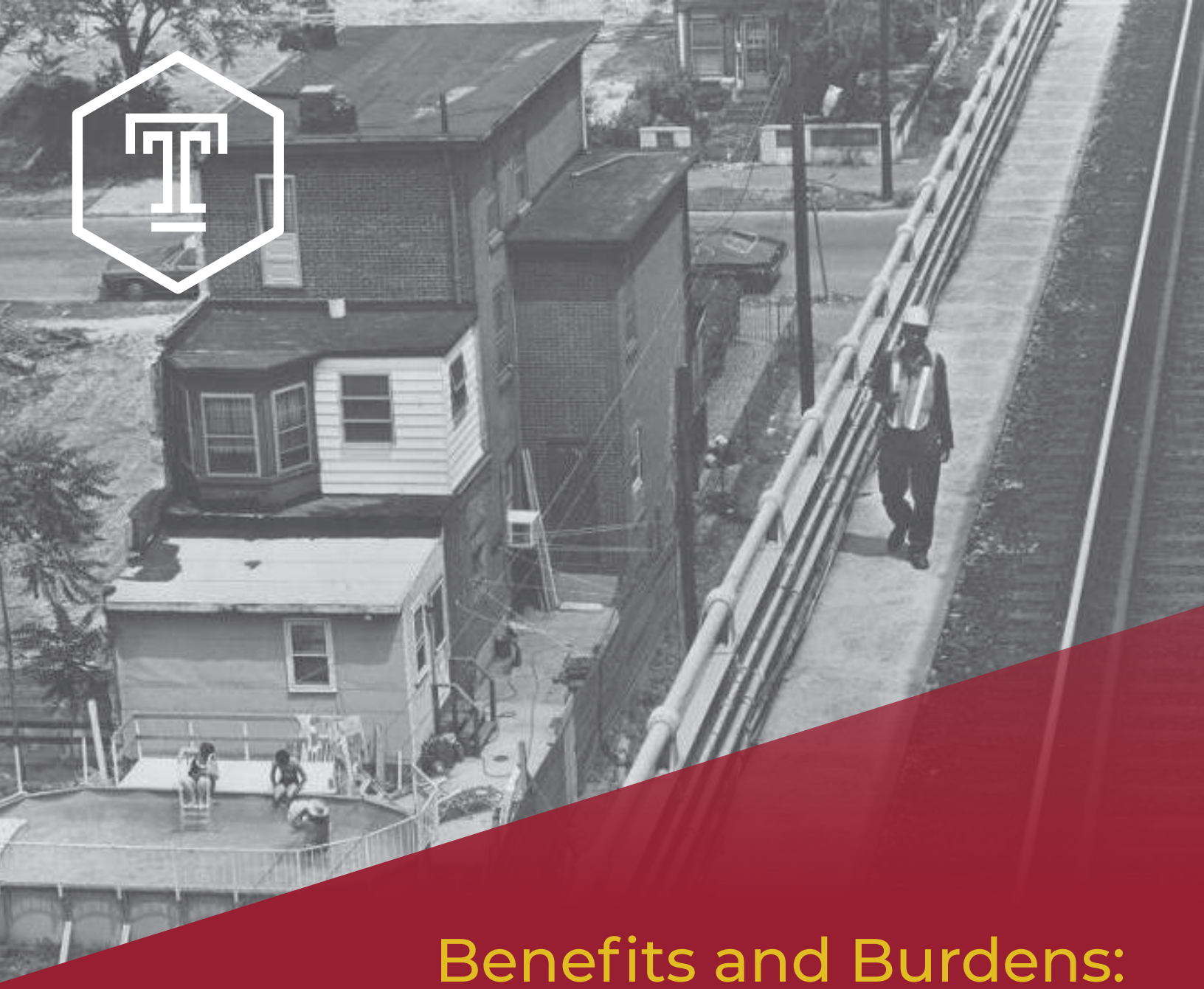

Benefits and Burdens:
Case Studies in Transportation Equity in the Philadelphia Region

May, 2021

Temple University
Masters of Public Policy

Temple University Masters of
City and Regional Planning

Forward

Delaware Valley Regional Planning Commission (DVRPC)-- the designated Metropolitan Planning Organization (MPO) for the nine-county, bi-state, Greater Philadelphia area, has commissioned for students within the Temple University Master of Public Policy and Master of City and Regional Planning programs to conduct an equity analysis on projects in designated regions. The project that DVRPC has assigned titled “Exploring the Impact of Major Transportation Projects on Communities of Black, Indigenous, and/or People of Color in the Pennsylvania Counties of Greater Philadelphia: 1962-2020”,will include a three volume report outlining our methodology and framework for evaluating the eight case studies, a deep analysis of the equity impacts of each project across our themes, and our next steps for DVRPC to further enhance and leverage the framework to evaluate future projects.

In light of the racial reckoning in the United States sparked by the senseless murder of George Floyd in May 2020, DVRPC is evaluating its own work and role in creating equitable transportation projects. This is important work, as true equity can only be achieved by addressing the past wrongs of systemic racism. The Temple student teams use our framework to identify the level in which equity is achieved in our eight case studies across six themes. Our goal is for this past review to inform future projects so that we can learn from past mistakes in transportation planning by creating equity in each new project.

Acknowledgments

First and foremost, both the Temple University Master of Public Policy and Master of City and Regional Planning student teams wish to express our utmost gratitude to the Delaware Regional Valley Planning Commission, and in particular, to Greg Krykewycz, Associate Director of Multimodal Planning, and Shoshana Akins, Public Participation Planner, for providing us with the opportunity to work on this equity analysis and giving us meaningful feedback throughout the research and writing process. We would also like to thank all the experts that participated in our interviews and for their time and the valuable knowledge and perspectives they shared with us (please see below for the list of people interviewed). Furthermore, this final report would not have been possible without the guidance and reviews of our Temple professors Dr. Jeffrey Doshna and Dr. Joeseph P. McLaughlin. We also appreciate the panel of leaders in the planning field brought together by Kevin Moran of ULI on March 25, 2021, which offered insightful commentary on our preliminary overview of work and research questions. Additional thanks to DVRPC’s Elizabeth Shoonmaker, Jesse Buerk, Kwan Hui, Rick Murphy, Amani Bey, Matt Gates, and Ben Loeb for their guidance, expertise, and generous data sharing.

Comprehensive Interview List

Cecilia Yep, Founder of PCDC and “Godmother of Chinatown”

Yue Wu, Neighborhood Planning at PCDC

Jack Smyth, Civil Engineer for Vine Street with Chinatown and on Blue Route

Kevin O’Brien, Senior Program Manager for SEPTA, with PennDOT during Blue Route and Vine Street Expressway

Denise Goren, Former Deputy Mayor for Transportation for Philadelphia

John Grady, Former Executive Director of PIDC

John Chin, Executive Director of PCDC

Bill Hankowsky, Former Executive Director of PIDC and Chair of the Philadelphia Chamber of Commerce, Former Economic Development Official in Camden, NJ

Pat Killian, Former Commerce Director, Delaware County

Andrew Warren, Former District 6 Supervisor for PennDOT

Gordon Lindon, Former FTA Administrator

Beverly Harper, Founder and CEO of Portfolio Associates

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Volume I
Executive Summary

The murder of George Floyd in May 2020 sparked a racial reckoning in America. Demonstrators marched for months demanding justice, and those calls have grown beyond police reform. Public and private agencies around the country are reckoning with their own history and culpability in systemic racism and inequity.

In June 2020, The Delaware Valley Regional Planning Commission (DVRPC) held a series of internal meetings aimed at redirecting the agency's work program to begin the process of redressing historical inequities. As part of that initiative, DVRPC asked Temple University's Public Policy (MPP) and City and Regional Planning (MCRP) graduate students to examine a breadth of projects that the agency has funded or planned with an equity lens. The Policy Team researched three projects that appear in Volume II of this report and the Planning Team researched five projects that appear in Volume III of this report. Volume I provides background, context, and research on best practices on doing a transportation equity analysis.

Volume II examines the Blue Route (I-476), the Market-Frankford Line reconstruction, and the Vine Street Expressway (I-676). Volume III examines NJ-29, PATCO, Direct Connection, US 422, and the Schuylkill River Trail.

Both Volumes II and III examine these transportation projects, or case studies, from an interdisciplinary lens, with the Policy Team's Volume II focusing on a political and public policy perspective, and the Planning Team relying primarily on a regional planning angle. Taken together, the case studies across these two volumes present a comprehensive view of how to best analyze equity in transportation planning as both perspectives are crucial to properly addressing the complexities of performing equity analyses.

Overall, the results of the analysis showed that equity has improved in transportation projects over time regionally, with major regulations such as the Title VI, the EJ Executive Order, and the National Environmental Policy Act (NEPA) playing crucial roles in this improvement. In addition, DVRPC has been a relative leader among MPOs in incorporating equity into their transportation analysis. However, improvement does not equal success, and the Philadelphia area is still not close to reaching true equity in transportation, and therefore must make major changes in both its policies and planning practices to finally reach this goal. Further complicating the challenge is that the longevity of transportation projects often ensures that inequitable decisions made decades ago still affect people today.

Volume Elements

Volume I: Background and Best Practices

Volume I serves as an introduction to Volumes II and III by providing a basis for the case studies through a review of transportation equity in planning literature, and an evaluation of Metropolitan Planning Organizations (MPOs) and at DVRPC in particular. This information sets the framework by which the subsequent volumes evaluate their case studies. The following subsections can be found in Volume I:

- An introduction to the concept of equity in transportation planning
- A literature review of equity in long-range transportation planning, including academic and legal perspectives
- A review of best practices in evaluating equity in transportation planning and projects
- A review of how Metropolitan Planning Organizations (MPOs) have analyzed transportation equity
- A review of DVRPC's methods in equity analysis
- The development of a framework grounded in the literature for evaluation in Volumes II and III

Volume II

Volume II is the Policy Team's study of equity in three transportation projects. The volume begins with an introduction that provides the context for the report, the reasoning behind reviewing the chosen case studies, and a review of the methodology, including rationales for the inclusion of the interviews performed and data reviewed. The rest of the volume is divided into chapters that analyze the following case studies:

- Blue Route (I-476)
- The Market-Frankford Line reconstruction
- The Vine Street Expressway (I-676)

Each case study is organized into the following subsections:

- Executive study with equity findings
- Impact Statement
- Background on the area
- Equity and policy analysis
- Equity considerations with regards to the legal framework and case study context
- Summary judgement
- Conclusions from the equity analysis
- Policy Recommendations

In addition, Volume II includes a conclusion that pulls the findings from the equity analyses of the three projects together. It then concludes with policy recommendations to improve equity outcomes in future transportation projects.

Volume III

Volume III is the Planning Team's study of equity in five transportation projects. The volume is divided into chapters, each of which reviews one of the following case studies:

- NJ-29
- PATCO
- Direct Connection
- US 422
- The Schuylkill River Trail

Each case study is organized into the following subsections:

- Executive summary with equity findings
- Introduction to the project
- Relevant history
- Equity in public process, decision-making, and community involvement
- Equity for demographic groups that face disadvantage
- Equity in mobility and accessibility
- Equity in environmental impacts
- Equity in economic impacts
- Equity in the allocation of project funds
- Conclusion with major takeaways

In addition, Volume III includes a conclusion that synthesizes key points taken from the equity analyses of all five case studies. Using those findings, the volume concludes with recommendations for using this report to further equity at DVRPC and next steps the organization should consider.

Methodology

Both the MPP and MCRP teams analyzed the selected transportation projects through six different dimensions of equity. The teams integrated these equity dimensions slightly differently in each of their volumes, but the six dimensions are consistent throughout all of the case studies.

- Process: The role of public participation, community involvement on decision-making, and outreach and mitigation efforts by agencies.
- Protected Classes: The impacts on demographic groups that face historical disadvantages and disadvantages in transportation planning.
- Access: The effects on access to opportunities and people's mobility.
- Environment: The impacts to the natural and built environment and human health.
- Economics: Impacts on cost-of-living, poverty, income, wealth, and jobs.
- Funding: How funding was obtained and allocated.

These categories give a broad understanding of the variety of impacts that transportation projects can have upon the communities they are located in, and the people who use the projects once they are completed. The teams drew from a variety of sources to inform each of the categories of analysis, from interviews, public meeting transcripts, to historic news articles, to a literature review, to U.S. census data, to publicly available government records. The diversity of sources leads to a holistic analysis that combines both quantitative measures with qualitative narrative, providing a view of equity from multiple different angles.

Key Takeaways

The analysis for each case study provides unique historical and equity insight, but major recurring themes are found across time periods and transportation modes. Some of the most important and persistent takeaways for each equity dimension across all of the case studies are summarized as follows:

Process

The decision-making process across transportation projects has typically put lots of power in the hands of those few who already held political power, and frequently did not extend power to those who would be most affected by the project, such as residents in the project's direct area. This imbalance typically led to worse outcomes for these residents, who oftentimes already faced disadvantage due to their race, income, or lack of political power. Disadvantaged residents often had to deal with decisions about road or rail alignments that burdened them because decisions were made without incorporating their feedback. In recent projects developed under better regulations, leaders continued to fail to incorporate equity early in the decision-making process by not considering equitable transportation alternatives like transit, and instead opting for highway improvements.

Protected Classes

Across cases, our finding show that highway and transportation construction projects have disproportionate negative impacts on demographic groups that face historical disadvantages. Protected groups often lack the capacity to navigate political channels to represent their interest in the transportation planning process, organize collectively, or the financial resources mitigate economic impacts. Because of this, their communities, homes, businesses, and interests fall into the backdrop during the beginning and interim phases of transportation project. Although these projects

have created jobs, homes, businesses, and brought communities closer together, but the trade-offs often come at the expense of the groups that do not have the means to participate and who have been historically disenfranchised.

Access

Access in transportation projects has not been equitable during the studied time period. Emphasis on construction of highway projects has led to great inequities, as highway projects do not grant benefit to those without cars. Highways often cut through minority and low-income communities, speeding the travel of white suburbanites through them but not servicing those neighborhoods at all. Highways are constructed for the purpose of moving cars, not people, and rates of car ownership and where car owners live means that they are almost always inequitable. Transit projects can still be inequitable, and without station locations in minority communities and transit-oriented development they can still repeat many of these inequities.

Environment

In comparing highway, rail transit, and trail projects, highways have the most significant negative impacts on the environment because vehicle emissions worsen air quality and contribute to climate change, which hurts vulnerable communities disproportionately. For most decision-makers, contributions to climate change were not at the forefront of project evaluation criteria, even after the passage of the Environmental Justice order, and certainly before it. In more recent years, incorporating nonmotorized projects into motorized projects and funding nonmotorized trail projects has become more common, which has improved environmental equity impacts somewhat.

Economics

The projects had various economic benefits, but the burdens were often pushed onto protected classes in urban communities, while benefits accrued to white suburbanites. Some highway projects, such as US 422 and the Blue Route, did create real economic growth, but lack of transit improvements effectively excluded populations without cars from sharing in that growth, with these excluded populations very often being protected classes. Transit, bicycle, and pedestrian projects usually performed better at creating equitable economic growth, but there are many instances of missed opportunities in these types of projects as well.

Funding

Funding is often inequitable in distribution. Highway and road projects are much easier to receive funding for and have less restrictions than transit projects. Funding for construction mitigation efforts is also inequitable, as whiter and wealthier communities receive concessions and mitigation upfront, while minority and low-income communities are left waiting for years for funding for those efforts. While there has been an improvement in the different ways funds can be used on a project for things like mitigation, there are serious questions of equitable resource allocation with current projects, in which improved transit is less of a priority than highway maintenance and capacity increase. However, the diversity of uses for funding in transportation projects has greatly improved as we get closer to the current day. While funds were previously reserved only for direct use on the project, funds can now be used for mitigation and improvements near or around the project.

Recommendations

The MPP and MCRP equity analyses show that transportation equity in the region needs to improve in order to mitigate and reverse the effects of past mistakes. To provide DVRPC some guidance on next steps, both teams identified recommendations that could be implemented in the next few years to ensure that there are equitable outcomes for future transportation projects in the region. These recommendations can also be found in the final pages of Volumes II and III in more detail.

MPP Analysis Recommendations

1. Choose More Equitable Sites: Whenever possible, choose sites that do not disadvantage marginalized communities. Research shows that on equity measures, site selection impacts outweigh treatment or mitigation efforts.

2. Work with Elected Officials Early: Consult with the relevant elected officials before consulting communities and try to gain their support. Consider asking them to sponsor dedicated appropriations for mitigation, with flexible language that allows their use for legitimate but unforeseen purposes.

3. Consult Communities Early: Begin consulting communities before undertaking design and try to accommodate their concerns into the initial plans.

4. Develop a Separate Mitigation Budget: Develop a mitigation budget separate from planning and construction contingencies, which could be funded from dedicated funding that gives legislators an opportunity to take credit for the help the funding provides.

5. Create Teams to Implement Mitigation Efforts: Assemble multi-agency teams to help design and implement mitigation efforts under the direction of a public executive who can ensure the cooperation of the relevant bureaucracies. Transportation projects should be led by transportation agencies, but those agencies need active support of bureaucracies with experience in dealing with adverse social and economic impacts.

6. Creativity in Construction: Find creative ways to accelerate construction to minimize highway and rail shutdowns.

7. Encourage Engineers to be Creative: Engage and empower civil engineers who can design creative solutions that address community concerns. RFPs could include a requirement that engineering firms provide evidence of their involvement in successful mitigation efforts.

8. Improve Transit Access: Provide more convenient transit access to marginalized communities.

9. Address Non-Economic Project Impacts: Pay attention to and address non-economic impacts like loss of social capital due to dividing neighborhoods and threats to a community's cultural, religious, and recreational assets.

10. Promote Equitable Economic Development: Enhance economic development opportunities for marginalized communities (e.g., creation of special service districts, neighborhood parks, new residential and commercial development, zoning to accommodate such development, while being mindful of arousing gentrification fears).

11. DVRPC Minority Representation: Encourage MPO voting members to appoint minority representatives to the DVRPC board.

12. Use New Infrastructure Funds to Repair Past Wrongs: Consider recommending to transportation agencies that they set aside a portion of President Biden's infrastructure funds for restorative projects such as covering the Vine Street Expressway with a park.

13. Investigate Tolling Highways to Fund Transit: Seek federal permission to toll highways such I-476 (The Blue Route) to pay for transit infrastructure that was ignored during the initial construction of these highways.

MCRP Analysis Recommendations

1. DVRPC Must Take Leadership in Transportation Equity: DVRPC is the organization that is best positioned to promote transportation equity at all project stages, from feasibility assessments to final construction. It there must take a leading role to ensure equity is a regional priority, and not an afterthought.

2. Continue Public Participation Beyond Legal Requirements: DVRPC must continue to expand its practice of going beyond the legal public outreach requirements and ensure the voices of those who have traditionally been left out of transportation projects are finally heard

3. Require Construction Mitigation at the Beginning of Projects: The impacts of transportation projects to protected classes can be improved if money is set aside for mitigation before the project has been finalized. This approach will ensure that promised mitigation efforts are actually implemented, instead of unfunded promises.

4. Create Transparent and Accessible Final Project Costs: DVRPC should work with its regional partners to centralize and publicly distribute information of the final costs of transportation projects, instead of only showing estimated costs from the Transportation Improvement Program (TIP).

5. Focus on Improving Access and Deemphasize Traditional Congestion Mitigation: Increasing access to good and services for all must take priority over highway capacity increases that are proven to be ineffective.

6. Be a More Forceful Advocate for Integrating Land-Use Planning into Transportation Project: Since some of the worst transportation equity outcomes are the result poor land-use decisions, DVRPC must be a louder advocate of removing the barriers between transportation and land-use planning.

Equity Scores

In order to make equity evaluations across transportation modes and time periods easily interpretable, “Equity Score Charts” were created. The charts display a 0-to-4 score for each equity dimension that a particular case study earned, with the score based on the equity ladders criteria shown in Table 1. A score of “0” is represented by a point at the center of the chart, and a score of “4” is represented by a point at the outside rung of the chart. These points are then connected, and the resulting shape provides an overview of how the case study performed overall. A larger, more filled in shape indicates that a project performed better in the equity analysis. Equity Score Charts for each MPP and MCRP case study and the general project themes descriptions are shown on the following pages.

Figure 1 Spider chart with 6 dimensions of equity

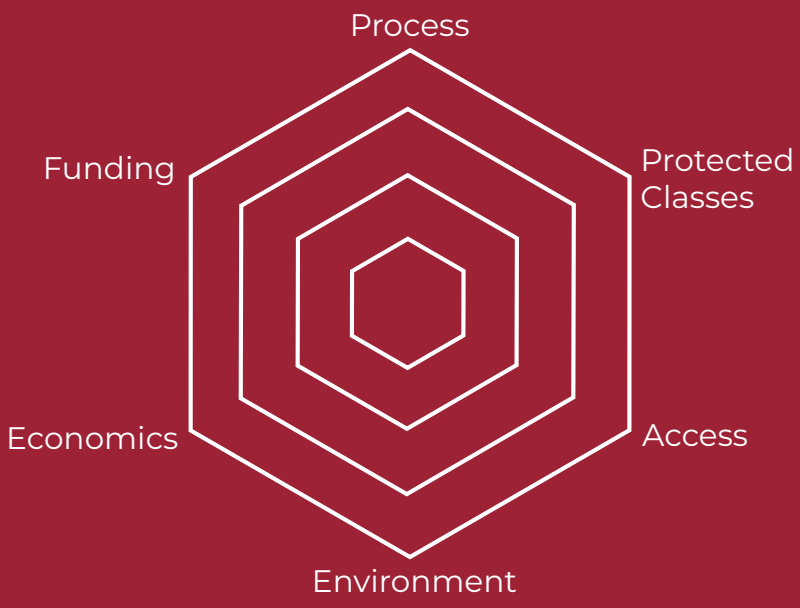

Figure 2 Spider chart with 5 levels of impact

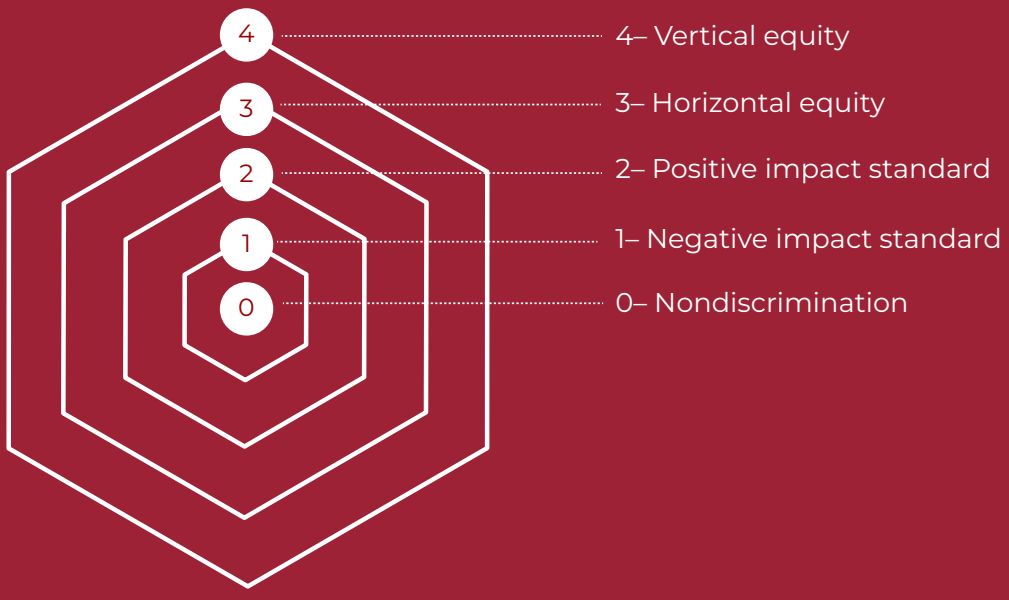

Figure 3 Table of Equity Scores

Rating	Impact Ladder of Equity	Process Ladder of Equity
4	Vertical equity: greater benefits go to historically disadvantaged groups in order to address past wrongs.	Those needs and priorities are identified, addressed, and progress is documented over time.
3	Horizontal equity: benefits are roughly evenly distributed across different populations.	Those needs and priorities are identified and are addressed with dedicated funding.
2	Positive impact standard: All populations receive meaningful benefits, although the amount of benefit may be disproportionate.	The needs and priorities of potentially affected populations are identified through a community-led process with sufficient resources, but are not addressed.
1	Negative impact standard: The benefits to one or more populations do not cause a burden to another group.	The potentially affected populations are consulted, but the process is not led by the community or adequately resourced.
0	Nondiscrimination: This standard falls outside of the definition equity but is included to provide a baseline reference for equity. Nondiscrimination can be linked to the language of Title VI. Nondescriminiation is the absence of overt discrimination against any particular group. Nondiscrimination is neutral to race, color, or national origin and requires no explicitly expressed attempt to provide or deny benefits to any group in particular.	The potentially affected populations are not consulted.

1. I-676 (Vine St. Expressway)

Those who held power at the time did not look or think like the community members who were set to be impacted. Over the course of two decades, some sympathetic individuals were able to assist a strong coalition of Chinatown members in protecting their vital interests.

Figure 4 Vine Street Expressway Equity Score Chart

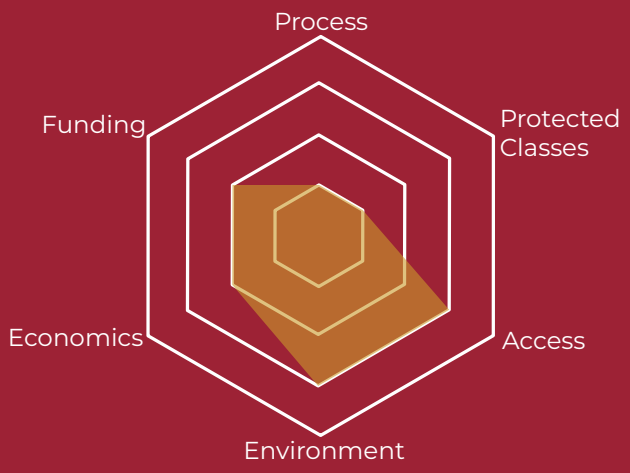

Figure 5 Vine Street Expressway Equity Score Table with reasoning

Equity Dimension	Score	Reasoning
Process	1	The community was only consulted after early plans were released, and the community had to produce its own resources in order to be heard.
Protected Classes	1	The marginalized community was most affected and was consulted, but their needs were not adequately met, and they did not drive the conversation or planning.
Access	3	The inclusion of a below-grade highway, a local access road, and pedestrian bridges meant that both the neighborhood and through-traffic had access via the Expressway.
Environment	3	The change from an at-grade arterial to the depressed highway benefitted noise and air pollution efforts, but the lack of a full cap did not prioritize the minority community.
Economics	2	Greater access for the region led to economic growth, and the survival of the Chinatown community allowed for economic growth, but the target sector was not the affected population.
Funding	2	The city and state effectively used federal funding to build the roadway but failed to bolster the project to meet the community needs fully and did not address their full concerns.

2. I-476 (Blue Route)

The Blue Route provides some useful examples as to how community input can shape transportation projects that directly impact them and decide the tradeoffs between benefits and burdens that they are willing to accept, especially in terms of environmental impacts. Social equity concerns lie in the lack of benefits conferred to lower-income and marginalized communities, including those from Philadelphia and Chester, through the lack of a public transit system connected to the highway and the preference given to privileged residents along the corridor.

Figure 6 Blue Route Equity Score Chart

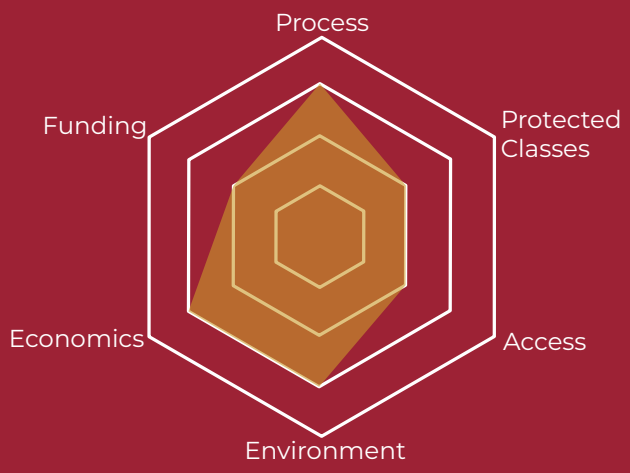

Figure 7 Blue Route Equity Score Table with reasoning

Equity Dimension	Score	Reasoning
Process	3	Communities were greatly involved in process, but those involved were mostly white and affluent. No targeted efforts were made to specifically include marginalized groups.
Protected Classes	2	Those who had political power and resources were ultimately protected. Marginalized groups were excluded by way of lack of public transit connections and decades of delays.
Access	2	Greater access was created for car owners along corridor and in region, but lack of public transit connections meant less access for marginalized groups and communities in Chester and Philadelphia to economic opportunities in region.
Environment	3	Years of studies and analyses were conducted during the EIS/4(f) process to consider and mitigate environmental impacts. Lack of public transit connections created future negative impacts.
Economics	3	Greater access for the region led to economic growth, especially in Montgomery and Delaware counties. Economic impact could have been greater had more attention been given to access for residents of Philadelphia and Chester.
Funding	2	Final project cost was significantly greater than initial projections and missed opportunities for funding public transit connections proposed in official government reports.

3. Market Frankford Elevated Line Reconstruction

Single service agencies may not possess the resources or political capacity to address socio-economic issues that are not with the specified scope of their project. Despite positive impacts of public transit projects, less resilient communities struggle to cope with disruption to everyday operations.

Figure 8 MFL Equity Score Chart

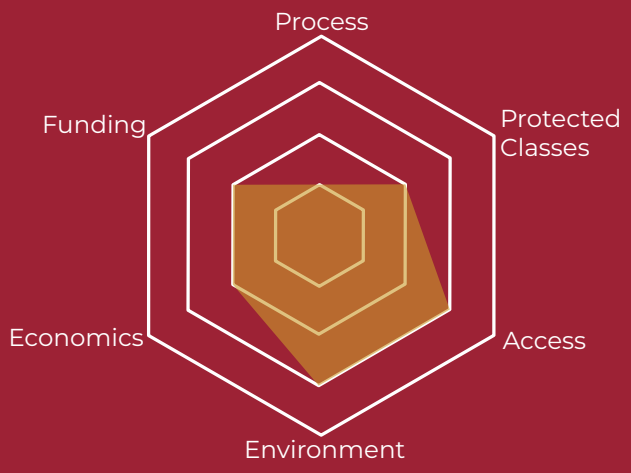

Figure 9 MFL Equity Score Table with reasoning

Equity Dimension	Score	Reasoning
Process	1	There was constant communication with local stakeholders but not at the decision-making level or during the project agenda setting phases.
Protected Classes	2	The focus on end goals had disproportionately negative impacts on BIPOC and business owners in low-income neighborhoods during the early and interim stages of the project
Access	3	SEPTA was able to keep the MFL running— which is one of Philadelphia's most heavily used transit lines and serves large populations of low-income and minority communities in West Philadelphia. Conversely, access to businesses was greatly affected by construction which was cited as the root for loss of business.
Environment	3	The investment in public transit systems is shown to be a more efficient and cleaner way of transporting people compared to private vehicles. The MFL reconstruction supports more active transit infrastructure like wider sidewalks and bike lanes. Still, during early and interim stages of construction residents and business owners complained about litter and public urination around the construction sites. There are also reports of lasting blight.
Economics	2	While the reconstruction did bring new development (especially around the refurbished stations) there were still many negative impacts on businesses during the project process. Also, those benefits are not often accessed by people within the project/construction area.
Funding	2	The plan lacked the diverse funding strategies to aid business during the construction process. Funds found for business relief often became tied up in bureaucratic red tape and arrived too late or not at all.

4. NJ-29

Largely as a result of state agencies enacting policies that eroded public trust, NJ 29 cut off communities of color in the City of Trenton, separating them from each other and environmental goods.

Figure 10 NJ-29 Equity Score Chart

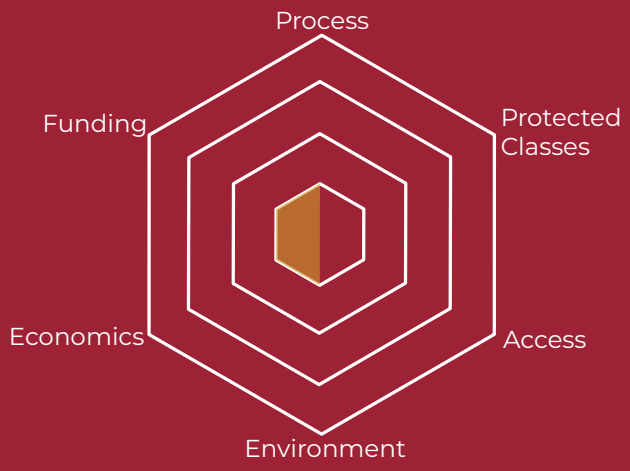

Figure 11 NJ-29 Equity Score Table with reasoning

Equity Dimension	Score	Reasoning
Process	1	While public outreach met legal requirements, the design was not influenced by it. The DVRPC Citizen's advisory committee was heard but largely ignored.
Protected Classes	0	Both NJ-29 & Lamberton Runnel negatively affected protected classes more than nonprotected classes, especially in downtown Trenton.
Access	0	Access benefits went mainly to suburban residents while negatively impacting Trenton residents, the majority of whom are people of color.
Environment	1	Noise and pollution impacts were negative for most groups. While the highway & tunnel destroyed waterfront access for city residents in order to benefit commuters, fewer wetlands were destroyed in the final plan, which benefits all, especially protected classes subject to flooding.
Economics	1	The highway had no major effect on employment in the project area, positively or negatively.
Funding	1	Little funding was provided to transit or non-motorized transportation projects, compared to the significant money spent on roadways. with commutes only temporarily reduced.

5. PATCO

PATCO'S failure to integrate station and land use planning has had profound effects on the distribution of the real benefits that the line provides, from economic growth to environmental impacts.

Figure 12 PATCO Equity Score Chart

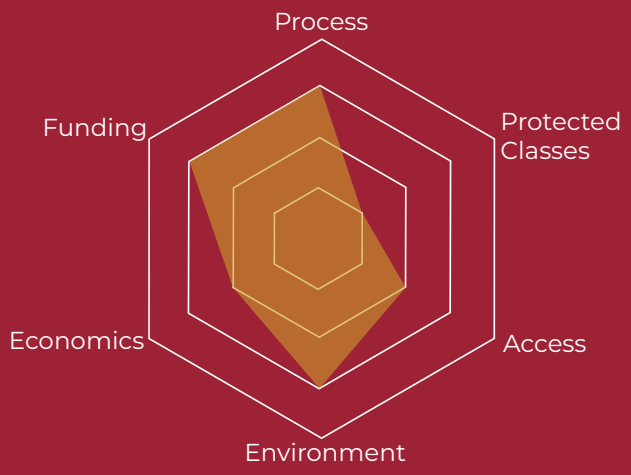

Figure 13 PATCO Equity Score Table with reasoning

Equity Dimension	Score	Reasoning
Process	3	DRPA listened to the community input and changed its plans multiple times based on public opinion
Protected Classes	1	While PATCO has served low-income passengers, it still has been much more useful to white commuters. Ridership for the lowest income is low, and the system is not fully physically accessible.
Access	2	Although PATCO increases accessibility for all, surface parking lots significantly reduce its usefulness, since there's less utility for reverse commuters.
Environment	3	Significant emission reductions and health benefits are similar for all. Negative effects of surface parking runoff may be worse in Camden, but there are equity benefits to keep cars out of Philadelphia.
Economics	2	Benefited white, suburban residents more in building wealth and employment, due to station area land uses.
Funding	3	Using DRPA bridge tolls to fund PATCO helps to reduce car-dependency. Low system costs allows for 24/7 service that helps 3rd shift workers the most, but consistent justification for low-transit funding was harmful to some groups over others.

6. Direct Connection

While having a proper environmental review processes and successful community engagement, Direct Connection has exacerbated current urban vs. suburban inequities and allocated resources inequitably as the second largest roadway project in New Jersey's history.

Figure 14 Direct Connection Equity Score Chart

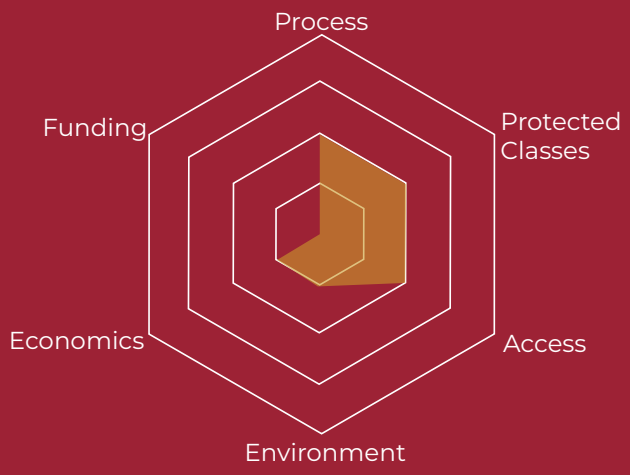

Figure 15 Direct Connection Equity Score Table with reasoning

Equity Dimension	Score	Reasoning
Process	2	There has been a quality public outreach process during the later project stages, but the alternatives analysis gave little consideration to more equitable transportation alternatives
Protected Classes	2	The project provides safety and mobility benefits for those with cars, and does not directly harm protected classes
Access	2	There were few access improvements, and only those with a vehicle will realize mobility benefits
Environment	1	There were no major environmental benefits to the project, while producing some burdens
Economics	1	Economic benefits go mainly to white suburbanites with vehicles, but not as a burden to other populations
Funding	0	The amount of money spent relative to other projects is significant, especially when considering how money that could have been spent for other alternatives that would have promoted equity, such as improved transit

7. US 422 (Pottstown Expressway)

While bringing needed mobility and economic growth, the construction of US 422 led to a series of planning and transportation investment failures that have created an inequitable and inaccessible corridor.

Figure 16 US 422 Equity Score Chart

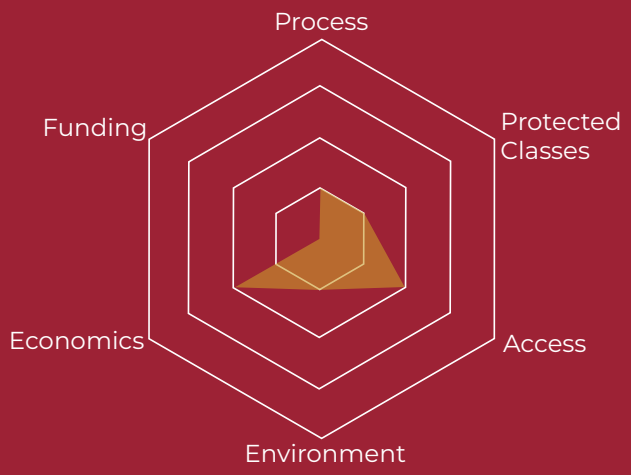

Figure 17 US 422 Equity Score Table with reasoning

Equity Dimension	Score	Reasoning
Process	1	The process was mainly led by the business community and other powerful people, not those mainly affected. Most public feedback that was heard was not implemented.
Protected Classes	1	The highway didn't cause a major burden to protected classes but did not benefit them either.
Access	2	The project improved access to the corridor for all, but not for carless populations, who are more likely to be protected classes.
Environment	1	No environmental benefits, but the project did not disproportionally harm one group or area over another.
Economics	2	The highway did produce economic growth in the corridor, but not for protected classes.
Funding	0	There has be almost no transit investment in the corridor, and any money that has going to studying transit has been for commuter rail, which is more expensive and less equitable.

8. Schuylkill River Trail

In repairing past environmental damage and improving access for a variety of populations throughout the region, the Schuylkill River Trail is an example of how even a relatively cheap transportation project can improve equity for large numbers of people throughout the region.

