# Ellen Oettinger White

## INTRODUCTION

As a scholar, teacher, and practitioner, I strive to show how the policy and design decisions we make impact communities and the environment, with the goal of better aligning policy to community values and evidence-based research. Prior to beginning a PhD, I worked as an urban designer at a street design firm in New Jersey, as a transportation planning consultant in cities and towns around the country, and as a civil servant for the City of New York.

This portfolio includes examples of scholarship, teaching, design research, and practice. I selected work for inclusion based on the following criteria:

1) to demonstrate how I use methods and tools to answer research questions or explore design solutions;
2) to show designs at a range of scales; and,
3) to represent a cross-section of my experience as a scholar, a teacher, and a practitioner.

All images are solely my own work except where noted.

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SCHOLARSHIP
In my dissertation, titled "Roadside Tree Removal: Causes, Consequences, and Who Decides," I examine roadside tree management as practiced at state highway agencies in the US and abroad, using results to devise policy recommendations, illuminate cultural values, and highlight the influence of epistemologies on modes of practice.

The first two papers shown here are chapters from my dissertation. The third paper evolved from my MLA thesis, an examination of road network patterns resulting from different eras of road design practices.

TEACHING
My teaching heretofore has focused on the use of digital tools like ArcGIS, R, and Python. Here I include two lab modules that I wrote for a Landscape Ecology course. The goals of these modules were to introduce the students to cutting-edge remote sensing and machine learning tools. A third slide includes student work from the graduate level Introduction to GIS for Planners that I teach.

DESIGN RESEARCH
I use design research to convey narratives beyond a single research question and to communicate with audiences beyond academia. I investigate themes at regional and site scales, using digital tools that excavate meaning from maps, imagery, words, and data.

Included here are images from a studio in Svalbard, a documentation of roadside landscape history, and an independent study that reimagines the Garden State Parkway in the year 2066.

PRACTICE
In 10 years as a practitioner, I have worked at the state, regional, corridor, and site scales. Work products have included reports, plans, transportation models, street designs, public participation processes, transportation policies, and management plans, among many others.

The three projects presented here show design-related work at three scales; two of the projects were design-build and are included for the impact they had on the surrounding community.

## "IT'S LIKE A MOONSCAPE.": ASSESSING LARGE-SCALE ROADSIDE TREE REMOVAL USING IMAGERY AND INTERVIEWS.

Manuscript under review at *Landscape and Urban Planning*

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Rutgers, The State University of New Jersey

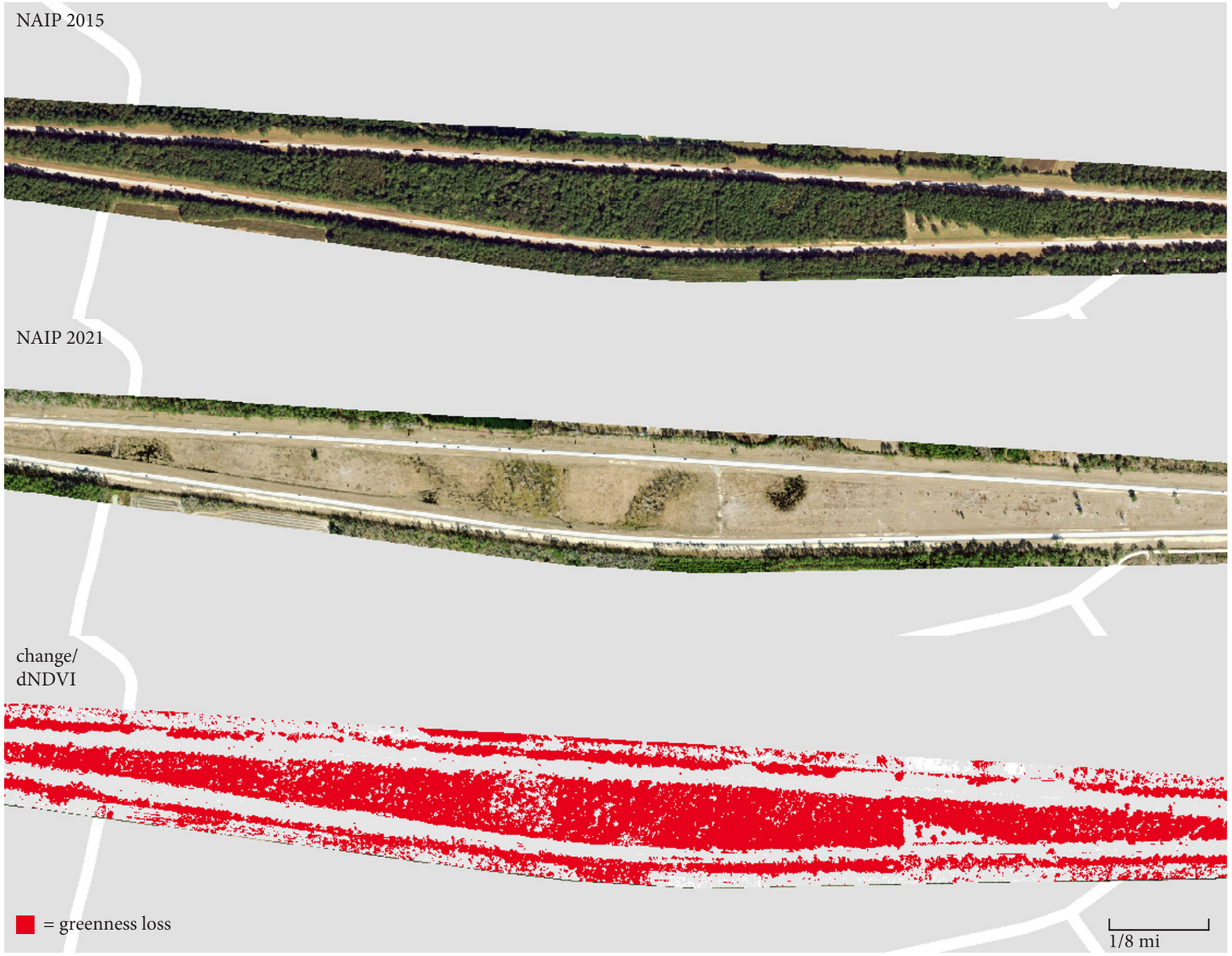
Dr. Marcia S. MEIXLER, Associate Professor
Department of Ecology, Evolution, and Natural Resources
Rutgers, The State University of New Jersey

**ABSTRACT**
In 2017, the Georgia Department of Transportation (GDOT) began clear-cutting trees on all highway property statewide. Thousands of acres of roadsides have been cleared. GDOT justified this tree removal by citing traffic fatalities resulting from crashes with trees. However, since the tree removal began in 2017, tree crash fatalities statewide have not significantly decreased from the 2017 total.

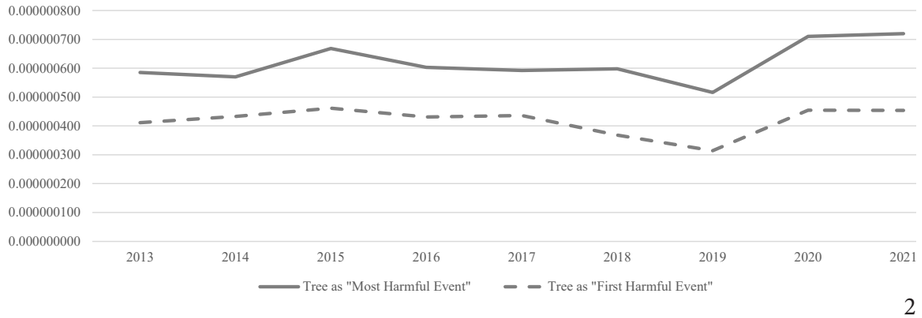
In this paper, we quantified the extent of tree removal along Interstate 16, from Macon to Savannah, using the United States Department of Agriculture (USDA) Farm Service Agency's National Agricultural Imagery Project (NAIP). We used Normalized Difference Vegetation Index (NDVI) differencing to assess change in greenness between 2015 and 2021 imagery. We also collected pre- and post-treatment tree crash fatality data. Finally, we conducted interviews with state agency staff to assess trade-offs and impacts.

Results showed that 12.7 sq km of the corridor along 268.4 km of I-16 became less green, indicating tree removal in 27% of the corridor. Over 68% of the area remained at the same level of greenness; this area was primarily paved roadbed. About 2 sq km became greener, representing 4.9% of the corridor.

