips/day
On-Street Parking	0.73 parked cars/ hour *(43 minutes, 48 seconds per stay)*
Non-Transportation Uses (Parklets, Streateries, Etc.)	Not applicable
Walking (Not included in the model)	Not applicable

Economic Value

Use	Economic Value (spending per person-trip)		
	Rosslyn-Ballston Corridor	Richmond Highway Corridor	Columbia Pike Corridor
Ride-hailing Service	$12.88	$53.07	$7.75
Commercial Loading	$500/delivery		
Transit Service	$11.38	$48.10	$6.83
Micromobility	$18.31	$40.58	$7.76
On-Street Parking	$12.88	$53.07	$7.75
Non-Transportation Uses (Parklets, Streateries, etc.)	$1265.75 daily sales per parklet/streatery		
Walking (Not included in the model)	$28.72	$42.23	$8.45

- **Ride-hail, Transit Service, Micromobility, and On-Street Parking values derived from a Seattle neighborhood intercept survey**
- **The intercept survey data was adjusted for use in Arlington County for each of the County's "transit-oriented planning corridors"**

Societal Value

Use	Societal Value
Ride-hailing Service	1.24 persons per trip
Commercial Loading	1 person per trip
Transit Service	4 persons per trip
Micromobility	1 person per trip
On-Street Parking	1.5 persons per trip
Non-Transportation Uses (Parklets, Streateries, etc.)	160 persons per trip
Walking (Not included in the model)	1 person per trip

Using the Curb Space Allocation Tool

- **Role of the curb space allocation tool**
- **Functionality and requirements**

Role of the Curb Space Allocation Tool

1. Inventory existing conditions
2. Identify land use and activity considerations to develop modal prioritization
3. Identify appropriate treatment alternatives
4. Assess and present alternatives for public feedback
5. Refine and implement treatments

"Curb space is flexible—while physically moving the curb usually requires expensive capital construction, curb use can be changed quickly, temporally, and iteratively."

- ITE Curbside Management Practitioners Guide

Welcome Page

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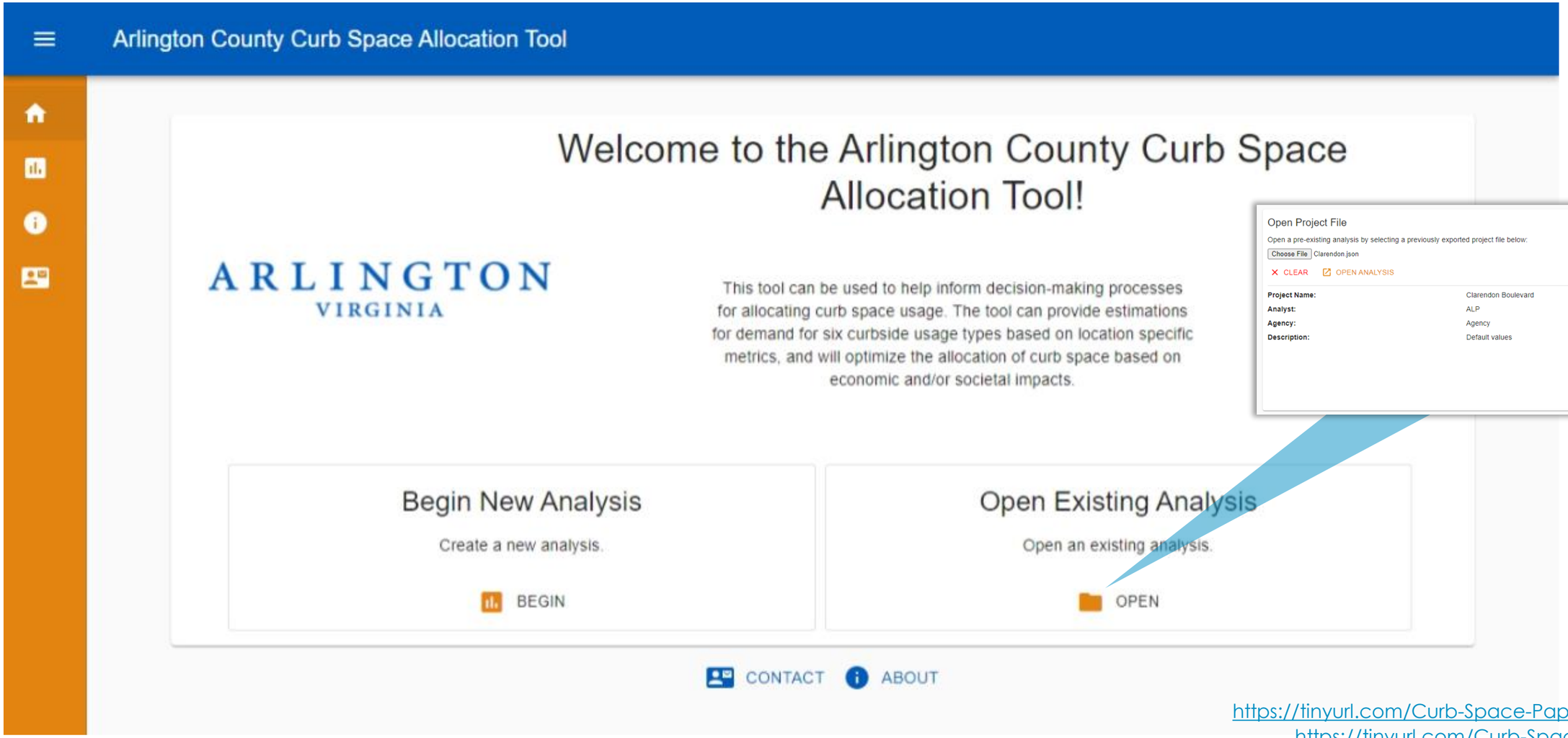