Figure 18 SRT Equity Score Chart

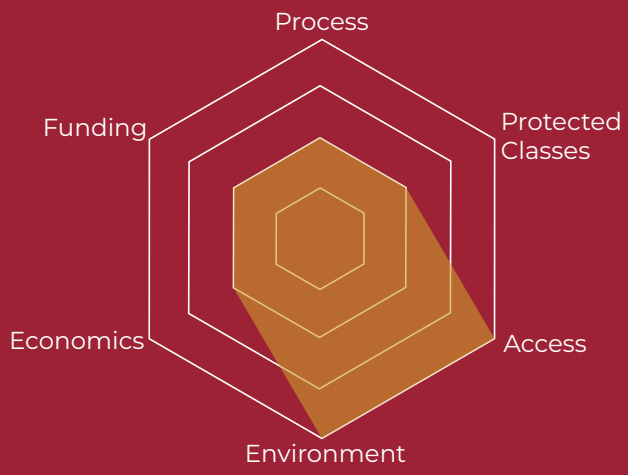

Figure 19 SRT Equity Score Table with reasoning

Equity Dimension	Score	Reasoning
Process	2	There have been trail improvements and benefits along the entire corridor, but not a significant amount of engagement.
Protected Classes	2	The trail goes through many different communities, including many with protected classes. However, the trail is not as well-maintained in lower-income areas.
Access	4	It provided access for those without a car or who cannot afford transit, when historically only motorized mobility has been prioritized. The SRT replaced a freight train that cut off communities from the waterfront.
Environment	4	While the SRT does not provide the most benefits to marginalized groups specifically, it does address past wrongs of prioritizing transportation modes that are primary pollutants and cause adverse health effects.
Economics	2	Economic benefits have gone to a variety of neighborhoods along the trail, but not evenly.
Funding	2	While funding sections through many communities, the disjointed funding structure of the trail means that not all sections receive the same level of funding.

Best Practices
Introduction to Equity in Transportation Planning

Examining the multi-dimensional concept of equity is a complex task in any field, and within transportation planning, it is no different: transportation planning touches everyone, directly in the form of providing or blocking mobility and access to opportunities, and indirectly in the effects of transportation on the surrounding area's economy, land use, and environment. However, before even examining how transportation projects might benefit and burden different populations in equitable or inequitable ways, it is necessary to define equity itself, and particularly equity in transportation planning, and how it has been applied.

Academics and the government alike have wrestled to define transportation equity, and have proposed tools to implement and evaluate transportation equity. This section will examine what equity is and how it is measured, starting with guidance from the federal government, then reviewing definitions of and measurement tools of transportation equity outside of regulations. It will then provide a comparison of how different Metropolitan Planning Organizations (MPOs) across the United States have used these various tools and analyzed their own hand in transportation equity, using the Delaware Regional Valley Planning Commission (DVRPC), as a comparison point. Finally, this section will end with takeaways from these reviews of how this report will analyze equity in the transportation projects under consideration.

Literature Review: Equity in Long-Range Transportation Planning

Federal regulations governing equity: Overview

Much of transportation equity is defined by the several federal regulations that require anyone working with federal dollars that fund transportation to abide by certain definitions of equity. Title VI of the Civil Rights Act of 1964 and the Executive Order on Environmental Justice (EJ) are two of the most impactful federal mandates that require nondiscrimination. The Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) have developed policies to ensure that this nondiscrimination is enforced. There are many other regulations governing transportation equity: DVRPC cites a non-exhaustive list of 15 regulations in their *Title VI Compliance Plan*, many of which provide guidelines and clarification for implementing and enforcing Title VI and EJ. The following three sections will provide background on Title VI, EJ, and other federal guidance on these two important mandates.

Title VI Overview

Title VI of the Civil Rights Act of 1964 states:

"No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."[1] Title 49 of the Code of Federal Regulations (CFR) Part 21 provides guidance for compliance with Title VI within the Department of Transportation. It specifies prohibited discriminatory acts, such as denying or providing benefits based on race, color or national origin, separate treatment and

segregation, differential treatment, and/or participation in the program. It clarifies that discriminatory acts are prohibited in both "purpose and effect,"[2] meaning that both goals and results of projects matter. It also establishes the required use of affirmative action in places in which there are lasting effects of "prior discriminatory practice or usage."[3]

Environmental Justice Overview

Environmental Justice (EJ) was mandated in Executive Order (EO) 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 16, 1994, issued by President Clinton.[4] The primary goal of EJ is to focus on disproportionately high and negative environmental and health effects on minority and low-income populations. Each federal agency is tasked with identifying and addressing these disparities and developing a strategy to implement environmental justice.

EJ not only focuses on health and the environment, but in a sense expands Title VI concerns about equity to include low-income populations, whereas Title VI addresses nondiscrimination of racial and ethnic minorities and not financially disadvantaged populations.

EJ also makes requirements for the public participation process. It calls for the development of agency strategies that "ensure greater public participation."[5]

USDOT Guidance

In accordance with Title VI and EJ, the US Department of Transportation (USDOT) has issued further guidance to interpret how these mandates apply to programs and activities under the purview of USDOT. USDOT developed three guiding EJ and equity principles that are outlined in FTA Circular 4702.1B:

- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process;
- To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including social and economic effects, on minority or low-income populations; and
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority or low-income populations.[6]

These principles and additional guidance from USDOT demonstrate that the role of equity in transportation planning is both about process and outcomes.

The 1999 FHWA/FTA Title VI memo "Implementing Title VI Requirements in Metropolitan and Statewide Planning" offers more specific guidance as to how MPOs must analyze the benefits and burdens of investments on different groups through a data-driven method, such as DVRPC's Indicators of Potential Disadvantage (IPD) method. It also mandates that MPOs undergo a self-certification of Title VI compliance. Although the memo does not make specific requirements as to the method for self-certification, it does include a list of questions regarding overall strategies, service equity, and public involvement as an aid to verify compliance.[7]

Definitions of Equity

While regulations provide the minimum standards by which MPOs must enact transportation equity, the concept of equity in the field of transportation planning is more expansive. This subsection will define equity within the context of transportation planning and projects based on a review of the literature. One common way of discussing equity is to break it into two categories: horizontal and vertical.[8] Horizontal equity is related to the concepts of fairness and egalitarianism, and is a type of equity in which equal populations receive equal distribution of resources and benefits. In a system of vertical equity, the distribution of resources and benefits are proportionate to the relative disadvantage of different populations.[7] The Victoria Transport Policy Institute further breaks down vertical equity in a transportation context into vertical equity with regard to income and social class, and vertical equity with regard to mobility need and ability.[9] Vertical equity with regard to income and social class relates directly to EJ among other regulations and vertical equity with regard to mobility and need relates to several regulations including the Americans with Disabilities Act of 1990[10] and EO #13166 *Improving Access to Services for Persons with Limited English Proficiency.*[11]

Horizontal equity and vertical equity can be additionally dissected into more distinctive standards that are ranked in ascending order as to how much they require action to reduce inequalities.[12] Martens and Golub (2018) examined how MPOs evaluate for equity in accessibility and came up with standards that are employed at the ten largest MPOs in the United States.[13] Their research looks at measures of justice more broadly based on interpretations of Title VI-related guidelines, and does not use the standards of horizontal and vertical equity explicitly, but two of their standards align with vertical/horizontal equity definitions. The following is a presentation of the Martens and Golub standards adapted to the common horizontal/vertical categorization and expanded to address equity in transportation project outcomes more broadly than just in accessibility:

0. **Nondiscrimination:** This standard falls outside of the definition equity but is included to provide a baseline reference for equity. Nondiscrimination can be linked to the language of Title VI. Nondiscrimination is the absence of overt discrimination against any particular group. Nondiscrimination is neutral to race, color, or national origin and requires no explicitly expressed attempt to provide or deny benefits to any group in particular.

1. **Negative impact standard:** The benefits to one or more populations do not cause a burden to another group.

2. **Positive impact standard:** All populations receive meaningful benefits, although the amount of benefit may be disproportionate.

3. **Horizontal equity:** benefits are roughly evenly distributed across different populations.

4. **Vertical equity:** greater benefits go to historically disadvantaged groups in order to address past wrongs.

These standards of equity are meant to be applied primarily to outcomes, or measures of effects on populations, rather than the process by which transportation projects are created. EJ and other statutes also require equity in the planning and decision-making process. The literature defines this type of

equity as *procedural*,[14] and is emphasized in the literature on transportation equity as well as among MPOs. The concept of a ladder in procedural justice is not new: Sherry Arnstein's 1969 "Ladder of Citizen Participation"[15] precedes many of the regulations governing fair public planning processes. More recent literature on public involvement revolves around the importance of "meaningful" involvement or inclusion.[11] Most definitions of "meaningful participation" involve some aspect of the affected communities having some impact on final decisions and outcomes. .[16] Karner and Marcantonio push the concept further to look at more than the impact on outcomes to ensure that the needs of underserved populations are actually met through the planning process.[17] Based on their three-pronged framework, the following equity standards have been developed to apply to procedural issues. These standards are intended to run parallel to the standards around project outcomes:

0. The potentially affected populations are not consulted.
1. The potentially affected populations are consulted, but the process is not led by the community or adequately resourced.
2. The needs and priorities of potentially affected populations are identified through a community-led process with sufficient resources, but are not addressed.
3. Those needs and priorities are identified and are addressed with dedicated funding.
4. Those needs and priorities are identified, addressed, and progress is documented over time.

These two ladders of equity in outcomes and processes will be used throughout this report to standardize the definition of equity while recognizing that there are multiple, competing definitions.

Best Practices: Measuring Transportation Equity

Categories of Impact

Given the complexity of defining equity, its implementations, and the complex nature of transportation projects, measuring equity in transportation is difficult. A common approach to measuring equity is to examine the costs and benefits across various impact categories. The Victoria Transport Policy Institute suggests the following impact categories for analysis:

- **Public Facilities and Services,** such as use of public funds and degree of public involvement
- **User Costs and Benefits,** such as level of mobility and accessibility, and tolls and fares
- **Service Quality,** such as available modes, and quality of roads and public transportation
- **External Impacts,** such as congestion, air and noise pollution, and livability
- **Economic Impacts,** such as employment access, and business activity
- **Regulation and Enforcement**, such as parking regulations and regulating safety risks[18]

A transportation project may provide a benefit or a burden in any of these impact categories, and it may do so disproportionately to different segments of the population. The next section will discuss how to examine the different segments of the population.

Demographic Categories

These categories for impact should be considered across disadvantaged populations. Different disadvantages play out differently. For example, low-income populations and racial groups are likely to be clustered in geographically distinct areas, and it is therefore important to consider the impact of location selection on these groups; whereas populations with a physical disability may be more evenly distributed across a region, but are likely to be impacted by decisions around physical design.

While some disadvantages have been identified through Title VI, EJ, and other regulations due to a history of injustice documented towards those groups, other factors of disadvantage have not been identified through federal regulation. In particular, factors that contribute specifically to transportation disadvantage must be considered. These factors include previously discussed factors such as LEP, disability, and low-income, but also include non-drivers, carless households, caregivers, people with societal obligations, and living in or frequenting an isolated location.[19] In many cases, these factors overlap; for example, motor vehicles have higher costs than other modes and are less affordable to lower income populations.

Not all demographic groups facing disadvantage are easily captured through available data. For example, the US Census collects data about certain disabilities, but does not provide details regarding the needs of people with different disabilities, such as a physical disability that makes it difficult to use public transportation or another that makes it difficult to drive a car. Data on race is similarly difficult to capture: while the US Census and many other data sources collect information on people who identify with multiple races, it is difficult to quantify multiracial identities in data analysis. Some racial identities are not captured at all, while others are combined into broader categories. Over time, the US Census has changed the questions it asks about both race and ethnicity, and people's racial identities have also changed, but the survey questions that are asked do not perfectly reflect the changing identities amongst populations.

Quantitative Measures

Some of these impact categories can be measured quantitatively through methods like the IPD analysis, and other uses of Census data to examine disparate impacts on geographically distinct groups, particularly those with disadvantage. Other quantitative measures include calculating costs on a per capita basis, per unit of travel, or per dollar, and investigating who these costs impact.[16] Examining mobility gaps across groups by examining where people travel and on what modes is a technique used to show disparities in access.[20]

Qualitative Measures

While impact can be measured quantitatively, qualitative analysis plays an important role in examining how transportation impacts equity. In the public participation process, one can collect data on who was involved from which demographic groups, but qualitative analysis is necessary to understand whether the potentially affected groups that participated felt that their input made a meaningful difference in decision making. When quantitative data are not available, a qualitative analysis that relies on histories, interviews, and anecdotes can help fill in the gaps in the story around equity. Another role of qualitative data analysis is the examination of recordkeeping, and how well equity impacts were documented and analyzed during a project.

Review of Equity Analysis at MPOs

Although federal regulation requires all MPOs to consider equity in their planning work and to provide an analysis of the impacts of their plans on groups protected by Title VI and EJ regulations, every MPO takes its own approach to this evaluation. To provide context as to how DVRPC integrates equity in their work, this section will provide a brief overview of the approaches of other MPOs.

A 2018 evaluation of 10 MPOs which included DVRPC found "a wide variety of equity analyses" and that "no MPO provid[ed] explicit reasons for carrying out particular analyses."[21] The authors of the study attribute the wide variety of approaches to equity analysis to the lack of specificity and clarity in the federal guidance for interpreting Title VI and EJ.

The equity analysis itself tends to follow a three-pronged process: (1) define the target populations (i.e. the demographic factors that signal disadvantage). Using a defined area (e.g. traffic analysis zones or census tracts), determine which areas have areas with high proportions of the target population. (2) Define the metrics by which equity will be examined (e.g. access to destinations, air quality, etc.). (3) Assess whether there are unequal burdens on the defined populations or unequal benefits towards other populations based on the determined metrics.[22]

Despite a similar approach, an examination of two sample MPOs, the Metropolitan Transportation Commission (MTC) in the San Francisco Bay Area and the National Capital Region Transportation Planning Board NCRTPB) in Washington, DC shows that the exact methods for determining step (1), defining the target populations and the applications of this analysis, do differ somewhat.

DVRPC Analysis Methodology Overview

Many MPOs modeled their equity analysis methodology from DVRPC. DVRPC has developed a tool called the Indicators of Potential Disadvantage (IPD). The IPD methodology is used to determine which tracts are "EJ-sensitive," meaning that the tract meets or exceeds the average level for the region within any category of disadvantage. A more in-depth discussion of the IPD methodology, including the eight factors of potential disadvantage, appears in the discussion of DVRPC's equity work in the Planner's Methodology Section.

Metropolitan Transportation Commission (San Francisco, CA Region)

MTC uses a methodology to measure disparities similar to DVRPC's IPD method. MTC's language for EJ-sensitive tracts is Communities of Concern.[23] MTC looks mostly at the same disadvantage factors as DVRPC, with a few differences including not using Hispanic populations as a factor and including "severely rent-burdened households" as a factor. Whereas EJ-sensitive tracts are ones with IPD equal to or above the regional average, Communities of Concern are defined as those with a concentration of underserved populations equal to the regional mean plus half a standard deviation. In other words, the MTC equity analysis method would yield fewer tracts of concern than the DVRPC IPD method.

MTC does use a similar analysis to DVRPC's to determine the investment in Communities of Concern by examining the number of projects in these census tracts. MTC also analyzes the potential benefit to each subgroup that make up the Communities of Concern by looking at the

typical use of these subgroups for each type of investment. MTC then forecasts how their 2050 Draft Plan will affect disparities among these subgroups. While DVRPC uses equity as a way to evaluate specific projects, DVRPC does not do a forecast like MTC's that would show how plan implementation might shape the future of equity for the region.

National Capital Region Transportation Planning Board (Washington, DC Region)

NCRTPB has their own method to identify tracts with significant concentrations of underserved populations. However, unlike DVRPC and MTC which look at eight different factors in determining disadvantage, NCRTPB examines only four categories, three of which are centered on race or ethnicity. NCRTPB uses the language "Equity Emphasis Areas" for DVRPC's EJ-sensitive tracts. For a tract to qualify as an Equity Emphasis Area, it must have a minimum of one-and-a-half times the regional average of one of the groups, or two or more of the groups. This threshold is therefore greater than either that at MTC or DVRPC. However, Equity Emphasis Areas is only one tool that NCRTPB uses to analyze equity, and does look at the distribution of more disadvantaged populations through a distribution mapping analysis that is separate from the Equity Emphasis Area methodology.[24]

NCRTPB uses this visualization of disadvantaged populations to measure potential benefits and burdens of the long-range plan specifically by measuring accessibility and mobility in terms of the number of jobs and hospitals accessible within 45 minutes. Using commute and travel time to assess benefits and burdens differs from both the DVRPC and MTC tools, both of which primarily use financial investment as a measure instead.

Critique of the Standard MPO Equity Analysis

One critique of the equity analysis implemented across MPOs, despite their differences, is that they all tend to examine EJ-sensitive areas, rather than individuals. Certain groups, such as disabled people or women, are more likely to be evenly distributed across several census tracts rather than clustering in one area. Even for groups that may be more likely to be geographically distinct, such as low-income populations or racial groups, those geographic clusters may not fall along census tracts or another analysis zone, and these groups will always be dispersed to a certain extent. The individuals of the protected group that live outside of the EJ-sensitive areas would not be included in the analysis.[25]

While some agencies, such as MTC do try to use their equity analysis in projections for the future, it is important to note that it is impossible to predict the locations of certain populations over time, and demographics shift rapidly.[26] It is however possible to examine the movement of these populations in history, and none of the analyzed MPOs used their equity analysis to examine past trends. In taking a historical approach, this report will do just that.

Finally, the choices of each MPO can lead to a wide variety of results. While there is some standardization across the analyzed population categories due to federal requirements, different MPOs may analyze various metrics of equity and determine inequitable burdens and benefits based on different standards. The Martens & Golub 2018 study of ten MPOs found that even within a single MPO, different standards of equity would be applied to the equity metrics across different reports.

Among the 10 MPOs, the disparities were greater, with some MPOs applying a standard of "nondescrimination" and others applying a "vertical equity" standard, and many in-between on the equity ladder. The lack of standardization across MPOs is not only confusing, but indicates that MPOs broadly have not determined a best method of analysis.

Overview of Equity Analysis at DVRPC

DVRPC is a leader among Metropolitan Planning Organizations (MPOs) in evaluating transportation planning for equity. It sets an example for meeting the requirements to be fully compliant with Title VI and EJ mandates, two of the primary federal mandates governing equity in transportation planning. DVRPC published *Equity & Opportunity: Title VI Compliance Plan* in 2014, which "establishes a framework for DVRPC's efforts to ensure compliance with Title VI and related statutes regarding nondiscrimination and EJ."[27] This plan outlines the following programs, protocols, and activities in place to ensure compliance:

- A Title VI Compliance Manager position;
- Data collection on population groups relating to Title VI and EJ analyses;
- Annual Report to State DOTs and Planning Partners on these efforts;
- Annual Review of Title VI Program;
- Public dissemination of information on the Title VI program;
- Procedures manual, *Planner's Methodology;*
- Participation in Title VI and EJ audits by partners;
- Publication of a Title VI Statement;
- Procedures for accepting complaints for violation of Title VI;
- A Communications and Public Involvement Program that includes but is not limited to:
    - Its *Public Participation Plan: A Strategy for Citizen Involvement;*
    - A policy for engaging individuals with Limited English Proficiency (LEP)
    - A policy for meeting Americans with Disabilities Act (ADA) Requirements
    - A task force, work group, and forum to convene different stakeholders
    - Publicly accessible resources such as a website and media releases
- Planning and Programming that is guided by many policies including but not limited to:
    - The Clean Air Act Amendments of 1990;
    - The *Environmental Justice at DVRPC* Annual Report;
- Standards for Consultant Contracts which include but are not limited to:
    - Equal opportunity, nondiscrimination, and access standards provided by Title VI and other statutes;
    - A DBE Program;
    - Title VI language in Request for Proposals i(RFPs);
- Title VI Responsibilities for Human Resources.

In addition to these specified activities, the *Title VI Compliance Plan* provides guidance for complying with Title VI and EJ orders in all DVRPC programming, and provides special attention to those programs involving the issues of Title VI and EJ most directly, such as Long-Range Planning (LRP) and the Transportation Improvement Program (TIP).

To get a better picture of DVRPC's work on equity, it is helpful to dive into a few of these plans and reports.

Planner's Methodology

The *Planner's Methodology* provides a condensed version of the several DVRPC documents that guide Title VI and EJ compliance.[28] The purpose of this condensed methodology is to help staff meet the requirements using the DVRPC EJ technical analysis method, *Indicators of Potential Disadvantage* (IPD). EJ and Title VI require that MPOs analyze race, ethnicity, and low-income as populations, and DVRPC looks at other factors too. There are eight IPDs that DVRPC analyzes: poverty, non-Hispanic minority, Hispanic, elderly, carless households, physically disabled, limited English Proficiency (LEP), and female head of household with child. Although DVRPC is not mandated specifically to analyze age, physical disability and LEP, there are other federal statutes that ensure nondiscrimination, inclusion, and/or accommodation for these groups. (A nonexhaustive list is: the Age Discrimination Act of 1975, Americans with Disabilities Act of 1990, Section 504 of the Rehabilitation Act of 1973 and EO #13166 Improving Access to Services for Persons with Limited English Proficiency [LEP]).

Using the eight indicators, DVRPC considers any census tract that meets or exceeds the average level for the region in any of these categories to be "EJ-sensitive." DVRPC also offers a public interactive map tool to view these tracts. Staff are asked to follow certain guidelines when working in EJ-sensitive tracts. The development and implementation of the IPD methodology to look at disproportionate adverse impacts on low-income and minority populations in DVRPC plans fulfills the equity analysis required by EJ.[29]

The *Planner's Methodology* also provides guidance for meeting public participation mandates, essentially condensing DVRPC's *Public Participation Plan* for practice.

Environmental Justice at DVRPC

The report *Environmental Justice at DVRPC* annually reviews the state of EJ in the DVRPC's plans and programs.[30] Beginning with an overview of the region's demographics using the IPD method, the report then reviews year's published plans and programs that incorporate the EJ method or have an EJ-related component to them. This report gives a snapshot of the type of EJ work DVRPC is doing on an annual basis.

Connections 2045

Connections 2045 is DVRPC's most up-to-date Long Range Regional Plan.[31] This plan outlines five core principles to create a vision for the future of the region, one of which is "Advance Equity and Foster Diversity."[32] This principle goes beyond meeting the federal requirements of Title VI and EJ to further the spirit equity, inclusion, and diversity. The four sub-goals of this core principle are:

- Promote equitable access to transportation for vulnerable persons;
- Create age-friendly communities;
- Give all children in the region access to good schools;

- Build inclusive communities and develop without displacement.[33]

Equity Analysis of the TIP

DVRPC includes an equity analysis in each TIP, the list of priority transportation projects for the region over a four-year period as is federally mandated. DVRPC shows funding and schedules beyond that requirement with 10 years in the New Jersey TIP and 12 years in Pennsylvania. The most recent TIPs for the two states use similar methodologies to evaluate the TIP projects for equity. DVRPC uses the IPD methodology to determine how many EJ-sensitive tracts will receive investment and the size of that based on the TIP.

The Pennsylvania TIP for FY2021 also examines equity through categorizing the transportation projects by category.[34] Categories are based on "potential impact type" which refers to their potential burden or benefit to the surrounding area. The most recent New Jersey TIP (FY2020) does not include this type of analysis.[35]

The projects prioritized in the TIPs are evaluated using Benefit Criteria to create the right balance of projects and each criterion receives an evaluation weight.[36] Equity is one of the seven Benefit Criteria and is weighted at 12%, which is tied for third highest evaluation weight (with Safety and Facility/Asset Condition & Maintenance weighted at 27% and 22%, respectively). Weighing equity into the TIP evaluation criteria is one way the IPD equity analysis method is directly incorporated into project prioritization.

Figure 20 Ladder of Equity.

Rating	Impact Ladder of Equity	Process Ladder of Equity
4	Vertical equity: greater benefits go to historically disadvantaged groups in order to address past wrongs.	Those needs and priorities are identified, addressed, and progress is documented over time.
3	Horizontal equity: benefits are roughly evenly distributed across different populations.	Those needs and priorities are identified and are addressed with dedicated funding.
2	Positive impact standard: All populations receive meaningful benefits, although the amount of benefit may be disproportionate.	The needs and priorities of potentially affected populations are identified through a community-led process with sufficient resources, but are not addressed.
1	Negative impact standard: The benefits to one or more populations do not cause a burden to another group.	The potentially affected populations are consulted, but the process is not led by the community or adequately resourced.
0	Nondiscrimination: This standard falls outside of the definition equity but is included to provide a baseline reference for equity. Nondiscrimination can be linked to the language of Title VI. Nondescriminiation is the absence of overt discrimination against any particular group. Nondiscrimination is neutral to race, color, or national origin and requires no explicitly expressed attempt to provide or deny benefits to any group in particular.	The potentially affected populations are not consulted.

Takeaways for this Report

Recognizing that equity in transportation is a pluralistic concept, this report will review the many aspects of equity in each of the five projects under consideration. For clarity, the two ladders from zero to four in evaluating equity, developed in the previous section on equity definitions, will be used to summarize each project's multifaceted analysis of transportation equity.

In order to measure equity in each project, each section will be broken into six categories for separate analysis. These categories were developed to allow for analysis of equity in the impact categories from the Victoria Transport Group, various disadvantaged groups, as set out by federal mandates, and as defined in the literature. This method allows for an in-depth look at the numerous facets of the potential impact of transportation on equity.

Each project analysis will examine equity as it pertains to:

- **Process:** The role of public participation, community involvement and decision-making
- **Protected Classes:** The impact on demographic groups that face historical disadvantages and disadvantage in transportation
- **Access:** The effect on access to opportunities and people's mobility
- **Environment:** Impacts to the natural and built environment and human health
- **Economics:** Impact on cost-of-living, poverty, income, wealth, and markets
- **Funding:** How funding was obtained and allocated

Together, these categories provide comprehensive coverage of the myriad aspects by which transportation projects should be examined for equity. The following provides further information as to the origins of each category.

Process

The importance of ensuring an equitable process for input and development of transportation projects is enumerated in nearly every regulation, academic analysis, and MPO analysis. Title VI ensures that public meetings are open to all, regardless of race, color, or national origin. EJ specifically requires public participation in transportation projects, and USDOT has issued several guidances on how that process should look. Discussions of power and decision-making long predate EJ, however, with Arnstein's Ladder of 1969 as one of the most widely-known documents (but certainly not the first) detailing the importance of how not all public participation provides equal opportunities for everyone involved.

Protected Classes

While every section focuses on the protected classes of people in some way—those populations who face disadvantage—this category allows for a deeper analysis of how a project directly impacts a certain population that is protected by regulations. The government recognizes classes including, but not limited to race, religion, national origin, sex, age, disability, LEP, and citizenship as protected from discrimination. It is important to note that the term protected classes has a legal definition that refers to specific classes protected by law, but that definition is not being used for the purposes of this report; rather, protected classes in this document refers to the discussed groups

that receive varying amounts of protection from a variety of laws, regulations, Executive Orders, and from special considerations by MPOs. Each transportation equity expert or MPO may specifically examine a slightly different list of disadvantaged groups based on their analysis of disadvantage in transportation and available information, but all agree that a direct look at who is impacted, advantaged, and disadvantaged across these groups is at the core of analyzing equity. For the purposes of this report, most of the analyses of the impact on protected classes will focus on the DVRPC IPD categories but will recognize that there are more groups who face disadvantage and are impacted by transportation projects.

Access

The concept of access is at the core of what transportation is: transportation is built to get people to places. Accessibility and mobility can be equally confused for one another, but accessibility is the ability to reach opportunities and activities. Mobility is the pure ability to move through space. While mobility and accessibility frequently are aligned, the presence of one does not necessitate the other. When discussing equity in particular, access becomes particularly important, particularly in regards to jobs, health care, child care, education and green space. Golub & Martens (2018) look at accessibility in particular in their analysis of transportation equity that has been adapted into the equity analysis used in the present report.[37] Regulations protecting people with physical disabilities and LEP are clearly about accessibility, but other regulations are also about access: Title 49 CFR § 21, which regulates the implementation of Title VI in transportation, requires that the effects of a project not be discriminatory, and for transportation, those effects are usually those of accessibility.[38] Three of the Victoria Transport Policy Institute's equity impact categories discussed above (public facilities and services, user costs and benefits, and service quality) are largely issues of accessibility.[39]

Environment

An equity analysis across an environmental lens is crucial to satisfying the EJ mandate which discusses both environmental and health impacts. Environmental impacts include issues of air and water quality which are directly linked to health outcomes. Environmental impacts also include noise, smells, and other issues that are both quality-of-life issues and health issues. The disparate impact of climate change on populations is also affected by transportation projects, as the transportation sector accounts for 28% of all greenhouse gas (GHG) emissions in the US, making it the largest contributor.[40]

Economics

While EJ primarily address environmental concerns, by expanding the group of disadvantaged populations to include low-income populations, EJ necessitates an economic equity analysis. Economic impacts can be more direct, such as employment opportunities and changes in economic activity or more indirect, such as the impact on land values and home prices. Analyzing economic impact is crucial for looking at equity concerns among low-income populations, but is equally as important to examining equity concerns of other groups, including racial, immigrant, and disabled groups that have historically faced barriers to economic opportunity.

Funding

An examination of funding sources and transportation funding decisions provides needed context to analyze a project's impact. Funding is limited, and which projects are funded affects other projects, and ultimately, transportation is a network, and no project is built in total isolation. Geographic distribution of financial investment is a useful tool to look at disparate impacts of transportation projects and account for the equity concerns of one project receiving funds over another, or one project connecting to or laying the groundwork for another.

In addition to using the equity ladder across these six categories, this report will also draw upon a list of questions developed based on the best practices research and the FHWA/ FTA 1999 Memorandum to provide a more comprehensive qualitative analysis. The list of questions can be found in Appendix A. This report will use both quantitative and qualitative data to address the impact of transportation projects on equity, drawing on discussed methods.

Using this methodology, this report will analyze eight transportation projects for equity concerns. Each project will begin with an equity theme and some historical context for background. Then each project will be analyzed in the six categories: process, protected classes, access, environment, economic, and funding. Using the equity ladders, each project will receive a rating for each category.

The case studies and their major themes are as follows:

Volume II

The Vine Street Expressway (I-676)

Those who held power at the time did not look or think like the community members who were set to be impacted. Over the course of two decades, some sympathetic individuals were able to assist a strong coalition of Chinatown members in protecting their vital interests.

Blue Route (I-476)

The Blue Route provides some useful examples as to how community input can shape transportation projects that directly impact them and decide the tradeoffs between benefits and burdens that they are willing to accept, especially in terms of environmental impacts. Social equity concerns lie in the lack of benefits conferred to lower-income and marginalized communities, including those from Philadelphia and Chester, through the lack of a public transit system connected to the highway and the preference given to privileged residents along the corridor.

The Market-Frankford Line Reconstruction

Single service agencies may not possess the resources or political capacity to address socio-economic issues that are not with the specified scope of their project. Despite positive impacts of public transit projects, less resilient communities struggle to cope with disruption to everyday operations.

Volume III

NJ-29

Largely as a result of state agencies enacting policies that eroded public trust, NJ-29 cut off communities of color in the City of Trenton, separating them from each other and environmental goods.

PATCO

PATCO'S failure to integrate station and land use planning has had profound effects on the distribution of the real benefits that the line provides, from economic growth to environmental impacts.

Direct Connection

While having a proper environmental review processes and successful community engagement, Direct Connection has exacerbated current urban vs. suburban inequities and allocated resources inequitably as the second largest roadway project in New Jersey's history.

US 422 (Pottstown Expressway)

While bringing needed mobility and economic growth, the construction of US 422 led to a series of planning and transportation investment failures that have created an inequitable and inaccessible corridor.

Schuylkill River Trail

In repairing past environmental damage and improving access for a variety of populations throughout the region, the Schuylkill River Trail is an example of how even a relatively cheap transportation project can improve equity for large numbers of people throughout the region.

Endnotes

1 Civil Rights Act of 1964, 42 U.S.C. § 2000d-2000d-7. 1964.

2 Nondiscrimination in Federally-Assisted Programs of The Department of Transportation - Effectuation of Title VI of The Civil Rights Act Of 1964, 49 C.F.R. § 21. 2020.

3 Ibid.

4 Executive Order 12898 of February 16, 1994, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 59 Federal Register 7629, p. 94-3685

5 Ibid.

6 Federal Transit Administration, Circular 4702.1B, "Title VI Requirements and Guidelines for Federal, U.S. Department of Transportation." (Washington, DC: 2012).

7 Federal Highway Administration and Federal Transit Administration, "Implementing Title VI Requirements in Metropolitan and Statewide Planning" (official memorandum, Washington, DC: U.S. Department of Transportation, 1999).

8 C. Jotin Khisty, "Operationalizing Concepts of Equity for Public Project Investments," *Journal of the Transportation Research Board*, 1559. (Washington, DC: 1996).

9 Ibid.

10 *The American with Disabilities Act of 1990,* 42 U.S.C. § 12101. 1990.

11 Executive Order 13166 of August 11, 2000, Improving Access to Services for Persons with Limited English Proficiency, 65 Federal Register 50121, p. 50119-50122.

12 Karel Martens and Aaron Golub, "A Fair Distribution of Accessibility: Interpreting Civil Rights Regulations for Regional Transportation Plans," *Journal of Planning Education and Research*, 1, no. 20 (2018): https://doi.org/10.1177/0739456X18791014

13 Ibid.

14 Derek Bell and Jayne Carrick, "Procedural Environmental Justice." In *The Routledge Handbook of Environmental Justice*, edited by Ryan Holifield, Jayajit Chakraborty, and Gordon Walker (New York: Routledge, 2018), 101-112.

15 Sherry Arnstein, "A Ladder of Citizen Participation," *Journal of American Institute of Planners 7, no. 35*, (1969): 216-224, https://doi.org/10.1080/01944366908977225

16 Gene Row and Lynn Frewer, "Public participation methods: A framework for evaluation," *Science, Technology, & Human Values* no 1, 25 (Winter 2000): 3-29, Sage Publications, 2000; David Aimen and Anne Morris, "Practical approaches for involving traditionally underserved populations in transportation decisionmaking," *National Coopertive Highway Research Program*, Report No. NCHRP 710 (Washington DC: 2012); Keiron Bailey and Ted Grossardt, "Addressing the Arnstein Gap: Improving Public Confidence in Transportation Planning and Design through Structured Public Involvement," *11th International Geo-Multimedia Symposium CORP* (2006): 337-341.

17 Alex Karner and Richard Marcantonio, "Achieving Transportation Equity: Meaningful Public Involvement to Meet the Needs of Underserved Communities," *Public Works Management & Policy* no. 2, 23 (2017): 105-126, https://doi.org/10.1177/1087724X17738792

18 Todd Litman, "*Evaluating Transportation Equity Guidance for Incorporating Distributional Impacts in Transportation Planning"* (Victoria: Victoria Transport Policy Institute, 2021), Accessed March 15, 2021, https://www.vtpi.org/equity.pdf

19 Ibid.

20 Ibid.

21 Martens and Golub, "Fair Distribution of Accessibility," 9.

22 Alex Karner and Deb Niemieir, "Civil rights guidance and equity analysis methods for regional transportation plans: a critical review of literature and practice," *Journal of Transport Geography* no. 1, 33 (2013): 126-134, https://doi.org/10.1016/j.jtrangeo.2013.09.017

23 " Anup Tapase to Regional Working Group, November 10, 2020, "Plan Bay Area 2050 Equity Analysis," *Metropolitan Transportation Commission Association of Bay Area Governments,* https://mtc.ca.gov/sites/default/files/meetings/packets/Memo_Plan%20Bay%20Area%202050%20Equity%20Analysis%20Update%20Oct%202020.pdf

24 Metropolitan Washington Council of Governments, *Title VI Plan*: *January 2021 Update* (Washington, DC: Metropolitan Washington Council of Governments, 2021): https://www.mwcog.org/documents/titlevi/

25 Richard A. Marcantonio, Aaron Golub, Alex Karner, and Louise Nelson Dyble, "Confronting Inequality in Metropolitan Regions: Realizing The Promise Of Civil Rights And Environmental Justice In Metropolitan Transportation Planning," *Fordham Urban Law Journal* no. 4, 44 (New York: 2017): 1018-1077, Gale Academic OneFile

26 Ibid.

27 Delaware Regional Valley Planning Commission, *Equity and Opportunity: Title VI Compliance Plan*, (Philadelphia, DVRPC, 2014): https://www.dvrpc.org/Reports/TM14010.pdf

28 Delaware Regional Valley Planning Commission, *DVRPC Planner's Methodology*, (Philadelphia, DVRPC, 2015): https://www.dvrpc.org/Reports/TM14005.pdf

29 Marcantonio, Golub, Karner, and Dyble, "Confronting Inequality in Metropolitan Regions," 1041-1046

30 Delaware Regional Valley Planning Commission, *Environmental Justice at DVRPC*, (Philadelphia, DVRPC, 2014): https://www.dvrpc.org/Reports/TM15017.pdf.

31 Delaware Regional Valley Planning Commission, *Connections 2045 Plan for Greater Philadelphia*, (Philadelphia, DVRPC, 2017): https://www.dvrpc.org/Products/17039.pdf.

32 Ibid., 85

33 Ibid., 88-94

34 Delaware Regional Valley Planning Commission, *FY2021 TIP for Pennsylvania: FY21-24*, (Philadelphia, DVRPC, 2020): https://www.dvrpc.org/TIP/PA/pdf/TIPPA21.pdf.

35 Delaware Regional Valley Planning Commission, *FY2020 TIP for New Jersey: FY20-23*, (Philadelphia, DVRPC, 2019): https://www.dvrpc.org/TIP/NJ/pdf/20001B.pdf.

36 DVRPC, *FY2021 TIP for Pennsylvania*, 17.

37 Martens and Golub, "Fair Distribution of Accessibility."

38 49 CFR § 21

39 Litman, *Evaluating Transportation Equity Guidance*, 8.

40 "Carbon Pollution from Transportation," US Environmental Protection Agency, accessed March 15, 2021, https://www.epa.gov/transportation-air-pollution-and-climate-change/carbon-pollution-transportation

Volume II

The Vine Street Expressway

I-476 (The Blue Route)

The Market Street Elevated Line Reconstruction

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Executive Summary Volume II

The Temple University Master of Public Policy students have written Volume II of the report titled *"Exploring the Impact of Major Transportation Projects on Communities of Black, Indigenous, and/or People of Color: 1962 – 2020."* Volume II includes three case studies of transportation infrastructure projects in the Delaware Valley Regional Planning Commission (DVRPC) region. The projects are The Vine Street Expressway (I-676), The Blue Route (I-476), and The Market-Frankford Line Reconstruction. These case studies examine the relationship between transportations infrastructure projects and equity concerns as a result of their construction. Each case study includes the following components:

- Background on Relevant Corridor
- Equity/Policy Analysis
- Equity Considerations with Regards to the Legal Framework and Case Study Context
- Summary Judgements on the Dimensions of Equity
- Conclusion with Key Findings
- Policy Recommendations

Each case study provides an in-depth look at how the project affected distinct groups of people, with a particular focus on those that have been historically marginalized. Using a policy perspective, the MPP students used a variety of methodologies to examine impacts. These sources include historical newspaper records, U.S. Census data, public testimony and records, and interviews with project leaders, participants, supporters, and opponents. The variety of sources leads to a holistic analysis that considers both quantifiable trends and qualitative assessments that can only be discerned through story telling and first-hand accounts. Each case study investigated equity with regards to six categories. Below is a brief Summary of the approach taken by the MPP team for each category:

Process

Findings are derived from interviews with transit experts, advocates, government officials, and from published information on the expressed interests of communities and the degree to which they participated in the planning and implementation decisions

Protected Classes

Our studies explore the transportation planning process and project effects on groups who have been historically disenfranchised. These groups are determined through historical analysis, census data on income and race, and proximity to socio-economic opportunity.

Accessibility

Case studies assess impacts through interviews and historical accounts, while also assessing the trade-offs between transportation alternatives.

Environment

Case studies used Environmental Impact Surveys, interviews, and reports proposing on transit alternatives to inform our research on how highway projects impact low-income and Black, Indigenous, and people of color (BIPOC).

Economic

To estimate economic impacts, case study relied largely on information in records like the EIS and on the judgments of economic development and transportation officials and some business leaders.

Funding

Our cases used project records and accounts from expert interviewees to explore whether projects were completed in a timely fashion, on budget, and if other projects were likely to have been delayed, cut, or abandoned as a result

Equity Scores

In order to make equity evaluations across transportation modes and time periods easily interpretable, “Equity Score Charts” were created. The charts display a 0-to-4 score for each equity dimension that a particular case study earned, with the score based on the equity ladders criteria shown in Figure 3. A score of “0” is represented by a point at the center of the chart, and a score of “4” is represented by a point at the outside rung of the chart. These points are then connected, and the resulting shape provides an overview of how the case study performed overall. A larger, more filled in shape indicates that a project performed better in the equity analysis. Spider charts with the dimensions of equity , levels of impacts and the table of equity scores that are used to assess each case study are detailed on the following pages.