Findings illustrate that a simple tool like NDVI can provide a high-level look at roadside maintenance activities while helping assess impacts and plan for next steps. The lack of evidence of reducing tree crash fatalities along this corridor following the tree removal indicates that Departments of Transportation (DOTs) may need to consider measures other than large-scale tree removal to prevent fatal crashes with trees.




Above: Portion of I-16 corridor where trees were cleared by GDOT




Right: Tree crash fatality rate in Georgia (fatalities normalized by vehicle miles traveled), 2013-2021
Source: Georgia DOT Crash Portal

**UNCLEAR TERRITORY: CLEAR ZONES, ROADSIDE TREES, AND COLLABORATION IN STATE HIGHWAY AGENCIES**

Manuscript under review at *Transportation Research Part D: Transport and Environment*

**AUTHOR**
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**ABSTRACT**
The American Association of State Highway and Transportation Officials (AASHTO) issues guidance for highway agencies to maintain clear zones adjacent to the roadbed, free of fixed objects such as trees, to reduce the severity of run-off-the-road crashes. Some departments of transportation (DOTs) are clearing trees well beyond the standard clear zone dimension in the name of road safety, creating friction between units of different disciplines. Existing disciplinary siloes are reinforced by a separation in the literature on roadside trees. Engineers read only that trees are safety hazards; environmental and landscape architecture staff read only that trees are beneficial and should be saved. The literature and federal guidance clearly show that the answer is somewhere in the middle and that collaboration and site-specific solutions are necessary. In this bifurcated context, how do competing epistemologies play out in decision-making when DOTs decide to clear-cut their roadsides? I use semi-structured interviews with agency staff to illuminate how perceptions of trees—either as safety hazards or as beneficial environmental components—are considered by practitioners across disciplines.

Results indicate that engineering leadership understands the clear zone as a variable dimension and roadside tree management as a nuanced issue. The benefits of trees are generally understood by most staff, though are rarely a sufficient counterweight for perceived safety issues. Maintenance staff tend to be motivated more by budgets or contracts than by research or federal guidance. An interdisciplinary staff structure, robust communication practices, stronger environmental policy, and enhanced understanding of public sentiment can increase collaborative decision-making involving roadside trees.

**“We don’t need to clear [trees] for a category five hurricane.”**

**“The way [the tree clearing] occurred, the way it happened. It led everyone involved, including the public, to just believe we were powerless.”**

Quotations from interviewees.

**THE EFFECTS OF ROAD DESIGN CHARACTERISTICS AND FUNCTIONAL CLASS ON LANDSCAPE FRAGMENTATION IN THE SOUTHERN APPALACHIAN MOUNTAINS**

Manuscript in progress.

**AUTHORS**
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**ABSTRACT**
The functional classification of roads determines the physical design of the road and thus the pattern it creates on the land. Some scholarship suggests that road design—sinuosity, width, alignment—influences animal movement and other drivers of landscape pattern. Moreover, design guidelines and construction technology have changed over time, and the physical form and shape of roads can be linked to their design era.

This research seeks to answer these questions: Can different design eras, preserved in the shape of the roads and in the surrounding landscapes, be quantified or numerically defined using geospatial analysis? Can functional class be linked to different patterns in the landscapes surrounding roads? And finally, what can we learn about the relationship between road sinuosity, functional class, and landscape pattern?

To investigate these relationships, we used GIS and FRAGSTATS to divide a regional road network of the North Carolina mountains into 1-mile segments, measured road design characteristics and characteristics of the surrounding landscapes, and conducted ANOVA tests and a random forest model to describe the nature of these relationships. Our ANOVA results show that road designs (sinuosity and elevation change along the roadway) are measurably different based on functional classification. Further, the landscapes surrounding roads show statistically different levels of landscape division according to the functional classification of the roads.

*SECONDARY ROUTES*

0'-<1' Unpaved Shoulder

Two 9'-10' Lanes

Shallow, Sidehill Cut

Sinuosity: 0.859
Elevation Change: 96.2'
Landscape Division Index: 0.694

*STATE HIGHWAYS*

3'-5' Unpaved Shoulder

Two 10'-11' Lanes

Sidehill, Sloped Embankment

Sinuosity: 0.868
Elevation Change: 96.2'
Landscape Division Index: 0.730

*US HIGHWAYS*

5'-8' Paved Shoulder

Four 10'-12" Lanes

Large Cut, Sloped Embankment

Sinuosity: 0.914
Elevation Change: 78.7'
Landscape Division Index: 0.802

*INTERSTATES*

8'-10' Paved Shoulder, 5'-30' Clear Zone

Four 12'-14' Lanes, 30' Median

Large Cut, Sloped Embankment

Sinuosity: 0.96
Elevation Change: 64'
Landscape Division Index: 0.838

Sinuosity: 1 = perfectly straight
0 = perfect circle

Landscape division index:
1 = fragmented
0 = no fragmentation

## LANDSCAPE ECOLOGY MODULES IN ARCGIS PRO

I created this lab for the undergraduate and graduate Landscape Ecology course in the Department of Ecology and Evolution in the School of Environmental and Biological Sciences, Rutgers University, 2020.

### ROLE

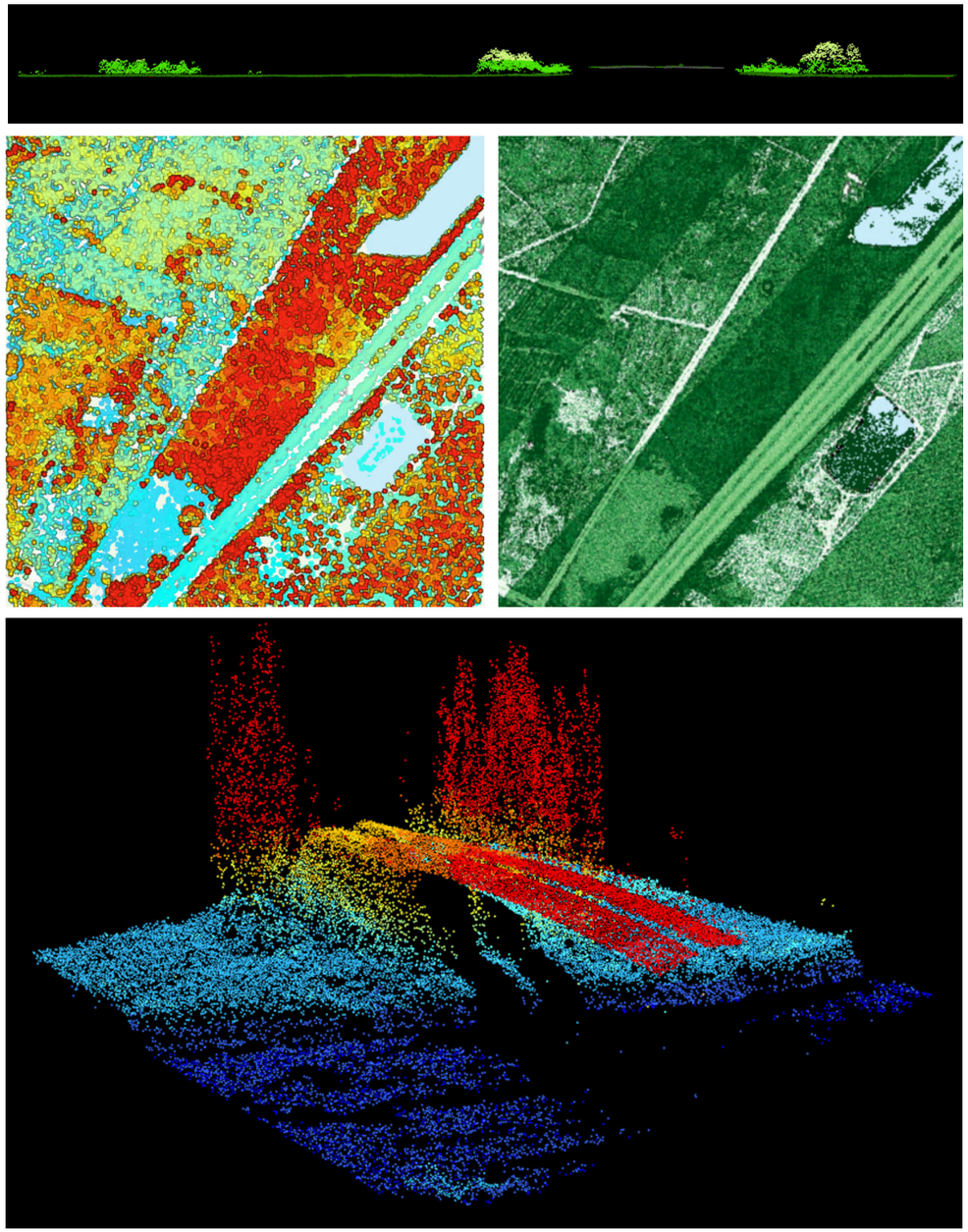
I wrote this module for one of the course homework assignments. I was the course TA.