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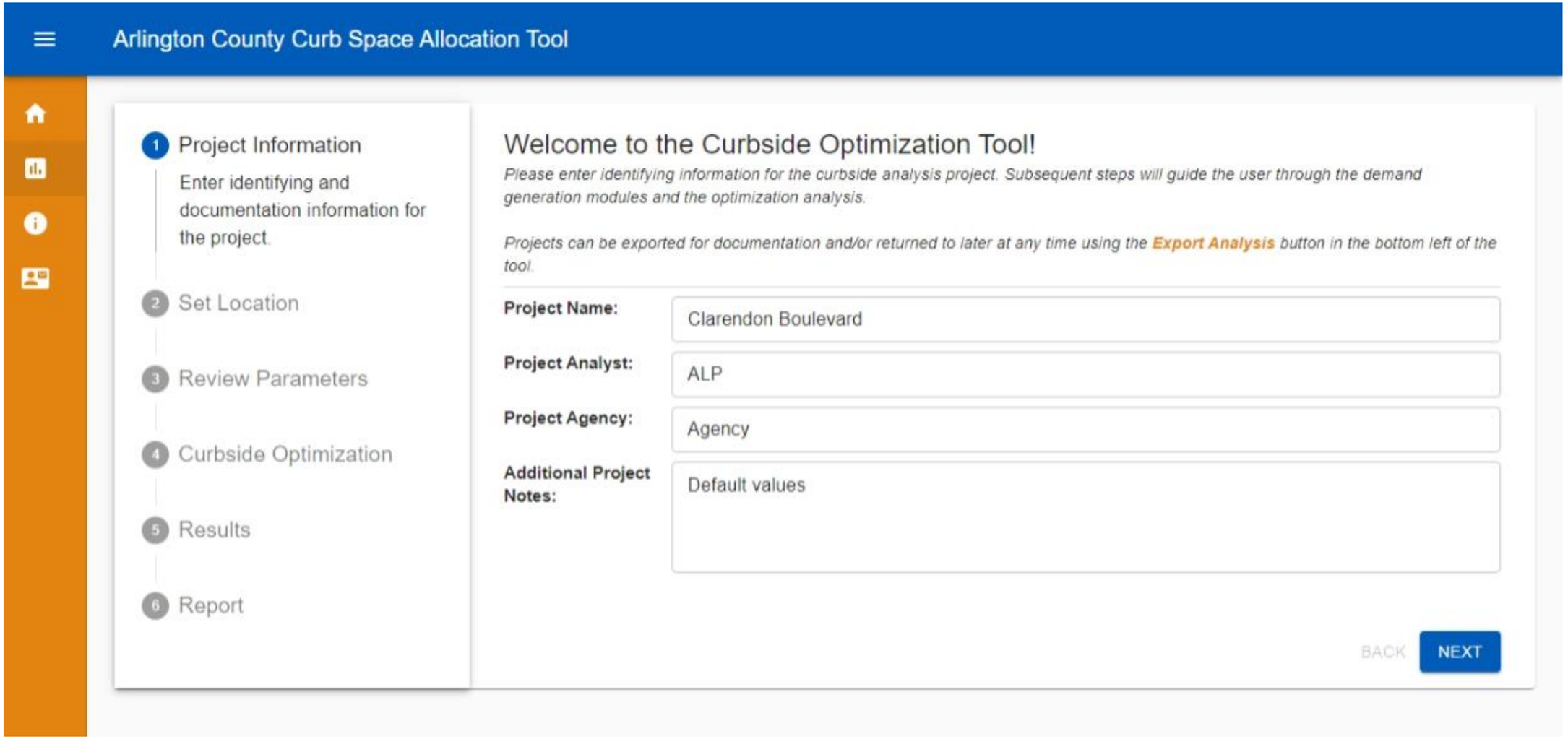