Figure 2 Spider Charts with 6 dimensions of equity

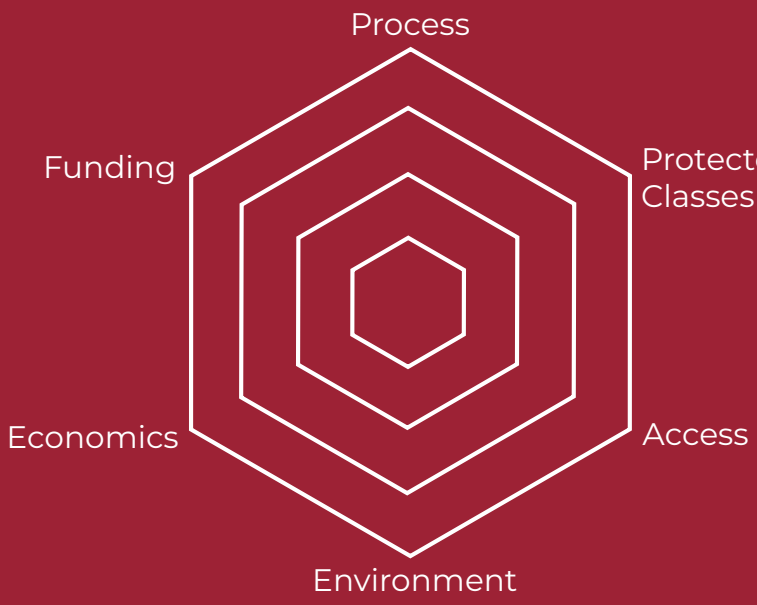


Figure 3 Spider chart with 5 levels of impact

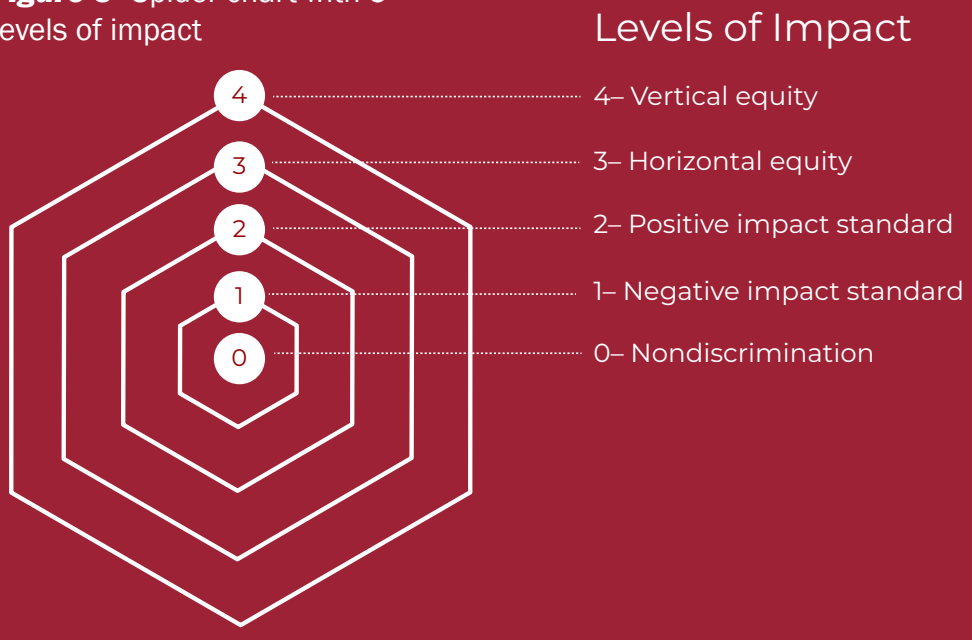


Figure 4 Table of Equity Scores

Rating	Impact Ladder of Equity	Process Ladder of Equity
4	Vertical equity: greater benefits go to historically disadvantaged groups in order to address past wrongs.	Those needs and priorities are identified, addressed, and progress is documented over time.
3	Horizontal equity: benefits are roughly evenly distributed across different populations.	Those needs and priorities are identified and are addressed with dedicated funding.
2	Positive impact standard: All populations receive meaningful benefits, although the amount of benefit may be disproportionate.	The needs and priorities of potentially affected populations are identified through a community-led process with sufficient resources, but are not addressed.
1	Negative impact standard: The benefits to one or more populations do not cause a burden to another group.	The potentially affected populations are consulted, but the process is not led by the community or adequately resourced.
0	Nondiscrimination: This standard falls outside of the definition equity but is included to provide a baseline reference for equity. Nondiscrimination can be linked to the language of Title VI. Nondescriminiation is the absence of overt discrimination against any particular group. Nondiscrimination is neutral to race, color, or national origin and requires no explicitly expressed attempt to provide or deny benefits to any group in particular.	The potentially affected populations are not consulted.

Introduction

Problem Statement

Major transportation infrastructure investments often have a complex array of benefits and burdens for communities (social, environmental, economic, accessibility, and safety). Policies and politics at the time of planning and implementation affect how these benefits and burdens are distributed. Black, indigenous, and people of color (BIPOC), low-income, and other marginalized communities have historically received disproportionate burdens from transportation projects. In addition, the construction of these projects often causes environmental externalities that negatively affect BIPOC, low-income, and other marginalized communities.

This report will detail a comprehensive analysis that can be a resource for the construction and planning of future projects with greater equity and environmental justice considerations.

Rationale for Case Studies

To facilitate a comprehensive analysis of the impact of past transportation projects and the historical-political contexts that shaped them, the Temple Master of Public Policy team has selected three Philadelphia-area case studies for policy analysis. The selected case studies will show whether the planning considerations, political concerns, and consequences (both intended and unintended) of the projects had either a disproportionate burden upon low-income and minority communities, granted an unequal set of benefits to wealthier and largely white communities, or both. The selected case studies have been analyzed through both the lens of planning, as well as public policy outcomes for equity, civil rights, and environmental justice. This report will display and summarize key data points related to the before and after of the construction of these transportation projects. Finally, in light of these case histories, we evaluated whether adherence to the Civil Rights Act (Title VI) and federal environmental justice (EJ) standards are sufficient to avoid or mitigate the effects of future projects on low-income and minority communities. Our selected case studies are:

(1) Construction of the Vine Street Expressway through Center City Philadelphia to connect I-76 to I-95 and the Ben Franklin Bridge.

This case study analyzes the impacts that construction had upon the Chinese community in Philadelphia's Chinatown area and how public agencies handled the process of planning and negotiation with the Chinese community. We will examine the differences in how the agencies saw the project in comparison to how the project was treated by the Chinatown residents and businesses. We examined to what degree the completion of the expressway produced benefits for residents of the city, Chinatown, the business community in Philadelphia, and the residents of the Pennsylvania and New Jersey suburbs will also be a facet of our analysis. The case study will also examine cultural versus economic impacts, as well as how federal law and funding availability affected the project. Alternatives to the Vine Street routing will also be explored and how and why those projects were defeated or discarded.

(2) Construction of I-476, also known as the Blue Route or the Mid-County Expressway.

This case study examines whether transportation planning and policy are more responsive to the needs and complaints of wealthier and largely

white communities, whether the needs for public transit planning (integrated along the highway) as a way of facilitating easier access to jobs was ignored, whether the construction of the route accelerated the movement of jobs out of the city and into the surrounding suburbs, and whether the route provided residents of the suburbs with disproportionate access to jobs at the expense of urban residents. We give additional consideration in the Blue Route analysis to the City of Chester, which was one of the initial proponents of a new highway through Delaware County as a means of expanding trucking access to its industrial center on the Delaware River and connecting the city to the Pennsylvania Turnpike.

(3) Reconstruction of the Market Street Elevated line in West Philadelphia on the Southeastern Pennsylvania Transportation Authority's (SEPTA) Market-Frankford Line.

This analysis and how the decade-long construction work impacted local residents and resulted in the closure of businesses due to street blockages and construction obstacles. The case study will analyze how the programs that were created to mitigate the aforementioned effects were handled as well as how the project was seen by SEPTA and whether they were obligated or capable of providing services that business needed or not. Another important aspect of this study was investigating the differences in how the project was seen by local residents and businesses compared to SEPTA.

Background on Equity Analysis

In coordination with students in Temple's Master of City and Regional Planning program, we examined equity impacts by utilizing the same equity categories. The data that is obtained from each case study will be assessed by these six categories and will be given a ranking based on the rubric detailed in Volume I. The equity categories include:

In the process, public participation, and decision-making

Our findings are derived from interviews with transit experts, advocates, government officials, and from published information on the expressed interests of communities and the degree to which they participated in the planning and implementation decisions

In Title VI and EJ Communities that are historically marginalized and discriminated against in transportation projects

Our studies explore the transportation planning process and project effects on groups who have been historically disenfranchised from decision making and from fairly realizing the benefits of transportation projects. These groups are determined through historical analysis, census data on income and race, and proximity to socio-economic opportunity.

In mobility and accessibility

This volume explores the impacts of construction on access to business during the beginning and intermediate phases of transportation projects through interviews and historical accounts. We also assess the trade-offs between transportation alternatives and their capacity to provide

low-income and minority communities to diverse jobs, housing, and recreational opportunities.

In the environment

Environmental Impact Surveys, interviews, and reports proposing on transit alternatives inform our research on how highway projects impact low-income and Black, Indigenous, and people of color (BIPOC). We also focused on on-site degradation during early and interim stages of construction. Our work also explores the environmental trade-off between public transit and highway investment more generally.

In economic impacts

To estimate economic impacts, we have relied largely on information in records like the EIS and on the judgments of economic development and transportation officials and some business leaders. The pandemic closed many government offices and archives and hindered our ability to obtain quantitative data such as changes in property values. However, We did measure changes in average income and poverty levels.

In allocation of project funds

Our cases used project records and accounts from expert interviewees to explore whether projects were completed in a timely fashion, on budget, and if other projects were likely to have been delayed, cut, or abandoned as a result. This step will identify opportunity costs of not using the funds for arguably more equitable alternatives.

Equity Score

Recognizing that equity in transportation is a pluralistic concept, this report will review the many aspects of equity in each of the projects under consideration. For clarity, the two ladders from zero to four in evaluating equity, developed in the equity definitions explained in the Volume I & II executive summaries, will be used to summarize each project's multifaceted analysis of transportation equity. Below Is an examplke of the equity score rebc used for thi each case study.

Interview Rationale

In addition to using historical and journalistic sources and available data provided by DVRPC and from other sources, our team incorporated the extensive use of interviews with important political, community, planning, and engineering figures who participated in the projects or were opposed to them or have expert knowledge about them. We have completed several interviews and gathered a wealth of information using expertise insight.

We viewed these interviewees in four broad categories, with each group likely to have different perspectives:

- Local activist and community members who were key in the negotiation process of the construction project and were advocates for the marginalized and underrepresented communities;
- Economic development and business leaders whose paramount goals are typical to support the economic growth of the entire city and the region and regard transportation assets as important assets in that mission (such groups are sometimes called “growth machines” in the literature of urban politics;
- Transportation officials and professionals whose mission is to build highway and transit systems that serve the needs of residents and businesses and who must do so under the often-conflicting constraints of budget pressures and community opposition.

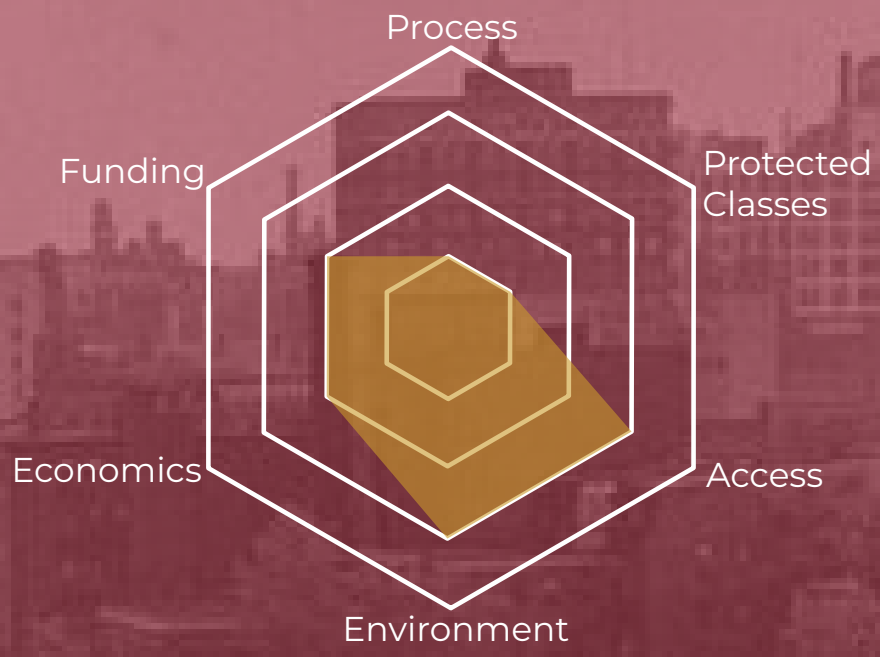
We see a basic tension between advocates for transportation investments as tools for overall economic growth and advocates for disproportionately affected communities who see the projects as impediments to their economic well-being and quality of life.

Our interviewees have a wealth of historical knowledge about these projects. To explore how they evaluate the impact of the case history projects using common metrics, we have developed a set of structured questions that are attached in an appendix to this progress report. Although we can sometimes derive the views they had at the time the projects were being planned or built, our questions are aimed at uncovering whether in retrospect they have modified their views as observers rather than participants.

Although each group is likely to have a dominant perspective in the tension between growth imperatives and equity concerns, they are often capable of recognizing the legitimacy of the perspectives of the other groups. As noted above, government leaders and organizations like DVRPC have the responsibility of balancing these conflicting aims. Indeed, DVRPC's mission statement includes both supporting economic growth and advancing equity.

Indicators of Potential Disadvantages (IPDs) Considerations

DVRPC has created and maintained a GIS tool that uses data from the American Community Survey (ACS) to calculate the presence of populations covered under Title VI and Environmental Justice protections. We have used this tool to inform the quantitative research our report produced and specifically pulled certain measures to take a fuller look at with a historical analysis. These included racial minority, ethnic minority, and low-income. We were unable to lean too deeply into the framework of the IPD tool in large part because it relies on calculations made on ACS data that only began being collected in 2005, and all three of our case studies began well before this date. What you will see in this report is demographic data presented at two time periods with respect to the relevant project corridor, the respective county, and the DVRPC region. Secondly, we aggregate census data that is reported as a count of families living at different levels below or above poverty for the same periods to understand how the relative level of poverty in an area has changed. Graphs demonstrating this aggregated data are located within the "Appendix" portion of this report. These two metrics align with the work of DVRPC and the IPD project and allow us to show further evidence to support our conclusions.



Equity Dimension	Score	Reasoning
Process	1	The community was only consulted after early plans were released, and the community had to produce its own resources in order to be heard.
Protected Classes	1	The marginalized community was most affected and was consulted, but their needs were not adequately met, and they did not drive the conversation or planning.
Access	3	The inclusion of a below-grade highway, a local access road, and pedestrian bridges meant that both the neighborhood and through-traffic had access via the Expressway.
Environment	3	The change from an at-grade arterial to the depressed highway benefitted noise and air pollution efforts, but the lack of a full cap did not prioritize the minority community.
Economics	2	Greater access for the region led to economic growth, and the survival of the Chinatown community allowed for economic growth, but the target sector was not the affected population.
Funding	2	The city and state effectively used federal funding to build the roadway but failed to bolster the project to meet the community needs fully and did not address their full concerns.

Figure 5 Vine Street Expressway equity spider chart and table

Vine Street Expressway
1.1 Chapter Summary

Theme: Those who held power at the time did not look or think like the community members who were set to be impacted. Over the course of two decades, some sympathetic individuals were able to assist a strong coalition of Chinatown members in protecting their vital interests.

Touted by planning professionals as an early example of proper community engagement and extensive mitigation considerations, the Vine Street Expressway is more well-known for being a prime example of community displacement and the impediment on a marginalized community. In this case study, we have considered our five measures of equity, worked through the Environmental Impact Statements, interviewed many of the key players from the original construction of the project, and worked to piece together a story of all the relevant legislation that played a role in this project. This is a story of cultural impact, one that put a community on its heels and forced it to fight for its survival for decades. Those who held power at the time did not look or think like the community members who were set to be impacted. Over the course of two decades, some sympathetic individuals were able to assist a strong coalition of Chinatown members in protecting their vital interests. All of this shows that although a final version of a major transportation project may have involved many mitigation factors, the burden placed upon the impacted community during the process can have long-lasting effects.

Equity Analysis Key Takeaways:

Planning considerations must include the cultural effects of a project, not solely the economic or environmental effects that are required in federal policies

The Vine Street Expressway was proposed out of economic need and regional mobility, and it was approved based on environmental considerations and economic insight, yet the Chinatown community's main concern was the cultural impact of losing the Holy Redeemer Church and School.

Already marginalized communities feel threatened when transportation projects are planned without prior input, and these communities should be included in the initial phase of planning

The Chinatown community first learned of the plans for the Vine Street Expressway from the Free Library presentation in 1966. Because of this, the community shifted into reactionary mode and was forced to defend itself, rather than work with planning officials to identify key concerns. If community leaders had been consulted before initial plans were made, fights over the Holy Redeemer Church and School could have been avoided and a smoother process would have occurred.

Vine Street Expressway

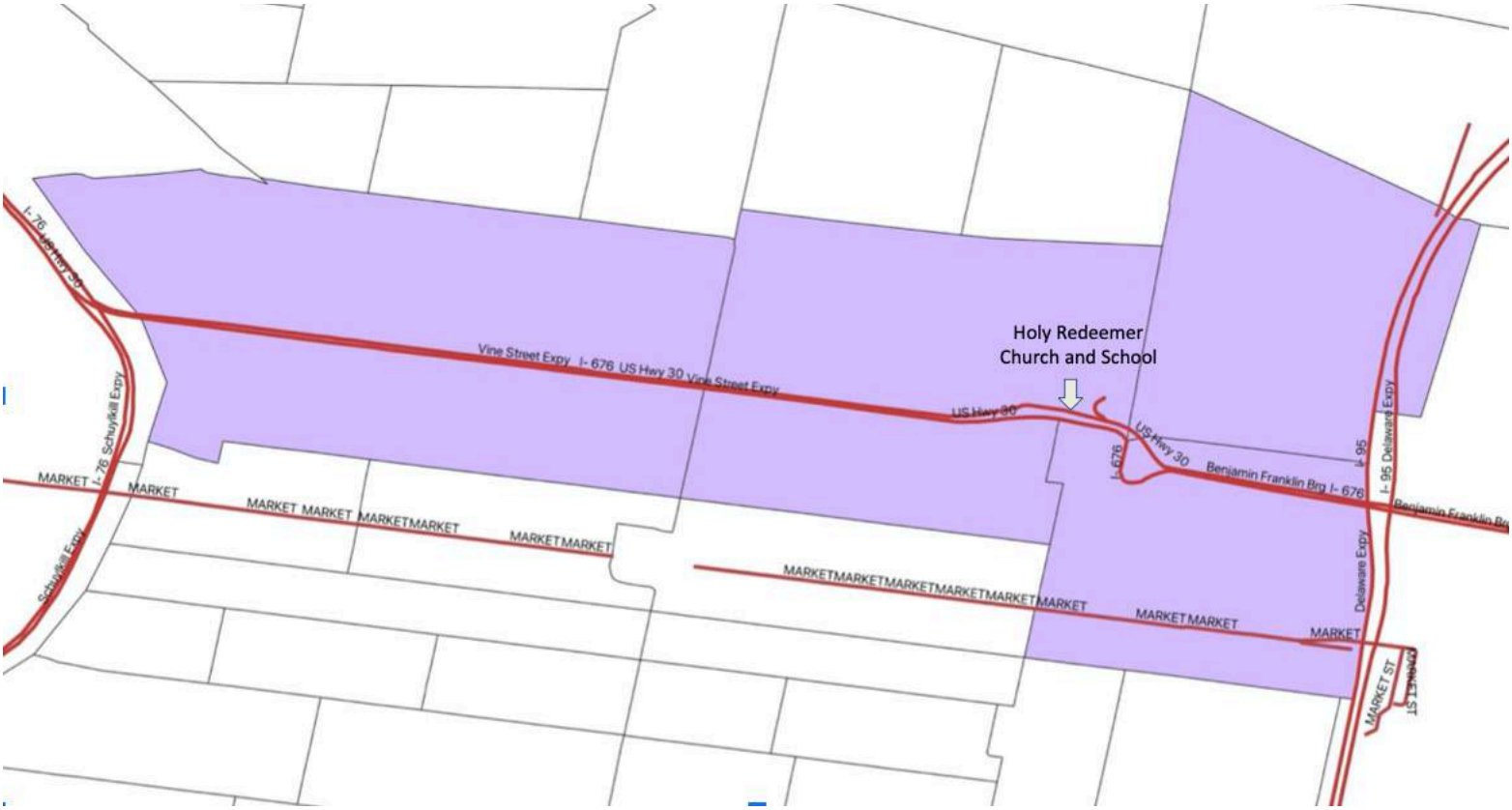


Figure 6 Map of Vine Street Expressway relevant corridor

1.2 Impact (Problem) Statement

The construction of a six-lane depressed highway through the northern edge of Center City Philadelphia slashed directly through multiple neighborhoods, notably the Chinatown community which already faced 'urban revival' projects on two sides of its informal borders. The construction of this expressway had a notable impact on the growth and development of neighborhoods in Philadelphia, which has led our team to research and determine what positive or negative impacts it had on the goals derived from The Civil Rights Act, the Environmental Justice Order of 1994, and DVRPC's five Long Range Plan principles, which we refer to more broadly as social equity.

1.3 Background on the Relevant Corridor

The Vine Street Expressway opened to the public on January 10, 1991, connected I-95 traffic and the Benjamin Franklin Bridge with I-76 and the Schuylkill Expressway. The project, which cost $225 million, took a total of 25 years from the first unveiling of the plans to the final completion. The story of the Vine Street Expressway is one of efficiency rather than equity: a desire to ease the burden of commuting to, and traveling through, Philadelphia. After the Ben Franklin Bridge was opened in 1926 (originally known as the Delaware River Bridge), Center City experienced heavy traffic backups, largely on Vine Street. Over the next six decades, City and state officials, planning groups, and the federal government would all offer solutions that sought to speed up travel times through the city and help connect the Philadelphia suburbs to New Jersey (see our historical appendix for a list of iterations that were proposed in the 1983 Environmental Impact Statement). The question now is what was the real cost of developing a major highway system through Philadelphia and which communities were left out of the process? This case study will lean into the historical timeline that tells the story of how those involved helped shape the area into what it is today and how varying policies helped or hurt disadvantaged communities in and around Philadelphia or did both in different ways.

1.4 Equity/Policy Analysis

Relevant Legislation:

National Interstate and Defense Highways Act (Public Law 84-627)

The entire basis for the Vine Street Expressway was prompted by the passage of this legislation in 1956. It allowed for 90% of highway construction costs to be covered by federal dollars, with states and localities being responsible for the final 10%. A full explanation of this law is available in the Volume II appendix.

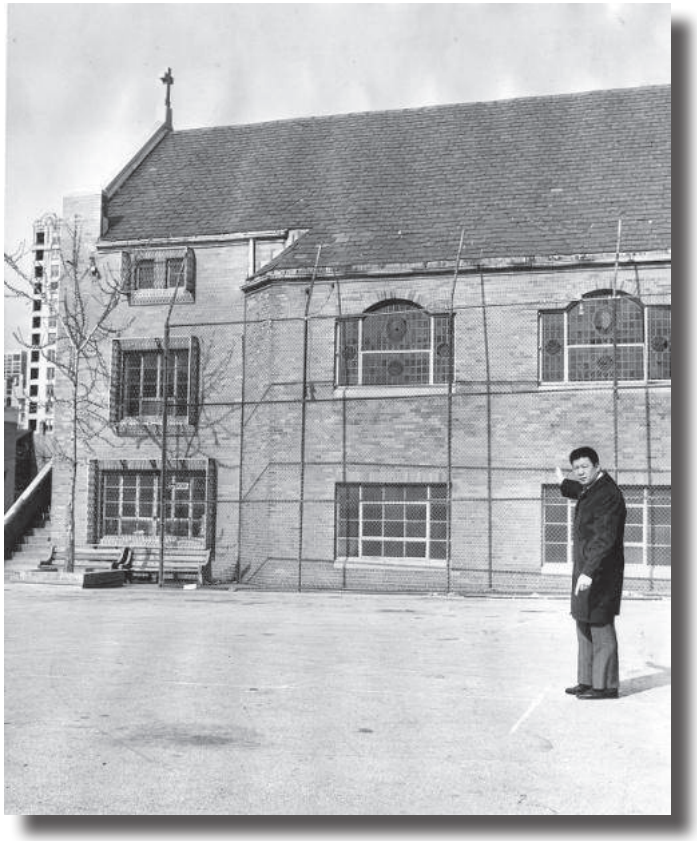
Formation of PCDC (1969)

In the early 20th century, Chinatown was comprised of a few hundred families and bordered 'skid row', an area full of less than desirable characters and hotels utilized for discreet activities and drug use. In 1941, the Archdiocese of Philadelphia opened the Holy Redeemer Church and School as a beacon for Chinese Catholics in the city. It was the first of its kind in the country, to offer both a place for religious service but also a place for the community youth to come together and learn in their native language. In less than 20 years, the neighborhood and the church were feeling the pressures of urban revitalization and renewal projects. With the rejuvenation of Old City as a historical landmark on the east, the construction of the Pennsylvania Convention Center on the west, and the commuter tunnel construction on the south, the chance for expansion and growth of a more vibrant neighborhood was looking

more unlikely. In response to earlier threats to the neighborhood, the different generations reacted differently to the imposing threats. The community elders spoke little English and struggled to keep up with the ways that the city and state operated, while the younger generation chose to be more visible and assertive in their tactics, going so far as to stand on top of buildings scheduled for demolition, and hosting protests around City Hall.

No person was more crucial in the fight to save Chinatown than Cecilia Yep. At the time of the Free Library meeting that unveiled the first plans for the expressway, she was a young widow with three children. Her home, located along the Vine Street corridor, faced eviction multiple times, with most of the neighborhood being torn down around her as she looked on. Her story and her role in the Vine St project will continue to be an important factor, and her importance and dedication to the community cannot be overstated.

Figure 7 George Moy, Chairman of PCDC showing Holy Reedemer Church. Source: Temple University Library Digital Collection, 1973,



National Environmental Policy Act (1969)

Signed into law on Jan. 1, 1970, the National Environmental Policy Act (NEPA) tasked federal agencies with making real considerations to the environmental impacts of any proposed project. The full description of this legislation is discussed in the appendix to Volume II.

Environmental Impact Statements (1977, 1983)

One of the cornerstones of NEPA was an analysis metric known as an Environmental Impact Statement. These reports are required before the approval of any permits or construction projects are completed. It was a major lifeline for the Chinatown community in slowing down the state and forcing officials to consider the full range of consequences that would come from the Vine Street expansion. One notable aspect of the reports was that the Draft in 1977 called for the 'Full Expressway" that was part of the original plans, but in the Final EIS in 1983, revised traffic and population estimates determined that the 'Scaled-Down Expressway' was the largest iteration of the roadway to be proposed. In much of this case study, we refer to the 'Scaled-Down Expressway,' which refers to the final iteration of the roadway that was ultimately constructed and is only considered scaled-down based on the 1966 plans. For a fuller legislative explanation of these statements, please see the appendix for Volume II. The role of these reports in the Vine Street Expressway are detailed with greater detail in the equity analysis section.

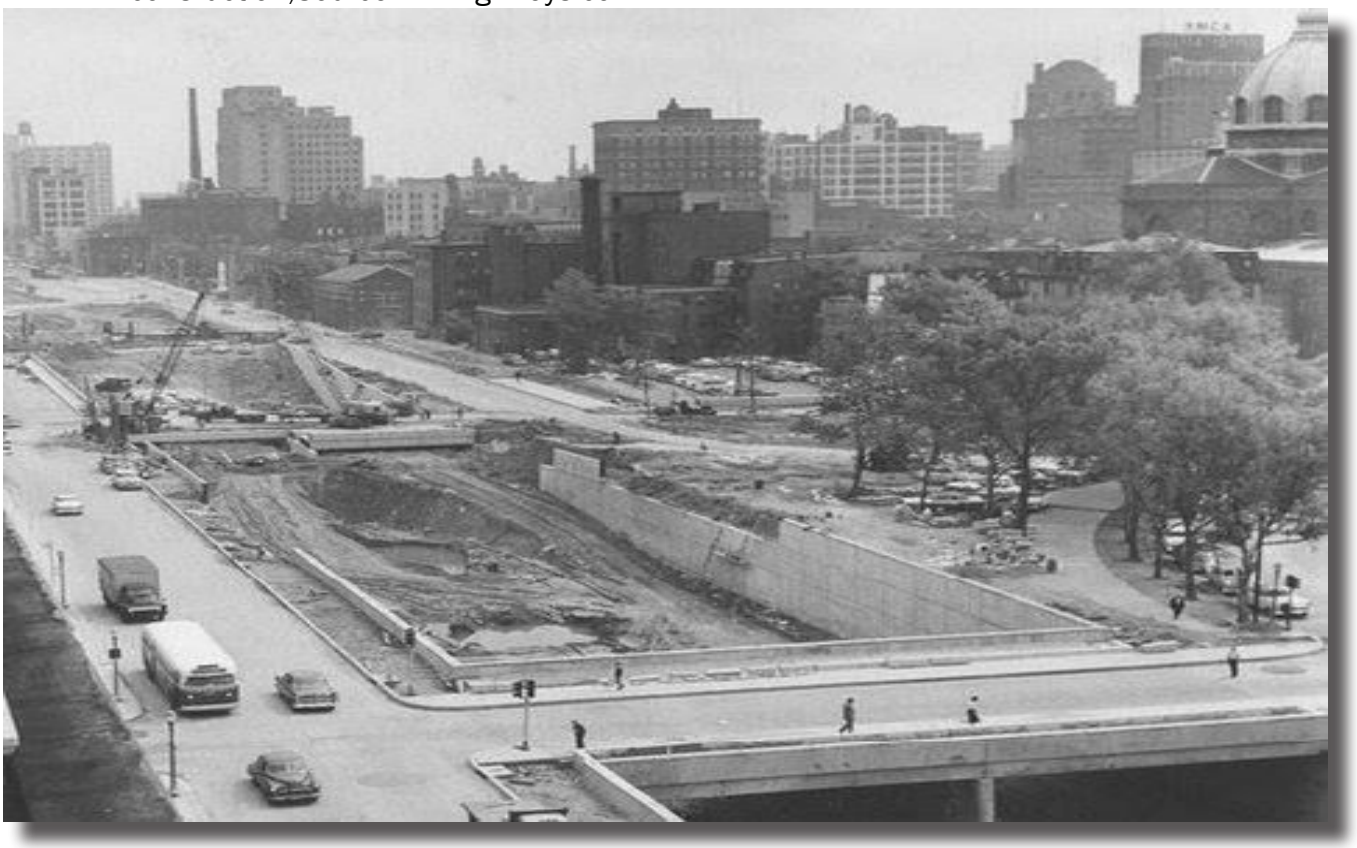
1.5 Equity Considerations

Equity considerations of the National Interstate and Defense Highways Act

Very shortly after the passage of the FAHA, cities, and states began to imagine how they could utilize the funding opportunities to expand and connect their roadways to the new national grid. With I-95 on one side and I-76 on the other, Philadelphia's traffic had become such a mess that people regularly spent an hour in traffic just trying to get from river to river. Suburban commuters looking to come into the city from New Jersey (using the Ben Franklin Bridge) or from the four surrounding counties in PA (using the Schuylkill Expressway) would pour onto Vine Street and Race Street trying to get across the city. Vine Street at this time was a 10-lane arterial running East-West from river-to-river, and they quickly designated it as a federal interstate to allow for the 90% federal funding that had become available. By 1959, the section coming off of I-76 became a below-grade highway from 21st to 17th streets.[1] The next seven years were spent crafting a plan for the roadway by PennDOT and regional planning groups like DVRPC, and the initial plans were presented at a community meeting held at the Free Library of Philadelphia, conveniently located along Vine Street This community hearing was met with harsh criticism and anger from the community who saw this as an attack on their communities and neighborhoods.

The era of white flight and suburban growth during the 1950s is well documented in

Figure 8 Intersection of Vine Street and 20th Street in September 1957 during consruction,Source : PAHighways.com



literature and history, and the intense focus by the Eisenhower Administration to expand the highway system only exploited this further. For many decades, car ownership and regional travel were seen as a luxury of a disposable income and reserved for those who lived in the suburbs. Many of these people still found work in city centers and desired an easier commute to and from work. This led to new roadways cutting through 'undesirable' neighborhoods where regional planners and politicians saw little value in the land and community as it was, and determined the best uses were new highways. When analyzing the equity in process and decision-making, the regional planning for highways and interstates in this early period shows multiple glaring inequities. Within the Vine Street Expressway case study, we see this manifest as the first introduction of the expressway plans without first approaching the impacted communities to receive feedback on important sites or considerations to be made. The role of the Holy Redeemer Church and School will come up time and time again in this analysis, but PCDC founder Cecilia Yep made it known that the survival of the church was the centerpiece of their fight, and years of struggle and contention could have been avoided through a simple conversation early in the process.

Equity Considerations Regarding PCDC's efforts

When the original plans for the Expressway were released in 1966, it included plans to remove most properties along Vine St in order to expand the roadway and increase traffic flow. This included Holy Redeemer Church, which was the heart and soul of the Chinese community. Yep noted that since the business did not drive community growth at the time, the loss of the church would have been the end of Chinatown, and it would not exist as we know it today. When talking to experts who worked on the government side of the project, they noted that their perspective of the issue all boiled down to saving the church and school. This was confirmed by Yep, who knew that the most important threat imposed by the Expressway was not economic in nature, but cultural. Assessing equity as it relates to process, public participation, and decision-making gives the best glimpse at the root of the issue in the Expressway case study. Chinatown leaders were not privy to early discussions of the proposed route, and when it came to the church, Cardinal John Krol was looked to as the voice of the church. Krol, born in Cleveland, OH, and brought to Philadelphia to serve the Archdiocese, represented the broadest and traditional interpretation of the Catholic Church. He chose not to fight on behalf of the Chinese community because he accepted the plans at value and believed that urban planners would not have released plans to remove the church unless it were necessary. This view of Cardinal Krol's position was iterated both by Cecilia Yep and Jack Smyth, a civil engineer closely related to the project.

Equity Considerations in regard to NEPA

Because Vine Street was designated as an interstate under the FAHA (I-676), an EIS was required before any construction could begin. PennDOT, in coordination with the DOT in Washington, D.C., began work on producing the Draft EIS to be submitted for local review and community input. Discussion of the actual DEIS and eventual final EIS will be considered in the next section. When we assess our metrics of equity against the importance of NEPA, we know that without this law, considerations of equity on all fronts would not have had the same force that they do today. Equity in environmental and

economic impacts is an explicit interest for this report, and all of the work done for these impacts were driven by NEPA. We now know that a healthy and prosperous environment contributes positively to the economy and that poor environmental decisions can become a major setback in future economic development.

Equity Considerations of the EIS and Response to the Reports

The requirement of producing an Environmental Impact Statement before the approval of any permits or construction projects are completed was the cornerstone of NEPA. When the first plans were released in 1966, no formal considerations were required in order to make major decisions that would affect the long-term wellbeing of those in the surrounding communities. The first EIS was ordered for the Expressway after the passage of NEPA and was published to the public as a draft in 1977. The data used to make determinations in this EIS were based on planning estimates set for 1995 and called for an 8-lane depressed highway that would support river-to-river traffic, as well as interchanges with I-95, I-76, and the Benjamin Franklin Bridge. After this draft was published and made available to the public, the backlash was quick and widespread. The DEIS formalized the plans to remove and relocate the Holy Redeemer Church and School, and it overlooked many of the important community engagement tasks that were desired by community leaders. It also quickly became clear with newer long-range data plans that highway ridership trends would not show the uptick that was shown in the 1995 research. This would have many impacts in the next stage of planning for the construction of the Expressway.

In 1980, with community pressure growing, congestion still an issue on Vine and Race streets, and time running out before federal dollars would disappear, Philadelphia Mayor William Green convened the Vine Street Task Force. The goal of the task force was to grow community support and to clear the remaining hurdles that would impede the start of construction. Transportation planners and public officials look back on this time as an early example of a proper public engagement campaign that worked to keep residents well informed and part of the broader conversation. This work existed alongside PennDOT and the federal officials who were working through the final EIS to be published in 1983, with the goal of having the community in agreement with the project in order to expedite it once the report was released.

When the report came out in 1983, Mayor Green and other policymakers were optimistic that all of the procedural hurdles had been cleared, and that construction could begin. As it turned out, the report instead offered several alternatives that could be pursued in order to reach various outcomes, such as cost, community cohesion, timeline, and utilization of federal dollars. The planners, engineers, and advocates for the expressway wanted the full budget of $176 million to go towards the project, while some in other sectors of the region, including one of the mayor's cabinet members, pounced on the option of applying to the Federal Interstate Transfer Program for authorization to reduce the scope and cost of the expressway and instead shuttle the saved funds into SEPTA and other local infrastructure improvements. The ensuing deliberations over the cost and scope of the project not only affected how the roadway was constructed but also offered a look into the considerations that were being made at the time, and how we can understand equity at different stages.

Equity in mobility and accessibility has not played a large role in this case study up to this point, but that is not to say it is not vital to understanding the fuller picture at play. One of the key reflections on the highway system conceived in the mid-20th century is that these highways cut through minority neighborhoods but often did little to provide their benefits to those communities. Mobility itself describes the ability for a person or group of people to move about and access different areas for various reasons, whether it be for business, health, or pleasure. The scaled-down expressway alternative posed in the 1983 EIS, which is the alternative chosen and constructed as it is seen today, created local access roads that still allowed local traffic to flow through the neighborhood, and could easily connect persons to the expressway within a few blocks.

Equity Considerations for the Interstate Transfer Program

In the interview with Cecilia Yep, she made it known that whenever their group caught wind of money being a barrier to any improvement in the project, it drove them to work harder because that was seen as a means to avoid addressing real issues. When asked if they were aware of this specific provision, she was not able to recall this specifically, but noted that they were keen on anytime money was the limiting factor. In a conversation with another interview subject, in order to further understand the importance of this monetary incentive in reducing the cost of the expressway project, we inquired into whether this incentive actually played a role in the decision-making process at the city or state level. We learned in this conversation that there were competing forces vying for the mayor's attention and pressuring him to divert the money back into city projects or to build the expressway fully. In the end, we learned a surprising revelation that the mayor was able to call up the Secretary of Transportation in D.C. and consult with him about the strength of the transfer program. To learn more about this phone call, see the related box story (page 22).

One of our equity measures is equity in the allocation of project funds. This piece of legislation shows us a prime example of contention existing into 1983, and that much of the fight over this project was happening between governmental leaders and influential members of the business sector who stood to gain from a larger expressway. Because Chinatown was only one small neighborhood, it rested within a small group of policy makers' jurisdictions and left the rest of the decision-makers to fight for the money that was set to be put into the construction. Policymakers, engineers, and planners all jockeyed for influence over the mayor and the PennDOT Secretary. In a discussion with John Grady, former Executive Director of PIDC, he felt that the discussion and differing approaches to this fight were healthy and that business interests should be represented in the same fashion community groups are.

Defeated Alternatives: The Crosstown Expressway and the Imagined Freeway Network

A counterpoint to the eventual completion of the Vine Street Expressway was the proposed Crosstown Expressway and the wider planned network of freeways and interstates in the greater Philadelphia area. The Crosstown Expressway was to be a depressed freeway located along or near the current location of South Street at the southern border of Center City. At the time of the planning of this freeway, the neighborhoods along South Street east of Broad Street were home to a variety of diverse

communities, and the neighborhoods along South Street west of Broad Street were primarily African American. Planners and politicians desired the expressway not only as a method of "urban renewal" in these neighborhoods, but as well as a barrier that separated Center City from South Philadelphia.[2] The Crosstown Expressway, unlike the Vine Street Expressway, was eventually completely defeated and dropped from future plans for the freeway network. While immediately local community organizations banded together to oppose the Crosstown Expressway, they were bolstered by opposition to the freeway by residents of the Rittenhouse and Society Hill neighborhoods, which were primarily enclaves of affluent and white residents in Center City. Though the Expressway would not have run through these neighborhoods, the proximity of the highway and associated impacts of construction were close enough to them that the residents of these neighborhoods joined together with the residents of South Street to oppose construction. The opposition of these residents likely played a large part in why this highway was not constructed.

