Preliminary Work to Assess Potential Shifts in Transportation Modes and GHG Emissions During and After the I-81 Project

Final Report

Investigators: Baris Salman (CEE) and Sevgi Erdogan (iSchool)

Budget: $7,000 (Actual amount spent: $4,384)

Students Funded:

- Isabela Argentina Rodriguez, CEE, Senior Student
- Steven Perez, CEE, Sophomore Student
- Charles Christopher Sirey, iSchool, Senior Student

Objective: The I-81 project is a $2.25 billion project, with a planned duration of approximately six years. This megaproject is divided into a total of eight contracts to be released in two phases and will consist of work to convert the approximately 12-mile stretch of I-81 into a business loop, to make the necessary improvements and modifications on the interchanges between I-81 and other roads and highways (i.e., I-690, I-481, and local roads), and to install 18,000 linear feet of new stormwater lines. The project is phased such that the interchanges and improvements on the outer portions of the project area will be completed and traffic will be diverted to I-481 before the I-81 viaduct is removed from the downtown Syracuse area. During and after the execution of this project, travel behavior of commuters and resulting traffic patterns in the project area are expected to change substantially. These changes will most likely trigger cascading impacts on user costs and emissions in the area.

The objective of this project was to generate the foundational information necessary to be able to assess the changes in travel patterns and behavior, such as potential shifts in transportation modes, and GHG emissions during and after the I-81 project. As such, this project focused on exploring the potential data needs and identifying possible methodologies that could be adopted in a future study to assess shifts in transportation modes and GHG emissions as a result of the I-81 project.

Summary of Research Efforts:

This project helped the research team identify various publications that focused on assessing the success of highway removal projects around the United States. The characteristics of these highway removal projects and methods used in assessing the impacts of these projects were studied. Potential data needs were also identified. The research team held weekly meetings to discuss research efforts and to generate research

plans for the following week. Students were provided with guidance and a certain level of autonomy to improve their research skills. With some minor adjustments to the initial scope, the project generated the intended results, and the investigators plan on continuing to work on this topic in the following years.

The highway projects studied as part of this project include:

- Rochester, Inner Loop removal
- Cypress Freeway (Oakland)
- Embarcadero and Central Freeway (San Francisco)
- Park East Freeway (Milwaukee)
- Caldecott Tunnel Expansion (California)
- Harbor Drive (Portland)
- I-980, proposed project (Oakland)
- I-375, planned project (Detroit)

Summaries of the characteristics of these projects and the methodologies used can be found in the next pages.

Other documents reviewed include the Environmental Impact Statement (EIS) issued for the I-81 project and Syracuse Metropolitan Transportation Council (SPMTC)'s Transportation Atlas.

One of the research team members visited the local Centro Office during a public outreach event to gather expert opinion on the bus re-routing and BRT plans being developed by the agency. The research team also conducted an interview with SMTC's Director, Mr. James D'Agostino, and other SMTC professionals on April 30. This interview helped with better understanding the data needs and potential methods to be used in future studies to examine the transportation shifts and GHG emissions in the area. The other planned interviews couldn't be completed due to scheduling complications with the agencies.

The research team generated a poster to summarize the research efforts and findings. The poster is presented at the 2025 New York State Association of MPOs (NYSAMPO) Conference in Syracuse on May 13th. A copy of the conference poster is attached to this report.

Next Steps:

The research team is planning to continue working on collecting additional data and expert opinion from local agencies. Two of the students who were supported by this project will continue studying at SU in Fall 2025. The research team will explore funding opportunities to support these two students and to add more students to the research team.