### ASSIGNMENT: ANALYZING TREE CANOPY HEIGHT AND DENSITY USING USGS 3D LIDAR

Students were asked to download, clean, and process Lidar data from the USGS 3D Elevation Program (3DEP), using both automated and manual Lidar classification tools in ArcGIS Pro 2.5. They then calculated tree canopy density and height and compared the differences.

USGS began producing Lidar point cloud data in 2016, as part of 3DEP. Full national coverage is expected to be complete by 2023. 3DEP includes a range of DEM products as well as Lidar point cloud data. This module works with the Lidar point cloud data to analyze tree canopy density and height. Measuring tree canopy density with the high accuracy allowed by Lidar can help quantify environmental benefits of tree stands and forests.

Student work pictured.



**LANDSCAPE ECOLOGY MODULES IN ARCGIS PRO**

I created this lab for the undergraduate and graduate Landscape Ecology course in the Department of Ecology and Evolution in the School of Environmental and Biological Sciences, Rutgers University, 2020.

**ROLE**

I wrote this module for one of the course homework assignments. I was the course TA.

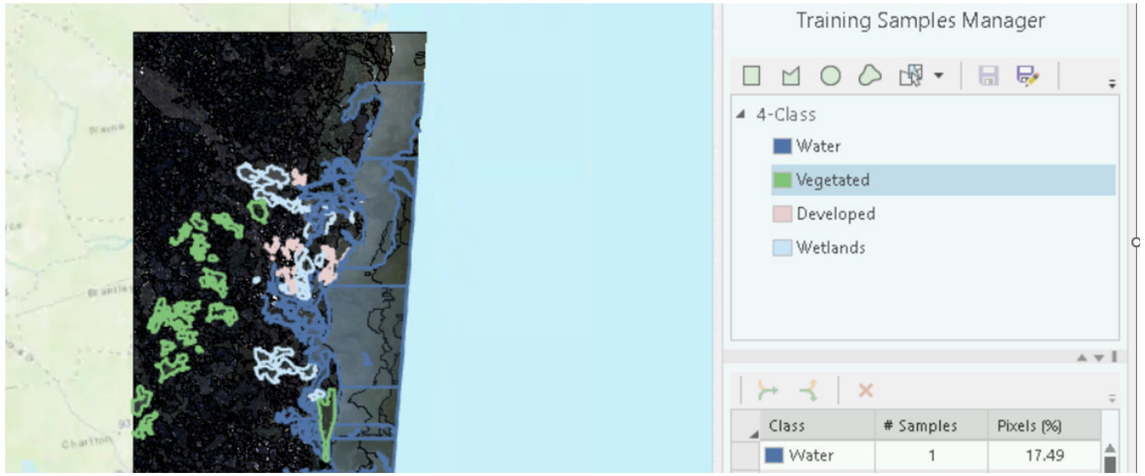
**ASSIGNMENT: ANALYZING LANDSAT LAND COVER USING UNSUPERVISED AND SUPERVISED IMAGE CLASSIFICATION TECHNIQUES**

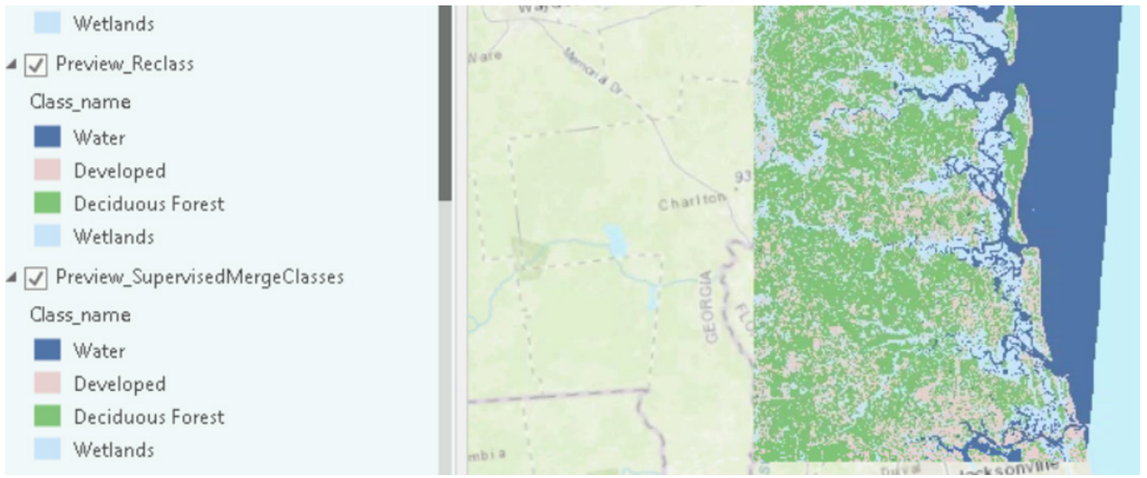
Students were asked to compare the unsupervised, object-based supervised, and pixel-based supervised processes and results in ArcGIS Pro 2.5.

Machine learning techniques are becoming more and more widespread, and image analysis is a highly useful function of machine learning tools. In unsupervised machine learning, the program discerns patterns based on minimal inputs; the user does not control the output. In supervised learning, the user provides the program the expected outputs (in this case, land use classifications) as well as training data.

In this exercise, students learned three image classification methods in ArcGIS Pro. The first was unsupervised learning image classification. The second and third were supervised learning, one with pixel-based image analysis, the other with object-based image analysis. Students used a Landsat satellite image of a coastal area in Georgia into four broad land cover classes: Water, Developed, Vegetated, and Wetlands. These land cover classification methods are used to quickly analyze satellite data in areas experiencing change at a faster rate than land cover products (such as the National Land Cover Database) may be updated. Examples include areas seeing rapid land cover change, such as deforestation, wetland loss, or urbanization. Students compared results and the benefits and drawbacks of each method.

Student work pictured.




Process screenshots from student image classification module.

**INTRODUCTION TO GIS FOR PLANNERS: FINAL PROJECT**

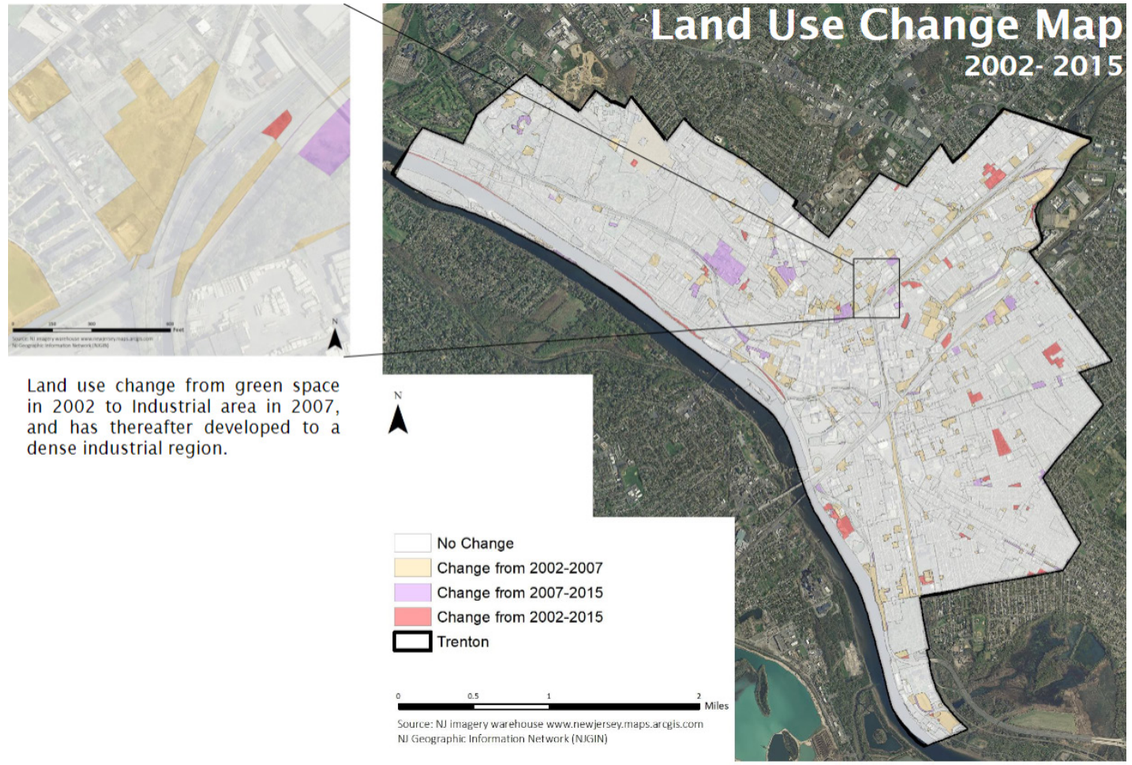
These are selections from the final projects for the graduate Introduction to GIS for Planners, 2021.