Figure 9 Demonstration Against Crosstown Expressway, Source: Temple University Library Digital Collection,1970.

The Crosstown Expressway remained on long-term plans for over a decade despite the opposition and caused the properties and streets around South Street to stagnate, as everyone thought eventually any buildings there would need to be demolished to accommodate construction of the expressway. Also, in 1972 Mayor Frank Rizzo proposed that the construction of the expressway should be accompanied by a massive, planned development called Southbridge. The Southbridge plans were once again met with furious opposition, and the expressway was officially removed from DVRPC plans in 1973 and from the plans of the Philadelphia City Planning Commission in 1974.[3] After the abandonment of the expressway, the areas around South Street began to quickly see the effects of urban redevelopment and gentrification due to the proximity to Center City. The defeat of the Crosstown Expressway stands in stark contrast to the eventual construction of the Vine Street Expressway and is an important piece of evidence that suggests how the opinions of certain groups of city residents carry more weight with politicians, bureaucrats, and city planners than others.

1.6 A Fateful Phone Call in 1983 ends with “Build It”

After the Environmental Impact Statement was released in early 1983, vocal advocates for the different alternatives sought to influence the final decision made by Mayor Green. Although the final authority rested with PennDOT, it was well understood that whatever Green supported was going to be the final decision. Green was receiving input on the transfer program and the various ways that these dollars could be spent to invigorate SEPTA projects or be used to fix city roads. He had also seen the plans for the scaled-down expressway or the modified arterial and understood the benefits of committing the full dollar amount to the project. Struggling to make a decision, and with all transfer requests due to the Department of Transportation in DC by October 1, 1983, he was running out of time to decide.

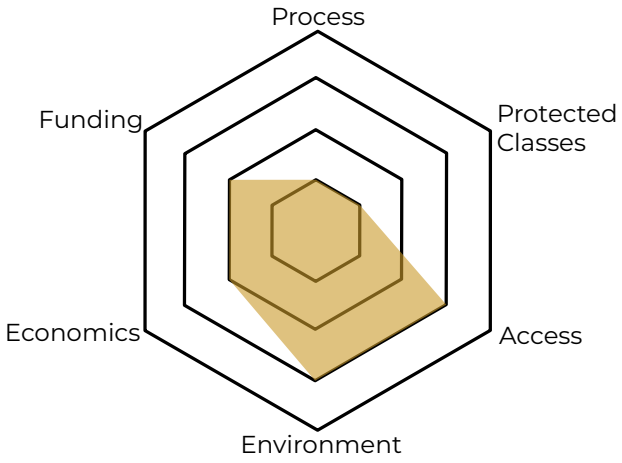
Drew Lewis, the US Secretary of Transportation at the time, was a Pennsylvania native, a Republican, and friend of Mayor Green, a Democrat. During a meeting with his staff and engineers on the project, Green suddenly decided

Figure 10 “Young Protestor”, Temple University Library Digital Colection,1973

to call Lewis and get his reaction to the situation. In a recounting of this phone call by one of the participants, Lewis told Green that DOT had received requests that more than doubled the amount of money that had been appropriated for this program, and that it was not prudent to assume that the City would see the amount of money it turned away from the Vine Street project come back in federal dollars for other City infrastructure projects. On the other hand, Lewis assured Green that if he went ahead with Vine Street as it was proposed, the project would get every dollar it has been promised and would get it on time. It became clear to Green that this transfer program would likely hinder the project further and would leave a stain on the process. Green decided right then that he would support the scaled-down expressway, and he announced it publicly at the intersection of Broad and Vine. At the end of the call, as one participant in the meeting remembers, the mayor hung up and said simply of Vine Street, "Build it."

Figure 11 "Vine Street 20th"Temple University Library Digital Collection

Summary Judgments on Equity Dimensions for the Vine Street Expressway



Conclusion

Thirty years past the opening of the Vine St Expressway, many will look back and say that it not only quelled traffic issues, or that it better connected the two major interstates in Philadelphia, but also that it saved Chinatown. By moving much of the roadway below-grade and keeping Holy Redeemer as a focal point for the community, Chinese immigrants and locals alike were able to move to the neighborhood and start families and businesses. According to Mary Yee, who has chronicled the Chinatown Story, through these struggles, organizations like PCDC were formed and the community learned how to advocate for itself and is better off for it today.[4] This sentiment comes both from within, with Yep acknowledging the importance

Equity Dimension	Score	Reasoning
Process	1	The community was only consulted after early plans were released, and the community had to produce its own resources in order to be heard.
Protected Classes	1	The marginalized community was most affected and was consulted, but their needs were not adequately met, and they did not drive the conversation or planning.
Access	3	The inclusion of a below-grade highway, a local access road, and pedestrian bridges meant that both the neighborhood and through-traffic had access via the Expressway.
Environment	3	The change from an at-grade arterial to the depressed highway benefitted noise and air pollution efforts, but the lack of a full cap did not prioritize the minority community.
Economics	2	Greater access for the region led to economic growth, and the survival of the Chinatown community allowed for economic growth, but the target sector was not the affected population.
Funding	2	The city and state effectively used federal funding to build the roadway but failed to bolster the project to meet the community needs fully and did not address their full concerns.

of centralizing the community, as well as from outside actors who seek to justify the actions the City took. These observations make the point that non-economic gains as well as loses arise from the infrastructure projects. Although there is truth to these claims they miss one of the key points of our discussion : An already marginalized community was forced to fight for its existence in order to ease a transportation burden on regional commuters and folks who regularly utilize the interstate system. Over and over in this case study, we have discussed equity through our key framework, and it returns us to the singular point that the effects of the Vine St Expressway do not show up in every economic indicator, but they do show up in the conversations with the residents of the Chinatown community. The Philadelphia region may never come to a consensus on this project, but it can come together to improve its faults and bolster the community that was negatively affected. We have seen very recent developments on this front with the proposal of the American Jobs Plan, and Secretary of Transportation Pete Buttigieg has voiced support for righting the wrongs that took place with the construction of the Vine Street Expressway and many other highways like it.

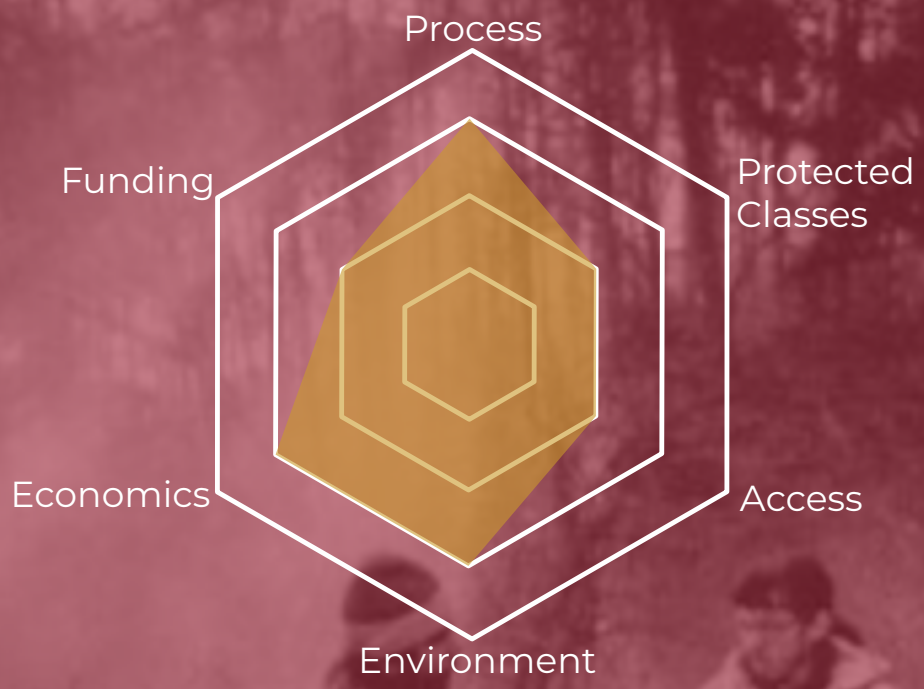
Policy Recommendations

One lesson rings out from this case study that we believe should be considered in future transportation projects:

Engage with communities before the first iteration of plans are completed and announced. True community engagement can only exist when the outreach begins before the first iteration of plans are completed and announced. Taking the proposed plans and trying to sell them to the community is unlikely to succeed in winning community support.

When the first plans for the Vine Street Expressway were unveiled to the community at the Free Library meeting in 1966, it was immediately viewed as threatening by the community. Suddenly, their neighborhood, their school, and their church were destined to be destroyed, and they had not known this was an option. This forced Chinatown to play defense, and Yep noted that they were always on their heels trying to catch up and react. Samuel H. Jones and Dr. Daniel Armanios argue that the location and placement of bridges, and by extension other forms of infrastructure, can have a greater impact on social equity than any of the mitigation factors that are inputted during the construction or restorative phases of the project.[5] This suggests that if PennDOT had approached the Chinese Benevolent Association in the early 1960s and discussed which areas of their community were most vital, and what factors could be altered or removed, that greater equity would have been achieved from the beginning.

There are further discussions to be had about the decision-making factors that went into Vine Street being the location for the cross-cutting through Philadelphia, rather than the proposed Crosstown Expressway or Girard Expressway, but this study does not go into great enough detail on those projects to make summary judgments or recommendations based on those historical narratives.



Equity Dimension	Score	Reasoning
Process	3	Communities were greatly involved in process, but those involved were mostly white and affluent. No targeted efforts were made to specifically include marginalized groups.
Protected Classes	2	Those who had political power and resources were ultimately protected. Marginalized groups were excluded by way of lack of public transit connections and decades of delays.
Access	2	Greater access was created for car owners along corridor and in region, but lack of public transit connections meant less access for marginalized groups and communities in Chester and Philadelphia to economic opportunities in region.
Environment	3	Years of studies and analyses were conducted during the EIS/4(f) process to consider and mitigate environmental impacts. Lack of public transit connections created future negative impacts.
Economics	3	Greater access for the region led to economic growth, especially in Montgomery and Delaware counties. Economic impact could have been greater had more attention been given to access for residents of Philadelphia and Chester.
Funding	2	Final project cost was significantly greater than initial projections and missed opportunities for funding public transit connections proposed in official government reports.

Figure 12 The Blue Route equity spider chart and table

The Blue Route (Interstate- 476) 2.1 Chapter Summary

Theme: Community input can shape transportation projects that directly impact them and decide the tradeoffs between benefits and burdens. Equity concerns lie in the lack of benefits conferred to marginalized communities.

The Blue Route provides some useful examples as to how community input can shape transportation projects that directly impact them and decide the tradeoffs between benefits and burdens that they are willing to accept, especially in terms of environmental impacts. Social equity concerns lie in the lack of benefits conferred to lower-income and marginalized communities, including those from Philadelphia and Chester, through the lack of a public transit system connected to the highway and the preference given to privileged residents along the corridor.

Equity Analysis Key Takeaways:

Communities were greatly involved in the process, but those involved were mostly white and affluent. No targeted efforts were made to specifically include marginalized groups.

Hundreds of public meetings were held, some of them in residents' homes, and communication was widespread through local media and newsletters throughout the EIS/4(f) and redesign processes. These communities possessed the wealth, resources, and political power needed to hire lawyers, educate themselves about relevant legislation, attend meetings, and lobby local politicians for their cause against the construction of the highway. Transportation agencies allowed these communities the space to become so involved in the planning and redesign process.

Those who had political power and resources were ultimately protected. Marginalized groups were excluded by way of lack of public transit connections and decades of delays.

The affluent and largely white communities that had the opportunities to delay the project did not need and/or desire the greater economic benefits and connections that were predicted to be brought about by the new highway. Those who needed greater access to jobs either did not possess the resources and power to be included in the planning and redesign process or could not utilize the highway once built because they did not own cars. Officials wanted to connect suburban residents with job opportunities in Philadelphia but did not place importance on nearby city residents seeking job opportunities in the suburbs.

Greater access for the region led to economic growth, especially in Montgomery and Delaware counties. Economic impact could have been greater had more attention been given to access for residents of Philadelphia and Chester.

Prioritization was given to the already-established economic and commercial centers in the suburban region in proximity to the Blue Route corridor. The highway was also viewed by officials as a means of providing a more efficient route to Philadelphia for suburban residents, thereby providing them with greater economic opportunities. The highway continues to have lasting impacts on economic growth surrounding the corridor and in the region but missed opportunities for public transit connection still exclude marginalized communities from some of this economic opportunity.

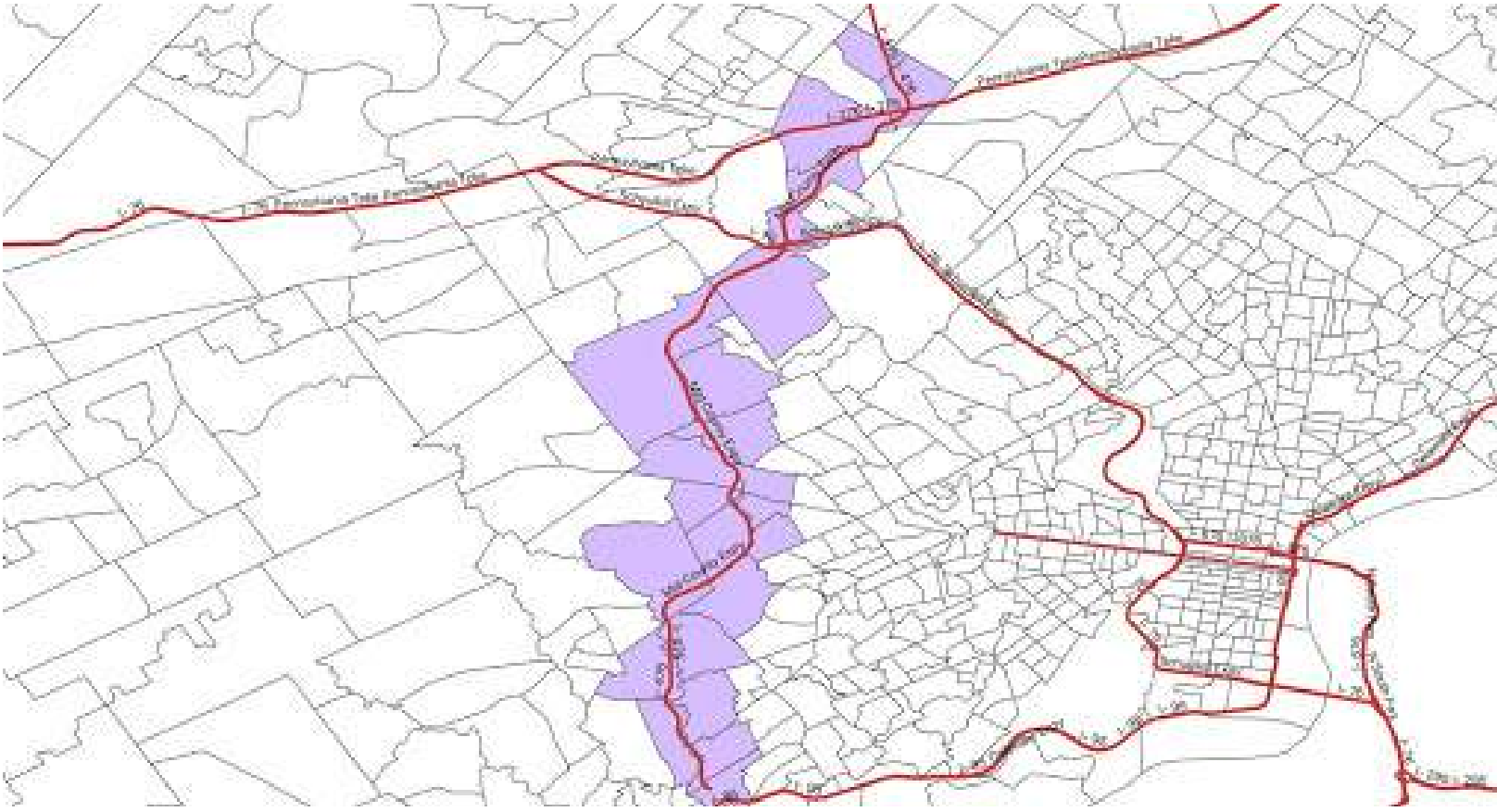


Figure 13 Map of The Blue Route relevant corridor

Impact (Problem) Statement

The story of the Blue Route provides an example of how even when an agency redesigns a project according to community input and seriously regards potential negative environmental impacts, two critical equity considerations, the agency can still play a role in perpetuating regional inequalities and ignoring the needs of historically marginalized communities.

Background on the Relevant Corridor

After 30 years of construction, the 21.5 mile-long Blue Route was completed in 1991 as one of the last interstate highways to be constructed in Pennsylvania. The highway was planned to create a more efficient north-south route in the area and to alleviate traffic conditions through Philadelphia's western suburbs, namely in Montgomery and Delaware counties. The facility connects I-95 in the City of Chester with the Pennsylvania Turnpike's Northeast Extension in Plymouth Meeting. Originally proposed in 1929, construction began in 1961 after funds were allocated from the National Interstate and Defense Highways Act. The Blue Route is unique from other suburban ring highways in that it was planned to go through an already densely populated, developed area, rather than development following the completion of the project. In order to avoid high levels of residential displacement in these suburban communities, the proposed route cut through streams and some of the small amount of natural space remaining in the area. Originally proposed as a $64 million project, the first 5.1 miles that were completed between the Schuylkill Expressway and I-95 by 1969 cost $72 million, with the final cost of the total project coming to $750 million.[6] It is also important to consider the demographics of the census tracts along the Blue Route corridor: in 1980 the area's residents were 95.4% white and fairly wealthy, with 85.3% of households living above 200% of the poverty level (the metric DVRPC's IPD tool identifies as above the threshold for low-income status).[7]

Construction of the Blue Route faced several setbacks, especially from 1973 to 1984, and became notoriously known for ongoing community protests and construction delays. Many of the delays and protests can be attributed to concerns about the environmental impact of the project. After the National Environmental Policy Act was passed in 1969,

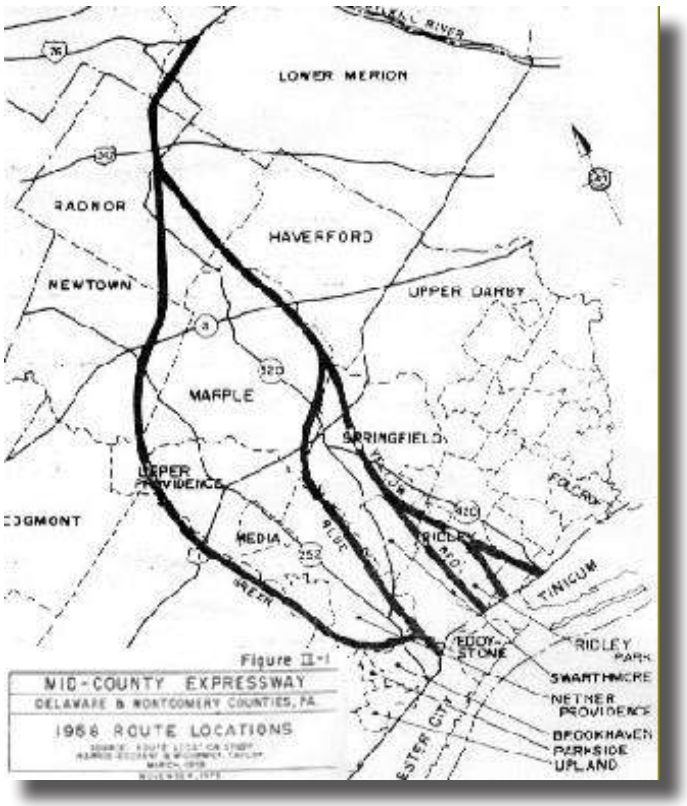


Figure 14 Mid-County Expressway inital planning map, found in Draft EIS and Section 4(f) Source: Map from Federal Highway Administration and Pennsylvania Department of Transportation

and according to Section 4(f) of the U.S. Department of Transportation Act of 1966, it was required that an Environmental Impact Statement (EIS) and 4(f) Statement [EIS/4(f)] must be published before construction could resume. This opened the door for the decade of delays that would ensue, as the well-resourced communities that opposed the construction of the highway utilized public meetings, lawsuits, and political influence to challenge each iteration of the EIS/4(f) that was created. Residents in communities along the Blue Route corridor were not only concerned about the negative impact on the natural spaces in the area, but also about air pollution and noise pollution for those residents who would be living adjacent to the new highway.[8]

In the long-term, once the Blue Route was completed in 1991, it became apparent that these communities would benefit from economic growth and increased job opportunities, with continuous rapid development taking place in some areas like King of Prussia or Conshohocken. Residents along the corridor eventually came to generally view the highway positively. Finally, it is important to note that while some supporters of the Blue Route hoped to see development and reinvestment into the industrial sector in the City of Chester as a result of increased connectivity provided by the highway, Chester today continues to struggle economically.[9]

2.4 Equity/Policy Analysis

Relevant Legislation

National Environmental Policy Act (1969)

Signed into law on Jan. 1, 1970, the National Environmental Policy Act (NEPA) tasked federal agencies with making real considerations to the environmental impacts of any proposed project. A full description of this legislation is discussed in the appendix to Volume II.

U.S. Department of Transportation Act of 1966 - Section 4(f)

Section 4(f) of the U.S. Department of Transportation Act of 1966 mandates that a transportation project requiring 4(f) lands will only be approved if no prudent and feasible alternative exists. A full explanation of this legislation is available in the Volume II appendix.

Environmental Impact Statements and Section 4(f) Statements

Although work on the Blue Route had already begun, construction was halted in 1973 and could not resume until the project underwent an environmental impact assessment and 4(f) assessment under the provisions of NEPA and Section 4(f) of the U.S. Department of Transportation Act of 1966. It is important to note that:

"An environmental impact/Section 4(f) statement should include information to demonstrate that all possible planning to minimize harm to 4(f) lands is or will be included in the highway proposal. Such information should include (1) a report on efforts to find a feasible and prudent alternative to taking of 4(f) lands and (2) a description of highway design features developed to enhance the Section 4(f) lands or lessen or eliminate adverse effects."[10]

The first Draft EIS/4(f) in 1976 reviewed eleven recreation areas and five historic properties that fell into Section 4(f) consideration. Additional review, investigation, and inventory were given to numerous parks, open-space areas, and historic sites which did not fall under Section 4(f) consideration. Impact on 4(f) sites was determined not just by a project's direct acquisition of land, but also the effects alternate highway alignments and the current highway alignment may have on these sites in regard to air quality, noise levels, water resources (where appropriate), visibility of the Expressway from the 4(f) sites, and access. The 1976 Draft EIS/4(f) also listed strategies that could be utilized to minimize negative impacts on streams, which were plentiful along the proposed highway route and were of great concern for local environmentalists, and noise pollution mitigation techniques, which were also of great concern for those residents living adjacent to the proposed highway route.[11]

The Draft EIS/4(f) was met with opposition from residents who were not satisfied with the mitigation strategies that it recommended. More public hearings were held to gather community input on the Draft EIS/4(f). Residents in Marple and Radnor Townships prompted their respective Boards of Commissioners to file a civil action in the U.S. District Court against the Draft EIS/4(f) after it was approved. In August 1982, Judge Van Artsdalen rejected many of the plaintiff's complaints but did require that PennDOT prepare a Supplemental EIS/4(f) to give the public a chance to formally comment on the proposed revised design of the route (which had not yet been circulated for public comment previously) and also required that a new 4(f) statement be prepared, as the first one was insufficient. After more public hearings were held in 1983, with more than 1,300 individuals, groups, and agencies submitting comments, the Final Supplemental EIS/4(f) was submitted to the FHWA in March 1984.[12] The proposed revised route in this report did not require the use of any 4(f) lands this time, something that had been a major sticking point for environmentalists and opponents to the route. After the elimination of 4(f) lands in the Final EIS/4(f), the highway's opponents focused more of their efforts on fighting the noise and air pollution they believed the highway would impact adjacent communities.[13]

Notable Reports

Two notable reports have greatly informed this case study. The first, "Report on Interstate 476," was created by the Transportation Advisory Committee, organized by U.S. Representative Robert W. Edgar, a Democrat who represented Delaware County, in March 1977. "Because of the uncertainty surrounding the completion of the Blue Route, and because the project [had] aroused considerable controversy in Delaware County," Representative Edgar organized the committee to provide a comprehensive analysis of the project. In a report submitted to the congressman, the committee recommended that Representative Edgar commit himself to the approval of the project given some design modifications. These modifications were intended to improve coordination of the freeway with existing transportation in the corridor, namely public transit, and reduce the original design's harmful impacts on the preserved natural spaces in the corridor. This report will hereafter be referred to as the "Transportation Advisory Committee Report."

The second report that has provided much insight for this case study is the "Overview of Departmental Recommendations on the Blue Route (Interstate 476)." This report, prepared by Boles, Smyth Associates, Inc. in association with the Delta Group, Inc. (both located in Philadelphia), was published by Pennsylvania Secretary of Transportation, Thomas D. Larson. The report was created by a task force in response to the Final EIS/4(f), the 1982 U.S. District Court order (referenced in the section above), and the FHWA's request for the secretary to re-evaluate the project in terms of the financial condition of the department to complete the project, the size and scale of the project, and the opportunities for the project to intersect with public transit lines. The secretary's task force evaluated dozens of corridors and alignment shifts for the expressway in an attempt to avoid public parklands and historic sites, ultimately deciding that there were no "feasible or prudent alternatives" to the route [as required by NEPA and Section 4(f)] and recommending a downscaled version of the project to greatly reduce impacts and land takings compared to the original design. This report summarized the findings of a task force created to study mitigation strategies for noise and other environmental impacts and potential interfacing of the highway with park-and-ride lots and other public transportation. In this report, the secretary noted his commitment to "make this highway a national showcase of design excellence where transportation and environmental goals work in concert rather than in conflict." The report ultimately determined that there were compelling reasons to finish the expressway in order to provide traffic relief to the area and link the region's high-growth suburban employment areas, while mitigating sprawl. This report will hereafter be referred to as the "Secretary of Transportation Report."

2.5 Equity Considerations

Equity Analysis - Environmental Impact

When examining the environmental aspect of the planning and implementation of the Blue Route through an equity lens, the major takeaway lies in the great deal of effort that was put into involving affected communities in the EIS/4(f) process and overall planning of the highway. Communities demanded, and were subsequently given, a seat in the process as the Blue Route became an

Figure 15 Protesters of Blue Route construction. Source: The Philadlephia Inquirer

increasingly contentious issue for many living in the communities along the proposed route's corridor. In addition, PennDOT worked to ensure that environmental concerns continued to be addressed after the project resumed construction following the Final EIS/4(f) approval, namely through the assignment of the country's first independent environmental consultant (from KCI Technologies, Inc., Baltimore) assigned to monitor a large-scale transportation project. The Blue Route corridor was different from most places in the country where suburban ring highways were built in that it was already densely populated and fairly well-developed before construction began, with a large portion of the population being middle- to upper-class. This is notable when considering the bargaining power and political power that these communities held over the course of the decades it took to complete this project. In addition, multiple interviewees noted that the project would never have been completed without the political determination of Congressman Edgar (the congressman representing most of Delaware County at the time) his lobbying of the federal government and FHWA to ensure that the federal funds allocated for the highway be provided, his prioritization of mitigating the project's negative environmental impacts, and his advocating on behalf of the communities' wants and needs. Edgar garnered expert opinion on whether the benefits of the route outweighed the burdens, especially those burdens perceived by communities who were opposed and so he put together the task force to create the report entitled "Overview of Departmental Recommendations on the Blue Route (Interstate 476" (referenced above). One interviewee noted that for the Blue Route and for other interstate highways built around the country, many of the final details and route locations were contingent on political pressure.[14]

The communities adjacent to the Blue Route undoubtedly had Edgar as a major political advocate, but they also had a significant population of people that possessed the time and resources that were needed to challenge certain aspects of the proposed project and contribute to the public meetings. One interviewee that was involved in holding some of the public meetings noted that the "people that attended the public meetings were very upset, very vocal, and very well-informed…they knew the [environmental] regulations better than PennDOT knew the regulations and could quote and challenge you on every piece and every corner, every decision that you made, in order to protect their interests." The townships of Marple, Radnor, Ashwood Manor, and Swarthmore, prompted by their respective boards of commissioners, took PennDOT to court in 1981 over the approved EIS/4(f) in an attempt to stop construction; a critical takeaway was that these townships had residents who had the means to hire lawyers to take the agency to court over the construction of the highway.[15] Numerous interviewees noted how incredibly well-organized the opposition was and that much of the opposition came from residents themselves, not necessarily their townships or elected officials. Furthermore, interviewees and research affirm the relationship between the wealth of many of these residents and the influence that they had during the planning and implementation process.

One of the key components of the Blue Route's story, and one of the things it is most widely known for, are the public meetings that were held in conjunction with the EIS/4(f) process

and the continued agency communication with the public throughout the duration of the project. Since residents were so vocal in their opposition and so active in the redesign process, communication with these residents was consequently made a high priority. Great effort was put into advertising public meetings through the local press and targeted notices were sent by mail to interested individuals and organizations. The agencies made time to educate residents about realistic expectations for reduced noise pollution levels and conferred with these residents about their preferences for noise pollution mitigation techniques, such as different designs of sound barrier walls. These meetings were often held in people's homes, demonstrating the intimacy of the relationship between the communities and the agencies during the process. The environmental consultant monitor assigned to ensuring that environmental considerations and measures were properly taken throughout the remainder of the construction process after the approved EIS/4(f) noted that "we found that the key to successful monitoring relies heavily on effective coordination, communication, and cooperation…a monitor must develop a well-considered procedure for addressing public concerns, identifying problems, and working toward a resolution of those problems."[16] The environmental monitor would publish a monthly newsletter with updates on construction. sent to about 6,000 people who were directly affected by the project. In addition, the environmental monitor noted the outstanding number of contacts that occurred *after* the EIS/4(f) process: 4,000 contacts with individual citizens, organizations, and environmental groups to review design plans, reports, and final construction drawings, as well as to address complaints (including 190 community meetings and more than 100 presentations to civic associations, community organizations, and environmental groups).[17] Finally, the Secretary of Transportation Report was made available to the public, which according to one interviewee involved in creating the report, was not something that was typically done at the time.

Equity Analysis - Economic Impact

While the environmental aspect of the Blue Route is defined by stark opponents to the construction of the facility, the economic aspect of the project is more defined by its proponents. Many of those in favor of the Blue Route, though their voices were often drowned out by the project's opposition, saw the highway as an opportunity to create job growth in the region and connect those living along the corridor to already existing commercial and economic centers in the region and to jobs in Philadelphia. At times the exact projected economic impact of the Blue Route was disputed; for example, the role it would play in boosting Chester's industrial sector or the true number of jobs that it would create (a more detailed history and policy analysis of the highway's relationship to Chester follows in the section below). In addition, while some experts involved in the planning process acknowledged the positive role the highway would have in creating economic growth by connecting already existing commercial and employment centers along the corridor, since the highway was being planned in an already-developed area, they disputed the generous projections (i.e. 10,000 new jobs created) that some proponents touted.[18] The Transportation Advisory Committee Report and Draft EIS/4(f) both noted that although the employment benefits would be very long-term, they would probably be minor in scale. Despite the lack of agreement on the specific economic projections

and the uncertainty surrounding the scale of the economic impact the highway would have, reports from experts involved in the project and the EIS/4(f) process concurred that successful completion of the Blue Route would mitigate sprawl, connect the high-growth suburban employment areas that already existed along the corridor, and that property values would increase.

This case study requires an examination of how much the aforementioned projections prove to be true today. Every person interviewed for this case study agreed that the region's economy would not be as strong as it is today without the Blue Route. Journalist reports indicate that many residents share that view.[19] As one interviewee put it, "I don't know how we would live without the Blue Route now that it is there." There is also consensus among the interviewees that the economic boom in places like King of Prussia and Conshohocken can be directly attributed to the completion of the Blue Route. The highway no doubt had a positive impact on connecting the corridor's residents with economic opportunities that already existed in the region, provided a more efficient route to employment opportunities in Philadelphia, and also provided the framework for creating new economic centers. One example of this is evident in the rapid growth that has taken place and continues to take place in Conshohocken and West Conshohocken, situated in the critical location of the intersection of I-76 (Schuylkill Expressway) and the Blue Route. In 1987, after construction of the Blue Route resumed, Conshohocken and West Conshohocken were designated as Enterprise Zones.[20] Since then, the area has come to have "a gleaming skyline with office towers, hotels, and hundreds of upscale apartments." As one Montgomery County leader recounts in the Philadelphia Inquirer article, "20 years later, they love their Blue Route,"; once the construction on the Blue Route resumed, land in Conshohocken went from "$20,000 an acre to $750,000 an acre overnight."[21] Finally, in examining the data that indicates the economic impact of the highway, it is notable that the average family incomes levels of the census tracts along the corridor

Figure 16 Ariel view of The Blue Route in Conshohocken. Source: Scott M. Kotzel, Pennways.com, 1978

steadily increased from 1970 to 2000, with levels peaking in 2000 (nine years after the Blue Route was completed).[22] While average family income levels increased throughout the planning process and after construction was completed, percentages of households in the census tracts along the corridor at 200% below and above the poverty level did not significantly change from 1980 to 2010 (one percentage point each).[23]

Equity Analysis - Accessibility and Public Transportation Integration

From the beginning, the role of public transportation in the Blue Route was either overlooked or intentionally disregarded. While designed from the start as a suburban highway that would connect southern Delaware County with the northern section and Montgomery County in an area where car ownership was mostly ubiquitous, the lack of transit integration is both a missed opportunity to reduce carbon emissions and pollution and to serve residents of the Philadelphia area who either cannot drive or lack access to a personal vehicle. The Blue Route was part of the trend in regional planning that prioritized additional freeway construction and downplayed the role of public transportation not just nationally, but especially in the Philadelphia region. The planned 1985 Adopted Transit Network plan by DVRPC contained routes that would be constructed in the future such as the Blue Route and the Vine Street Expressway, but also contained several other highway and freeway plans that never got off the ground. It ignored transit extensions that did end up being constructed. In the Transportation Advisory Committee Report, it was stated that "DVRPC's 1985 Transportation Plan favored construction of an extensive freeway network (most of which will not be built) and a rather limited transit network that excluded projects that are now taken seriously."[24] This focus on highway and freeway construction over transit would have many consequences for the outcomes caused by the construction of the Blue Route.

The Blue Route is unique in that it intersects with three commuter rail lines: SEPTA's Manayunk/Norristown Line, Paoli/Thorndale Line, and the Media/Elwyn Line. It terminates near Chester very close to SEPTA's Wilmington line. The highway also crosses the Norristown High-Speed Speed Line, a rapid transit line that runs between Upper Darby just outside of Philadelphia to Norristown in Montgomery County. Yet, the Blue Route contains no provisions or infrastructure related to these rail lines. While SEPTA expressed interest in using the highway to construct park-and-rides at stations near the intersections and facilitate bus service, plans for the highway did not change to accommodate interchanges for the proposed park-and-rides at rail facilities. DVRPC has conducted multiple planning studies for these services since the construction of the Blue Route, but none have yet come to fruition. Planning for the Blue Route also never seriously entertained plans for new associated transit facilities or bus lines or prioritization in the project. Interstate median placement of rail lines has become much more common across the country, especially in low-density and suburban contexts due to the already available right-of-way, but possible rail transit lines were not considered in addition to the Blue Route. According to the report of the Transportation Advisory Committee for Congressman Edgar, the only public transit study that was done on the Blue Route was to determine whether a "Lindenwold-type" (PATCO Speedline) rapid transit line could be used as an *alternative* to the construction of the Blue Route, rather than as a complement to it.[25] This study was sure to fail and meant that construction of the Blue Route would continue without consideration to public transit.

The reason why this lack of public transit integration on a suburban freeway becomes important is due to where job growth in the Philadelphia region was centered in the decades before and after the construction of the Blue Route and the lack of access for low-income residents in certain areas to these jobs that were located in the suburbs. The Blue Route's acceleration of job growth in areas such as Conshohocken, King of Prussia, and Plymouth Meeting and the lack of public transit options for reaching these well-paying jobs, put them out of reach for many. In Philadelphia and Chester today, an estimated 30% of households lack access to a personal vehicle.[26] The growth of jobs in these outlying suburban areas means many are only accessible on long bus rides on the Schuylkill Expressway, if they are even accessible by transit at all. The EIS for the King of Prussia Rail Extension project notes that for SEPTA bus routes serving the King of Prussia area that use the Schuylkill Expressway (I-76) to reach King of Prussia from Center City Philadelphia, "travel speed survey data show low average vehicle speeds of 20 miles per hour eastbound during the morning peak period and 17 miles per hour westbound during the evening peak period. Slow travel speeds result in five of the six bus routes having on-time performance rates ranging from 60% to 78%, which are below SEPTA's standard of 80%."[27] These trips are already fairly lengthy just due to the distance covered by the entire route to reach these outer suburban regions, and the lack of reliability and timeliness for these routes only accentuates the problem. Accelerating growth in these suburban job centers with poor public transit accessibility puts these jobs out of reach or places a high commuting burden on individuals with vehicles to reach these jobs. Pat Killian, a former county official, said that because of the lack of public transit infrastructure after the completion of the Blue Route, for a time the county paid for a shuttle bus service for the county's public nursing home that took employees from Chester to the nursing home's location in Media. This example of how the failure to integrate public transit into the Blue Route and into suburban areas in general places undue burdens on low-income and minority populations in regard to accessibility and affordability of jobs and opportunities.

A lack of consideration for transit should also be considered in the context of climate change, and how the Blue Route made driving in a personal vehicle even easier over encouraging transit usage. The Blue Route now is regularly choked with traffic, and the downsizing of the highway during the negotiations with community groups has now led to a situation where it has potentially not enough capacity to handle demanded traffic, though there are many questions around how much of an effect the number of lanes really has on traffic (see our box story on Swarthmore College below for additional information). Additional transit infrastructure could take many of these vehicles off the road during these peak hour commutes, leading to both better flow of traffic and better air quality for the communities adjacent to the Blue Route as well as an overall decrease in carbon emissions.

Equity Analysis - City of Chester

Though much of the story of the Blue Route concerns the power and resources of the affluent suburban communities along the route, those communities were not the only ones affected by the construction and delay of the Blue Route. Delaware County is home to a diverse variety of cities, townships, and communities. One of the most important communities to focus on the effects on (or lack thereof) of the Blue Route is the city of Chester.

Chester is located on the Delaware River waterfront in the southern section of the county around 5 miles away from Philadelphia city limits. Today, Chester is home to around 34,000 residents, almost 70% of whom are Black. 56.9% of the city is below 200% of the poverty level.[28] Chester is important due to its status as a poor and disinvested city located near the wealthy suburbs of Delaware County, and how it played into the history of the Blue Route. A main impetus for the original plans on the Mid-County Expressway, which would evolve into the Blue Route, was to better connect Chester to the Pennsylvania Turnpike and to improve trucking access to the city's industrial waterfront sector.[29] In the early to mid-20th century, Chester was an industrial boomtown, attracting migrants from across the country to work in its shipbuilding and automobile factories, including African Americans from the South.

The first wave of suburbanization impacted Chester in the 1920s and 1930s, but the city remained a center for industrial work due to the shipbuilding efforts during World War II. Chester was devastated by the forces of post-war suburbanization and deindustrialization. The city declined in population by over 20,000 in the decades following the war, as most of the industry that had supported the city moved operations or closed down, and white residents, boosted by unequal government benefits and access to mortgages that were unavailable for Black residents of the city, left for neighboring suburbs and the increasing number of white-collar jobs that they contained. It was in thiscontext that the Mid-County Expressway was proposed to help Chester's industrial sector before it completely collapsed. Instead, the expressway was delayed for decades and Chester was impacted by a different transportation project: the construction of I-95.