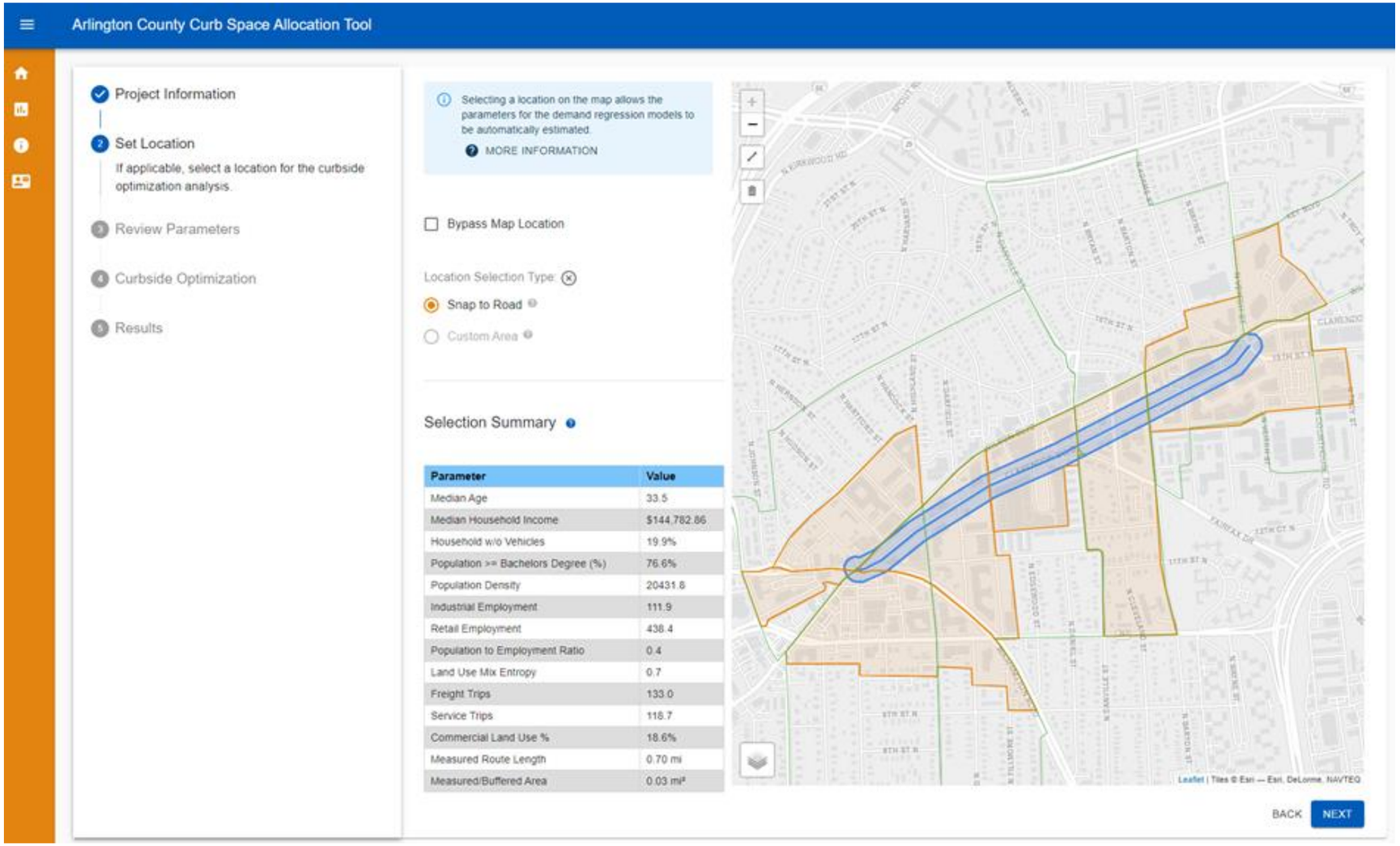
Project Information (Step 1)