Characteristics of Other Studies:

Study	Status	Length	Cost	Social Impact	Env. Impact	Comparison to I-81
Rochester Inner Loop Removal	Removal phase completed in 2017	5 years	$ 21 Million	No noticeable impact to bus ridership, lack of bus system overall	Boulevard might increase emissions by 4-27% due to braking and stoplights	Midsize city of a similar population to Syracuse
	Next 2 phases ongoing			60% of 500 newly built units are affordable housing	Asthma related incidents have increased from 2014-2018, due to teardown	
				2-3 street level boulevards with protected bus lanes, wide sidewalks		
Cypress Freeway (Oakland)	Complete	16 years (from collapse of highway to completion	12.5 million	No noticeable change in BART (metro rail) system	Pollutant levels dropped significantly around the highway	Freeway rebuilt in a more industrial area compared to no rebuild for I-81. Freeway next to a major metro station unlike I-81.

		of Mandela Parkway)		Environmental gentrification caused by the teardown has changed the neighborhood.	Approximately 50% decrease in nitrous oxides and 32% decrease in black carbon	
Embarcadero and Central Freeway (SF)	Complete	Embarcadero (21 years since earthquake collapse)	50 million	Average price of housing has increased within 2 miles of teardown (Embarcadero)	Project was undertaken for a social impact rather than environmental objectives.	Both freeways received more traffic than I-81. On Embarcadero, side streets relieved the main boulevard, similar to the goal of I-81 Crouse exit. Octavia boulevard (former Central Freeway) is still a very important route required for commuting to northside of City, similar to I-81 commute to northside or Destiny USA Mall.
				Average price of housing increased In the immediate area, but for houses 2 miles from it, remained the same		
		Central Freeway (26 years since earthquake collapse)		Traffic on new Octavia Boulevard decreased by over 50%		
				Vehicle accidents increased up to 24%		

Park East Freeway	Complete	About 2 years	$25 million	Reconnected downtown neighborhood to the north Lots of development as a result, including a basketball arena Traffic on boulevard 19k compared to 55k on freeway Traffic on side streets stayed the same for the most part		Like I-81 in the freeway's proximity to downtown and how it may have created disconnections between neighborhoods. Former traffic numbers are also very similar to current I-81.
Caldecott Tunnel expansion	Complete	3 years	$417 million	Opposite of a teardown: an expansion Volume on the freeway went up BART ridership went down at the time of construction completion but started to level out later Study also added that the times of		Shows the opposite scenario. Traffic volume went up and transit usage didn't drop. If that trend stays true, we can expect less capacity on boulevard. As seen in this project, maybe the commuting times and work schedules may change as a result of the teardown

				commutes changed to avoid traffic		
Harbor drive, Portland	Complete	4 years	20 million	The project was completed in 1978 which may explain the low cost. Connected downtown to the coast. Originally thought to not be possible. Many downtown streets turned into one-way streets and traffic lights were signalized. A bridge was built for drivers to access the highway on the other side of the river.	A new park opened with lots of greenery.	Both projects were coupled with larger zoning changes and revitalization plans, which is standard with removal projects. Otherwise not many similarities were observed.

I-980, Oakland	Proposed/under study	-	680,000 for study	Built to handle 19k vehicles per hour but only receives a little over 5k during peak times. Divides downtown from West Oakland. Linked proposal suggests replacing highway with BART line. A second transbay tube is planned to accommodate more capacity via rail. Tearing down 980 should likely lead to mode shift to rail.		Oakland is much more heavily populated than Syracuse. In the case of both, there isn't an obvious second route like a parallel highway.
I-375, Detroit	Planned	Break ground 2026 (tentative)	300 million			Highway will be turned into a four-lane boulevard, the same idea as in Syracuse, the current number of vehicles per day is also very similar to I-81.