I-95 is the primary north-south highway on the East Coast of the United States, running from Miami, Florida to the Canadian border in Maine. The highway is also a critical link in the Northeast Megalopolis, linking Washington DC, Baltimore, Philadelphia, New York City, New Haven, Providence, and Boston. I-95 was built directly through Chester, cutting the city in half. I-95 was built in a way that cuts off the southern part of the city on the riverfront that is primarily Black and has a significant number of individuals living in poverty, from the northeast section of the city that is home to Widener University and the west section that is whiter and more affluent, as well as from the surrounding suburban areas. In addition to cutting the city in half and displacing the people who were living where the interstate was built, I-95 was built in such a way that it only served to expedite the travels of suburban commuters and travelers between the major cities of the Northeast, not residents of Chester. According to former Delaware County Commerce Director Pat Killian, the way I-95 was built does not serve either residents or industries in Chester. It did not facilitate any access to the waterfront or industrial areas due to the placement of interchanges and on and off-ramps. Killian describes the impact on Chester from the construction of that highway as incredibly negative and has potentially blunted the potential positive impacts on Chester that could result from the Blue Route.

The effects on Chester from the result of the Blue Route have been mixed. The delays in the construction of the route hastened the departure of industry from the city. Pat Killian stated that while the departure of industry from Chester would have happened eventually, easier access for trucking from the Blue Route would likely have slowed down the departure

of jobs from the city. The delay also contributed to the hampering of reinvestment and redevelopment efforts, as private capital was less willing to risk lending to new developments or companies there due to what was seen as an extremely difficult to access area, among the other hurdles to development in Chester. The completion of the highway has brought some benefits to Chester, however. Former President of the Philadelphia Industrial Development Corporation Bill Hankowsky said that without the Blue Route, redevelopment projects such as the soccer stadium for the Philadelphia Union Major League Soccer team and the assorted developments near the stadium almost certainly would not have happened in Chester. It is an open question as to whether these amenities are necessarily beneficial to residents of Chester.

While questions of accessibility and the lack of transit integration with the Blue Route are featured in our report, Hankowsky says that jobs located in suburban edge cities like King of Prussia or Cherry Hill are still much more accessible to someone living in Philadelphia or Chester than jobs that are located in different metropolitan areas. In his view, the success of the Blue Route in generating economic growth in the Philadelphia region has had some benefits for residents of Chester, even if the challenges of making those jobs more accessible remains a problem that should be addressed. Pat Killian believes that the Blue Route has helped Chester, but that the problems that Chester faces were never going to be magically solved by a new highway. The lack of public transit integration and investment with the Blue Route have had a disproportionate effect on Chester as well, as 30% of households in the city do not own a personal vehicle, and existing SEPTA bus routes from Chester are not adequate for moving residents of the city to these job centers along the Blue Route. The new redevelopment projects in Chester have been greatly aided by the Blue Route, but Chester may still be suffering from effects that the original delays in the project partially caused by community opposition.

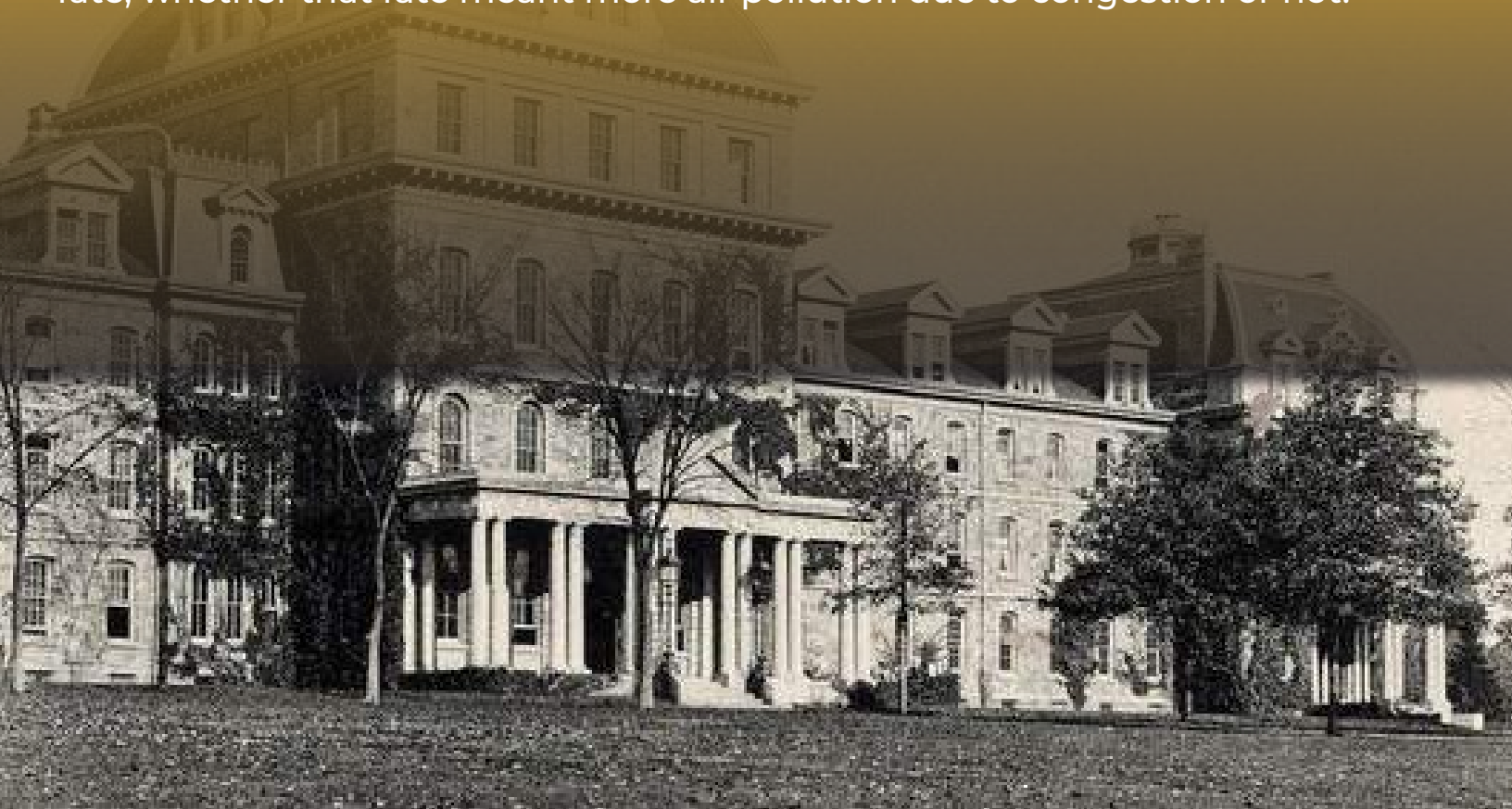
Figure 17 A deserted street in downtown Chester. Source: World Socialist Website, 2010

2.6 BOX STORY: Did a Small College with a Big Stick Stick Itself ?

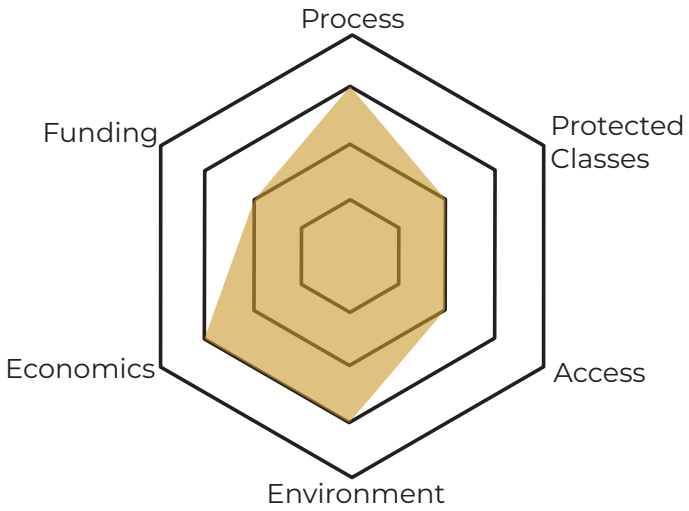
Swarthmore College also had a major role in shaping the project from its beginning and was one of the biggest opponents due to concerns that it would negatively affect the natural spaces of the campus and create too much nearby noise and air pollution. As one interviewee put it, the college had so much clout during the project process that when the prestigious board members wanted to delay construction or voice their concerns, “they didn’t call PennDOT or the governor of Pennsylvania, they called the President [of the United States].” Swarthmore College also took the FHWA to court multiple times throughout the project construction. After the Draft EIS/4(f), when all federal approvals were successfully obtained for the project, one of the requirements before construction could officially begin was that Edgar’s task force include the college’s officials in the revised planning process in order to minimize negative impacts on the institution.

Figure 18 Historical picture of Swarthmore College.
Source:Swarthmore President Website

Once the Final EIS/4(f) was made official in 1983, the Pennsylvania Secretary of Transportation got a call from the college to meet with its board of directors. After that meeting, the secretary, according to one interviewee, was apparently directed by the board to “build it.” Former Delaware County Commerce Director, Pat Killian’s opinion is that Swarthmore ironically worked hard to advocate for fewer lanes on the highway because of traffic pollution concerns, but today, the area of the Blue Route that runs by the college is one of the most congested areas, with cars being stuck in traffic standstill and idling near the college at least once a day during rush hour. This claim that less lanes means more congestion, according to Anthony Downs (author of “Still Stuck in Traffic: Dealing with Peak-Hour Traffic Congestion”), may not necessarily be true, but it also is not completely false. Downs writes that in general, building more road capacity usually means beneficial impacts on existing congestion, but in the long run it also has the potential to increase demand and therefore negate some of those initial benefits. Regardless of whether Killian’s claim is true, what is most important is that Swarthmore had the power to influence own fate, whether that fate meant more air pollution due to congestion or not.



2.7 Summary Judgments on Equity Dimensions for The Blue Route (I-476)



Equity Dimension	Score	Reasoning
Process	3	Communities were greatly involved in process, but those involved were mostly white and affluent. No targeted efforts were made to specifically include marginalized groups.
Protecte Classes	2	Those who had political power and resources were ultimately protected. Marginalized groups were excluded by way of lack of public transit connections and decades of delays.
Access	2	Greater access was created for car owners along corridor and in region, but lack of public transit connections meant less access for marginalized groups and communities in Chester and Philadelphia to economic opportunities in region.
Environment	3	Years of studies and analyses were conducted during the EIS/4(f) process to consider and mitigate environmental impacts. Lack of public transit connections created future negative impacts.
Economics	3	Greater access for the region led to economic growth, especially in Montgomery and Delaware counties. Economic impact could have been greater had more attention been given to access for residents of Philadelphia and Chester.

Figure 19 The Blue Route equity spider chart and table

2.8 Conclusions

The core equity problems surrounding the planning and construction of the Blue Route are not a lack of consideration regarding environmental degradation and destruction, or an absence of community involvement and input throughout the planning and construction process. In fact, the story of the Blue Route demonstrates the kind of influence that communities can have on major transportation projects in ensuring that nature conservation, historic preservation, and an effort to minimize negative environmental impacts continuously considered throughout the planning and construction process. The problem, when considering social equity, lies in the lack of benefits conferred to lower-income communities, including those from Philadelphia and Chester, through the lack of a public transit system connected to the highway, the prioritization of communication with community members who had the who had the wealth and resources to influence the highway design, and the delays in building the southern portion of the highway that connected the suburbs to I-95 in Chester.

One of the biggest takeaways from this case study analysis is that job creation and access resulting from the completion of the Blue Route was focused on car owners, excluding those low-income populations in the region that are less likely to own cars and more likely to rely on public transit for job opportunities. While the regional growth argument stated in the section above is a compelling one, in the end, encouraging job growth in the suburbs, where for decades minority communities were functionally barred from residing and now today are often inaccessible due to distance and lack of transportation options, is an equity issue. Furthermore, when the Blue Route was being planned and reevaluated during the EIS/4(f) Statement process, much of the focus on the economic benefits of the highway was in regard to increasing access for those living along the corridor to the already-established economic and commercial centers in the region and providing residents in Delaware and Montgomery counties with more direct access to Philadelphia.

2.9 Policy Recommendations

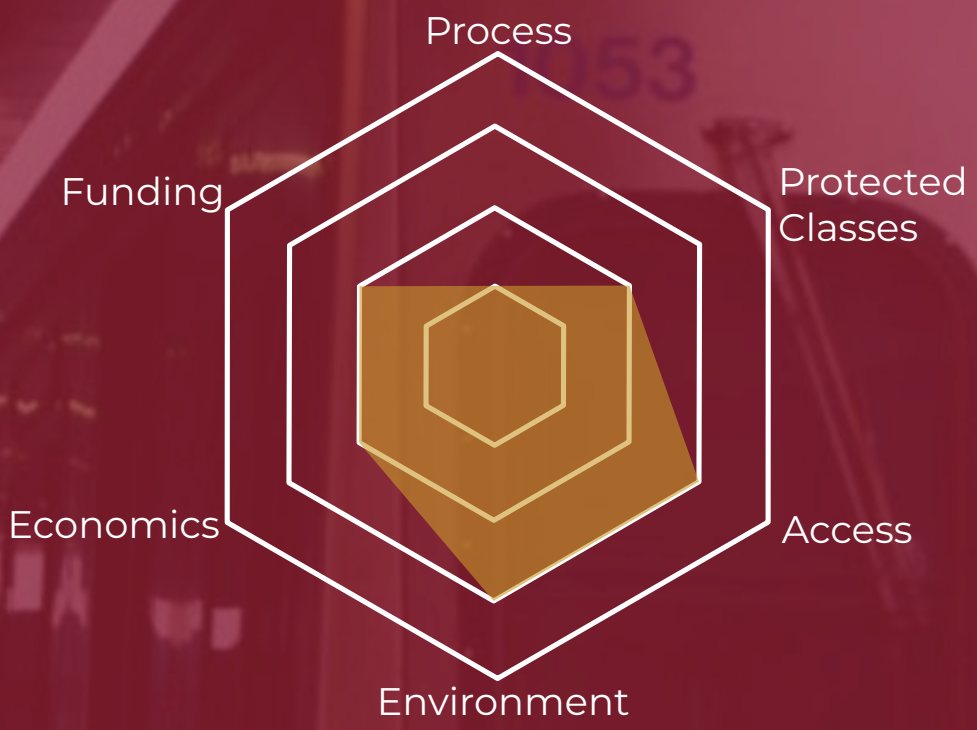
The story of the Blue Route provides some useful examples as to how community input can shape transportation projects that directly impact them and decide the tradeoffs between benefits and burdens that they are willing to accept. While it is usually seen as a positive that community voices were heard and incorporated into the planning and implementation process, policymakers and transportation agencies must also consider the demographics of these communities who have the bargaining power and resources to shape these projects. In the case of the Blue Route, we must ask, whose voices were not heard during the planning and implementation process? What about the residents in the corridor who needed a more interconnected region for greater job opportunities because their current job opportunities were not sufficient to provide for themselves and their families? What about the non-car owners in the corridor who could have benefited from the public transit connections that were proposed along the highway but never were built because they were not given importance and were overshadowed by the attention given to the residents concerned about the level of noise pollution the highway would create for them? One can reasonably assume that those who were responsible for delaying the highway's construction for over a decade were also those who did not need better job opportunities and access to those job opportunities through public transit. These questions, and the conclusions of this analysis inform the following policy recommendations:

Bridge the gap between communities affected by a proposed transportation project who do not have the wealth, resources, or political advocates like the communities along the Blue Route corridor.

Agencies should consider working with other agencies/organizations that have the expertise and/or capacity to assist in this process.

Develop concrete policies that will ensure social equity is considered during the planning and implementation process, and for projects that have already been completed, consider measures that can begin to address social inequalities in relation to the project.

Many interviewees noted that equity considerations "did not exist" (although a better way to consider this is that equity considerations were not mainstream) at the time of the Blue Route's construction. One interviewee noted that "regulations are geared toward issues of the day, good or bad, no matter how perfect or imperfect they are." Without policies that provide regulations that are geared toward the issues of the day (i.e., social equity), it cannot be guaranteed that equity will play an important role in future transportation projects. If a project is completed, agencies can still take equity into consideration. For example, Downs recommends tolling or congestion pricing to reduce congestion rather than lane expansion, which with federal permission, could also be a way to fund the transit that should have been built along the Blue Route in the first place.



Equity Dimension	Score	Reasoning
Process	1	There was constant communication with local stakeholders but not at the decision-making level or during the project agenda setting phases.
Protected Classes	2	The focus on end goals had disproportionately negative impacts on BIPOC and business owners in low-income neighborhoods during the early and interim stages of the project
Access	3	SEPTA was able to keep the MFL running— which is one of Philadelphia's most heavily used transit lines and serves large populations of low-income and minority communities in West Philadelphia. Conversely, access to businesses was greatly affected by construction which was cited as the root for loss of business.
Environment	3	The investment in public transit systems is shown to be a more efficient and cleaner way of transporting people compared to private vehicles. The MFL reconstruction supports more active transit infrastructure like wider sidewalks and bike lanes. Still, during early and interim stages of construction residents and business owners complained about litter and public urination around the construction sites. There are also reports of lasting blight.
Economics	2	While the reconstruction did bring new development (especially around the refurbished stations) there were still many negative impacts on businesses during the project process. Also, those benefits are not often accessed by people within the project/construction area.

Figure 20 Market Street equity spider chart and table

Market-Frankford Elevated Line Reconstruction

3.1 Chapter Summary

Theme: Single service agencies may not possess the resources or political capacity to address socio-economic issues that are not with the specified scope of their project. Despite positive impacts of public transit projects, less resilient communities struggle to cope with disruption to everyday operations.

The Market Frankford West Reconstruction (MFWR) was an integral part of bolstering revitalization along Market Street West. The project encouraged new development projects along the corridor and modernized one of Philadelphia's most heavily used transit systems. Philadelphia's dedication to the MFL illustrates ongoing interests in sustainable transit in Philadelphia. Public transit can move more people more efficiently when compared to private transit. The capacity to support more individuals at one time addresses issues like urban congestion at peak hours, emissions from privately owned vehicles, and resources invested in parking infrastructure. These environmental effects are felt more severely in low-income and minority communities who live within the metropolitan and inner-city communities where highways were built. Research illustrates the disproportionate negative impacts on low-income and minority communities when transportation agencies optimize urban space to support private vehicle transit. Conversely, investing in public transit projects also encourages the incorporation of other pedestrian and alternative transit infrastructure (such as the multiple bus stops and bike lanes as seen on 46th and Market). While the plan went over time and over budget the outcomes brought a new sense of stability to the corridor.

Equity Analysis Key Takeaways:

Early and interim stages show the weaknesses of single-purpose public agencies in addressing complex socio-economic issues. Both literature and transit authorities agree that transit agencies may not possess the full capacity to mitigate the impacts of construction for residents and businesses. As a result, early and interim stages force businesses to change their operational practice in an effort to maintain consistent revenue intake.

Public agencies should consider the impact of proposals on demographic groups that have faced historical disadvantages in transportation, for example:

Are the effects on access to opportunities and mobility proportionately beneficial across socioeconomic backgrounds?

Are impacts to the natural and built environment and human health mitigated?

Are the impacts on cost-of-living, poverty, income, wealth, and markets mutually beneficial across diverse populations, and whether and how funding was obtained and allocated consider historically disenfranchised people?

Businesses in these situations often have many options to pivot in dynamic economic circumstances, but many businesses in Market West did not have that flexibility.

While Market West is one case, our findings corroborate this trend of difficulty making business transitions is present in many minority-owned businesses and businesses in low-income neighborhoods who face systemic barriers as well as lack the formal financial tools (like bank accounts or revenue loss

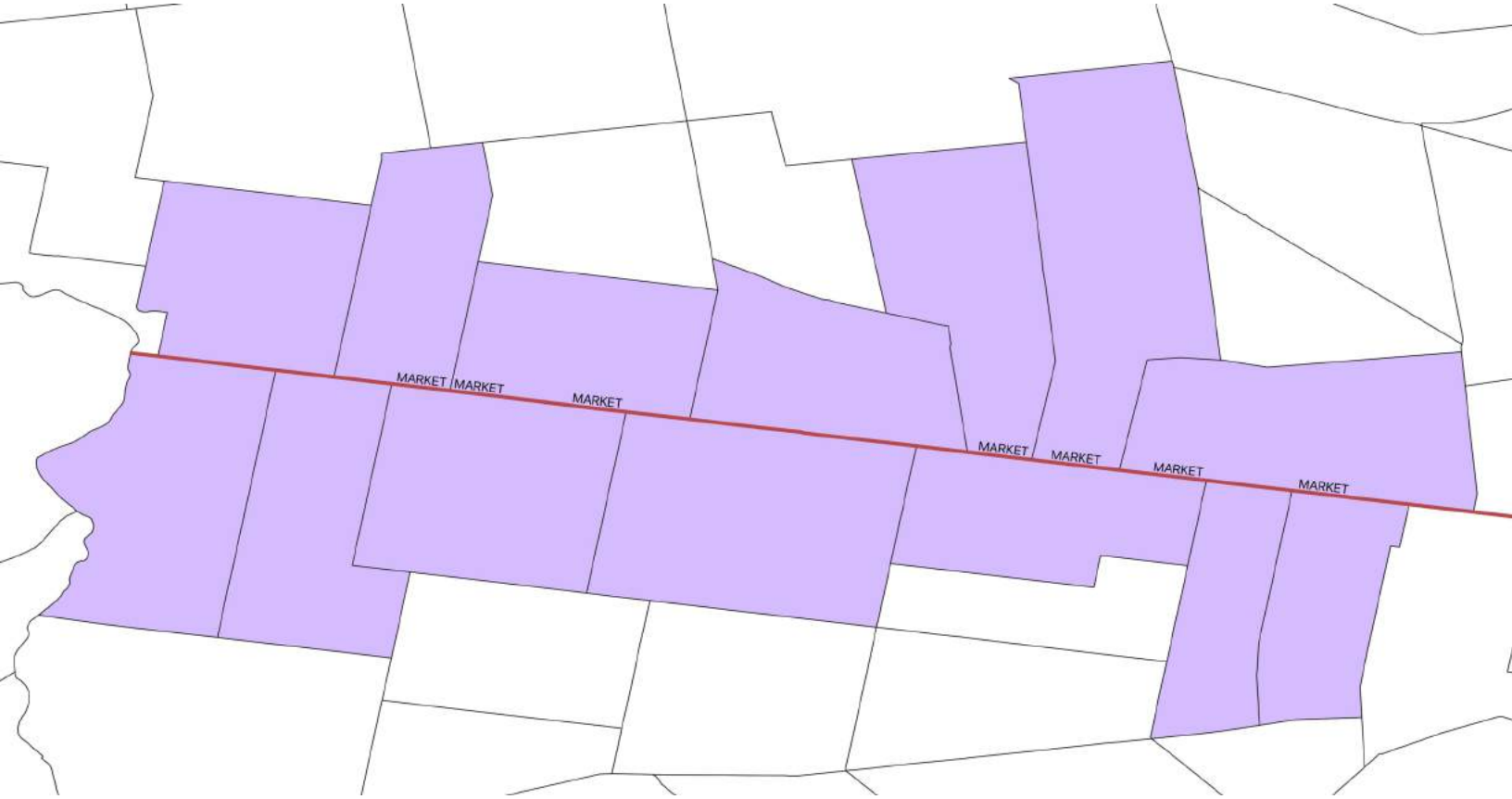


Figure 21 Map of Market Street relevant corridor

3.2 Impact (Problem) Statement

During the early stages of the Market Frank West Reconstruction (MFWR) business owners cited construction as a direct cause of revenue losses, layoffs, and business closure. Heavy construction along the corridor obstructed pedestrian and vehicle thoroughfare which cut revenues for some businesses in the area by 50%. There were many efforts to equip business owners with the resources to cope with construction impositions, but business owners and city officials experienced ongoing misconceptions on the effectiveness of outreach and consultation efforts.[30] Despite SEPTA's and governmental attempts to provide financial support, Black Indigenous & People of Color (BIPOC), as well as businesses in low-income areas, often lack the resources to seize the full range of opportunities. Many agree that the area is better because of the development the project encouraged but also agree that planning and transportation agencies could have more thoroughly considered systemic challenges that may perpetuate inequities in accessing the benefits of new development.

3.3 Background on the Relevant Corridor

The Market-Frankford Line (MFL) is a Southeastern Pennsylvania Transportation Authority (SEPTA) rapid transit line operating between 69th Street Transportation Center in Upper Darby (Delaware County, PA), Central Philadelphia, and the Frankford Transportation Center (Northeast Philadelphia). The line runs as a subway in Center City but as an elevated rail on the east and west sides of the line. The line opened in 1907, including the elevated section in West Philadelphia. In 2000 SEPTA obtained $567 million in federal, state, and local grants to reconstruct the elevated sections between 44th street and 69th street. The initial predicted time of completion was 2006. The west MFL reconstruction project required new foundations and utility infrastructure to be built before structural corrections could begin, thus the early stages of the project were not complete until 2004. SEPTA was able to run shuttle buses and only closed one station at a time to minimize ridership impacts. Although ridership was minimally affected business owners and residents experienced different challenges.

City leaders sat in over 80 town hall meetings listening to residents and business owners discussing the noticeable lack of bathroom and trash facilities for construction personnel. There were reports of increased litter and public urination. At first, complaints stemmed from the degradation of conditions around construction areas but as the plan went over schedule the construction had more permanent effects on the area. Additionally, many of the construction workers hired by contractors for the project resided in other states or counties which exacerbated the frustration of local officials trying to bring more jobs to the city.[31] The obstruction to foot traffic caused businesses to slow severly. SEPTA implemented several technical support and outreach services to aid businesses, but some businesses were unable to recoup from revenue losses that transpired early in the project.[32] This also meant that many workers in the area had to be laid off and many businesses closed or relocated. By the end of the project the number of layoff and business closures was incalculable.

In 2005 State Reps. Tommy Blackwell, Ronald Waters, and Alan Butkovitz sponsored a $5 million rescue bill to aid affected businesses. By 2006 the impact became more morose. More than two dozen business closures were reported, barricades between 46th and 63rd street obstructed pedestrians and vehicle transit, one protest led to a day of construction shutdown, and there were two other 16-day shutdowns. Business relief funds were never seen by some businesses, to which SEPTA responded they were neither allowed nor obligated to provide financial services.

When the project was finished, SEPTA Market Street was completely repaved with the addition of bicycle lanes on the streets and the single beam structures with a larger aperture for natural light to hit the street. The construction on the six transit stations inspired a new era of development along the entire Market West area. Although the project created many difficulties for businesses in the early and interim stages, many believe that the outcomes of the project had an overall positive impact on the area as a whole. Despite final outcomes, businesses between 46th-63rd streets experienced rates of shutdown, layoffs, and property degradation that they attributed directly to construction impacts.[33] Although SEPTA provided services for business, they proved largely ineffective or not sufficient enough to supplement the effects of lost revenues or were just too late. The issue did garner political support but funds to aid businesses became tied up in bureaucratic "pipelines" or went missing. While the development brought revitalization to the location post-project, there was not sufficient planning to mitigate early or interim impositions. There is consensus among experts and literature that transportation agencies

Figure 22 Market-Frakford Elevated. Source: Billy Penn Newspaper

often lack resources, diverse perspectives, or inclusive practices to address the systemic challenges faced by low-income and racial minority communities. Additionally, people who live and own businesses in low-income neighborhoods struggle more with meeting their daily needs, obtaining financial support, and have less political bargaining power. Therefore, the difficulties faced by those communities are exacerbated when government and transit agencies preemptively address their burdens in transportation projects.

Due to the stagnation of revenue streams business owners were unable to afford rent on their business properties, forced to make major employment cuts, and relocate or close down. Site degradation and obstruction of foot traffic caused businesses to lose revenue, but retention of clientele was reported after construction. Furthermore, reconstruction of the MFL was expected to bring increased ridership. Within the context of this reconstruction project, we have identified two vital areas that will improve practice for planning agencies to engage in more holistic and equitable planning projects: Alignment of Company and Community Vision of Success and CDFIs and Creative Financing Products. We believe by focusing on these areas MPOs can engage in equitable planning that supports diverse communities at all stages of the project process.

3.4 Equity/Policy Analysis

3.4.1 Planning and the decision-making process

Although there was extensive outreach, there was little incorporation of community input at the decision-making level. Because of this much of communication resulted in a “dog and pony show”, as one former transit official called it, or just elaborate spectacles of decisions already made. There were over 80 Town hall meetings to keep community members informed on project progress and understand their needs and concerns. This trend is common among transportation agencies and other single purpose bureaucracies who find themselves responding to inequities rather than proactively addressing them in the planning process.

The inability to meet diverse needs through transit projects is not particularly the fault of SEPTA. SEPTA receives a large portion of its funding from federal, state, and local legislation. Because of this dependence, MPOs must balance how they allocate funding among various counties. Because of this some transportation projects often lack additional resources to address larger socio-economic inequities. Conversely, municipal transportation experts like Beverly Harper and Gordon Linton agree that the lack of BIPOC and low-income representation in the planning and decision making exacerbates many of the systemic difficulties these populations face during the time of the project. Although transportation agencies lack the inhouse resources and expertise, they often have the political bargaining power that these communities lack to expand the scope of the agenda and form partnership with other organizations. Therefore,

to achieve an equitable process, agencies should proactively seek out ways to address deep rooted issues and create the necessary partnerships to meet those needs. Multi-agency task forces that include economic development and human resources agencies can help address needs for which a transportation agency is not typically well equipped, although such approaches also work best when guided by a strong leader who can enforce cooperation if the bureaucracies become recalcitrant or turf conscious. Congressman Bob Edgar played such a role in the case of the Blue Route project.

Impacts on protected classes

Reconstruction of the Market Frankford Line encouraged a new wave of development across Market West: with connections to the suburbs, the Norristown High Speed Line, and offering low-income areas more secure access to Center City. Some new stations included elevators for people with mobility difficulties. The refurbished streetscapes also have bikes lanes which is an important planning incorporation considering low-income people who use bicycles as a primary means of transportation at a higher rate compared to people who make middle- and higher-wages.

Conversely some areas of Market West have not recovered from construction impacts. Some experts say that the rate of business decline would have been the same due to the natural trends of business in low-income and BIPOC neighborhoods. Others say the City and SEPTA could have done more to consider the systemic challenges those populations face and used the project to address deep rooted issues. Because we looked at the project period and planning phases opposed to the total outcomes, we felt SEPTA could have done more to consider construction impacts on the neighborhood. The reason for the inability to address the diverse needs of communities is consistent across racial and income demographics: limited funding must be shared by various counties with diverse populations and needs. While this reality is true for many planning projects low-income and racial minority communities are historically less socioeconomically resilient. Thus, it is important to consider inconveniences on historically marginalized groups, especially as we consider historic trends of neighborhood resilience, and their ability to recover from acute socio-economic shocks.

Accessibility Achievements and Challenges

The end project resulted in the complete repaving of western Market Street, more efficient vehicle transit for both suburban commuters and low-income city residents, elevators & escalators on some stations that complied with requirements of the Americans With Disabilities Act (ADA), bicycle lanes with bike share stations, and better connective networks to suburban centers. Additionally, SEPTA was able to keep most of the line functioning during the construction process which kept ridership largely undisturbed and access to economic opportunities outside of the project corridor. We also are in the process of understanding how the single beam structure created better traffic flow for vehicle transit. Another outcome of the improved design of the elevated support structures was better traffic flow and visibility for vehicles driving along west Market Street. While post construction impacts may fall out of the scope of our project it is

important to understand how they overlap with other transit infrastructure.

One of SEPTA's top priorities during the project was to ensure passengers who relied on the MFL experience as little inconvenience as possible. To overcome temporary station closures during the reconstruction project, SEPTA enlisted a fleet shuttle buses from closed stations and introduced new Suburban Transit Division routes and new intercity routes (the 21, 31, 38, 42, 44, 65 and G).[34] During Construction Phases SEPTA arranged for deliveries to have better access to stores, had parking space on 52nd and 56th street was added to make access to businesses easier. Despite SEPTA efforts over 200 business owners complained of barricades that blocked access to their businesses. Many businesses also had to relocate which created more confusion for potential customers. As the project reached its later phases riders became less enchanted with the shuttle systems: delays and cold weather we a few complaints riders faced. Plus, the route faced all the other inconveniences of street traffic opposed to an elevated line. SEPTA dedicated many resources and created many solutions to mitigate access to ensure impact of the access to the area remained efficient. Still, many business owners were unhappy with their strategies. Furthermore, businesses owners cited construction impositions as a direct reasoning for having to lay off workers which conflicts with a positive effect of access to opportunities and people's mobility.

Environmental Impacts

Little could be found about the environmental impacts of the Market-Frankford West reconstruction project on the relevant corridors. Our research shows many residents and business owners complained of site degradation in the lack of bathrooms and garbage receptacles around the construction zones. Additionally, residents and experts on the project corroborate areas marked by blight which started to grow during many of the property closures during the project.

Although there were some negative impacts during the construction process the project resulted in various positive environmental

Figure 23 Market Frankford Line. Source: The Philadelphia Inquirer

outcomes. Investing in public transit is vital for sustainable urban transit planning. The investment in modernizing public transit infrastructure encourages the inclusion of other forms of public transit such as new bus stops, bike lanes, bike parking infrastructure, bike sharing stations, and wider sidewalks for increased pedestrian thoroughfare. The project also increased the MFL's capacity to carry more riders per day and connect them with more public transit systems.

Economics Impacts and Outcomes.

Income data on the relevant census tracts illustrates a decline in income during and after the period of the MFWR.[35] Business owners report loss of revenues and business closures in direct correlation to construction impacts. One anecdotal report came from a resident who lived and grew up on 56th and Walnut. They noted that at times they had to walk five blocks to access their barber shop which was normally across the street. They also note that the entire method of navigating Market Street was inconsistent and confusing. Although this is one report it also parallels some the methods explained by Kevin O'Brien (project manager for SEPTA at the time). Along with keeping the MFL running, SEPTA also prioritized keeping access to residential and business parcels open. Despite their attempts the protective barriers and changes access points dissuaded many customers from patronizing their regular establishments. Some businesses also had to relocate completely which also changed the dynamics of their clientele.[36]

Another issue that arose from during the project was the employment of non-Philadelphia workers. Works hired though contracting agencies were discovered to be from other counties, exacerbating frustration over job allocation between government officials and construction companies. "Lilly Claitt of SEPTA's small and disadvantaged business utilization office gave a brief summary on employment figures for the entire project…of 534 total workers, 133 are African-American, 20 are Hispanic and 6 are female. Minority workers are employed from six zip codes, including 19121, 19139, 19142, 19143, 19151, and 19082."[37] State Representative Ronald Waters contrasts reports of equitable accessible opportunities during the construction project saying, "When the work began, we would see tags from New Jersey, Delaware, New York and even West Virginia," he said. "The only way we could send a message was by staging a protest with Sacaree Rhodes and other activists. We shut the operation down and they (contractors and SEPTA) called the sheriff's office to arrest us." [38]

While the project had a tumultuous construction process many agree that the area is primed to foster a new wave of development. Beverly Harper cited CHOP Karabots Pediatric Center as an example of new development encouraged by the revitalized 46th Street Station. Despite her optimism, she and many others believe that the more attention should be given to the incumbent business owners and residents as those who are still remaining work to adjust economic growth and demands.

Funding Support Strategies for Local Businesses

By the end of 2007 more than $2.5 million had been allocated for financial relief to businesses through a variety of local, state, and federal

channels. But this splitting of the money only furthered confusion for businesses on how to access it. $1.2 million of those dollars were federal relief that was not accessible until 2008 or 2009, while another $600,000 from the state government in Harrisburg sat in bureaucratic limbo. Another $600,000 was distributed by the City, but it was up to Philadelphia Commercial Development Corporation to use the funds. Confusion between government agencies as to what the purpose of the money was for was also a common feature. PennDOT seemed to think the federal money was for the streetscaping programs on West Market Street to come after construction on the structure of the elevated was completed. The interim president of PCDC stated that that money was supposed to be used not only for aiding the direct finances of businesses but also for programs to advertise those businesses and the Market West corridor in general.[39] The delays in the distribution of money and the seeming lack of taking responsibility by the various agencies involved only made the business owners and residents more frustrated. Lack of communication and cooperation between government agencies is a key problem in transportation projects that can lead to inequitable outcomes. Not only is the response to the issues impaired, but communication to the communities who are affected can be muddled or even contradictory.

Funding Challenges

There were few funds or strategies early in the planning process to consider or anticipate reimbursing business for losses due to construction impacts. SEPTA partnered with state and local officials to find funds for struggling businesses. One of the core issues was the bureaucratic red tape and confusion about how to allocate funds, which meant funds often arrived too late or not at all. In the section *Funding Support Strategies for Local Businesses,* we discuss SEPTA funding strategies and how businesses were assisted to mitigate construction impacts. SEPTA also created business promotion and consultation resources for diverse revenue streams. Despite their efforts, many businesses in low-income or BIPOC neighborhoods lack the formal financial infrastructure or knowledge to fully access the offered benefits. In the section on CDFIs and Creative Financing Products, we discuss strategies transportation agencies can take to ensure they engage in equitable funding strategies.

Alternative Construction and Transportation Proposal

One solution discussed as an alternative to the reconstruction of the Market Street Elevated line was to replace the elevated line with an underground subway line, which is how the Market-Frankford Line is aligned from the 44th Street Portal to 2nd Street on the east side of the line. The Market Street Elevated used to emerge from a portal on the east side of the Schuylkill River at 24th Street before continuing as an elevated line. In the 1950s, the subway tunnel under Market Street was extended beneath the Schuylkill River and the subway section of the line now runs out to 44th Street. The section of the elevated from 30th Street to 44th Street was then demolished. While the planning for the reconstruction of the elevated line was underway, there was discussion of converting the rest of the elevated line on Market Street to a subway. This position was championed by the representative in the Pennsylvania House for the area, James

Roebuck Jr. “The problems are unending and the delays in the construction have been devastating to the businesses,” he said. “I think the whole concept is crazy. Why build an El instead of a subway? There’s no economic empowerment. When PTC (SEPTA forerunner Philadelphia Transportation Co.) decided to go underground between 32nd and 40th streets, businesses above ground flourished.”[40] Subway lines have many benefits over elevated lines. Subways generate far less noise pollution due to being underground, as elevated lines can be extremely loud when carrying heavy rail. Elevated lines also block out the sunlight from the areas they are over. Falling debris and repair work can generate hazards for pedestrians and vehicles, as seen in this case study. Trains that run on elevated lines are also more subject to the elements such as rain, snow, and excessive heat or cold, necessitating more frequent repair work.

There are several reasons that a proposal to convert the line into a subway did not happen. The most important concern was cost. Constructing subway lines is enormously expensive in the United States. The cost for the conversion of the line would have greatly exceeded the $750 million dollar cost for the extensive reconstruction efforts that did happen. Despite the benefits, it was not deemed worth the cost when a rapid transit line already existed in the same place, just in dire need of repairs. The work to convert to a subway may have also caused more disruptions to the area than the reconstruction of the Elevated due to the need to seriously disrupt Market Street itself for tunnel construction. Additionally, when asked about the idea of a subway line instead, many residents at community meetings did not prefer the subway line as they felt underground, and cramped subway stations were less safe than above-ground elevated stations according to a source from SEPTA present at some of the community meetings. Though the cost was the primary reason for why this alternative did not happen, it is important to consider the benefits and negatives that this conversion would have had on the residents of West Philadelphia.

Alignment of Planning and Community Goals

It is important to remember that transportation planning is about people. Infrastructure and vehicles are secondary to the lives that they impact. Most transportation construction projects take years to complete, therefore it is important to have a person-based foundation to understand and address the long- and short-term needs of the people in the project area. A major aspect of person-based transportation planning is the alignment of the agencies and the communities’ goals and expectations. One way to approach a succinct vision early in a project is through the agenda-setting process. When setting an agenda, planners should see how they can use the project as an opportunity to engage and deepen their relationships with people in the project location. Furthermore, agenda-setting is a complex undertaking and may shift as a project evolves. Planners should understand that agendas may evolve and create different levels of goals to meet different time frames and checkpoints. Equitable planning also incorporates a shared vision of success between the planning agencies and community stakeholders. This is especially important for minority and low-income communities who have historically been disenfranchised from the planning process. Another important consideration is the inclusion of community perspectives at the various levels of decision-making. Within the

context of urban development minority and low-income perspectives are often left outside of the decision making. To ensure that residents are the agents in their community development involvement and diversity in key roles of planning and policymaking are imperative.