Set Location (Step 2)



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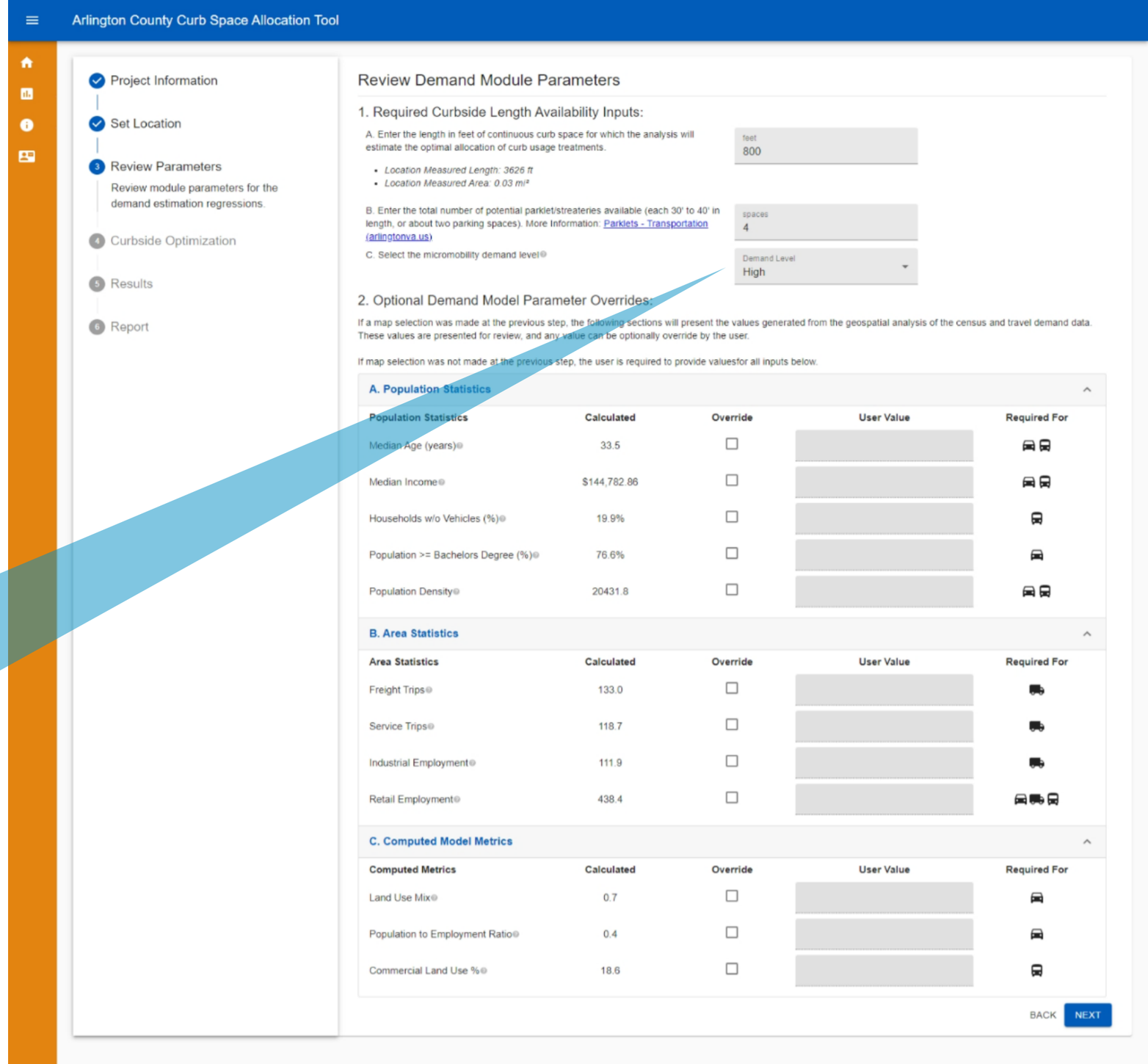
Review Parameters (Step 3)

Micromobility Demand Levels:

- **High:** Central business districts and major transportation hubs. Example areas: National Landing, Rosslyn. (Trip rate per acre = 1.02)
- **Moderate:** Densely developed neighborhood in proximity to key activity centers or adjacent to high-ridership demand areas. Example area: North Highlands. (Trip rate per acre = 0.36)
- **Low:** Areas in suburban and with more auto-oriented land uses. Example areas: Arlington Ridge, North Arlington. (Trip rate per acre = 0.08)



Curbside Optimization (Step 4)