Methodologies Used in Other Studies

Study	Air Quality/ Emissions	Traffic volumes/ Mode shifts	Socioeconomic	Organization
Rochester Inner Loop	EPA's Fused Air Quality Service Using Downscaling (changes in ozone and fine particular matter) NYSDOT Average Annual Daily Traffic and Truck volumes (Analyzed whether changes in air quality were affected by differences in traffic)	Stantec (Firm contracted by City of Rochester to conduct an analysis of pedestrian and bike mobility)	US census data (collect demographics, socioeconomic and housing characteristics before and after project)	Atlas.ti (Used to organize and code interview transcripts and documents)
Cypress Freeway	Emission rates were calculated from hourly traffic rates and Emission factors Factors were determined on aggregate vehicle speeds NOx and PM2.5 emissions factored by vehicle types using	Combined road data from I-880 reroute and Mandela Parkway from California DOT and City of Oakland.	US Census data from 1990, 2010 and 2006-2010 American Community Survey.	

	EMFAC model outputs			
Embarcadero and Central Freeway			Informant Interviews and Literature review	
			Block level census statistics and land use projection from the Association of Bay Area Governments	
			Property value based on residential sale prices, neighborhood attributes, and distance to transportation corridors	
Park East Freeway		Average Daily Traffic provided by WisDOT		
Caldecott Tunnel Expansion		Freeway volumes from Oct. 2012 - Oct.2014, from morning to afternoon peak hours, monthly (Caltrans Performance Measurement System)		
		Examined weekday BART trip pairs for the transit system and stations near tunnels. Compared ridership between Sep.2012-Oct.2014		

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Syracuse University School of Information Studies

Syracuse University College of Engineering & Computer Science

Charles Sirey[1], Steven Perez[2], Isabela Rodriguez[2], Baris Salman[2], Sevgi Erdogan[1, 2]

Syracuse University School of Information Studies[1], Civil and Environmental Engineering Department[2]

Introduction

In this study we conducted a literature review of highway removal projects (completed, ongoing, or planned) in the US.

Objectives

Identify best practices in terms of:

- Methods for quantifying impacts of highway removal projects focusing on emissions and mode shifts
- Data collection and data sources used
- Identification of research gaps and needs

Method

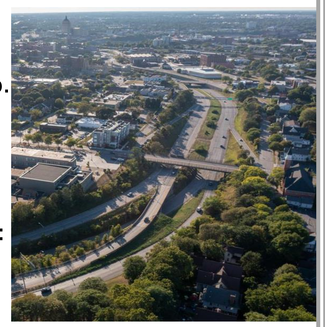
An extensive literature review on analyses of freeway removal projects and their impacts on GHG emissions, mode shifts and traffic patterns.

- Examined over 10 cities and their related documentation
- Conducted interviews with relevant agencies in Syracuse

Related Projects Identified

The demolition of I-81 is a unique undertaking, with no perfect comparison. However, several similar projects offer useful points of reference. We focus on two most similar and innovative project here:

Rochester Inner Loop. In the first phase of a broader initiative, the City of Rochester removed a portion of its downtown inner loop. The highway was replaced with a two-lane road featuring sidewalks on both sides and a dedicated bike path to the west.



Rochester Inner Loop North to be replaced in future phase. Source: City of Rochester

This project is similar to I-81 in several ways:

- Located in New York
- Serves a city of comparable size
- One of the most recent projects completed

Milwaukee's Park East Freeway. This highway was demolished to reconnect the downtown area with neighborhoods to the north. It was replaced by a six-lane boulevard. Like I-81, the Park East Freeway carried a high volume of traffic prior to removal.

Findings after removal:

- The traffic significantly declined once the boulevard was completed.
- The project also involved modifications to adjacent streets to accommodate changes in traffic patterns, similar to how I-81 is adjusting nearby corridors like Crouse Avenue to manage flow around Syracuse University.

This is not an exhaustive list of the highway removals similar to I-81. Others like the **Cypress Freeway** in Oakland serve as good examples for studying highway removals too.

Source : https://nysfocus.com/2023/07/06/syracuse-i-81-highway-environment

Source:https://webapps.dot.ny.gov/i-81-viaduct-project-overview

Best practices for impact assessment methods

In examining the methodologies used by cities, we can see various approaches used, many exhibiting overlaps but some having their own techniques in obtaining data.