Over the course of the project SEPTA, city leaders, business owners, and residents had more than 80 town hall meetings to discuss the conditions of the project area. To address the slowed business during construction business consultation agencies worked to develop reimbursement coupons for businesses in the project corridor, advertising on billboards and radio, and a standing advertisement in West Side Weekly. Other efforts to mitigate the imposition of construction involved workshops to provide businesses with consultation on methods to diversify their revenue streams and manage their financial records. SEPTA was aware of the business hardships and addressed them through their extensive outreach and updating the community on project progress. Despite SEPTA's effort to mitigate financial hardship, the most important goal for SEPTA was the completion of the construction project.[41] One official speculated that the rate of business closure throughout the project would have been the same if the project did not happen. "If you see any new building along Market Street, that's because of the reconstruction," said one official who worked on community engagement. SEPTA's goals were primarily engineering-based but that did not stop them from engaging in an aggressive community outreach campaign. Additionally, despite heavy construction in the early stages, SEPTA was able to go through the course of the project with minimal impact on ridership. The reconstruction resulted in six new station reconstructions decorated by local paid artists. It also resulted in single-pillar supports which let in more light and created a more attractive transportation corridor. The renewed aesthetic of the location also invited new development to the area. While businesses struggled at the start, many say that the area is better off than if the project had not happened.

The project resulted in a safer, more attractive Market West corridor, but the impacts of the project are mixed. Although the MFWR project encouraged new development in the area, ensured a safer transit line, and resulted in a repaving along the project area, local news reports uncovered another side of the project's impacts. The Philadelphia Tribune used interviews to report the various impacts brought on by the project. Between 2003-2008 they interviewed business owners, SEPTA officials, and state and local officials on impacts and outcomes of the project. From the early stages, businesses reported losing up to 50% of their clientele. As late as 2007 layoffs, business closure, and inability to pay rent on the business property were all correlated to the construction by business owners. Although some SEPTA officials assume the rate of business closure did not fully correlate to construction impacts, business owners cited their loss of revenue in direct correlation to operational difficulties due to construction. State legislators like Ron Waters felt SEPTA did not fulfill the original commitment to aid struggling businesses through the construction process. Aside from consultation businesses owners needed cash programs to stay afloat. In order to meet these needs SEPTA did create a grant program but over 25% of the businesses were unable to access the funds. This pattern was consistent

among many of the financial efforts to support business. Our research found reports indicating that many businesses were unable to access the support they needed because they did not have the financial support structures (such as bank accounts or organized business records) to access the programs, were unaware of the opportunities, or funds arrived too late.

The misalignment of views on the project impacts comes from the differentiation of expectations. “I strongly feel while improvements to the Market-Frankford El line are intended to benefit all who use it, SEPTA should be responsible for damages it causes in the interim if evident neglect exists,” said [State Senator at the time] Anthony Williams. “I don’t believe SEPTA had a real workable plan to address the crisis the construction has caused or has lived up to its promises to the business community.”[42] Strategies to enhance business awareness and provide business consultation were an ongoing process throughout the MFWR. Business owners and government officials felt SEPTA should have done more to assist with impacts of early revenue losses. Despite criticism, experts across all sectors agree that it may not be within SEPTA’s capacity to provide a diverse range of services that are not directly tied to the transportation project. Because community representation is left out of the various steps of the decision-making process, planning agencies often have to find a way to address inequities in hindsight. Low-income and racial representation has historically been lacking in the higher decision-making process of transit projects. Government officials like Gordon Linton (Head of FTA 1993-1999) also note that communities in historically low-income areas lack the political organization or bargaining capacity to influence planning decisions. It was not feasible for SEPTA to engage in the robust funding campaign necessary to support businesses earlier in the project stages. While the project did bring many positive outcomes there is consensus that a more inclusive planning process would have mitigated many of the early and interim impacts of the project.

In order to engage in more equitable transportation projects, MPOs should incorporate community input at vital levels of decision-making. Early in the agenda-setting process planners may engage in prolonged site analysis to access the needs of the people and community at large. Because business disruption is an inevitable reality of construction projects, early coordination also establishes the potential partners that can be incorporated into the project such as CDFI or business consultation that can address the specific needs of an area. Research shows that black and other minority business owners have historically faced disproportionate challenges accessing financial support for small businesses. Many lack business accounts, organized records to report finances or employees, infrastructure to keep the information, or the knowledge to access and maintain financial stability in dynamic economic conditions. A transportation agency may have to tailor its agenda to address realities that may keep communities from coping with project impacts. Along with agenda setting transportation agencies can create checkpoints or smaller goals through the planning process which illustrate small wills, create observable metrics for impact mitigation, and seizes opportunities created by the project. Alexander von Hoffman (Senior Research Fellow at the Joint Center for Housing Studies and lecturer at the Harvard Graduate School of Design) discusses that it is typical for

agencies and government officials to face some distrust or skepticism from their communities. By working with communities to establish goals, the agencies may start building trust by gathering "small wins". Furthermore, goals and bench markers incorporate a larger scope to the transportation project. Because BIPOC small businesses and businesses in low-income neighborhoods often lack the resources or capital to shift from their typical business practice, it is important to provide them with support early in the process in order to cope with future difficulties.

CDFIs and Creative Financing Products

Inconvenience to business is an unavoidable reality in most urban construction projects.[43] To preserve business corridors experiencing intense construction planners should diversify their partnerships to mitigate unexpected challenges and seize opportunities their agency may not be equipped to support. One of the most critical considerations of planning projects is the role of CDFIs. CDFIs are crucial to the foundation of holistic municipal projects. They can share their expertise with community and planning agencies, help lay a foundation for equity in the project, and provide flexible financial products that keep businesses and residents afloat during development.

Before the early stages of the construction were finished over 200 Black, Hispanic, and Asian businesses were reported to have been negatively impacted by the construction.[44] Many were struggling to keep their doors open and lost up to 50% of their revenue sources. By the interim stages of the project, the corridor had already experienced irreversible damage.[45] Impacts of construction like disruption of pedestrian and vehicle traffic in the area snowballed into major reduction of vital revenue streams for businesses.[46] Due to the loss of revenue many businesses had to lay off workers, relocate, or close.

SEPTA enlisted the help of business and development expertise that provided technical assistance to business owners. The programs educated business owners on ways to maintain business during construction[47] such as alternative business management strategies during the project and different ways to reach and attract customers. On the political side, state and local officials sponsored relief bills to mitigate construction impacts on business and supplement loss revenues. In 2004 Jannie Blackwell sponsored a bill setting aside $750,000 in City funds; $619,107 was distributed from June 2004 to August 2006, while $130,893 was unspent. Congressman Chaka Fattah added $1,170,400 in federal dollars to 2005 transit legislation to be spent from 2006 to 2009. Additionally, the PCDC was tasked with securing state and federal funds to allocate to business for relief. The funds were meant to, "...sustain mom-and-pop businesses with cash grants and loans to help them through the mess of El reconstruction."[48] Although there were funds allocated to business, they spent too much time suspended in bureaucratic red tape. By the time many of the funds reach the channels to be allocated to business the corridor already lost a major portion of its business.

To avert damages to business CDFIs need to be active in the early stages of development and dynamic during the interim stages. According to the CDFI Coalition the current CDFI industry began in the 1960's and 70's as a reaction to the success of community development corporations (CDC') created during the Johnson

Administration to serve urban and rural poor communities. While early incarnations of CDFIs can be traced through as far back as the 1973 CDFIs started to gain more foundational support in the 90's and 2000's. In 1994, the CDFI Fund was created through a federal agency that provides funding to CDFI and their partners. These agencies provided services like financial loans and investments for local businesses, offering training and technical assistance, and the promotional of development initiatives in struggling communities.

CDFI can use their expertise to scenario plan potential disruption to their establishments. Early involvement enhances partnerships, involvement, and trust within the early stages of the project. Furthermore, meeting problems before they arrive allows for them to be addressed as potential opportunities. von Hoffman identifies four core practices CDFIs can employ to enact more equitable development projects. 1) CDFIs should look to see what roles they can play in an equitable development campaign: quarterback organization, lead financier, and/or community partner. 2) Within an overall equitable development campaign, CDFIs of all sizes can fill valuable transactional niches, deploying their capital to revitalize underserved places as well as to promote the financial well-being of the people who live in them. 3) CDFIs have to delineate a target area that is small enough to create a measurable change but large enough to offer a sufficient volume of transactions. 4) CDFIs should seek suitable partners to mitigate financial risk while meeting the demands in disinvested neighborhoods.

Strong CDFI engagement is vital in projects like the MFWR. The Market West area from 46th-69th Streets, like many other historically BIPOC business and resident corridors, was previously deemed "hazardous" or "definitely declining" according to a 1930's Home Owners Loan Corporation HOLC appraisal map. The process of redlining was used by the HOLC to appraise "Residential Security" which is a tool loan officers and real estate brokers used to evaluate risks for mortgage lending. Factors that contribute to poor neighborhood ratings included, "Heavy obsolescence of property-concentration of Negroes and Italians.": correlating less desirable living conditions with race. Because of this many minority communities faced generations of divestment compared to the growing (whiter) suburbs, which drove their communities further into socio-economic distress. Literature shows that the effects of redlining still have negative impacts on majority-minority communities today. Sixty-one percent of redlined areas from the 1930s still struggle economically. Of the neighborhoods that were not redlined, 94% are still upper income. Most of the redlined neighborhoods are minority-majority today, "with redlined neighborhoods receiving 20% fewer business loans between 2012 and 2016."[49] These findings are congruent with reports of business owners in the project area who were unable to secure private bank loans when relief funds were at a standstill.

CDFIs need to be cognizant of the specific histories of an area such as land appraisal history or ecological fragility of an area. Community development specialists at the Enterprise Center discuss tying loans and grant access to technical support. In order to secure funds, business owners must engage in technical support or consultation. This teaches the proverbial man to fish, but also ensures that he does not starve that night. To secure funds and engage in consultation opportunities CDFIs

must also create equitable channels to access opportunities. CDFIs like PIDC are creating workshops that help businesses organize financial information and overcome language barriers on relief applications. Initiatives like theirs ensure that historically disenfranchised communities have access to the specific resources they need. By doing so CDFIs can help businesses become more resilient through consultation and technical assistance and mitigate the immediate effects of revenue loss.

BIPOC businesses and businesses in low-income neighborhoods often lack the financial resources and resources to deal with rapidly changing markets or prolonged revenue loss. SEPTA provided a range of consultations to help businesses expand their revenue bases and establish financial security. Despite their attempts, business owners report operational difficulties at the early stages of the project. Although state and local governments created relief funds many of the businesses were able to access those funds. CDFI plays a major role in these situations because they can meet specific financial needs early in the project's process. When CDFI are active early and dynamic throughout they can preemptively address problems commonly brought by urban construction and tailor their aid to the needs of communities most commonly left out.

3.5 Box Story: Twenty Years Later, SEPTA Still Left on Its Own to Cope with Social Problems.

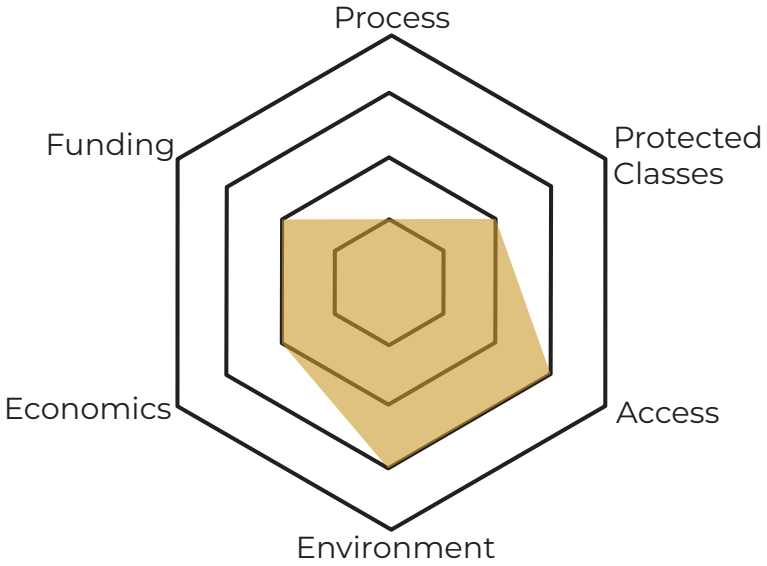
Many of the problems with the reconstruction of the Market Street Elevated can be traced back to SEPTA not being the appropriate agency to handle the externalities caused by transportation projects and social problems in general. SEPTA's goal as a "production" bureaucracy is to provide the service of transportation, not a "coping" bureaucracy that deals with social problems.[50] A recent example of how SEPTA is still often on its own when it comes to coping with social problems is the closure of Somerset Station on the Market-Frankford Line by SEPTA in March of 2021. The Philadelphia Inquirer reported that the station was closed by SEPTA after passengers and SEPTA workers felt unsafe after the station became a hub for the homeless and for drug use.[51] As well, SEPTA said the elevators for the station were broken due to clogging by needles and human waste. The closure of the station instantly inspired community opposition, as residents and workers who relied on the station now had to walk another half mile in either direction to use another station. The Inquirer also reported that observers noted that the City had failed to provide SEPTA with adequate support from agencies in the city government that are tasked to deal with the problems that were plaguing Somerset Station.[52] SEPTA has moved to renovation and cleaning of other stations in the Kensington area, but due to community opposition refrained from closing those stations entirely and reopened Somerset Station ahead of schedule.

Better coordination between the City and SEPTA in this case could have created a better outcome for the residents near the station just as coordination with the City and other groups preemptively could have resulted in better outcomes for the Market West Corridor. SEPTA moved on closing this station due to station conditions and pressure from SEPTA employees, but the closure created negative con-

Figure 24 Market- Frankford Line. Source: Billy Penn Newspaper

sequences for people living near the station. Without aid from the City or other agencies or groups, a transit agency like SEPTA is not equipped to deal with the problems that caused the closure of Somerset Station. SEPTA moved to reopen the station faster than planned because of community opposition. The consequences of removing transit access from the area is something SEPTA *is* able to solve as a transit agency, but the social issues that caused the closure in the first place are not something that SEPTA can be expected to deal with on its own.

3.6 Summary Judgement 3.6 Summary Judgment for the Market -Frankford Reconstruction on the Equity Dimensions



Equity Dimension	Score	Reasoning
Process	1	There was constant communication with local stakeholders but not at the decision-making level or during the project agenda setting phases.
Protected Classes	2	The focus on end goals had disproportionately negative impacts on BIPOC and business owners in low-income neighborhoods during the early and interim stages of the project
Access	3	SEPTA was able to keep the MFL running— which is one a Philadelphia's most heavily used transit lines and serves large populations of low-income and minority communities in West Philadelphia. Conversely, access to businesses was greatly affected by construction which was cited as the root for loss of business.
Environment	3	The investment in public transit systems is shown to be a more efficient and cleaner way of transporting people compared to private vehicles. The MFL reconstruction supports more active transit infrastructure like wider sidewalks and bike lanes. Still, during early and interim stages of construction residents and business owners complained about litter and public urination around the construction sites. There are also reports of lasting blight.
Economics	2	While the reconstruction did bring new development (especially around the refurbished stations) there were still many negative impacts on businesses during the project process. Also, those benefits are not often accessed by people within the project/construction area.
Funding	2	The plan lacked the diverse funding strategies to aid business during the construction process. Funds found for business relief often became tied up in bureaucratic red tape and arrived too late or not at all.

3.7 Conclusion

The MFWR demonstrates the complex nature of policymaking. Although there were many positive outcomes, low-income and minority owned businesses face disproportionately negative impacts during the interim and early stages of construction. SEPTA engaged in various creative strategies to mitigate construction impacts and understand the needs and concerns of business owners and residents in the community. They also worked to ensure access to the Market Frankford Line was undisturbed and that people could access their homes in businesses without inconvenience. Although SEPTA employed many strategies to address local challenges, they were not effective enough to prevent business closure, layoffs for many employees, and relocation for many staple businesses. Strategies for business relief funding were not coordinated until the mid to late stages of the project. The delay of financial strategizing around business relief in the early stages of the project exacerbated many of the challenge's minority owned businesses and businesses in low-income communities face. Additionally, those organizations often lack the formal financial infrastructure, such as bank accounts, employment records, and other necessary business records to seize the full benefits of relief programs.

The inability to meet complex the needs of vulnerable communities is often out of the range of single service public agencies. Thus, in order to engage in more equitable project processes, we have determined that alignment of the planning agencies and community goals in creative financing strategies ensure that disenfranchised perspectives are included, they are prepared for the project, and primed for the future. While many agree the project has brought many benefits to the location, they also agree more strategizing can be done in the early stages of the project to consider the specific vulnerabilities and history of peoples in the project area.

3.9 Policy Recommendations

Research into this transportation project has taught us about the dynamic nature of the policy making process. We observe that the initial and interim stages of some projects had many negative impacts for residents and business owners while the projects outcomes presently benefit those same groups. The reality is that most state agencies are not equipped to address diverse issues outside of the scope of their project budgets. Agencies like SEPTA must compete with interests from other counties to receive any funding at all and have strict limitations on what those funds can be spent on. Because of bureaucratic, funding, and political limitations, single service agencies become outcome-oriented and are forced to address issues as they arise in hindsight. This reality is especially potent for historically disenfranchised populations. In specific consideration to BIPOC and businesses in low-income communities: pivoting during acute economic changes are extremely difficult. Business owners in these groups are far less likely to receive help from private funding sources and rely on out-of-pocket funds to stay afloat (despite having less of those dollars). Additionally, they often lack the financial infrastructure such as bank accounts, business information, or records or revenue loss to access the full range of public aid. In order to overcome these realities transportation and planning agencies should:

Plan around the Alignment of Planning Agencies' and Community Goals

Establish CDFIs and Creative Financing Products.

The Alignment of Planning Agency and Community Goals begins at the agenda-setting phase when planning agencies are creating their priorities and the scope of their project. Community insight here may establish potential impacts of the project, needs of local stakeholders, and potential partnerships to address issues outside of the planning agency's capacity. This is also a chance to create multi-level goals and early wins. Creating multi-level goals is a result of collaborative agenda-setting. Goals can come in various forms such as the number of community meetings per month or funds distributed for relief. Through meeting goals and getting early wins, agencies build trust within communities and local stakeholders are better able to understand some of the root causes of hold-ups or delay. A more deep-rooted issue is representation on the executive level. Even today minority perspectives are rare in the policy-making process. Because of the lack of representation where plans are set, and how they are executed, they lacked the nuance to address the compounded issues that intersect with transportation issues.

As we work to engage in more equitable transportation planning, we understand the need for diverse partnerships. *Community Development Finance Institutions* serve many key roles that mitigate the challenges observed in the MFWR. Alexander von Hoffman, Senior research fellow at the Joint Center for Housing Studies and lecturer at the Harvard Graduate School of Design, discusses some of the vital roles CDFI plays in "The Ingredients of Equitable Development Planning: A Cross-case Analysis of Equitable Development Planning and CDFIs." Financial partners should:

Be active early and dynamic throughout.

CDFIs can use their expertise to scenario plan potential disruption to their establishments. Beverly Harper notes that she spends at least a year within the community before engaging on a project. By sending key figures into the community transit agencies and planners are able to have a firmer understanding impacting on the impacts of their projects, especially on daily operations.

One method to identify these needs is through collaborative scenario planning. Collective scenario planning allows agencies to forecast and mitigate conflicts, prepare for potential shocks, and deal with uncertainties. Scenario planning starts with prudent assumptions or baseline realities that organizations must internalize to move forward during times of uncertainty. Planners should also consider critical uncertainties such as volatile factors (length of construction), differing or changing policies, immediate and long-term effects of the project, government response and condition of social safety nets, level of technical support, and level of social/public cooperation.

Along with education and planning support for communities and planning agencies, CDFI are able to mitigate acute economic impacts through creative financing programs. Many minority-owned businesses and businesses in low-income neighborhoods lack formal financial resources such as bank accounts,

employee records, or legible revenue reports. The absence of records creates difficulties when businesses are trying to access private and public funding to cope with revenue losses. This trend is also compounded with historical exclusion from financial support on the ground of race and income. Thus, CDFIs should work to create financing programs that address social-economic challenges and systemic exclusion. One example of this approach is the PIDC COVID-19 Hospitality Industry Recovery Program (CHIRP). The program specifically gives priority for assistance to businesses that are owned by women, immigrants, disabled-persons, or veterans, earn less than $3 million in annual revenue pre-COVID-19, provide jobs in Philadelphia. Additionally, the program application assistance such as language translation services, technological support, help documentation organization, and allows partnering organizations to apply on a business' behalf. The CHIRP provides funds while also creating resources that help businesses organize financial information and overcome systemic barriers that prevent businesses participation or qualification. If this approach is proactive and partnered with scenario planning CDFI can create funding programs tailored to the potential impacts of a project on a specific community.[53]

4. Cross-Case Conclusion

After examination of our selected case studies, we have concluded that the construction of major transportation projects in the Philadelphia region do not meet our standards of horizontal equity (3 on spider chart) or vertical equity (4 on the spider chart), as they are more clearly defined and discussed in Volume I. Burdens and negative effects from these transportation projects have been disproportionately placed upon minority and low-income communities while transferring the benefits of these projects to wealthier and more affluent communities, often located outside Philadelphia itself. Transportation projects are too frequently located in communities such as Chinatown in Philadelphia for the Vine Street Expressway and the City of Chester for I-95, while projects like the Blue Route put significant effort into avoiding as much impact as possible on the surrounding suburban communities. Mitigation efforts for these projects were also often too little and too late or have never been completely implemented in the cases of Chinatown and West Philadelphia, while the suburban communities near the Blue Route received changes and compensatory additions to the project up front.

5. Recommendations

The benefits of these projects also too frequently result in benefits and growth for the region, but with those benefits distributed disproportionately to affluent and white communities. The Blue Route was fought tooth and nail by these communities, but once it was completed it brought great benefits to them and other suburbs at the expense of job growth and job access in Philadelphia and Chester. The Vine Street Expressway eased the traffic for commuters utilizing I-76 and I-95, but brought little benefit to the residents of Chinatown itself. Reconstruction of the Market Street Elevated was necessary for the transit system of the entire region, but the negative effects were almost entirely felt by the residents and small business owners of West Philadelphia. As the future will continue to need transportation construction and reconstruction projects, we have compiled some policy recommendations to improve equity outcomes.

Be Forward Thinking on Future Definitions of Equity

An observation that repeatedly came up in our interviews was that during the planning of these projects, planners, engineers, and agency officials did not consider equity concerns at the time these projects happened. They noted that policy usually reflected the problems and desired outcomes of the day. The National Environmental Policy Act in 1970 reflected the issues of that time in regard to environmental degradation and pollution, but does not reflect our current understanding of impact on the greater environment because of climate change. But adherence to the policy and regulations of the time does not excuse negative outcomes that have disproportionately affected minority communities. Therefore, one of our recommendations based on our findings is that policy and planning should be proactive to respond to changing definitions of equity and more responsive to the concerns of impacted communities. Simply following the existing laws and regulations should not be considered adequate, and planners and MPOs should work to both anticipate negative impacts in advance and listen to different perspectives to improve their own understanding of the impacts of transportation and urban planning.

Achieving Fuller Equity Through Early Community Engagement

When discussing community engagement and its ensuing role in equity, there is a growing acknowledgement that community outreach must happen before the initial proposal or plan is released. This is necessary for two reasons: building community trust and a communication pipeline and identifying possible pitfalls or areas of greater value to the community. One former public official interviewed for this project claimed that “dog-and-pony shows” were the tactic of the times, well into the 90s; scenarios where agency officials went into communities where transportation projects were planned, told them the plan for the project and the effects it would have on the community, listened to the community’s response, and continued on with the next phase of the project without regard to the response or perceived community needs. In the appendix, we cite an article by Samuel H. Jones and Dr. Daniel Armanios that focuses on infrastructure equity in a broad fashion, and their piece concludes that the placement of a roadway or bridge is a far greater determinant of social equity than any of the mitigation efforts that follow. We believe that the work we have produced aligns with this conclusion and should be considered seriously in the future.

In the case of the Vine Street Expressway, this played out in a very public and drastic fashion. Chinatown members first learned about the proposal for the Expressway through the public presentation given at the Free Library in 1966 and had not been given any advance warning or input into these plans. The result of this lack of community outreach meant that Chinatown felt attacked and that their beloved church was being threatened. For the next decade, the Chinatown community would seek to be recognized and heard for their worries and concerns and would cost the City and PennDOT time and money seeking to reconcile with their earlier mistake. In the case of the Blue Route, some residents in the communities affected by the construction of the highway did have a role in the planning and redesign processes, but these residents were those who had the time, wealth, and resources to hire lawyers, become familiar with the relevant environmental legislation, and leverage political advocates for their cause. The Blue Route's story demonstrates a lack of engagement with lower-income communities and non-car owners in the affected communities or those places (such as Chester and Philadelphia) where people could have benefited from greater job access in the region through the use of public transit connections along the highway.

Climate Change, Highways, and the Future of Construction Projects

Despite climate change not factoring into how these projects were planned at the time, it would be negligent of us to not mention the impact of climate change from transportation projects. Two of our selected case studies are highways, and the impact of both of these highway projects is encouraging and easing the use of personal vehicles. According to the Federal Transit Administration, a trip with a private automobile produces almost double the carbon emissions per mile as a trip using public transportation.[54] Both the Vine Street Expressway and the Blue Route both were important links in the Philadelphia highway network that did make getting around the region easier by car, but that also meant additional personal vehicle trips as opposed to transit usage. In the case of the Vine Street Expressway, we saw how the oversubscription to the federal transfer program meant that the money would be spent on the Expressway as opposed to upgrades for SEPTA due to lack of funds for the transfer program. For the Blue Route, we saw how potential integration of public transit into the project was ignored, and although there was a deep environmental aspect to the project and the resulting delays, they revolved around the preservation of the local creek bed, not how highways like the Blue Route impact global climate change.

It is important to focus on how these projects impacted climate change due to the impacts that climate has and will continue to have on mostly minority, BIPOC, and low-income communities in the United States and across the globe. These populations are more likely to live in areas vulnerable to flooding, mudslides, storm surges, and other catastrophic impacts from climate change.[55] The impacts of events such as hurricanes, tornadoes, and other severe weather events that are potentially worsened by a warming climate will also have a greater impact on these communities due to where they can live and the associated high costs of stronger disaster-resistant construction for their homes and businesses. Because of climate change effects, the team recommends no further construction of large highway projects that facilitate further easing of personal automobile transportation in the ways that the Vine Street Expressway and the Blue Route did, though we caution that future public transit projects may also be vulnerable to the mistakes and failures that were made in community outreach and planning, construction impacts, and the granting of unequal benefits just as these highway projects were.

Providing more convenient access to transit for minority and marginalized communities is also an important future task for planning agencies. While currently Philadelphia's transit system does serve a diverse set of communities within the city and region, transit can function as an engine of gentrification, and making sure that access to transit in the future that is affordable and serves more than just 9-5 commuters will be a massive equity issue in the future as the country moves away from automobiles in the future. Keep fares affordable, make sure new transit projects serve minority communities, and remove barriers to use on transit such as commuter rail are some of our recommendations for the future.

Are Single Purpose "Production" Bureaucracies Properly Equipped to Deal with Negative Outcomes from Transportation Projects?

One area where outcomes in transportation planning and construction can be improved is in the area of intra-agency cooperation and coordination as well as in assigning an agency to perform a job for which it is not equipped. We saw that many things went wrong during the reconstruction of the Market Street Elevated, but many of them stemmed from the beginning that SEPTA is a transit agency and is equipped and has the expertise to provide and maintain public transportation, not the many other duties that were needed to help preserve the businesses and community in West Philadelphia. We believe that better coordination from the start between SEPTA, the city government, and local businesses combined with earlier intervention from CDFIs could have brought about a better outcome in the Market Street corridor, SEPTA's primary responsibility as a largely single-purpose "production" bureaucracy is to provide transportation, not to provide financial assistance to businesses or to their employees who lost their jobs. In the future to better facilitate improved equity outcomes in transportation projects, the team recommends investigating whether entrusting the mitigation efforts associated with transportation projects just to agencies such as SEPTA or PennDOT rather than a more holistic planning process involving MPOs such as DVRPC along with elected governments and agencies. This approach could be done in a way that allows each agency to work to its strengths and avoid its weaknesses. As James Q. Wilson's typology of bureaucracies suggests, a production bureaucracy such as a transit agency is focused on and best suited for the creation of its particular service, and coping bureaucracies and support from elected governments should be employed instead to deal with social issues and adverse impacts from construction projects[56] . Interagency communication and cooperation are vital but often lacking in projects such as the ones we have studied in this report. Streamlining that cooperation could be a major outcome in avoiding negative effects from transportation projects. This could be a new responsibility for an agency like DVRPC as the regional planning organization or a new partnership between the appropriate agencies. It is important that this multi-organizational task force be responsible to a public official who can require cooperation in the event of disagreements or agency recalcitrance, such as the City's Managing Director or the Mayor's chief of stall on a project that is located within Philadelphia. In our case histories, Congressman Edgar stands out as an example of the kind of leadership that is needed to direct such efforts. Edgar, a Democrat, was widely credited for tireless and by all accounts effective work on the Blue Route even while the counties through which it passed were governed by Republican commissioners and represented by mostly Republican state and local officials.

Be Proactive in Funding Both Mitigation Efforts and Amenities

One important lesson in the differences in the case of the Vine Street Expressway and the Blue Route is the timeframe that affected communities received funding or when construction began on mitigation efforts and concessions. For the Blue Route, the political power and influence of the affluent suburban communities was able to wring out a litany of concessions from PennDOT that were immediately appreciable, such as reduction of the number of lanes, sound barriers, and the efforts to turn the route into a scenic byway with sculptures and preserved natural areas. This is in contrast to the Chinatown community, who had to put all of their efforts into what they saw as an existential battle to preserve the church and school. Their efforts for concessions ended up resulting in a small gathering space on a bridge directly over the roaring highway, rather than the cap of the highway with real community amenities that they still seek today. In the West Market corridor, proactive creation of business relief funds would have potentially saved dozens of businesses, but because of bureaucratic red tape and delays, by the time any funding was available many businesses were already gone, or employees were let go. In addition, some, and perhaps many, of the businesses might have benefitted from counseling on how to access funds by improving their accounting systems and enhancing their ability to document revenue losses that would have qualified them for relief.

Communities affected by transportation projects in the future should receive upfront funding for the mitigation strategies and cultural amenities that help the area recover after the project. Planners and policymakers should study these potential measures in advance so that they can be included in the initial funding proposals, not promised at a later date when political turnover, sudden budget constraints, or leaders and legislators not inclined to listen to the needs of those communities can delay the funding for those efforts or jeopardize them entirely. Politically well-connected white communities should not be the only ones able to make sure that they receive concessions in advance and planners and policymakers should strive not to short-change minority communities of the funds for these efforts in the future.

5.5 Composition of MPO and Regional Transit Agency Boards

One area that should be explored in attempting to address equity issues in major transportation projects is changing the way representation is allocated on the boards of regional planning organizations and on regional transit boards. As Carolyn T. Adams writes in *From the Outside In: Suburban Elites, Third-sector Organizations, and the Reshaping of Philadelphia* "governing boards allocate seats by different methods, but in general they assign seats in ways that under-represent central cities and racial minorities while overrepresenting white suburbs."[57] A similar issue is found in the SEPTA board, where the suburban counties receive equal representation on the board for the agency as the city despite residents of Philadelphia making up the majority of ridership (though the appointees from the governor and legislature can help make up for some of this). Though non-proportional representation does not preclude significant minority representation on these boards, it can result in the overlooking of issues or the prioritization of suburban projects over ones in the city. However, it is important to note that DVRPC does have representation of minority advisors on its board and that DVRPC has developed an equity analysis tool that is used by other MPOs across the country. DVRPC also has representatives on the board not just for Philadelphia, but also for Camden, Chester, and Trenton, three cities that have majority-minority populations.

One potential alternative is found in Atlanta, where the Atlanta Regional Commission changed the composition of its board by including citizen representatives from equally apportioned districts across the metropolitan area in addition to elected or appointed officials from government units. This has resulted in a much larger board, 38 total members 15 of whom are from the equal population public districts compared to 18 members on the DVRPC board, but one that is at least potentially more representative of the area that is covered by the MPO. However, making changes to the board of DVRPC is not an easy or simple task. Because DVRPC is a bi-state MPO, changes to the structure of the commission would require the approval of both the legislatures of New Jersey and Pennsylvania. While the commission could send a specific request to both legislatures for changes, the opening of the legislative process would leave DVRPC vulnerable to unforeseen ☐ and potentially negative ☐ changes. It would also require that the changes approved by both New Jersey's Democratic-controlled legislature and Pennsylvania's Republican-controlled legislature and signed by the two states' governors would be identical, which is far from a given in today's political climate.

In 2014, in response to the changed policy guidance to requirements of the Moving Ahead for Progress in the 21st Century Act by the FHWA and the FTA requiring transit agency representation on MPO boards, the DVRPC decided to use an exemption allowance rather than undertake the legislative process to change the compact to amend the composition of the DVRPC Board. This board made this decision with the approval of SEPTA, NJ Transit, and the Delaware River Port Authority (DRPA), who remained non-voting members but gained formal comment privileges on any board action.[58] As the Board has concluded that there are great risks to opening up the DVRPC compact to the legislative process, changes to the structure of the board may not be a realistic solution. Similar to what has been done for transit agencies, DVRPC board could look into adding advisory members for equity and representation that are allowed public comment on any proposal as a compromise for improving equity outcomes in regional planning.

6. Summary of Recommendations and Tools for Equity

To summarize our recommendations, we have compiled a list for easy reference of our recommendations and tools for improving equity outcomes in transportation construction projects.

1. Whenever possible, choose sites that do not disadvantage marginalized communities. Research shows that on equity measures, site selection impacts outweigh treatment or mitigation efforts.

2. Consult with the relevant elected officials before consulting communities and try to gain their support. Consider asking them to sponsor dedicated appropriations for mitigation, with flexible language that allows their use for legitimate but unforeseen purposes.

3. Develop a mitigation budget separate from planning and construction contingencies, which could be funded from dedicated funding that gives legislators an opportunity to take credit for the help the funding provides.

4. Begin consulting communities before undertaking design and try to accommodate their concerns into the initial plans.

5. Assemble multi-agency teams to help design and implement mitigation efforts under the direction of a public executive who can ensure the cooperation of the relevant bureaucracies. Transportation projects should be led by transportation agencies, but those agencies need active support of bureaucracies with experience in dealing with adverse social and economic impacts.

6. Find creative ways to accelerate construction to minimize highway and rail shutdowns.

7. Engage and empower civil engineers who can design creative solutions that address community concerns. RFPs could include a requirement that engineering firms provide evidence of their involvement in successful mitigation efforts.

8. Provide more convenient transit access to marginalized communities.

9. Pay attention to and address non-economic impacts like loss of social capital due to dividing neighborhoods and threats to a community's cultural, religious, and recreational assets.

10. Enhance economic development opportunities for marginalized communities (e.g., creation of special service districts, neighborhood parks, new residential and commercial development, zoning to accommodate such development, while being mindful of arousing gentrification fears).

11. Encourage MPO voting members to appoint minority representatives to the DVRPC board.

12. Consider recommending to transportation agencies that they set aside a portion of President Biden's infrastructure funds for restorative projects such as covering the Vine Street Expressway with a park.

13. Seek federal permission to toll highways such I-476 (The Blue Route) to help pay for transit infrastructure that was ignored during the initial construction of these highways.

7. Closing Thoughts

Some of the agencies that have been mentioned in this report have already changed many of their policies away from the ones that caused harm and have made changes that are similar to some of our recommendations. PennDOT has a Public Participation Plan, last updated in 2020, that attempts to inform the public of the process of transportation planning as well as inviting the public to be more involved and goes beyond normal federal requirements. The plan prominently displays a quote from a National Cooperative Highway Research Program report that states "State DOTs are no longer just held accountable for the transportation system; they are also held accountable for how the system supports and improves the quality of life for communities".[59] PennDOT's Public Participation Plan shows how the agency has learned from the past and is attempting to make its own transportation planning more inclusive.

It promises early engagement with affected communities and the establishment of Stakeholder Committees that include "traditionally underserved, vulnerable, and social advocates for disenfranchised organizations or groups, to become members". The Stakeholder Committee meets as needed throughout the draft document development process. PennDOT's plan also calls for the establishment of Steering Committees that include an array of other public agencies which presumably are better equipped to cope with the economic and social problems that often accompany major construction projects. We also note, however, that these two committees operate within PennDOT's bureau of equal opportunity, or in other words, entirely within a "production" bureaucracy.

Although assessing the effectiveness of current participation programs was beyond the scope of our study, we are encouraged that the department has recognized the need for such steps and suspect that these plans reflect an understanding of inequities in the histories of the projects we have studied[60] as well as many others.

8. Volume II Post-Paper

Appendix

Relevant Legislation

Federal Interstate Transfer Program (1983)

As part of the legislation provided under the NIDHA, states and localities were permitted to reclaim dollars originally earmarked for an interstate project and reinvest it into other regional transportation improvements. "Federal law (23 USC, Section 103(e)4) allows local and state governments, with federal approval, to delete non-essential links from the Interstate system, and to transfer these funds to other transportation improvements. All transfers must receive federal approval prior to October 1, 1983." In the case of the Expressway planning, this meant that enough money had been set aside for the project to complete the full Expressway as originally envisioned in 1966, and any smaller iteration of the project would be subject to a larger refund.

National Interstate and Defense Highways Act (Public Law 84-627)

This monumental legislation was enacted on June 29, 1956, when President Dwight D. Eisenhower signed the bill into law. The bill authorized $25 billion towards the construction of 41,000 miles of Interstates over a 10-year period.[61] The system was envisioned as a critical piece of national defense, and as such, some of the original funding costs were diverted from the defense budget. It also connected most U.S. Air Force bases directly to the system. The funding was put into the Highway Trust Fund that paid for 90% of highway construction costs and required states to pay the remaining 10 percent.[62] Fuel taxes are the main source of funding for the Fund. Coming out of WWII, the US economy was booming and the desire to expand into the suburbs and created better-connected regions was a major priority of decision-makers.

National Environmental Policy Act (1969)

Signed into law on Jan. 1, 1970, the National Environmental Policy Act (NEPA) tasked federal agencies with making real considerations to the environmental impacts of any proposed project. This includes decisions on permit applications, adopting federal land management actions, and constructing highways and other publicly-owned facilities. The most important aspect of NEPA is its requirement to produce an Environmental Impact Statement (EIS) before approving any project that falls under the scope listed above. These EIS reports have become an essential piece of regulation for maintaining proper environmental standards, and they serve as an accountability measure to local stakeholders.

U.S. Department of Transportation Act of 1966 - Section 4(f)

Section 4(f) of the U.S. Department of Transportation Act of 1966 mandates that a special effort must be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites...Section 4(f) applies to all historic sites, but only to publicly owned parks, recreational areas, and wildlife and waterfowl refuges. Any project that affects Section 4(f) land must include a Section (4f) assessment. A transportation program or project requiring the use of such land will be approved only if there is no prudent and feasible alternative to using that land and if the program or project includes all possible planning to minimize harm to the land or resources." [63]

The Section 4(f) compliance process is as

follows: first, the significance of the land in question must be determined through consultation with federal, state, or local officials having jurisdiction over the property, then alternatives to using the land must be considered and determined whether those alternatives are prudent or feasible, and finally, an evaluation must be prepared to determine whether the alternatives are worth any social, economic, or environmental impacts that they might cause.

Title VI of the Civil Rights Act and Environmental Justice

Executive Order 12898: "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."

In February of 1994 President Bill Clinton issued an executive order alongside a memorandum that indicated that Title VI of the Civil Rights Act passed in 1964 was an appropriate existing law that could help prevent "disproportionately high and adverse environmental effects" on minority and low-income populations. Title VI of the Civil Rights Act dictates that no person should be excluded from access to programs that receive federal funding on the basis of race, color, or national origin. The executive order directs federal agencies to "identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations, to the greatest extent practicable and permitted by law, develop a strategy for implementing environmental justice, and promote nondiscrimination in federal programs that affect human health and the environment, as well as provide minority and low-income communities access to public information and public participation."[64] While issued after the completion of the Vine Street Expressway and the Blue Route, the executive order clarifies the continuing obligations of agencies in nondiscrimination and protecting vulnerable communities from adverse impacts.

Due to the pandemic, we were unable to obtain from SEPTA the Title VI filings the system submitted with respect to the reconstruction of the Markef Frankford Line.