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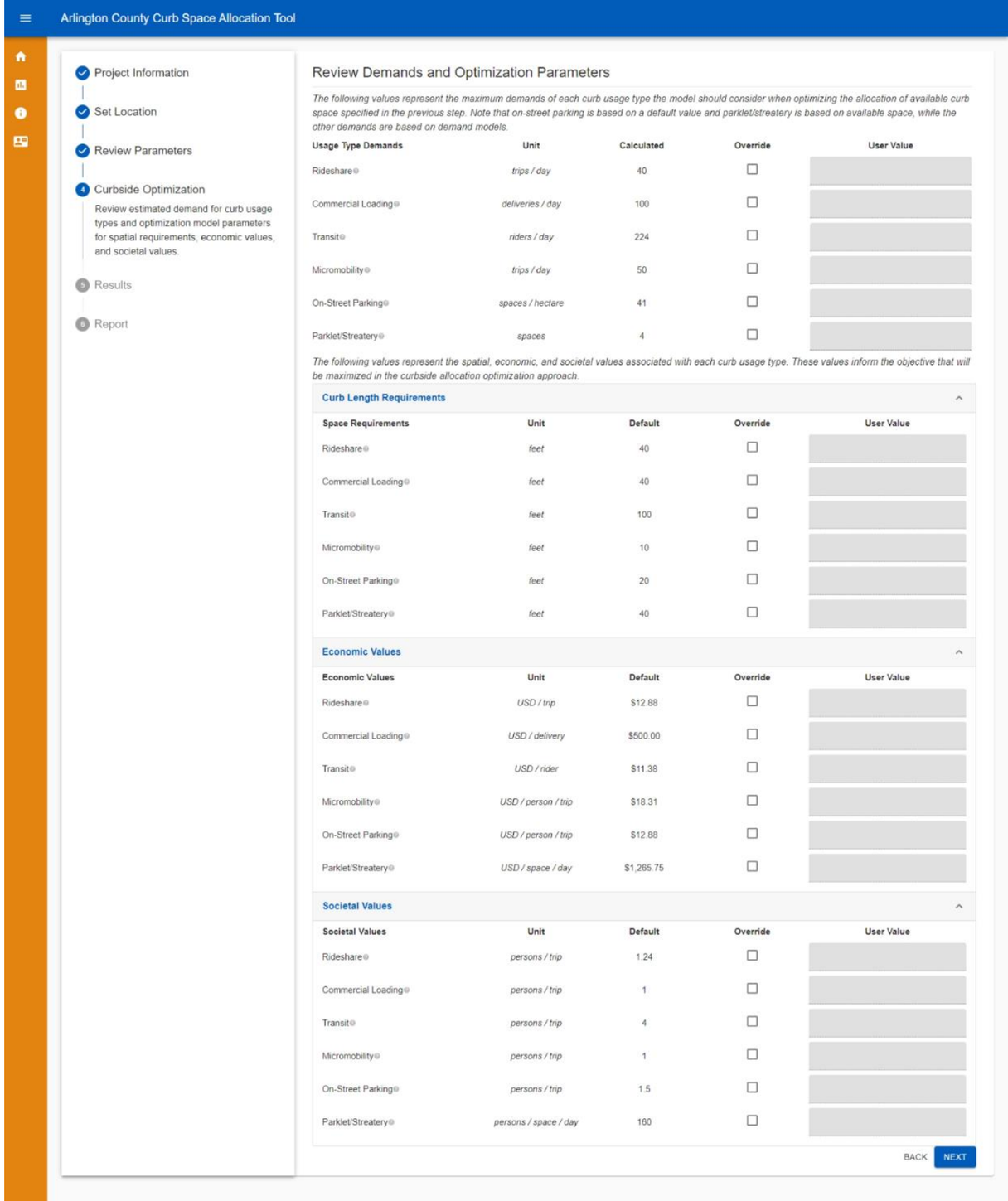