**ROLE**
I was the instructor for this course.

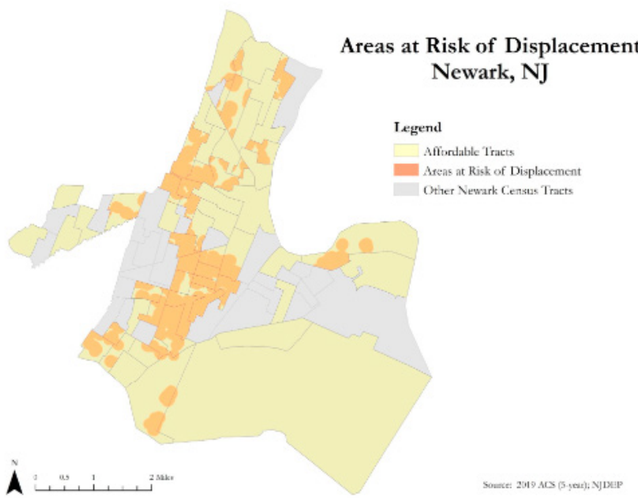
**DESCRIPTION**
In their final project, students practiced a variety of spatial data acquisition, analysis, and cartography skills learned in class. They were charged with presenting a cohesive narrative about a specific municipality and theme.

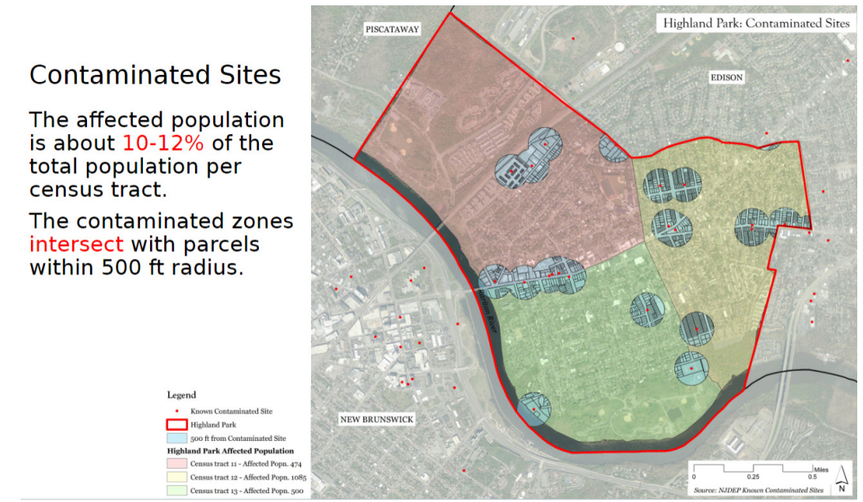
The final project was a departure from previous course assignments. Students had to plan a multi-step process to produce a set of maps, use basic geoprocessing tools to answer their chosen research question, and synthesize lessons from throughout the semester into a real-world project. Most students use products from this project in their professional portfolio.

Student work pictured.




Land use change from green space in 2002 to Industrial area in 2007, and has thereafter developed to a dense industrial region.



# design research site analysis

## SVALBARD AS FLUID TERRITORY

ASLA Award of Excellence, Research Category, 2017

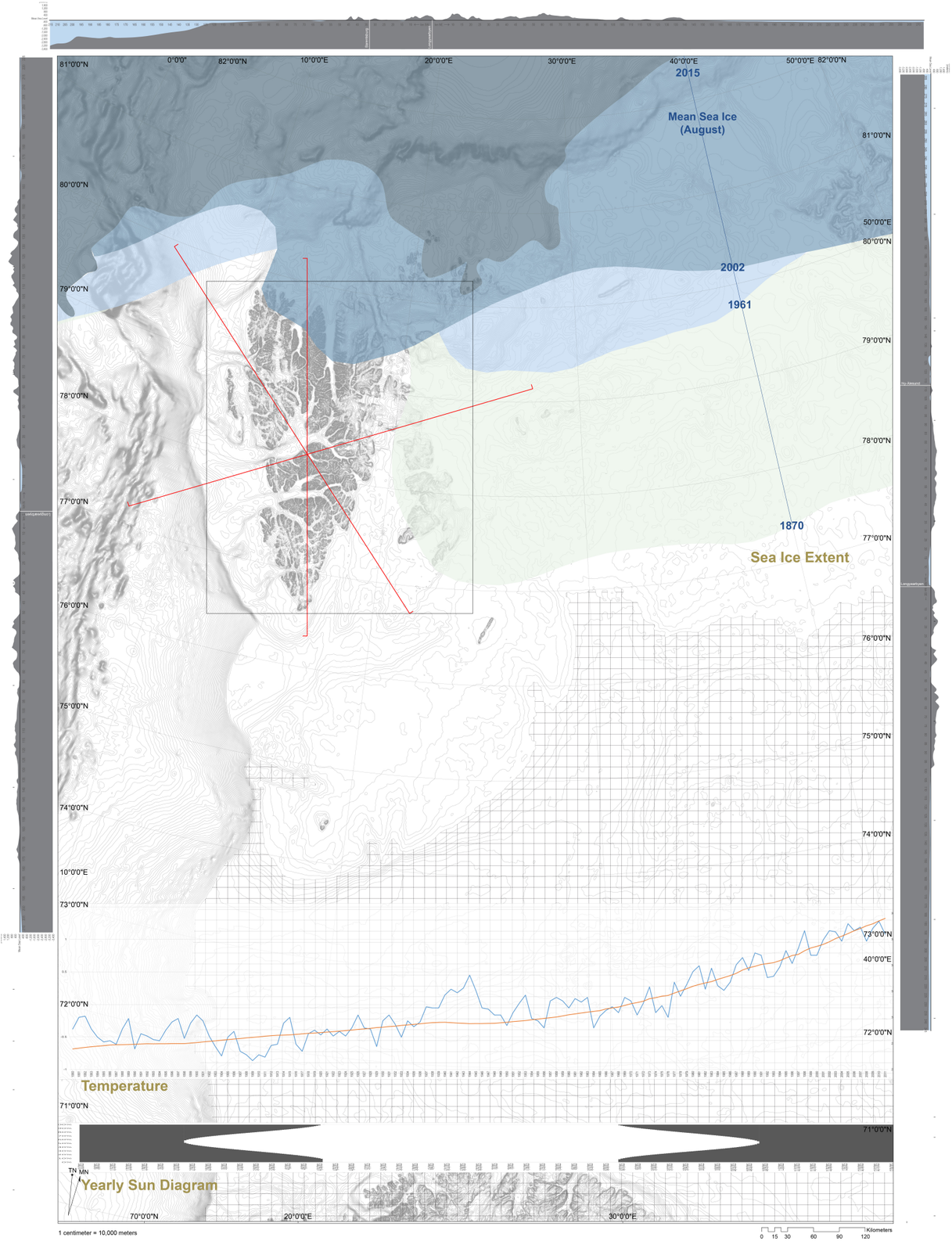
### ROLE

Contributor and research associate: I was a GIS advisor for the Tromsø Academy of Landscape and Territorial Studies studio, led by Janike Kampevold Larsen (Oslo School of Architecture and Design) and Kate John-Alder (Rutgers University). I created the first image in the series “Fluid Territory: A Journey into Svalbard, Norway” while in Svalbard on the studio site visit. “Fluid Territory” received an ASLA Award of Excellence in the Research Category in 2017.