Three Alternatives for Vine Street Proposed in 1983 EIS

The No-Build Alternative is essentially the same as the existing roadway and street system except for provisions for previously approved access between Vine Street and I-95, and between I-95 and the Benjamin Franklin Bridge. Any construction on Vine Street for the No-Build Alternative would be limited to the repair and rehabilitation of existing lanes. Right-of-way (approximately 16 acres) previously acquired by the Department for the improvement of Vine Street would be disposed of in accordance with the provisions of Pennsylvania Legislative Act 100. This situation could also apply to the two build alternatives; however, the amount of potentially excess right-of-way is considerably less.65

The Modified Arterial, one of the two build alternatives developed by the Vine Street Task Force, would involve the reconstruction of Vine Street as an arterial highway, providing thirteen traffic lanes between 15th and 10thStreets to accommodate both through and local traffic at existing street level with direct connection to I-95 and the Benjamin Franklin Bridge. East of 10th Street, Vine Street is connected directly to I-95 by elevated limited access lanes while the westbound movement is accommodated by an improved Callowhill Street and an overpass at 7thStreet.[66]

The Scaled-Down Expressway Alternative was developed by the task force specifically to reduce negative impacts of the Full-Scale Expressway design while maintaining as many of its benefits as possible. Under this alternative, through traffic would be separated from local traffic by extending the existing depressed lanes on Vine Street eastward 0.8 mile from 17th Street to 9th Street. The expressway lanes would then be elevated to make direct connections with I-95 and the Benjamin Franklin Bridge. Access to Center City would also be possible at 15th-16th Streets and 7th and 8th Streets. This alternative is the only one that could be designated as part of the Interstate Highway System (I-676).[67]

Alternative: Chicago Transit Authority Red Line Reconstruction

In May 2013, the Chicago Transit Authority (CTA) embarked on a very similar project to the reconstruction of the Market Street Elevated on the CTA Red Line through the South Side of Chicago. The structural supports did not need to be replaced, but the CTA renovated 8 stations on the line and replaced the track beds and rails on a 10.2 mile stretch of the line (Chicago Transit Authority). The Red Line on the south side of Chicago also runs through predominantly Black neighborhoods on an elevated structure just as the Market Street Elevated does. The key differences in methods between the CTA and SEPTA on the reconstruction of these elevated lines were the construction timelines and efforts to spend project funds on local and Black-owned firms. Differing from the timeline used in the Market Street elevated construction, the CTA completed the Red Line project in 5 months by shutting the entire line down south of downtown to complete the project as fast as possible, as opposed to working nights and weekends. Speed of construction and limiting the duration

of impact on the neighborhoods were prioritized over keeping the line open for daily commuters. The project also explicitly included provisions to make sure jobs and spending were focused on the neighborhoods that relied on the Red Line. The CTA estimates that the project created 1,500 jobs, and of the $82.5 million in contracts awarded, an estimated $56.4 million was awarded to black-owned firms.[68]

There are several differences to note that does not allow for a one-to-one comparison of this project and the Market Street Elevated. The CTA was more easily able to shut down the entire section of the line due to the additional transportation options that were available in the area that were not available in the case of the Market Street Elevated. Red Line trains were diverted onto the Green Line, which runs a few blocks east of the Red Line towards downtown. The Green Line does not extend as far south as the Red Line, but the increased capacity and close proximity of the Green Line was able to make up for the closure of the Red Line for many communities on the near South Side. The areas near the Red Line are also served by two lines of the Metra commuter rail system. Though not a perfect replacement for rapid transit, these commuter rail lines would still allow residents to reach jobs in the central business district downtown via rail. The CTA also ran shuttle busses along the route and offered discounted fares and transfers on bus routes on the South Side.[69] The project was also different due to the routing of the Red Line through the submerged median of I-94 for much of its route on the South Side. While that comes with its own issues, it means that construction work was less likely to have as much of an immediate impact upon nearby businesses like the Market Street Elevated did due to distance and lack of elevated structures, but some sections of the route still contained elevated structures.

Overall, while not a perfect comparison, looking at this alternative is a useful way to study how another city and transit authority undertook a similar reconstruction project on an elevated rapid transit line. The differences in methods are clear and provide clear alternatives for how SEPTA and DVRPC could plan for any future renovation projects on rail lines and minimize impacts upon affected communities.

Census Tract Data

Vine Street Expressway

Figure 25 Vine Street corridor demographics, 1980

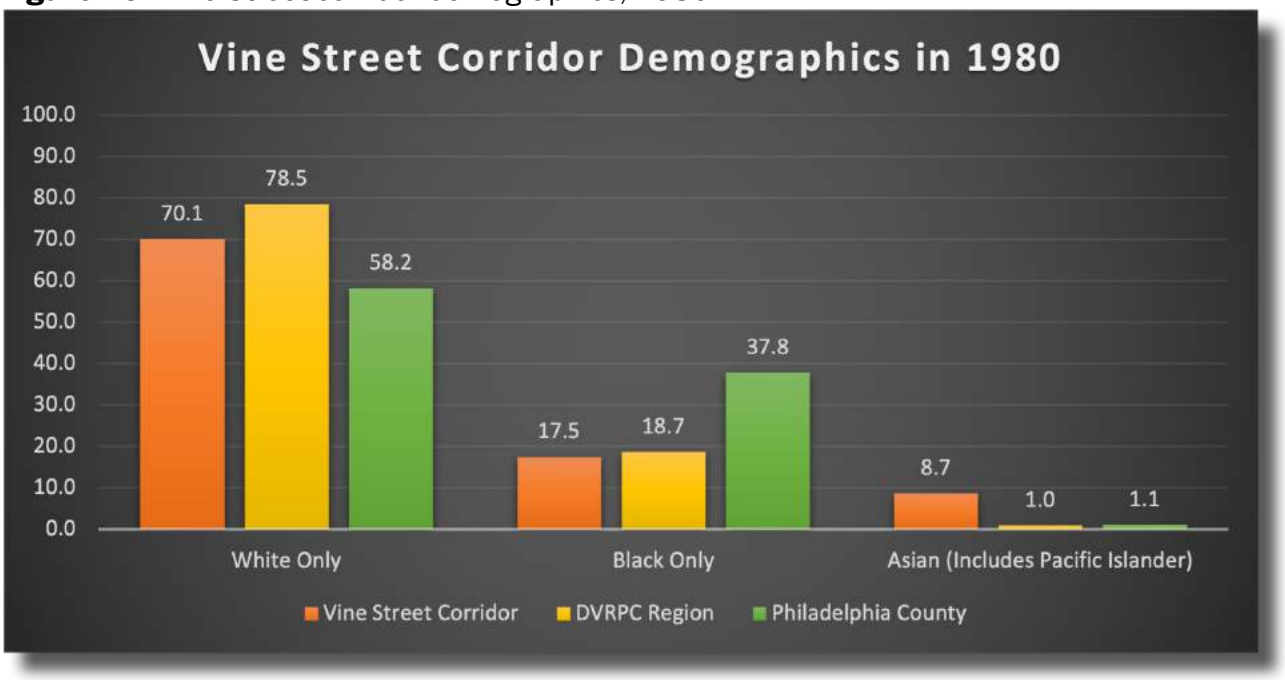


Figure 26 Vine Street corridor demographics, 2010

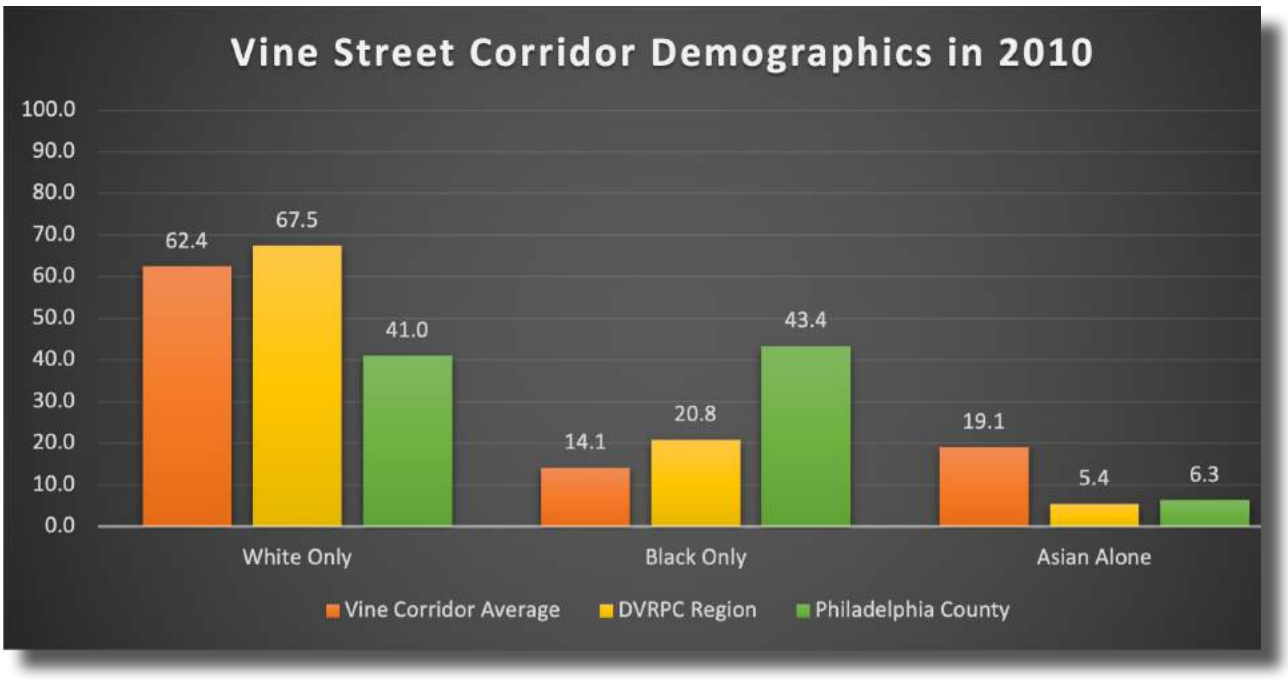


Figure 27 Vine Street corridor poverty levels, 1980

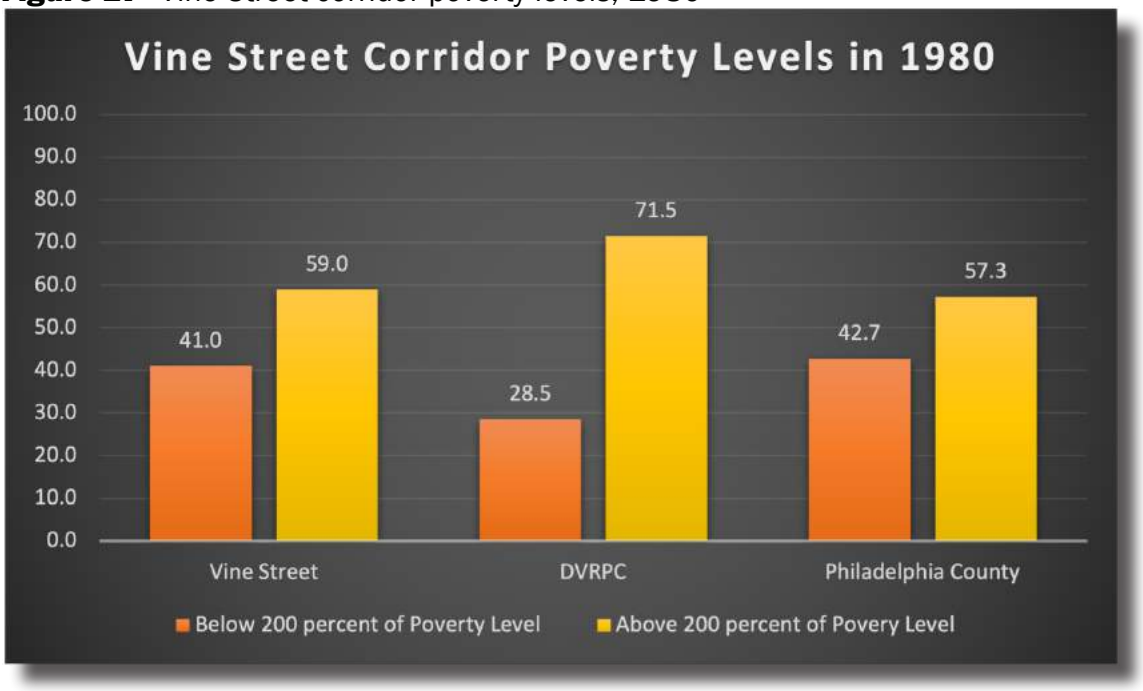


Figure 28 Vine Street corridor poverty levels, 2010

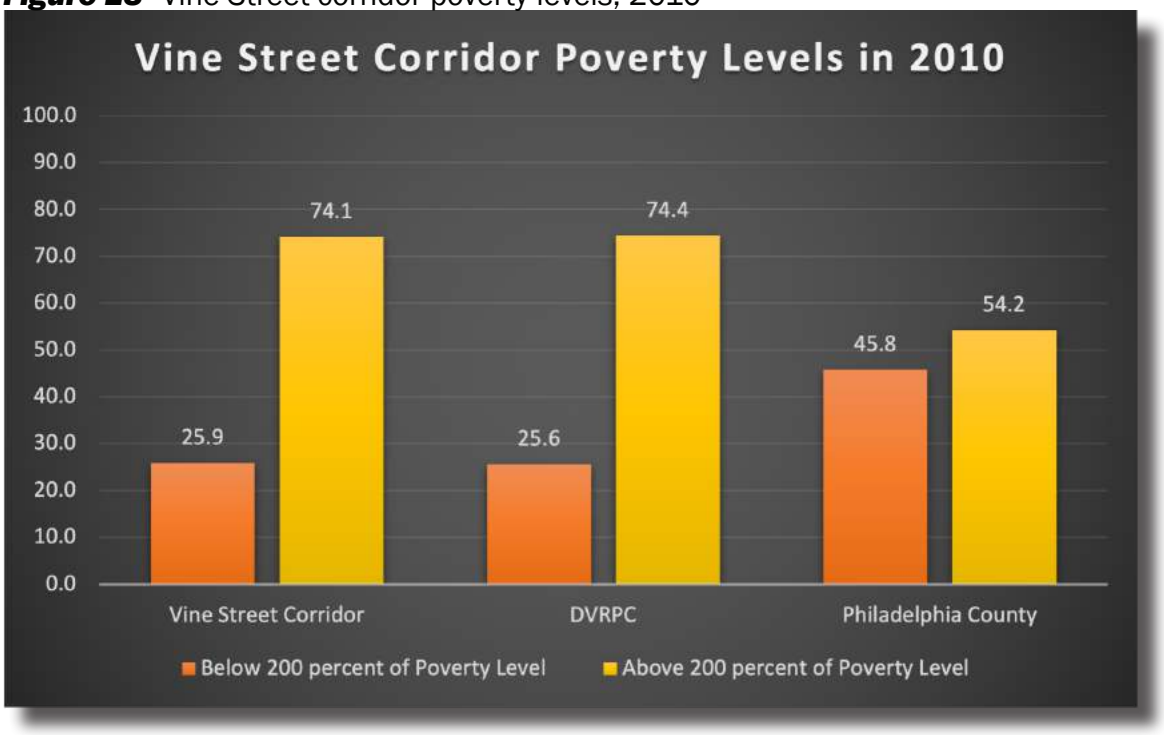
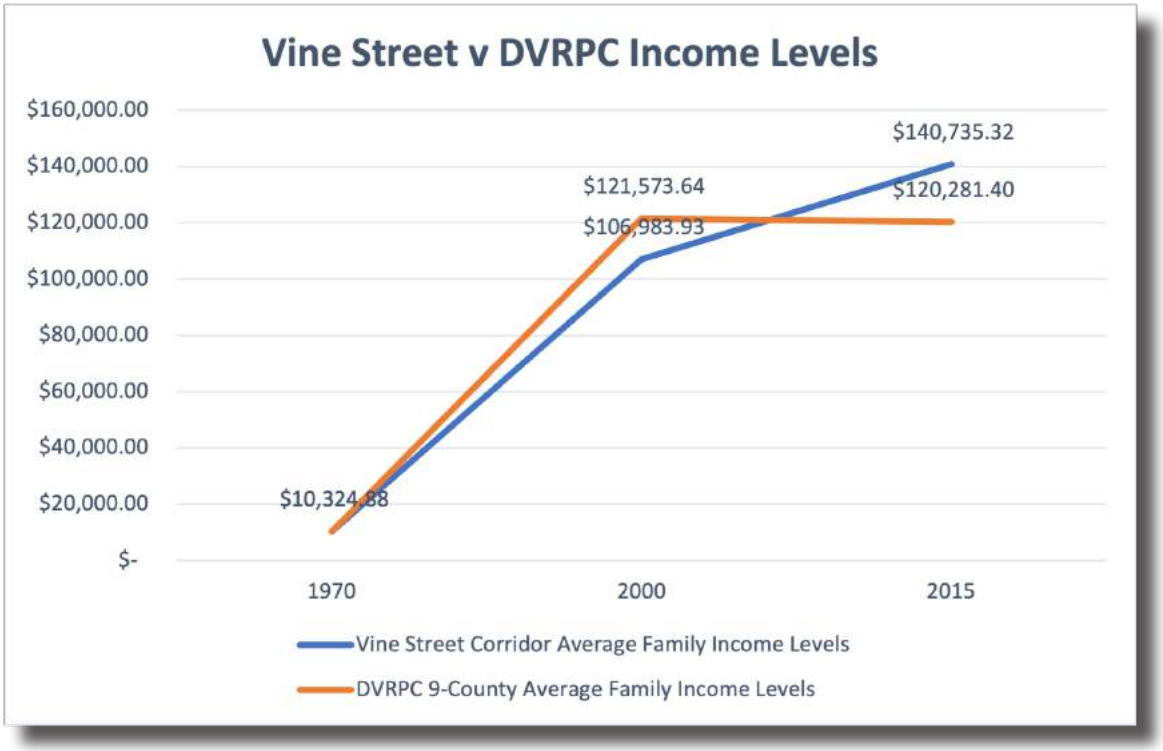


Figure 29 Vine Street corridor income versus DVRPC regional average



The Blue Route

Figure 30 Blue Route demographics, 1980

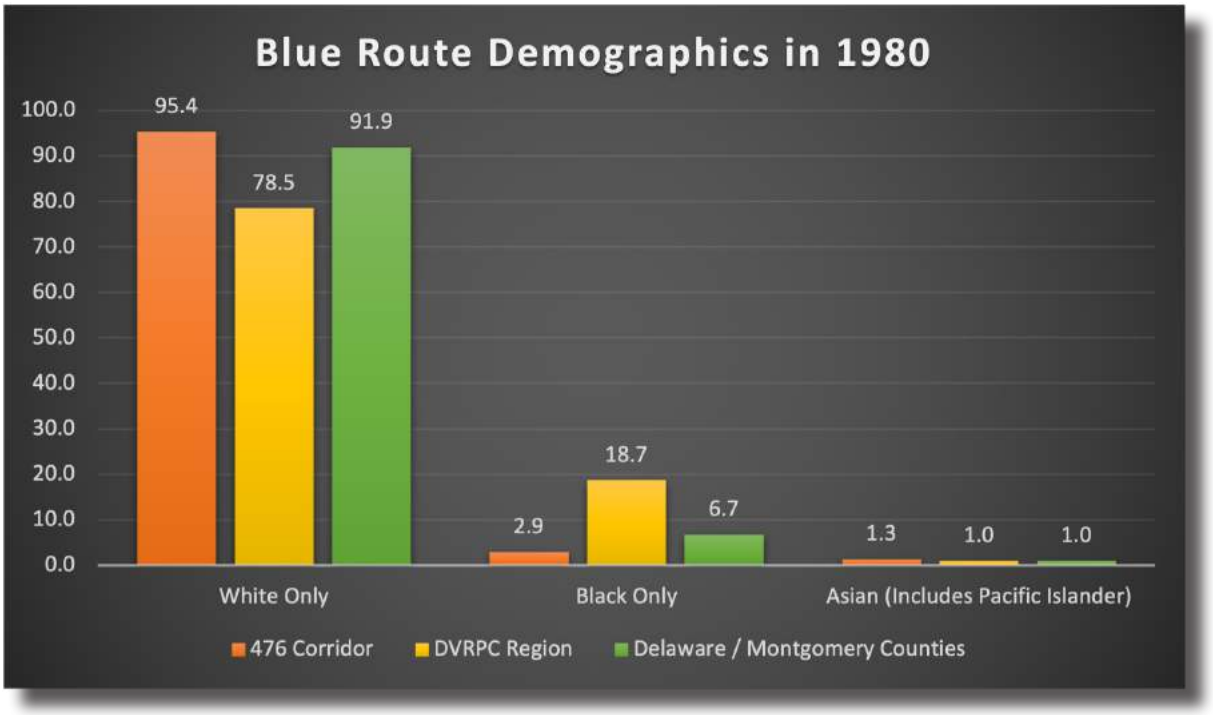


Figure 31 Blue Route demographics, 2010

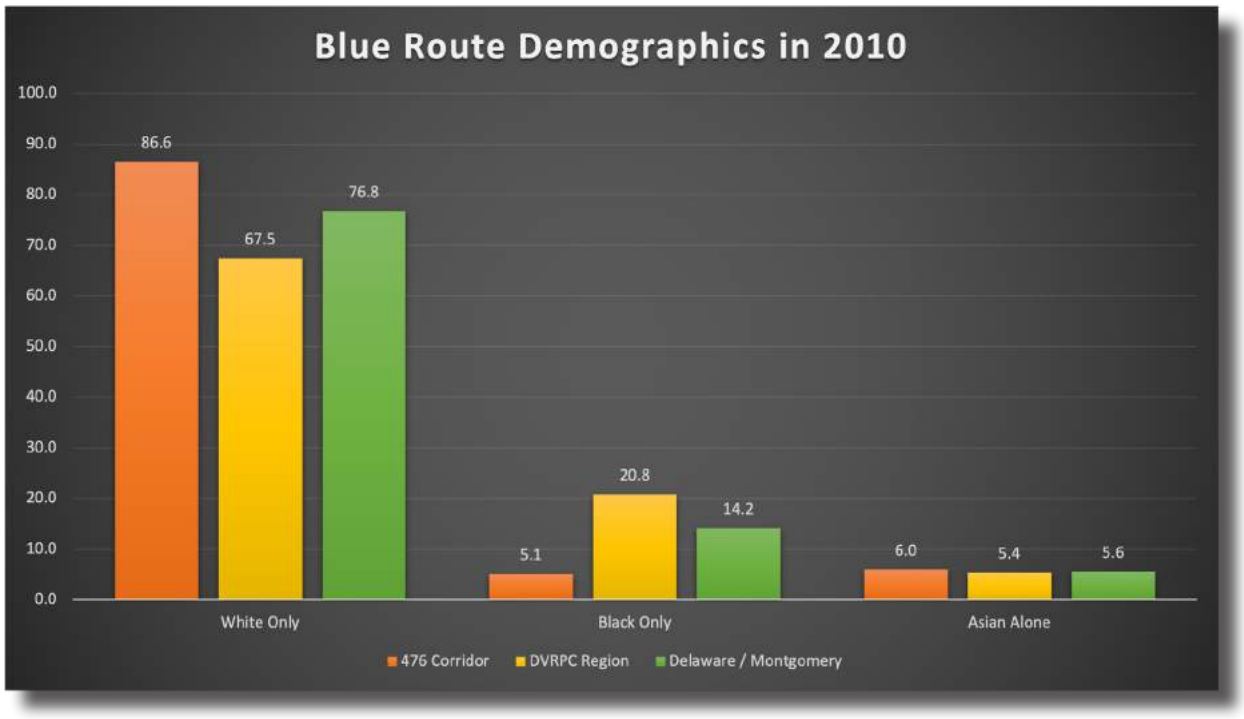


Figure 32 Blue Route poverty levels, 1980

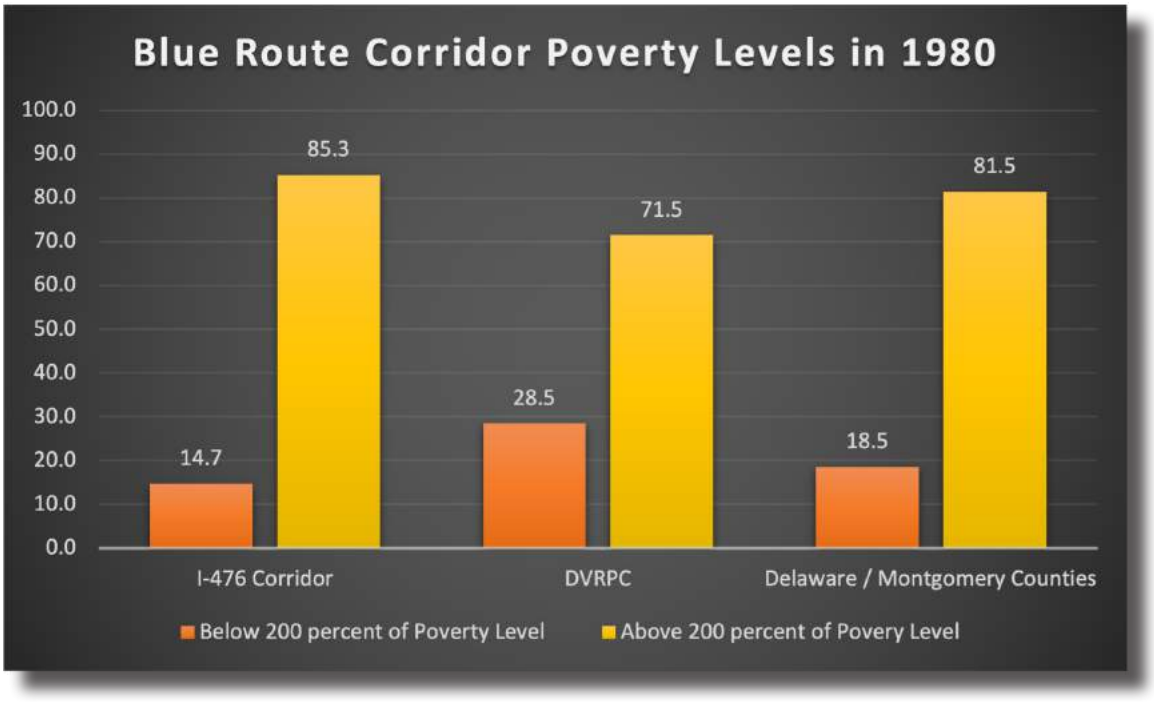


Figure 33 Blue Route poverty levels, 2010

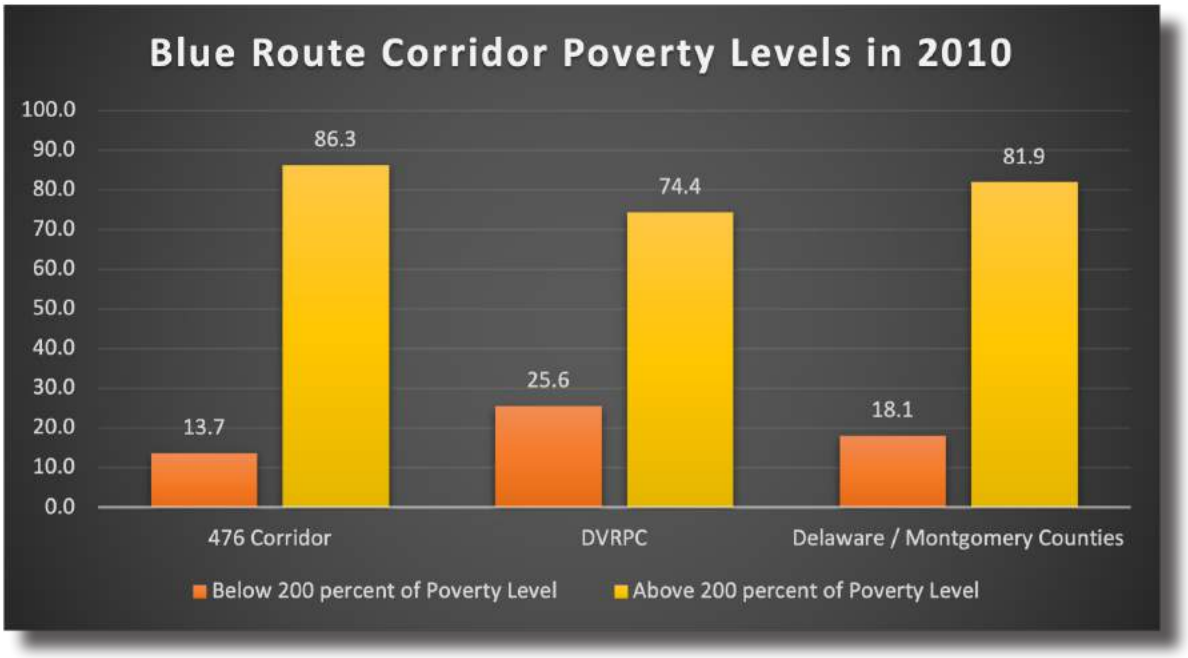


Figure 34 Blue Route income versus DVRPC regional average

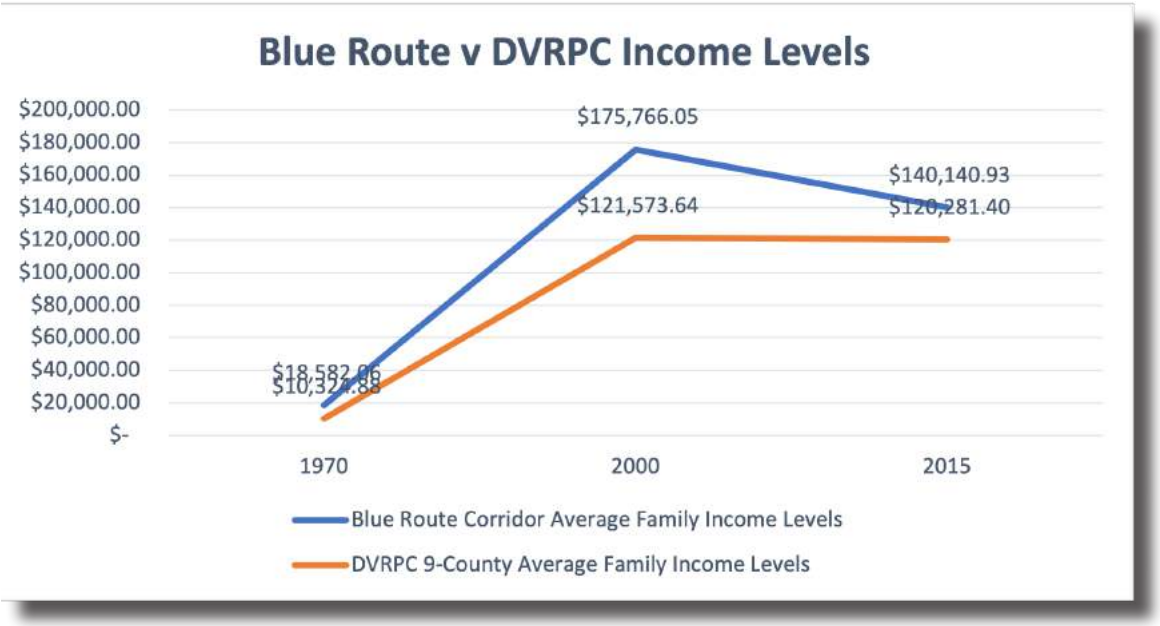


Figure 35 Market Street corridor demographics, 1980

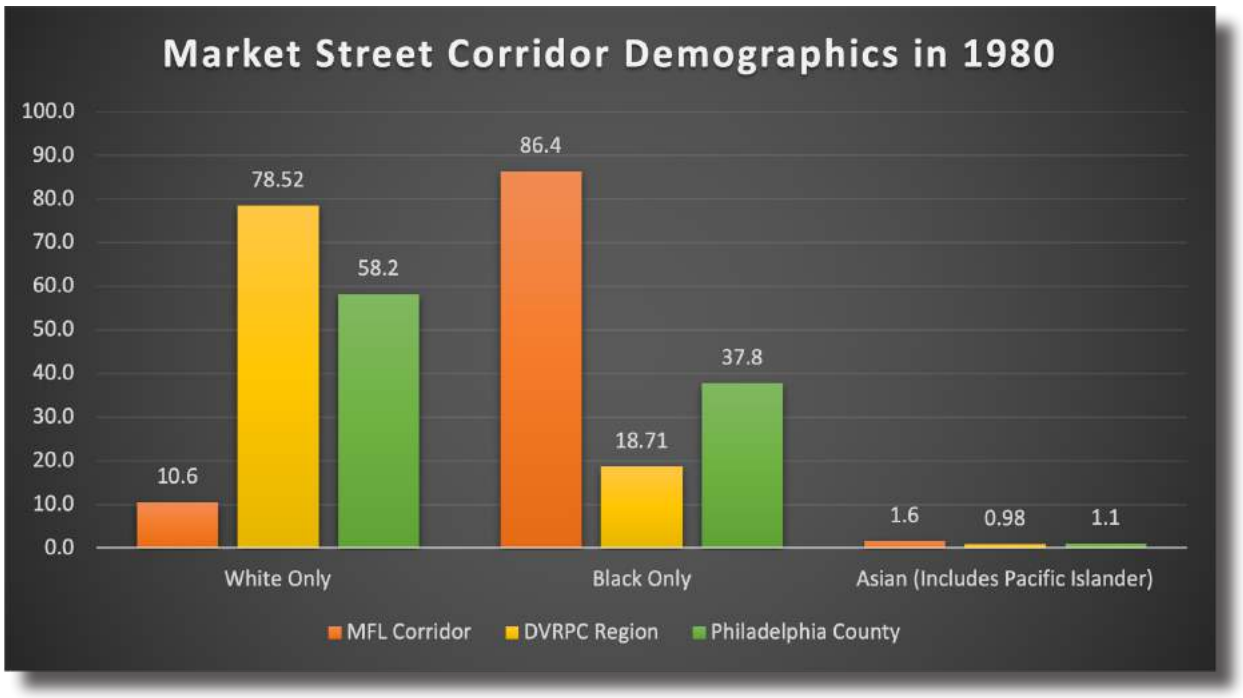


Figure 36 Market Street corridor demographics, 2010

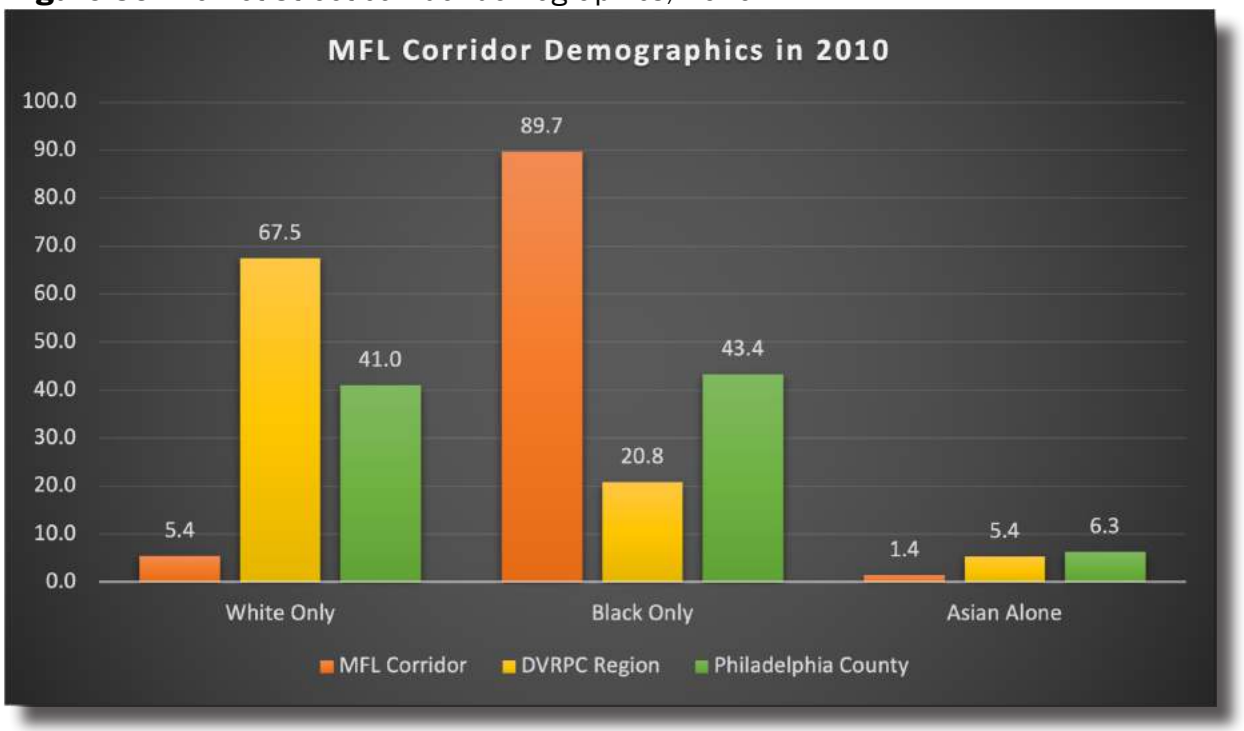


Figure 37 Market Street corridor poverty levels, 1980

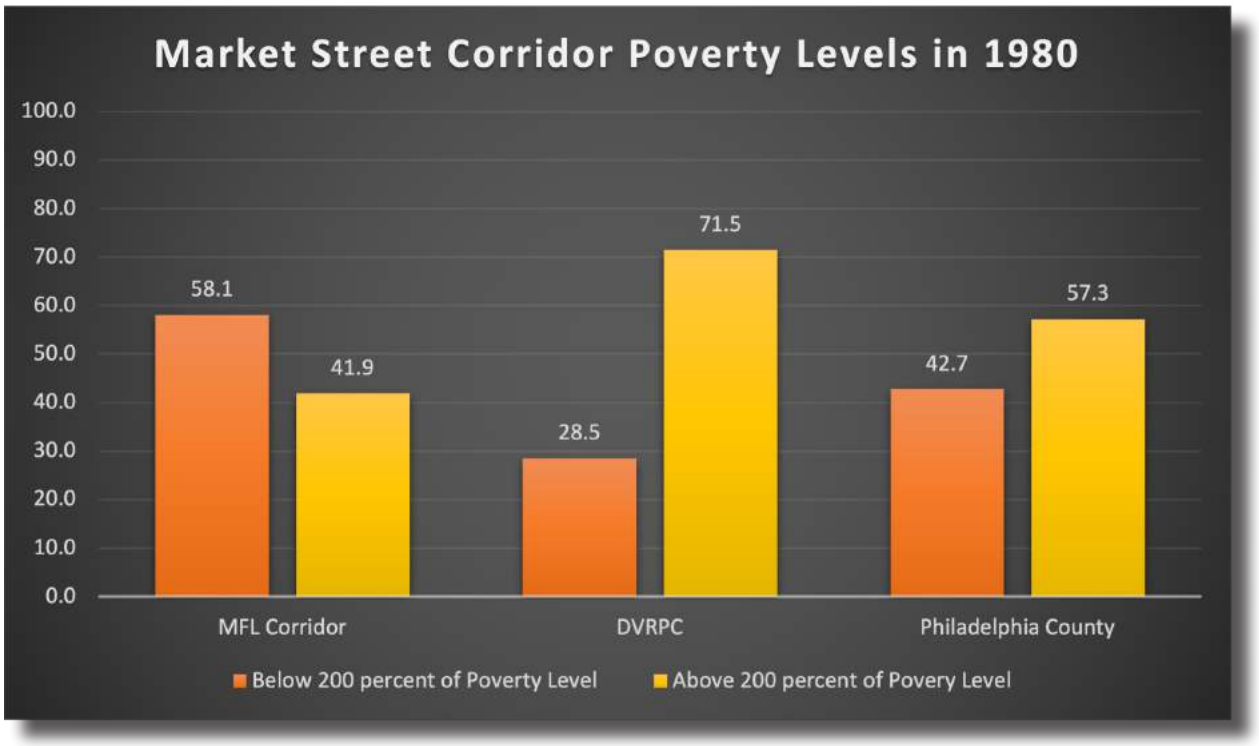


Figure 38 Market Street corridor poverty levels, 2010

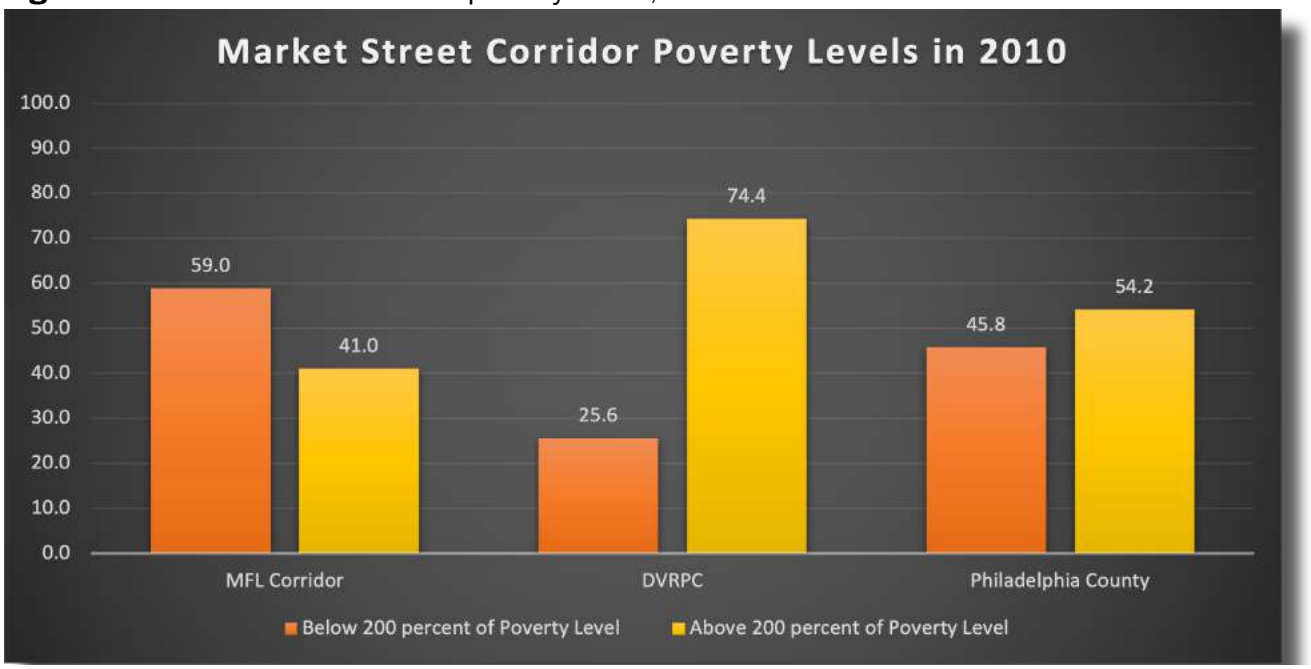


Figure 39 Market Street corridor income versus DVRPC regional average

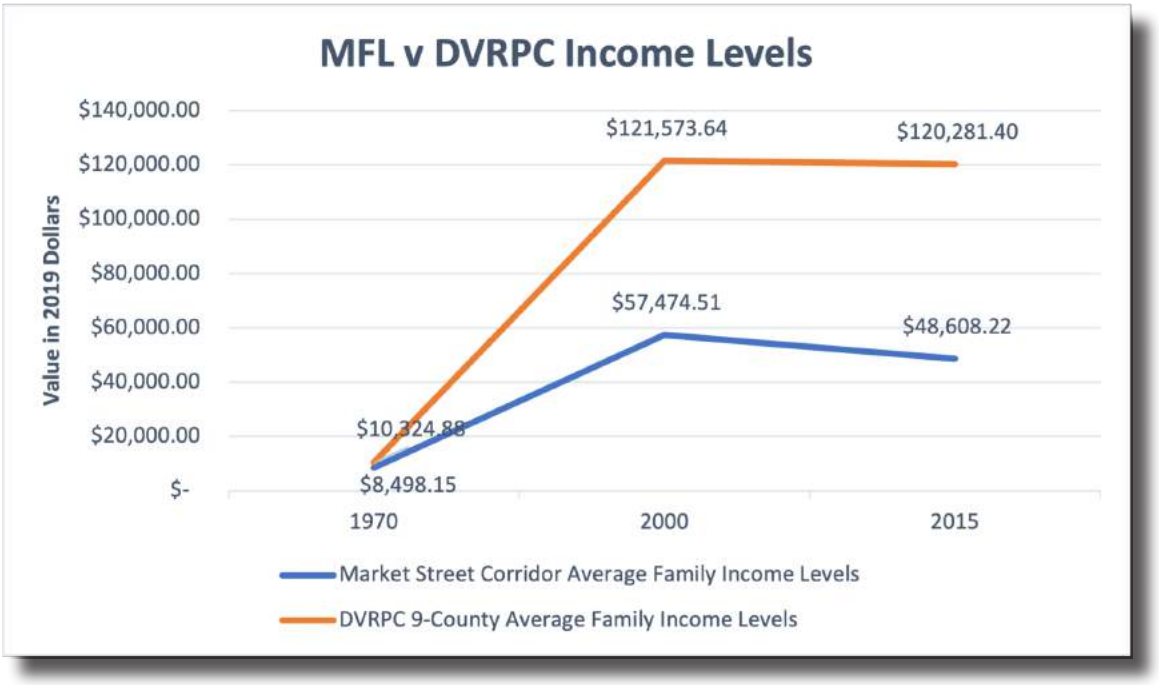


Figure 40 Walking and bicycling to work by income, 2008-2012. Source: Bloomburg News