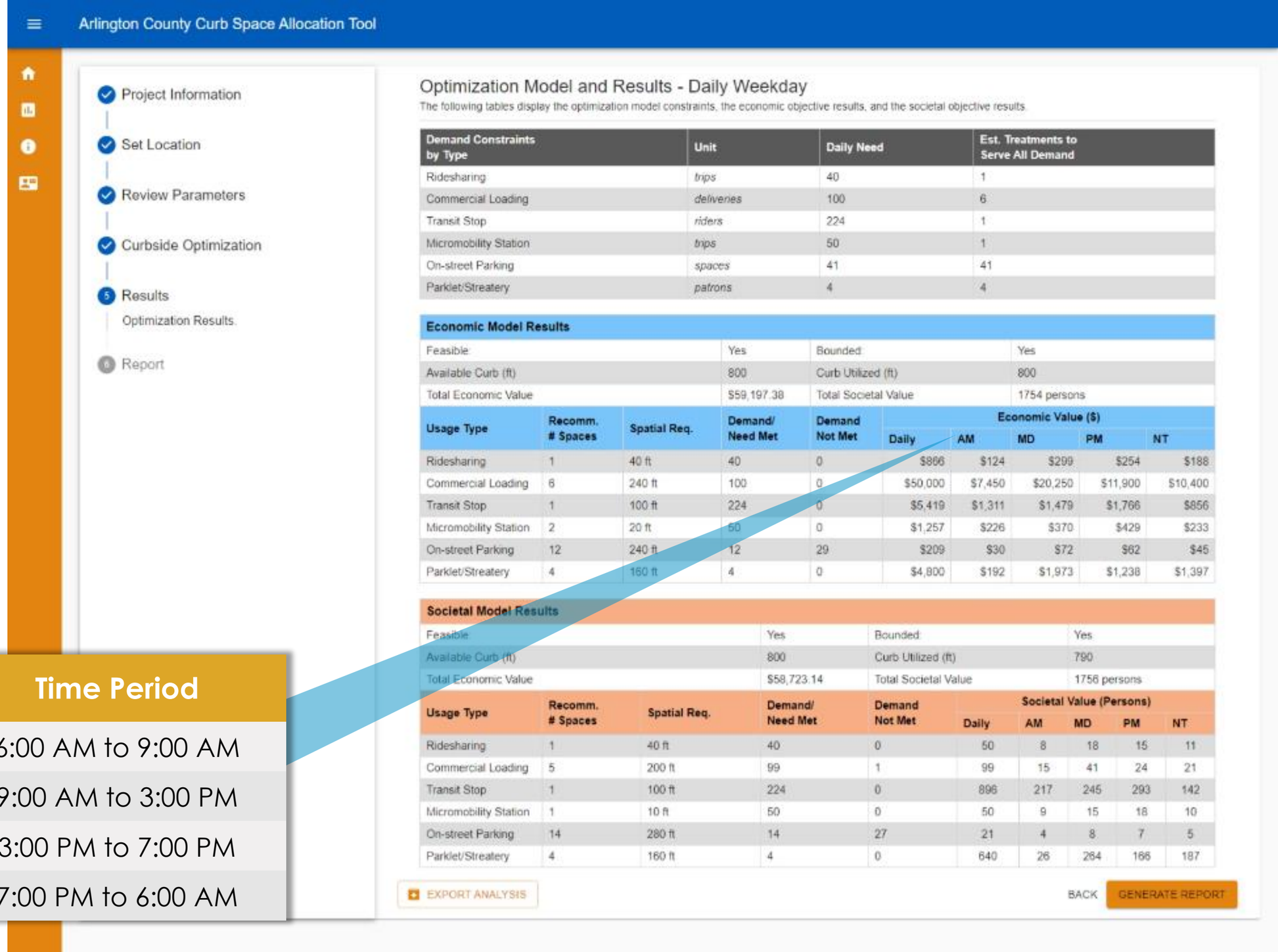
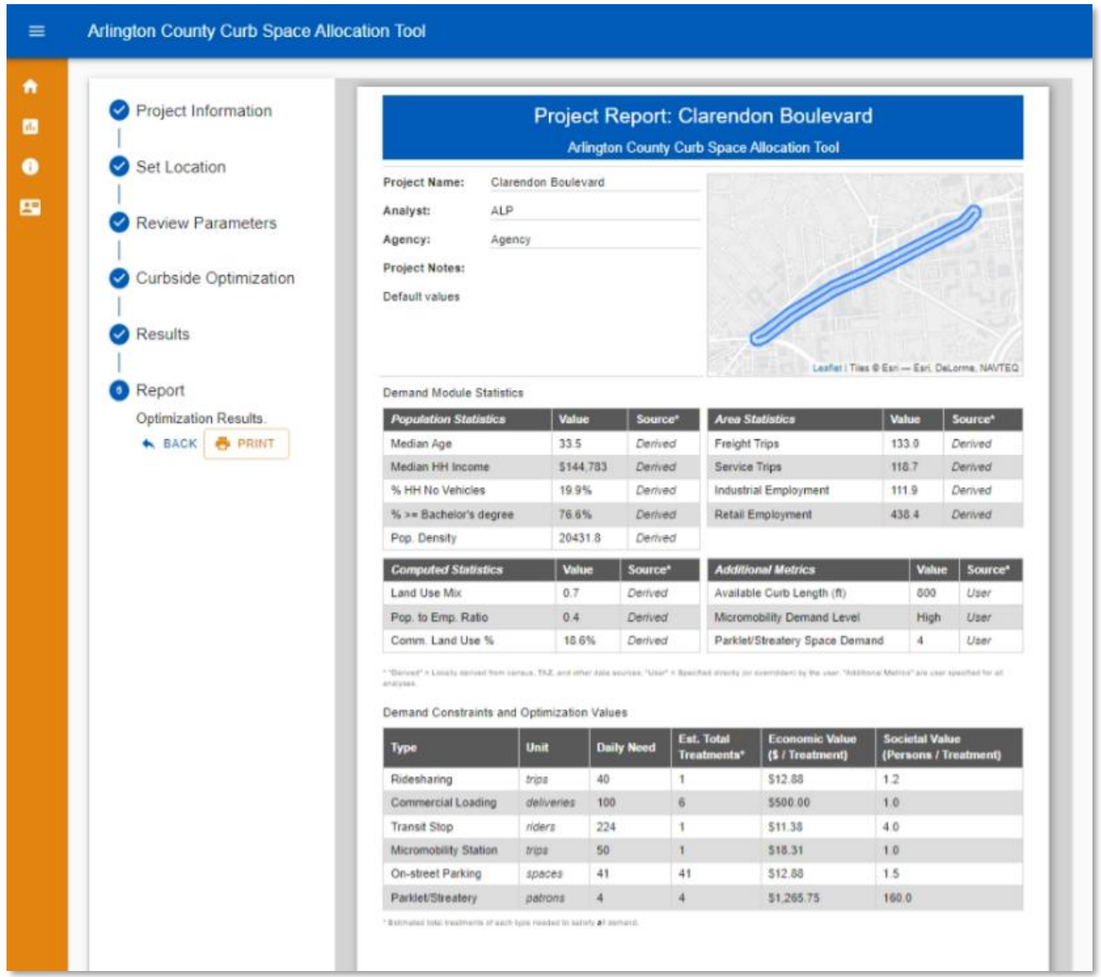