### DESCRIPTION

Svalbard is an archipelago about 650 miles from the North Pole, inhabited primarily by scientists and speckled with abandoned mining settlements. With no indigenous population, nearby countries (e.g., Russia and Norway) historically laid claim to the land. Now formally part of Norway, the Svalbard Treaty restricts the powers of Norway and requires environmental protections.

In the context of a rapidly warming Arctic, this studio explored a range of topics, from the architecture of abandoned mines to the changing fish and bird populations. I supported daily activities of the Tromsø students with GIS consultation and created maps for use as a base in their renderings. I created this image to visualize selected baseline data about the region. It includes historic temperature data, long sections through the archipelago and major settlements, historic sea ice extents, undelineated contours depicting topography and bathymetry, and an Excel model of sunlight hours for each day of the year.

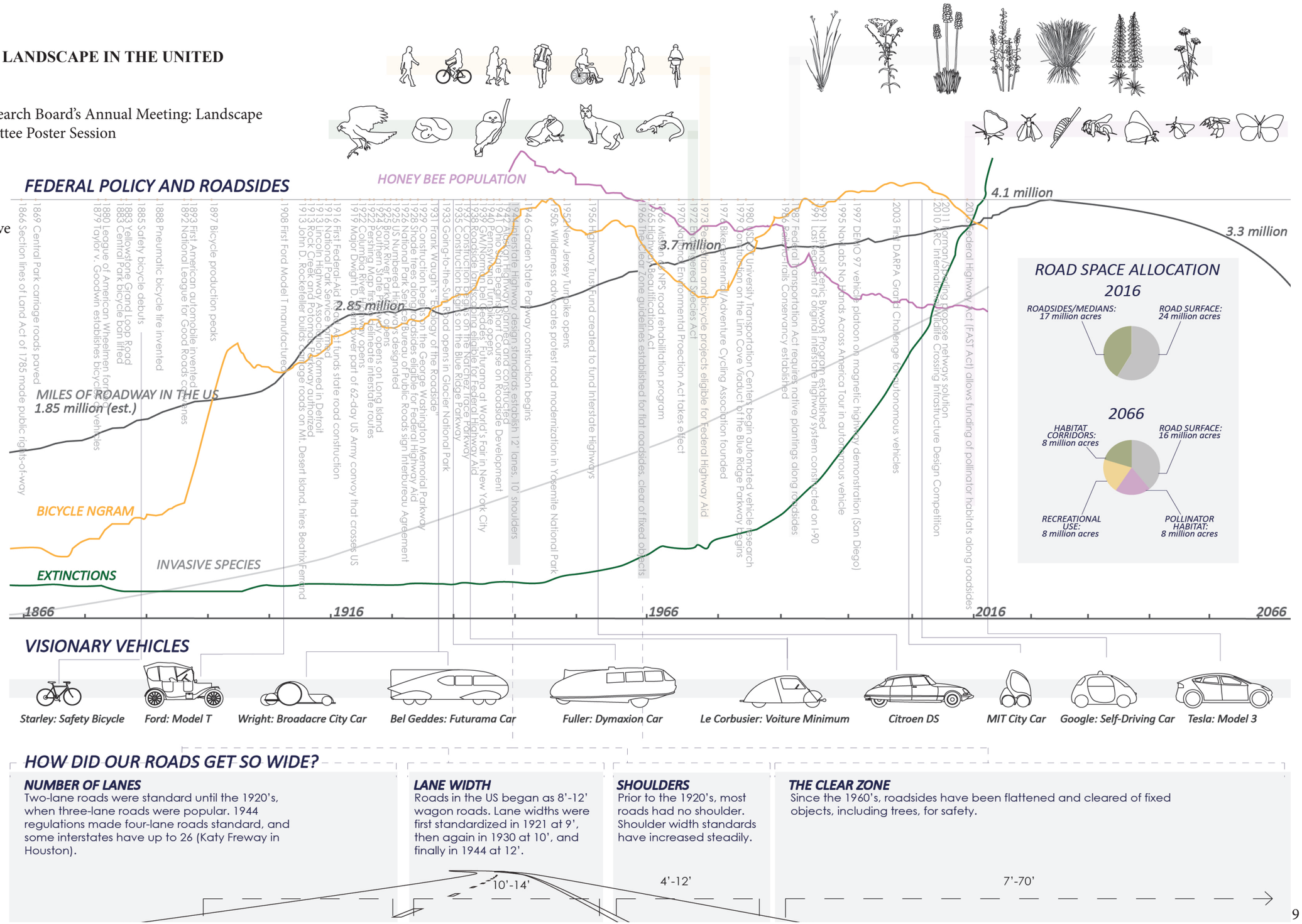


## HISTORY OF THE ROADSIDE LANDSCAPE IN THE UNITED STATES

2018 Poster for Transportation Research Board's Annual Meeting: Landscape and Environmental Design Committee Poster Session

## DESCRIPTION

This poster documents the history of federal policy and trends that have influenced the landscape of roads and the roadside landscape in the United States since 1866.