Methods for Estimating GHG Emissions Impacts:

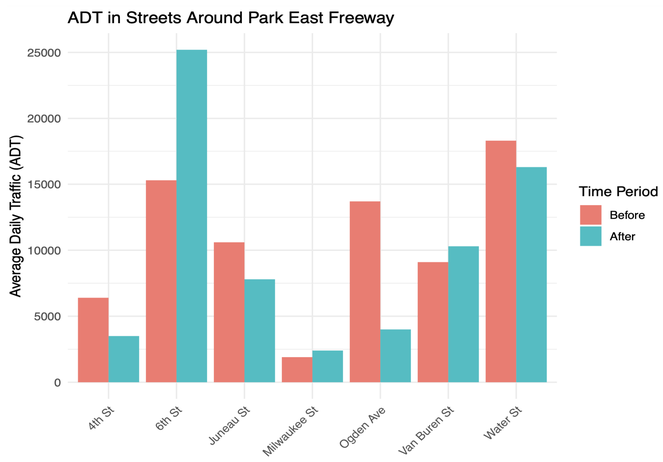
Rochester Inner Loop. Used the EPA's downscaling models to evaluate changes in ozone and fine particulate matter along with the NYSDOT's Average Annual Daily Traffic to find correlations between changes in air quality to shifts in traffic patterns.

Oakland Cypress Freeway. Calculated emission rates based on hourly data and emission factors which were determined by different aggregate vehicle speeds. Additionally, they used an EMFAC model to help factor in NOx and PM2.5 emissions based on vehicle types for a more granular estimation of emissions levels.

Methods for Estimating Mode Shifts:

Rochester Inner Loop. Used a private firm, STANTEC, to collect information on shifts in pedestrian and bike modes.

Park East Freeway. Used Average Daily Traffic data provided by the cities or Wisconsin State DOT.



Source: Wisconsin Department of Transportation, 2010

Data Needs Identified:

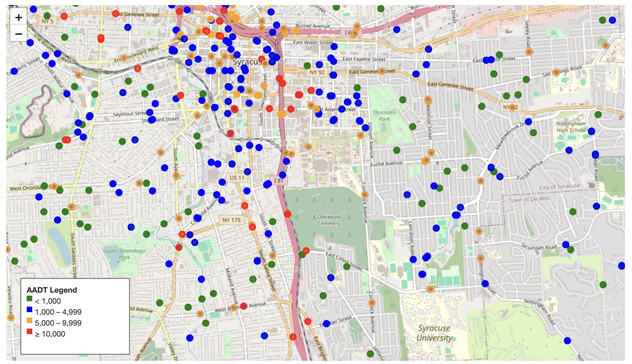
To effectively track changes in traffic patterns, data must be collected across all modes of transportation.

Tracking cars.

- Automatic traffic recorders and turning movement counters
- The New York State Department of Transportation records average daily vehicle counts at various locations(see image below)
- Other agencies and organizations may also conduct their own traffic studies which may require additional funding
- For deeper insights into commuting behavior:
  - Google Maps API (for route times)
  - Census data (for broader travel patterns)
  - Proprietary data such as Location-Based Services (LBS) data

Tracking other forms of transportation.

- Bus ridership by station and line to detect mode shifts
- Pedestrian and bicycle counts may require more active collection if the data isn't already available.
- The locations of bike lanes, sidewalks, and the condition of roads in the study area, all of which are available in the case of Syracuse.



Source: New York Department of Transportation

Preliminary Findings

- Projects vary by purpose, geography and scope, thus the methods.
- Many studies are limited in scope, and lacking a comprehensive analysis of impacts on emissions and mode shifts.
- Almost all studies reported reduced driving demand after highway demolition.
- Mode shift results depend on availability of the modes
- Using traffic data from the DOTs is the most common and effective way for analyzing traffic impacts.

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