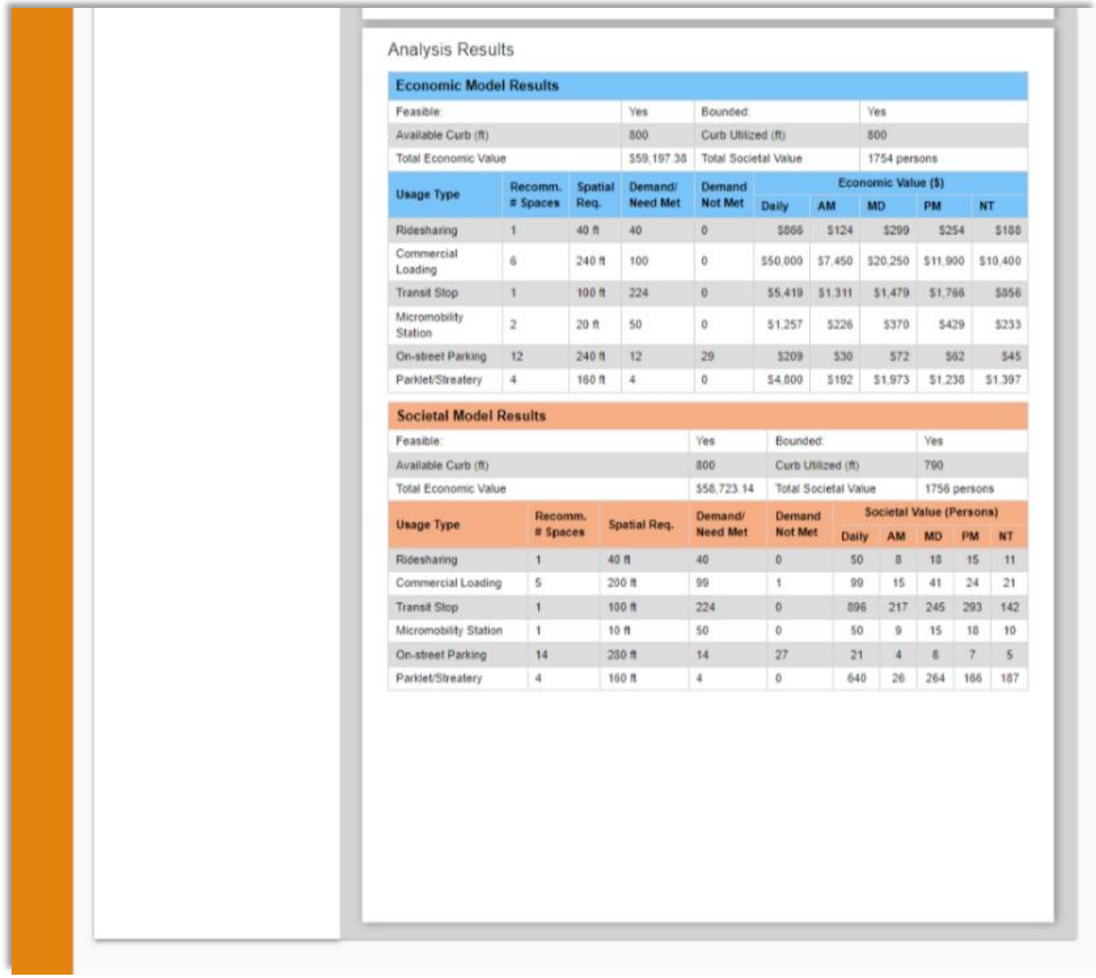
Results (Step 5)