## MAGIC MOTORWAYS: HIGHWAY DESIGN AND THE AUTONOMOUS VEHICLE

2016 MLA Independent Study, advised by Kate John-Alder (Rutgers University)

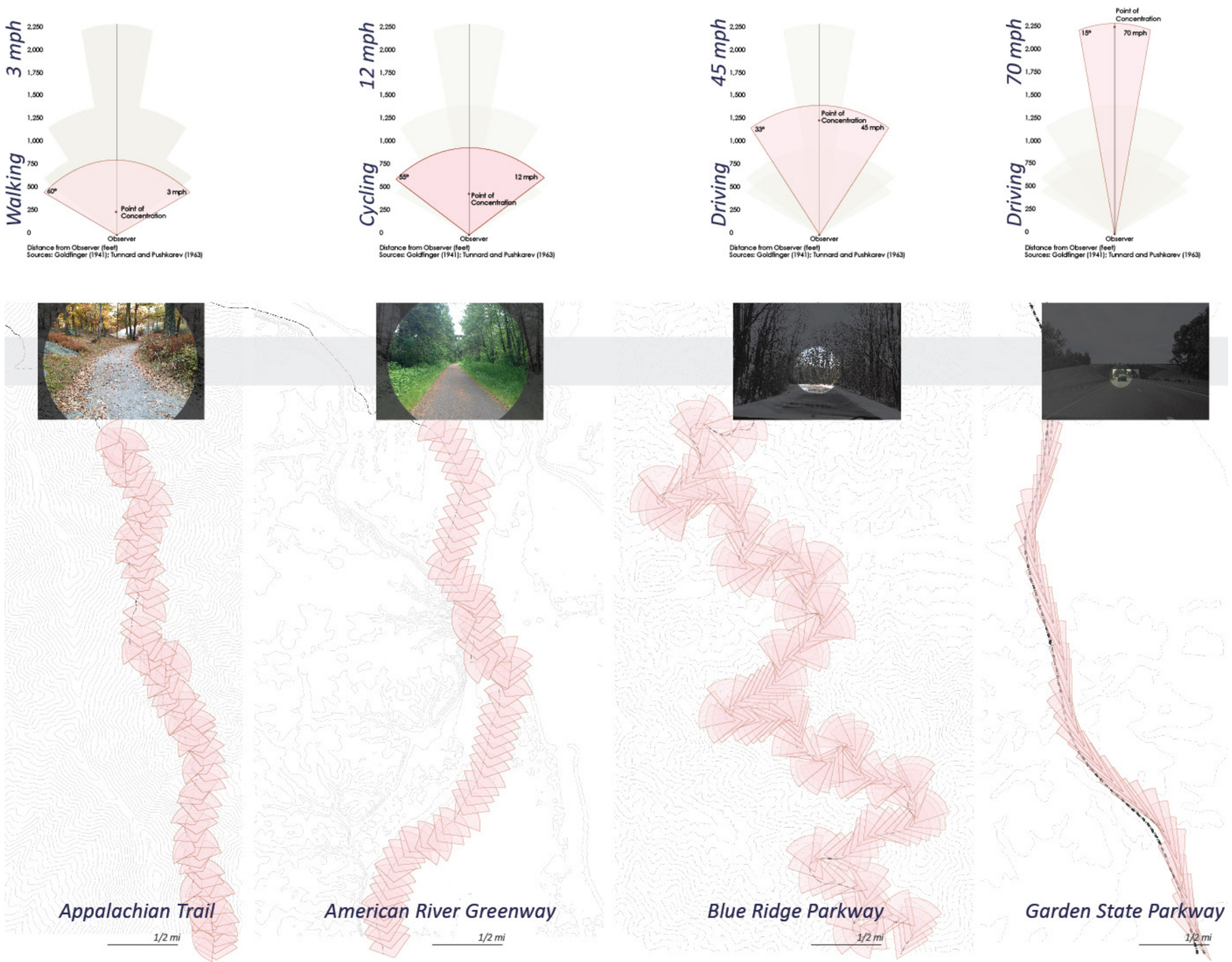
## SLIDE 1: CASE STUDIES IN SCENIC CORRIDORS AND PERCEPTIONS OF SPACE

### DESCRIPTION

I reimagined the Garden State Parkway in a fully autonomous world in the year 2066. It explores ideas for utilizing road right-of-way for functions other than travel lanes for cars, including a revived emphasis on the scenic roadside, a route vertically- and horizontally-aligned for the bicycle, and restored habitat for pollinators and endangered species.

Using the Garden State Parkway as a testing ground, I propose designs for recreational trails and habitat corridors. With safety improvements from autonomous vehicles, space allotted to accommodate driver error can be reclaimed: one roadbed may be closed completely, with all traffic accommodated on the other side. This is especially helpful for uses like new habitat connectivity for species that require minimum widths to be effective.

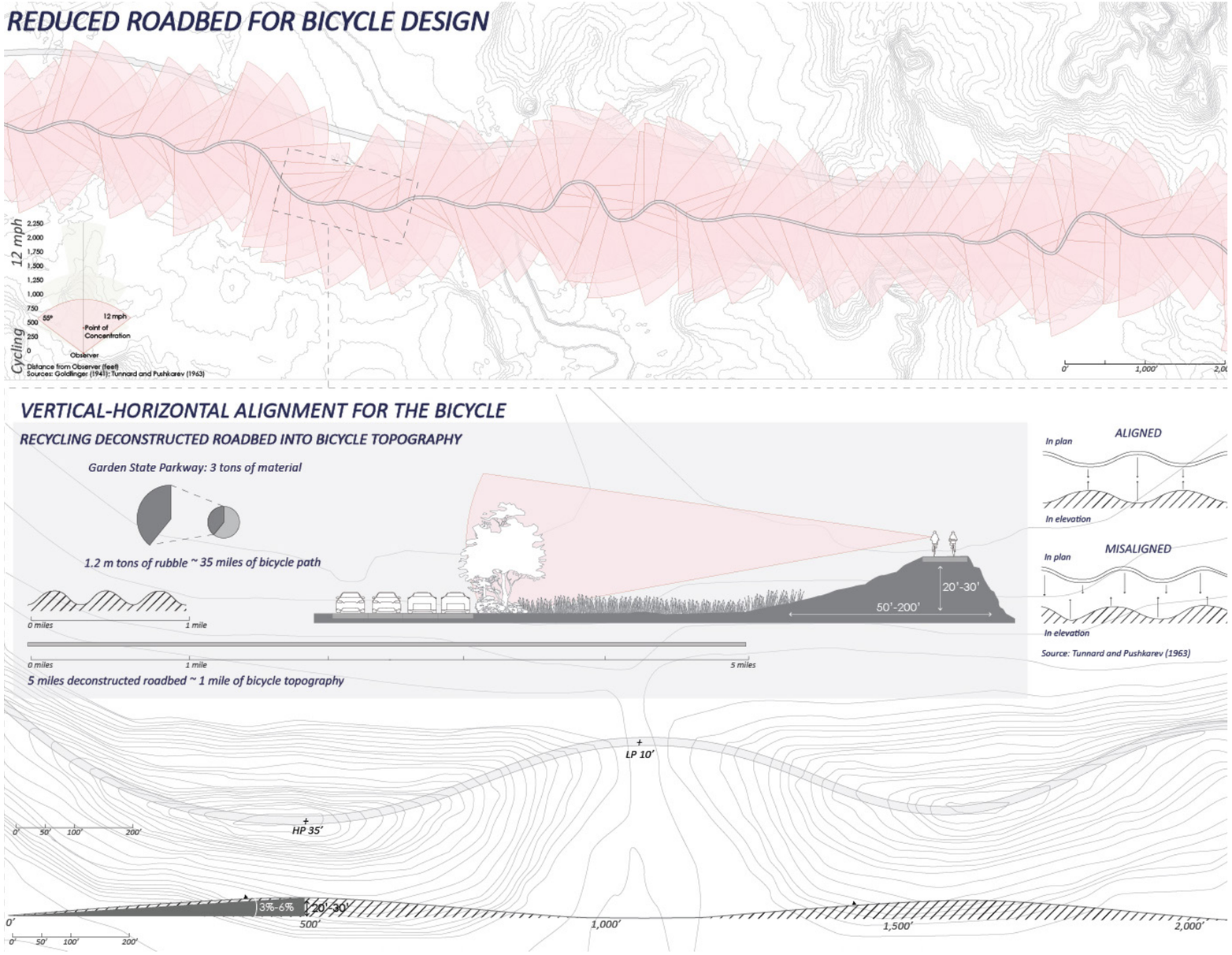
Fifteen hundred (1,500) acres of roadway and 2,700 acres of median and roadsides comprise the Parkway corridor. This design proposes a reduction of lane size from 12 feet to 8 feet, the elimination of the clear zone, and the reconfiguration of the northbound roadbed for new uses. The southbound roadbed becomes four 8-foot travel lanes with closely planted vegetation, freeing up over 700 acres for new plantings and 500 acres for recreational trails.



**MAGIC MOTORWAYS: HIGHWAY DESIGN AND THE AUTONOMOUS VEHICLE**

2016 MLA Independent Study, advised by Kate John-Alder (Rutgers University)

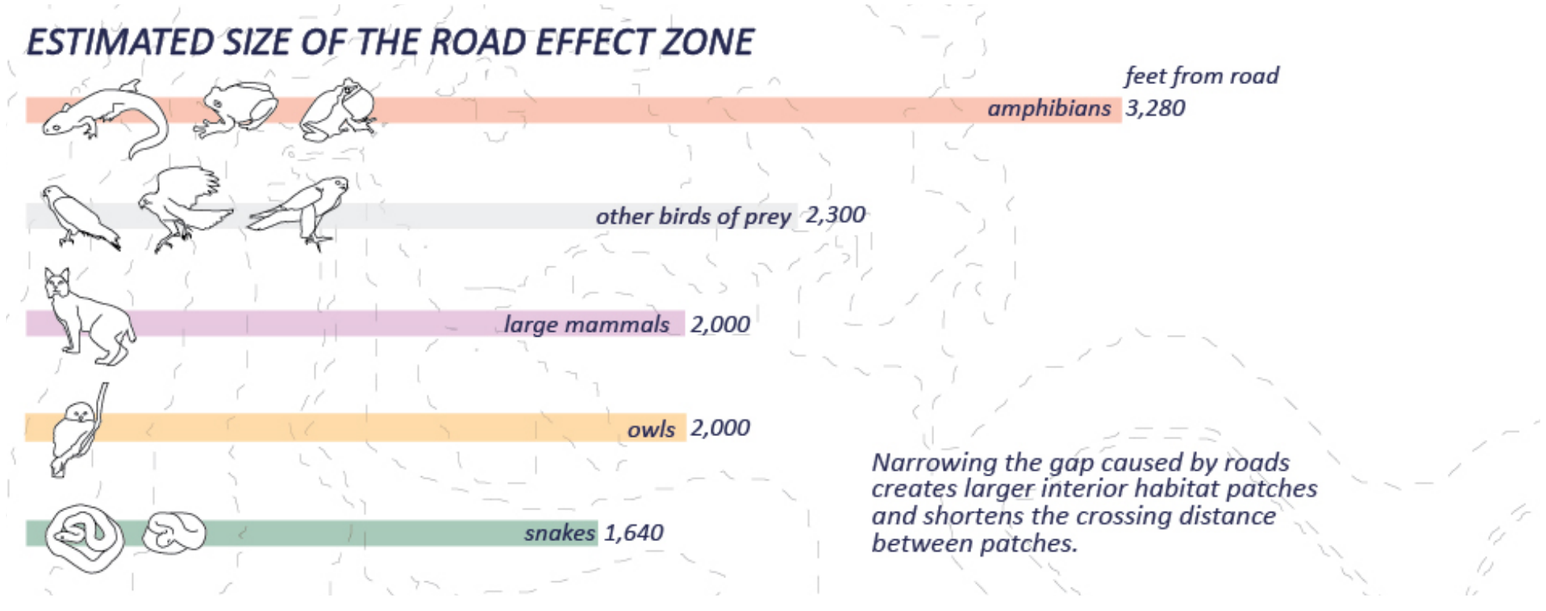
**SLIDE 2: ROADBEDS REDESIGNED FOR BICYCLES**

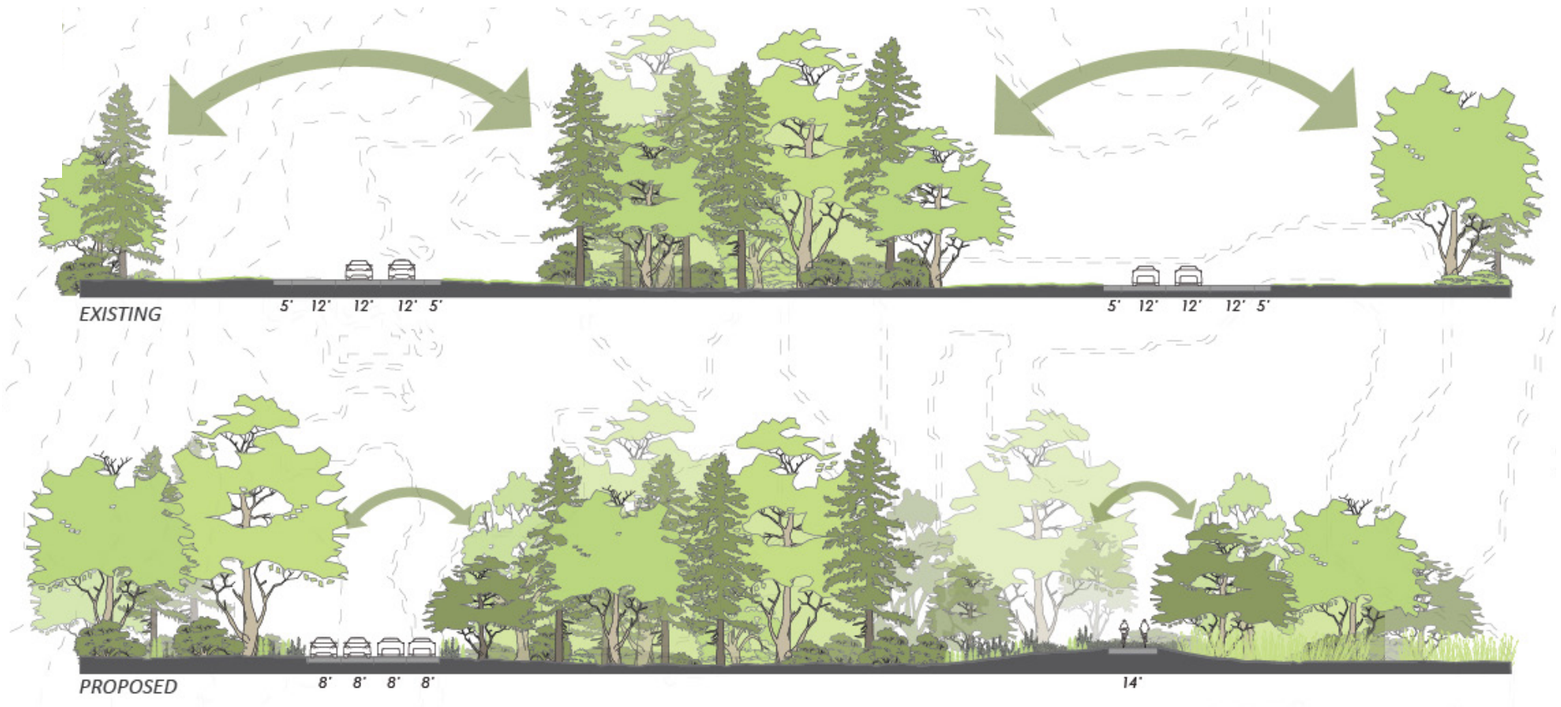


**MAGIC MOTORWAYS: HIGHWAY DESIGN AND THE AUTONOMOUS VEHICLE**

2016 MLA Independent Study, advised by Kate John-Alder (Rutgers University)

**SLIDE 3: HABITAT CORRIDOR PLAN**



**MORRIS CANAL GREENWAY DESIGN GUIDELINES**
**2018**

## ROLE

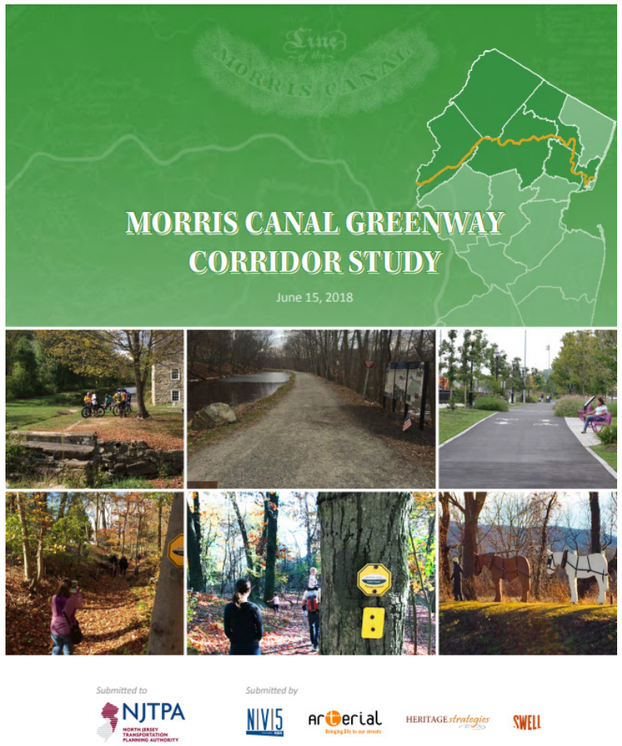
Project manager: I conducted initial site field work; managed project conceptual design; managed public outreach efforts; and oversaw final graphics, signage, and furnishings design.

Firm: Arterial Streets LLC
Prime: NV5

## DESCRIPTION

The Morris Canal was a significant contributor to the economic development of New Jersey in the 1800s. Characterized by 23 inclined planes that moved boats across steep hills, the graded planes left significant marks across the landscape of the state (see photo at lower right). In this greenway design project for the North Jersey Transportation Planning Authority, we created design guidelines to unify the appearance of the 109-mile greenway across the many municipalities and counties it traverses.

Images represent collaborative design work of the full Arterial team, including Dave Lustberg, Sunha Park, and Chris Townley.