Time Of Day Definitions	Time Period
AM (Morning)	6:00 AM to 9:00 AM
MD (Midday)	9:00 AM to 3:00 PM
PM (Evening)	3:00 PM to 7:00 PM
NT (Nighttime)	7:00 PM to 6:00 AM



Report (Step 6)



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Future Research and Identified Gaps

- **Gaps in Research and Data**
- **Future Tool Updates**

Gaps in Research and Data (1)

General Considerations

- Rules of thumb, industry standards, and data from other regions were frequently used so that the project team could focus on developing the tool's methodology, equations, and user interface. **Collecting local data, such as spending data by trip type and mode like the data collection efforts in Seattle, would substantially upgrade the calculations and allow for potential calibration of the model to local subareas.**

Economic and Societal Benefits

- The tool relied on a narrow definition of direct economic benefits in consumer spending; **future research and data gathering could be undertaken to incorporate indirect economic benefits**. The tool's **consideration of societal benefits could also be expanded** beyond individuals served to include the monetized value of other societal benefits.

Pricing and Time Limit Adjustments

- The tool does not adjust the demand or allocation based on pricing or time limits due to limited available data about the **impacts of price or time limit adjustments on the demand, economic, or societal values associated with these changes**. Incorporating pricing and time-limit adjustments would also help provide a more reasonable constraint on the current "limitless" demand for on-street parking spaces within the tool.

Ride-hailing Services

- An improved understanding of ride-hailing services, particularly in Arlington, would be beneficial. However, **the substantial resources required to collect and process a sufficient amount of data to provide a tangible benefit are likely not worth the effort at this time**.

Gaps in Research and Data (2)

Commercial Loading

- **A significant gap exists in available commercial loading data**. An initiative by the County to collect and inventory on- and off-street loading zones and usage data, including time-of-day, length-of-stay, distance and proximity to customers, and supplemental information including the number of parcels delivered, the number of customers served, and collecting potential economic value information associated with loading zones would provide a substantial upgrade to the curb space allocation tool. **This is likely the highest priority research gap.**

Off-Street Parking

- Incorporating off-street parking inventory and **upgrading the parking demand module to consider the off-street parking supply** in conjunction with demand for on-street parking would provide a much more reasonable constraint on the demand for on-street parking spaces.

Micromobility

- **An improved understanding of micromobility demand**, especially if the demand estimation could be upgraded to a regression approach, would provide more useful micromobility demand estimations and allocation outputs.

Non-transportation mode (parklet/streateries)

- Use new data on parklets and streateries, especially spending and usage information, to substantially upgrade the non-transportation mode module. Further, the tool does not adjust for potential shifts in demand for the use of outdoor space if the demand for indoor dining space returns after the COVID-19 pandemic subsides. **This is likely the second highest priority after commercial loading.**

Future Tool Updates

The ability to break down the available curb space into smaller segments could be useful for allocating "leftover" space. This could be done by combining the tool with a curbside inventory conducted using a linear referencing system.

Further enhancements could include a graphical output (like StreetMix) that provides visually appealing inputs and outputs.

Incorporating pricing and time changes with the parking demand calculations could allow additional functionality as the County explores performance parking initiatives.

Adding a supplemental electric vehicle charging component to the on-street parking module would allow the tool to consider electric vehicles' potential economic or societal benefits.

Considering the "Flex Zone" or the roadway lane immediately in front of the curb along with the sidewalk space adjacent to the curb could allow for the tool to analyze benefits associated with parking-protected bike lanes, transit lanes, an expanded sidewalk area, and landscaping including trees and shade.

Thank you

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