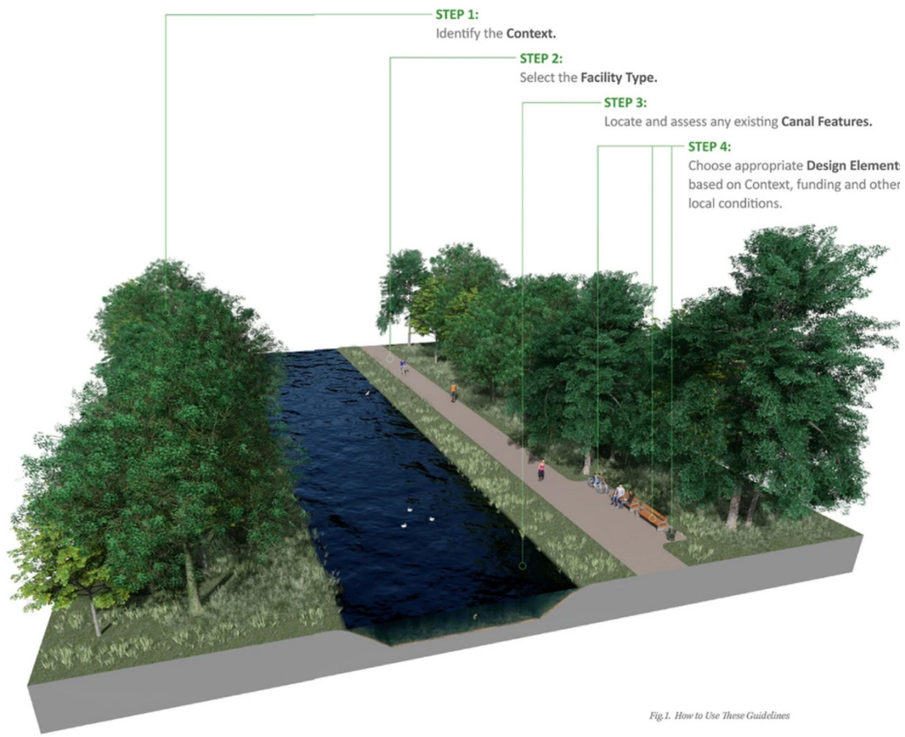



Fig.1. How to Use These Guidelines

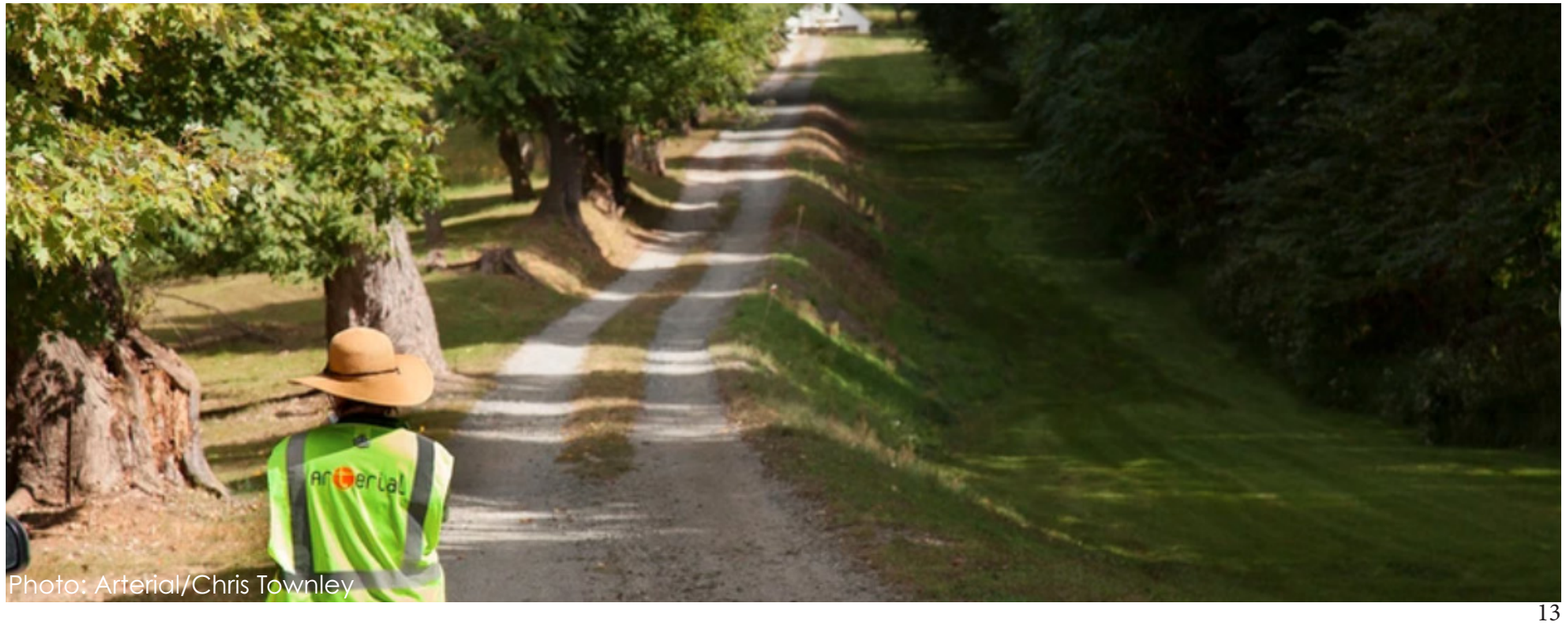


Photo: Arterial/Chris Townley

## STUYVESANT AVENUE STREETSCAPE

New Jersey Complete Streets Award, 2019

### ROLE

Project manager: I managed project conceptual design; coordinated renderings in CAD, Photoshop, and Lumion; oversaw construction document creation and delivery; and managed relationships with the client and contractor.

Firm: Arterial Streets LLC
Prime: Maser Engineering

### DESCRIPTION

Union, New Jersey, is a small township in Union County with a once-thriving downtown. As an economic development tool, the Township invested in revitalization of its downtown streetscape. Features include a raised mid-block crossing, pedestrian bump-outs, new lighting and benches, and ergo crosswalks. Engraved granite bands, which I designed and specified with the granite supplier, highlight the Township's Revolutionary War history. Removable bollards allow the Township to close the street to car traffic and host street festivals and other events.

The project won a Complete Streets Excellence Award from the New Jersey Bicycle & Pedestrian Resource Center and the New Jersey Department of Transportation in 2019.


Photos: Arterial/Jason Yadlovski

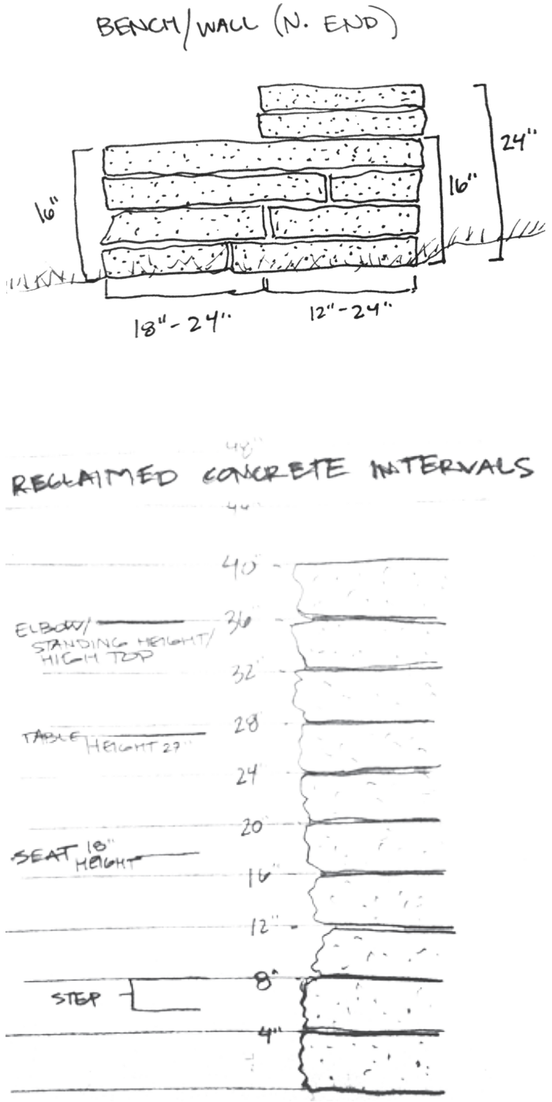
**NEWARK COMMUNITY GARDEN DESIGN-BUILD**

2015 Rutgers Landscape Architecture Praxis Studio

**ROLE**
Research assistant and studio participant

**DESCRIPTION**
The Ujimaa Garden (Morris Avenue & 14th Avenue) in Newark's Central Ward was an assemblage of vacant lots. Our studio's community partner had worked for years to establish a sense of place in the garden. Residents in the neighborhood had constructed a path diagonally bisecting the space. From a design standpoint, the path divided the space and disallowed any pedestrian interaction with the space through pacing or enclosure treatments. However, the residents felt a strong connection to the path. I designed this semi-circular seat wall to delineate a moment for pause in the path. I chose reclaimed concrete from sidewalks as the material for its aesthetics, availability, and heft.

The seat wall was the most heavily-used feature in the garden by garden volunteers, work crews, students, and nearby hospital workers. Several years after project installation in 2015, the community garden's Adopt-A-Lot lease was not renewed by the city. Most of our studio's other interventions are filled in or overgrown and the street trees have died, but this bench is still present as of summer 2022.





Post-construction, during a neighborhood work day.


Pre-build condition.