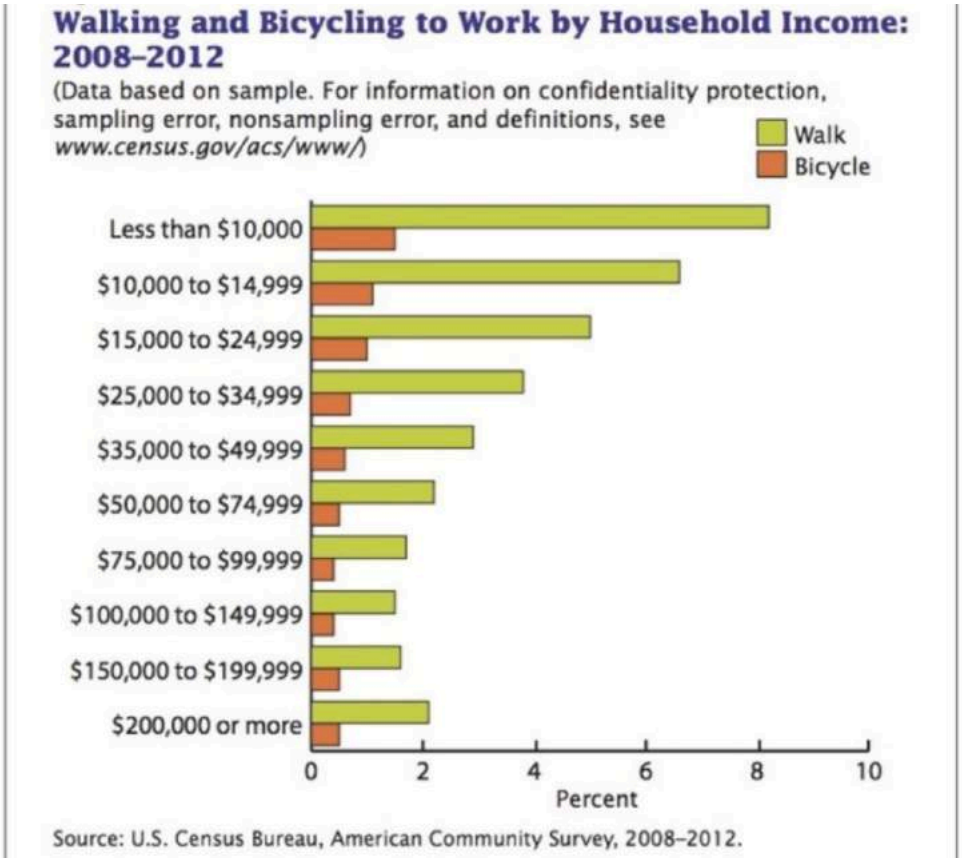
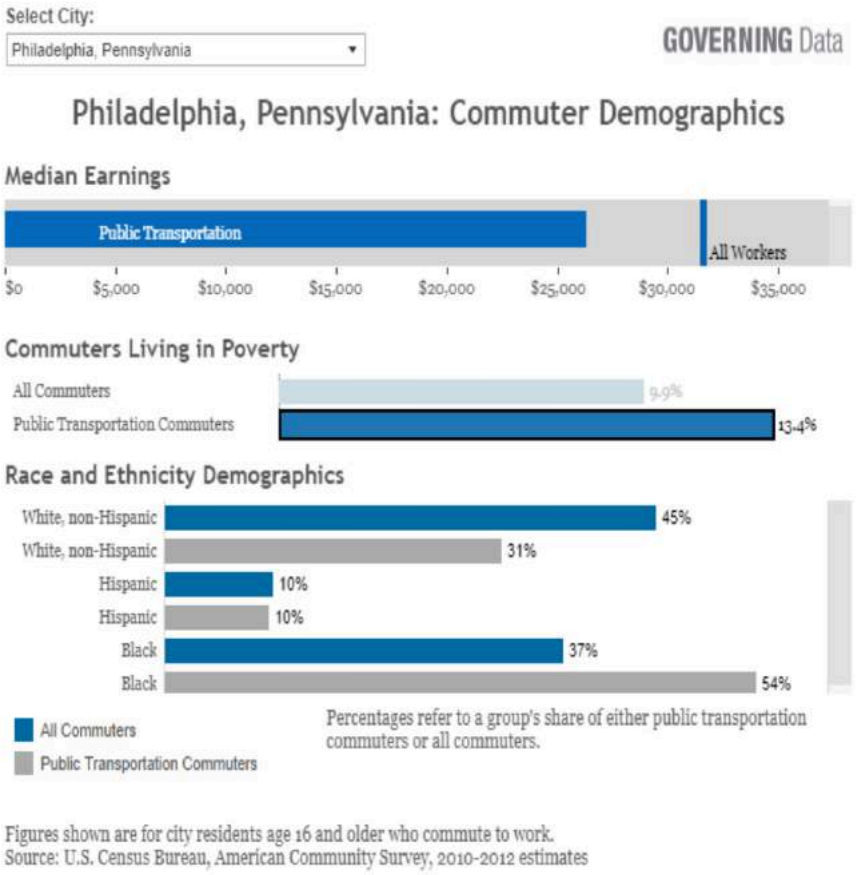


Figure 41 Philadelphia Commuter Graphics. Source: Governing.com



List of Interviewed Experts

Cecilia Yep, Founder of PCDC and “Godmother of Chinatown”

Yue Wu, Neighborhood Planning at PCDC

Jack Smyth, Civil Engineer for Vine Street with Chinatown and on Blue Route

Kevin O’Brien, Senior Program Manager for SEPTA, with PennDOT during Blue Route and Vine Street Expressway

Denise Goren, Former Deputy Mayor for Transportation for Philadelphia

John Grady, Former Executive Director of PIDC

John Chin, Executive Director of PCDC

Bill Hankowsky, Former Executive Director of PIDC and Chair of the Philadelphia Chamber of Commerce, Former Economic Development Official in Camden, NJ

Pat Killian, Former Commerce Director, Delaware County

Andrew Warren, Former District 6 Supervisor for PennDOT

Gordon Lindon, Former FTA Administrator

Beverly Harper, Founder and CEO of Portfolio Associates

Jesse Blizstein, Director of Community and Economic Development at The Enterprise Center

Donna Fabry, Senior Trails & Open Space Planner, Mongomery County Municipal Planning Commission

Brian Olszak , Senior Trails & Open Space Planner, Mongomery County Municipal Planning Commission

Joseph Syrnick, President & CEO, Schuylkill River Development Corporation

Blane Stoddart, President and CEO BFW Group LLC

Leslie Woo, CEO, CivicAction, Toronto ON

Annotated Bibliography

Vine Street Expressway

"Community Displacement." Blackbottom, April 22, 2009. https://theblackbottom.wordpress.com/communities/south-street-west/community-displacement/

This article discusses community displacement and its relation to the resisted Crosstown Expressway.

"Community Impact Mitigation: Case Studies." U.S. Department of Transportation/Federal Highway Administration, June 28, 2017. https://www.fhwa.dot.gov/livability/cia/community_impact_mitigation/cim_pa1.cfm.

This article discusses the preservation efforts from the Chinese community within Philadelphia and the mitigation, and negotiation processes.

Eastern Roadways. Vine Street Expressway (I-676 and US 30). Eastern Roads. Accessed April 14, 2021. http://www.phillyroads.com/roads/vine/.

This article gives the historical background around the progress of the Vine Street Expressway. The historical overview helped to inform the background and political history of the case study.

Heller, Gregory L. "Chapter 6. The Planner Versus the Automobile." Ed Bacon: Planning, Politics, and the Building of Modern Philadelphia, 2013, 149–70. https://doi.org/10.9783/9780812207842.149.

This chapter has helped to inform the relationship between planners and the highway projects that they develop. The chapter references specific Philadelphia projects.

Kitsko, Jeffrey J. Pennsylvania Highways: Interstate 676. Accessed April 14, 2021. https://www.pahighways.com/interstates/I676.html.

This article gives a historical overview of the construction of the Vine Street Expressway and also discusses contemporary events as well. This article helped to inform the impact of construction and allowed a better understanding of the construction process.

"National Interstate and Defense Highways Act (1956)." Our Documents - National Interstate and Defense Highways Act (1956). Accessed April 14, 2021. https://www.ourdocuments.gov/doc.php?flash=true&doc=88.

This article discusses the National Interstate and Defense Highways Act (1956) and gives the political history of the act. This article helped to inform the relevant legislation portion of the Vine Street Expressway case study.

Office of Research, Development, and Technology, and Office of Corporate Research, Technology, and Innovation Management. "Federal-Aid Highway Act of 1956: Creating The Interstate System." U.S. Department of Transportation/Federal Highway Administration, January 31, 2017. https://www.fhwa.dot.gov/publications/publicroads/96summer/p96su10.cfm.

This article discusses the Federal-Aid Highway Act of 1956 and gives the political history of the act. This article helped to inform the relevant legislation portion of the Vine Street Expressway case study

Patrick Glennon, For the Inquirer. "How Chinatown Rallied When Development Threatened to Divide the Neighborhood: Philly History." https://www.inquirer.com. The Philadelphia Inquirer, February 22, 2018. https://www.inquirer.com/philly/opinion/commentary/chinatown-church-holy-redeemer-vine-street-expressway-urban-renewal-philly-history-20180222.html.

This article discusses the strategies and advocacy methods that the Chinese community used in order to preserve their community. It also gave an overview of key issues that the Chinese community had and the negotiations that were conducted.

PhiaGeoHistory.org. "Map of Vine Street Expressway 1942." Map. Greater Philadelphia GeoHistory Network. Philadelphia, 2021.

The purpose of the Greater Philadelphia GeoHistory Network is to gather geographic materials useful for the study of historic Philadelphia and its region. This website holds an interactive map of Philadelphia at different points in history in order to understand the change and development around Vine Street.

Shank, Patrick. “Holy Redeemer Chinese Catholic Church.” Catholic Historical Research Center of the Archdiocese of Philadelphia, September 16, 2019. https://chrc-phila.org/holy-redeemer-chinese-catholic-church/.

This article gives a historical overview of the Holy Redeemer Chinese Catholic Church and its relevance to the Vine Street Expressway resistance from the Chinese community.

Smith, Steven. “Cecilia Moy Yep.” The Philadelphia Award, 2020.

https://www.philadelphiaaward.org/winners/cecilia-moy-yep/.

This article is a bibliography of Cecilia Moy Yep, one of the most influential activists and negotiators in resistance to the Vine Street Expressway construction.

Tenenbaum, Jeremy Eric, Edward Fidler, Tony Aloi, Richard Pain, Len Davidson, Rosemarie Fabien, Francis W. Hoeber, et al. “Saving South Street Through the Lens of Denise Scott Brown.” Hidden City Philadelphia, February 4, 2020.https://hiddencityphila.org/2020/02/saving-south-street-through-the-lens-of-denise-scott-brown.

This article helped to inform the resistance of crosstown expressway from potentially impacted communities and how they were able to defeat the construction of this alternative.

U.S. District Court for the Eastern District of Pennsylvania. “Vine Street Concerned Citizens, Inc. v. Dole, 630 F. Supp. 24 (E.D. Pa. 1985).” Justia Law. Accessed April 13, 2021. https://law.justia.com/cases/federal/district-courts/FSupp/630/24/2311984/.

This is a court case that involved the Plaintiff Vine Street Concerned Citizens, Inc. (“Concerned Citizens”) who aimed to enjoin construction of the Vine Street Transportation Improvements Project (“Vine Street Expressway” or “Expressway”) until defendants Elizabeth H. Dole, Secretary of Transportation of the United States, and Thomas Larson, Secretary of Transportation of the Commonwealth of Pennsylvania, prepared a Supplemental Environmental Impact Statement (“SEIS”) to the Vine Street Final Environmental Impact Statement (“VSFEIS” or “FEIS”).

Weingroff, Richard F. “Federal-Aid Highway Act of 1956: Creating The Interstate System.” U.S. Department of Transportation/Federal Highway Administration, January 31, 2017. https://www.fhwa.dot.gov/publications/publicroads/96summer/p96su10.cfm.

This article discusses the Federal-Aid Highway Act of 1956 and gives the political history of the act. This article helped to inform the relevant legislation portion of the Vine Street Expressway case study.

Yee, Mary. Encyclopedia of Greater Philadelphia, 2015. https://philadelphiaencyclopedia.org/archive/vine-street-expressway/.

This article is an encyclopedic story of Cecilia Moy Yep, one of the most influential activists and negotiators in resistance to the Vine Street Expressway construction.

Market Frankford Reconstruction

Welles, Elaine. “SEPTA’s New Fleet of Buses Surprise to Riders: More Modernized Vehicles and Renovations to Market El Platforms on the Way.” Philadelphia Tribune, Nov 30, 2001. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/septas-new-fleet-buses-surprise-riders-more/docview/337823701/se-2?accountid=14270.

This article discusses the fleet of buses SEPTA uses to partner with businesses in the impacted corridors of the Market Frankford Elevated Reconstruction. This helped to inform the efforts that SEPTA took to mitigate the impacts.

“SEPTA Facelift Causing Uproar; Business Owners, Residents Voice Concerns Over Labor Contracts.” 2003. Philadelphia Tribune, Apr 18. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/septa-facelift-causing-uproar-business-owners/docview/337816025/se-2?accountid=14270

This newspaper article details the public hearings and comments from community members and stakeholders about the impact that the Market Frankford Elevated had on the corridor’s community.

Lewis, Monica. 2003. “West Philadelphia Still in the Dark Near the El.” Philadelphia Tribune, Aug 05. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/west-philadelphia-still-dark-near-el/docview/337825500/se-2?accountid=14270.

This article details personal encounters and other qualitative data that discusses the impact that the Market Frankford Line reconstruction had on the West Philadelphia community.

“A SEPTA Shame Hurts West Phila.” 2005.Philadelphia Tribune, Mar 25. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/septa-shame-hurts-west-phila/docview/337763265/se-2?accountid=14270.

This article details personal encounters and other qualitative data that discusses the impact that the Market Frankford Line reconstruction had on the West Philadelphia community. This article also discusses the impacts the community faced as a result of the length in time of the reconstruction.

Toomer, Regan. 2006. “SEPTA CONSTRUCTION: It’s a Hassle for Commuters.” Philadelphia Tribune, Aug 11, 1.http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/septa-construction-hassle-commuters/docview/337821043/se-2?accountid=14270.

This article details personal encounters and other qualitative data that discusses the impact that the Market Frankford Line reconstruction had on commuters who depend on the corridors.

Hightower, Robert. 2007. “A Bittersweet Opening.” Philadelphia Tribune, Jun 19, 2-1A,4A. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/bittersweet-opening/docview/337852444/se-2?accountid=14270.

This article details personal encounters and other qualitative data that discusses the impact that the Market Frankford Line reconstruction had on business owners within the West Philadelphia community.

Hightower, Robert. 2007. “SEPTA Opens 56th St. Station.” Philadelphia Tribune, Nov 02, 2-1B,2B. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/septa-opens-56th-st-station/docview/337780549/se-2?accountid=14270.

This article discusses the reopening of the 56th St. Station, one of the main corridors in the reconstruction. This article details personal accounts and reactions from commuters and business owners.

Mayes, Eric. 2007. “El Closed Until Aug. 27 between 40th and 69th.” Philadelphia Tribune, Aug 14, 1.http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/el-closed-until-aug-27-between-40th-69th/docview/337772934/se-2?accountid=14270.

This article discusses the closure of the Market Street Elevated between 40th and 69th Street. The article also discusses potential impacts to commuters.

Mayes, Eric. 2008. “SEPTA Project Set to Finish, at Price for Area in W. Phila.” Philadelphia Tribune, Dec 12, 2-1B,2B. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/septa-project-set-finish-business owner-w-phila/docview/337777504/se-2?accountid=14270.

This article discusses the final stages of the Market Frankford Elevated reconstruction and gauges community and business owner opinions. The article also provides an analysis of the cost of the project and discusses why it went over the projected cost.

Creger, H., Espino, J., & Sanchez, A. S. “Mobility equity framework: Making transportation work for people, November 20, 2019. https://greenlining.org/publications/2018/mobility-equity-framework/

This article helped to inform the equity frameworks that can be used for transportation projects and it better informed the analysis of the Market Frankford Elevated case study.

Mitchel, Bruce. “Philadelphia and Business Disinvestment “ NCRC.” NCRC, October 1, 2018. https://ncrcenvironmentorg/philadelphia-and-business-disinvestment/.

This article gives a historical overview of business development within Philadelphia and how it relates to the current business environment in certain Philadelphia communities.

Von Hoffman, A. . The ingredients of equitable development planning, 2019Retrieved March 30, 2021. https://www.jchs.harvard.edu/sites/default/files/Harvard_JCHS_Ingredients_Equitable_Development_Planning.pdf

This article provides a guideline to readers on equitable development in planning projects. This helped to inform analysis and policy recommendations

The Blue Route

Jones, Samuel H., and Daniel Erian Armanios. “Methodological Framework and Feasibility Study to Assess Social Equity Impacts of the Built Environment.” Journal of Construction Engineering and Management 146, no. 11 (2020): 05020016. https://doi.org/10.1061/(asce)co.1943-7862.0001914.

This source discusses equity issues in transportation infrastructure. It argues that site selection impacts on equity outweigh treatment effects. It also provides suggestions on how to shorten business disruption from transportation projects.

Vuchic, Vukan R., Chandler, Carl, Davis, William K., Smyth, Jack, and Weber, Peter. “Report on Interstate 476 (The Blue Route).” Transportation Advisory Committee. February 1979.

This is a comprehensive report on the Blue Route construction and an analysis of its current and projected impacts.

Anderson, Steve. “Veterans Memorial Highway Pennsylvania Turnpike Northeast Extension.” Pennsylvania Highways. Updated March 12, 2021. https://www.pahighways.com/interstates/I476.html

This article gives a historical overview of the construction of the Blue Route. This article helped to inform the impact of construction and allowed a better understanding of the construction process.

Reynolds, Kenneth W. “The Blue Route: Past, Present, and Future.” Middle States Geographer 30 (1997): 124-134. https://citeseerx.ist.psu.edu/viewdoc/dow

nload?doi=10.1.1.520.5778&rep=rep1&type=pdf

This is a comprehensive historical overview of the Blue Route. The author presents an analysis of the Blue Route construction in the “Past, Present, and Future.”

Wyatt, James J. “Blue Route.” The Encyclopedia of Greater Philadelphia. Rutgers University, 2016. https://philadelphiaencyclopedia.org/archive/blue-route/

This is an Encyclopedia source that gives a historical overview of the Blue Route and key figures in the negotiation process.

"Summary of the National Environmental Policy Act." The United States Environmental Protection Agency. Updated August 15, 2019. https://www.epa.gov/laws-regulations/summary-national-environmental-policy-act

This article discusses the Environmental Policy Act (1969). This article helped to inform the relevant legislation portion of the Blue Route case study.

Dodds, Peter J. and Sternberger, R Scott. "The Evolution of an Environmental Monitor." Civil Engineering 62, no. 6 (June 1992): 56.

http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/scholarly-journals/evolution-environmental-monitor/docview/228416494/se-2?accountid=14270

This article discusses the environmental impacts of the Blue Route and also detailed an analysis/ recommendations on how to monitor environmental impacts.

Wallace, David. "New Marriott near I-476 aims to carve a market." Philadelphia Business Journal 10, no. 40 (1991) Gale General OneFile ,April 11, 2021). https://link.gale.com/apps/doc/A11787171/ITOF?u=temple_main&sid=ITOF&xid=580bdabf.

This article discusses the economic development and job growth that was anticipated by business owners as a result of the Blue Route completion.

"Montco designates two enterprise zones." The Morning Call, January 22, 1987. https://www.mcall.com/news/mc-xpm-1987-01-22-2566955-story.html

This article discusses development as a result of the Blue Route construction. The Montgomery County commissioners announced that the boroughs of Conshohocken and West Conshohocken were designated as Enterprise Zones.

Haumann, Sebastian. "Crosstown Expressway." Encyclopedia of Greater Philadelphia. Accessed April 14, 2021. https://philadelphiaencyclopedia.org/archive/crosstown-expressway.

This article is an encyclopedic overview of the Crosstown Expressway and the resistance to its construction.

"Draft Environmental Impact Statement and Section 4(f) Statement for Mid-County Expressway LR-1010, I-476 from I-95 to I-76, Delaware & Montgomery Counties." Prepared in cooperation with the Department of Transportation, Federal Highway Administration, Region III and Prepared for the Pennsylvania Department of Transportation by McCormick, Taylor & Associates, Inc. with Villanova University Transcentury Corporation, February 1976. https://hdl.handle.net/2027/ien.35556030803647

This source, prepared in accordance with the National Environmental Policy Act (NEPA), analyzes potential environmental impacts of projects and their alternatives. This aided in the analysis on the "in environmental" equity category.

"Final Environmental Impact Statement for I-0476, L.R. 1010, Mid-County Expressway from Ridge Pike to Pennsylvania Turnpike, Montgomery County, Pennsylvania." U.S. Department of Transportation, Federal Highway Administration, Pennsylvania Department of Transportation, and Pennsylvania Turnpike Commission. December 1983. https://hdl.handle.net/2027/ien.35556030149710

This source, prepared in accordance with the National Environmental Policy Act (NEPA), analyzes potential environmental impacts of projects and their alternatives. This aided in the analysis on the "in environmental" equity category.

"Section 4(f) Overview." U.S. Department of Transportation Federal Highway Administration.

https://www.environment.fhwa.dot.gov/env_topics/4f_tutorial/overview.aspx?h=e#h

This source is a general overview of the statute known as Section 4(f). This source refers to the original section within the U.S. Department of Transportation Act of 1966 which provided for consideration of park and recreation lands, wildlife and waterfowl refuges, and historic sites during transportation project development.

"23 U.S. Code § 138 - Preservation of parklands." Legal Information Institute - Cornell Law School.

https://www.law.cornell.edu/uscode/text/23/138#:~:text=After%20the%20effective%20date%20of,and%20waterfowl%20refuge%20of%20national

This is a national policy developed by The Secretary of Transportation which declares that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites.

Larson, Thomas D. “Overview of Departmental Recommendations on the Blue Route (Interstate 476).” Office of Secretary of Transportation, Commonwealth of Pennsylvania. Prepared by Boles, Smyth Associates, Inc. in association with the Delta Group, Inc, April 1984.

This report, prepared by Boles, Smyth Associates, Inc. in association with the Delta Group, Inc. (both located in Philadelphia), was published by Pennsylvania Secretary of Transportation, Thomas D. Larson. The report was created by a task force in response to the Final EIS/4(f)

data.census.gov. Accessed April 14, 2021. https://data.census.gov/cedsci/table?q=DP04+Chester+city%2C+pa&g=0500000US42101&tid=ACSDP5Y2019.DP04&hidePreview=false.

This source provides census data about the city of Chester.

data.census.gov. Accessed April 14, 2021. https://data.census.gov/cedsci/table?q=DP04+philadelphia%2C+PA&g=0500000US42101&tid=ACSDP5Y2019.DP04&hidePreview=false.

This source provides census data about the city of Philadelphia, used when analyzing the city of Chester.

“QuickFacts Chester City, Pennsylvania.” United States Census Bureau, n.d. https://www.census.gov/quickfacts/fact/table/chestercitypennsylvania/PST045219.

This source provides quick facts about the city of Chester based off of US Census data.

Downs, Anthony. “Still Stuck in Traffic: Dealing with Peak-Hour Traffic Congestion.” (103-107). Brookings Institution Press, Washington, D.C. 2004.

This source informs the debate of whether adding lanes on highways improves, exacerbates, or has no effect on traffic congestion.

Additional

Hodges, Tina. “Public Transportation’s Role in Responding to Climate Change.” U.S. Department of Transportation/Federal Transit Administration, January 2010.

This source is a journal article that presents arguments surrounding public transportation’s role in responding to climate change.

Islam, Nazrul, and John Winkel. “Climate Change and Social Inequality.” UN Department of Economic and Social Affairs (DESA) Working Papers, 2017. https://doi.org/10.18356/2c62335d-en.

This source is a journal article that offers a unifying conceptual framework for understanding the relationship between climate change and social inequalities.

Delaware Valley Regional Planning Commission. “Delaware Valley Regional Planning Commission Board Committee.” DVRPC, July 24, 2014. https://www.dvrpc.org/.

This source is official minutes from the Delaware Valley Regional Planning Commission Board Committee.

“CTA Red Line South Reconstruction Project.” CTA. Accessed April 14, 2021. https://www.transitchicago.com/redsouth/.

This source gives a historical overview of the CTA Red Line South Reconstruction project. This reconstruction project is noted as one of the alternatives to the Market- Frankford reconstructions.

Adams, Carolyn T.. From the Outside In : Suburban Elites, Third-Sector Organizations, and the Reshaping of Philadelphia. Ithaca: Cornell University Press, 2014. Accessed April 14, 2021. ProQuest Ebook Central.

This book addresses the role of suburban elites in setting development agendas for urban municipalities and their larger metropolitan regions. The book also shows how major nongovernmental, nonmarket institutions are taking responsibility for reshaping Philadelphia.

Brennan, C. . Urban warrior: 'I can't take it much longer',2007, November 2Retrieved March 01, 2021, from https://www.inquirer.com/philly/hp/news_update/20071126_Urban_Warrior___I_CANT_TAKE_IT_MUCH_LONGER.html

This article provides personal accounts from community members and business owners on the impacts of the Market Frankford Elevated Reconstruction on the West Philadelphia business sector.

"Public Participation Plan." Pennsylvania Department of Transportation, 2020, www.penndot.gov/ProjectAndPrograms/Planning/Pages/Public-Participation-Plan.aspx.

The PennDOT Public Participation Plan 2020 was used to see the initiatives that the transportation agency plans on implementing in the near future. We were able to compare these initiatives to the requirements in federal laws such as EIS and Title VI.

Endnotes

1 "Community Impact Mitigation: Case Studies." U.S. Department of Transportation/Federal Highway Administration, June 28, 2017. https://www.fhwa.dot.gov/livability/cia/community_impact_mitigation/cim_pa1.cfm.

2 Haumann, Sebastian. "Crosstown Expressway." Encyclopedia of Greater Philadelphia. Accessed April 14, 2021. https://philadelphiaencyclopedia.org/archive/crosstown-expressway.

3 *Ibid*

4 Yee, Mary. 2012. The Save Chinatown Movement. The Historical Society of Pennsylvania Legacies. Vol. 12, No. 1, pages 24-30.

https://philadelphiaencyclopedia.org/archive/vine-street-expressway/

5 Jones, Samuel H., and Daniel Erian Armanios. "Methodological Framework and Feasibility Study to Assess Social Equity Impacts of the Built Environment." *Journal of Construction Engineering and Management* 146, no. 11 (2020): 05020016. https://doi.org/10.1061/(asce)co.1943-7862.0001914.

6 Wyatt, James J. "Blue Route." The Encyclopedia of Greater Philadelphia. Rutgers University, 2016. https://philadelphiaencyclopedia.org/archive/blue-route/

7 Refer to "Census Tract Data" in the Appendix

8 Reynolds, Kenneth W. "The Blue Route: Past, Present, and Future." *Middle States Geographer* 30 (1997): 124-134.

9 Wyatt, James J. "Blue Route." The Encyclopedia of Greater Philadelphia. Rutgers University, 2016. https://philadelphiaencyclopedia.org/archive/blue-route/

10 Draft Environmental Impact Statement and Section 4(f) Statement for Mid-County Expressway LR-1010, I-476 from I-95 to I-76, Delaware & Montgomery Counties." *Prepared in cooperation with the Department of Transportation, Federal Highway Administration, Region III and Prepared for the Pennsylvania Department of Transportation by McCormick, Taylor & Associates, Inc. with Villanova University Transcentury Corporation,* February 1976. https://hdl.handle.net/2027/ien.35556030803647

11 *Ibid*

12 Larson, Thomas D. "Overview of Departmental Recommendations on the Blue Route (Interstate 476)." Office of Secretary of Transportation, Commonwealth of Pennsylvania. Prepared by Boles, Smyth Associates, Inc. in association with the Delta Group, Inc, April 1984.

13 Vuchic, Vukan R., Chandler, Carl, Davis, William K., Smyth, Jack, and Weber, Peter. "Report on Interstate 476 (The Blue Route)." Transportation Advisory Committee. February, 1979.

14 Vuchic, Vukan R., Chandler, Carl, Davis, William K., Smyth, Jack, and Weber, Peter. "Report on Interstate 476 (The Blue Route)." Transportation Advisory Committee. February, 1979.

15 Anderson, Steve. “Veterans Memorial Highway Pennsylvania Turnpike Northeast Extension.” Pennsylvania Highways. Updated March 12, 2021. https://www.pahighways.com/interstates/I476.html

16 Dodds, Peter J. and Sternberger, R Scott. “The Evolution of an Environmental Monitor.” *Civil Engineering* 62, no. 6 (June 1992): 56.

17 *Ibid*

18 Vuchic, Vukan R, Carl Chandler, William K Davis, Jack Smyth, and Peter Weber. “ScholarlyCommons.” Site. Penn Libraries University of Pennsylvania, February 1979. https://repository.upenn.edu/.

19 Infield, Tom. “20 years later, they love their Blue Route.” Philadelphia Inquirer. December 19, 2011. https://www.inquirer.com/philly/news/homepage/20111219_20_years_later__they_love_their_Blue_Route.html

20 “Montco designates two enterprise zones.” The Morning Call, January 22, 1987. https://www.mcall.com/news/mc-xpm-1987-01-22-2566955-story.html

21 Infield, Tom. “20 years later, they love their Blue Route.” Philadelphia Inquirer. December 19, 2011. https://www.inquirer.com/philly/news/homepage/20111219_20_years_later__they_love_their_Blue_Route.html

22 Refer to “Census Tract Data” in the Appendix

23 Refer to “Census Tract Data” in the Appendix

24 Vuchic, Vukan R, Carl Chandler, William K Davis, Jack Smyth, and Peter Weber. “ScholarlyCommons.” Site. Penn Libraries University of Pennsylvania, February 1979. https://repository.upenn.edu/.

25 *Ibid*

26 data.census.gov. Accessed April 14, 2021. https://data.census.gov/cedsci/table?q=DP04+Chester+c ity%2C+pa&g=0500000US42101&tid=ACSDP5Y2019.DP04&hidePreview=false.

27 U.S. Department of Transportation, and Federal Transit Administration. “Combined Final Environmental Impact Statement/Record of Decision.” King of Prussia Rail Extension Project, January 2021, ES-2–10 of 33.

28 QuickFacts Chester City, Pennsylvania.” United States Census Bureau, n.d. https://www.census.gov/quickfacts/fact/table/chestercitypennsylvania/PST045219.

29 Wyatt, James J. “Blue Route.” The Encyclopedia of Greater Philadelphia. Rutgers University, 2016.

30 Lewis, Monica. 2003. “West Philadelphia Still in the Dark Near the El.” Philadelphia Tribune, Aug 05. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/west-philadelphia-still-dark-near-el/docview/337825500/se-2?accountid=14270.

31 Wilson, K. Too high a price,2006, Oct 01,Philadelphia Tribune Retrieved from http://libproxy.temple.edu/login?url=https://www.proquest.com/newspapers/too-high-price/docview/337764154/se-2?accountid=14270

32 Mayes, Eric. 2008. "SEPTA Project Set to Finish, at Price for Area in W. Phila." Philadelphia Tribune, Dec 12, 2-1B,2B. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/septa-project-set-finish-business owner-w-phila/docview/337777504/se-2?accountid=14270.

33 Mayes, Eric. 2008. "SEPTA Project Set to Finish, at Price for Area in W. Phila." Philadelphia Tribune, Dec 12, 2-1B,2B. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/septa-project-set-finish-business owner-w-phila/docview/337777504/se-2?accountid=14270

34 Welles, Elaine. "SEPTA's New Fleet of Buses Surprise to Riders: More Modernized Vehicles and Renovations to Market El Platforms on the Way." Philadelphia Tribune, Nov 30, 2001. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/septas-new-fleet-buses-surprise-riders-more/docview/337823701/se-2?accountid=14270.

35 Refer to "Census Tract Data" in the Appendix

36

37 "SEPTA Facelift Causing Uproar; Business Owners, Residents Voice Concerns Over Labor Contracts." 2003.Philadelphia Tribune, Apr 18. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/septa-facelift-causing-uproar-business-owners/docview/337816025/se-2?accountid=14270

38 Wilson, K. Too high a price,2006, Oct 01,Philadelphia Tribune Retrieved from http://libproxy.temple.edu/login?url=https://www.proquest.com/newspapers/too-high-price/docview/337764154/se-2?accountid=14270

39 Brennan, C. . Urban warrior: 'I can't take it much longer',2007, November 2Retrieved March 01, 2021, from https://www.inquirer.com/philly/hp/news_update/20071126_Urban_Warrior___I_CANT_TAKE_IT_MUCH_LONGER.html

40 Wilson, Kendall. "Too High a Price." *Philadelphia Tribune,* Oct 01, 2006. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/too-high-price/docview/337764154/se-2?accountid=14270.

41 Lewis, Monica. 2003. "West Philadelphia Still in the Dark Near the El." Philadelphia Tribune, Aug 05. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/west-philadelphia-still-dark-near-el/docview/337825500/se-2?accountid=14270.

42 Wilson, K." Too high a price", Oct 01,2006, Philadelphia Tribune Retrieved from http://libproxytemple.edu/login?url=https://www.proquest.com/newspapers/too-high-price/docview/337764154/se-2?accountid=14270

43 Lewis, Monica. 2003. "West Philadelphia Still in the Dark Near the El." Philadelphia Tribune, Aug 05. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/west-philadelphia-still-dark-near-el/docview/337825500/se-2?accountid=14270.

44 "SEPTA Facelift Causing Uproar; Business Owners, Residents Voice Concerns Over Labor Contracts." 2003.Philadelphia Tribune, Apr 18. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/septa-facelift-causing-uproar-business-owners/docview/337816025/se-2?accountid=14270

45 Lewis, Monica. 2003. "West Philadelphia Still in the Dark Near the El." Philadelphia Tribune, Aug 05. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/west-philadelphia-still-dark-near-el/docview/337825500/se-2?accountid=14270.

46 Wilson, K." Too high a price", Oct 01,2006, Philadelphia Tribune Retrieved from http://libproxy.temple.edu/login?url=https://www.proquest.com/newspapers/too-high-price/docview/337764154/se-2?accountid=14270

47 Lewis, Monica. 2003. "West Philadelphia Still in the Dark Near the El." Philadelphia Tribune, Aug 05. http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/west-philadelphia-still-dark-near-el/docview/337825500/se-2?accountid=14270.

48 Brennan, C. . Urban warrior: 'I can't take it much longer',2007, November 2Retrieved March 01, 2021, from https://www.inquirer.com/philly/hp/news_update/20071126_Urban_Warrior___I_CANT_TAKE_IT_MUCH_LONGER.html

49 Mitchel, Bruce. "Philadelphia and Business Disinvestment " NCRC." NCRC, October 1, 2018. https://ncrcenvironmentorg/philadelphia-and-business-disinvestment/.

50 Employing James Q. Wilson's typology of agencies, we would classify SEPTA as a "production" bureaucracy whose inputs and outputs are easy to measure and manage, such as on-time metrics for trains and buses. Mitigating adverse economic and social impacts during construction requires what Wilson calls "coping" bureaucracies where inputs and outputs are difficult to measure and manage because the bureaucrats are often dealing with intractable problems that require judgments in the field. School teachers, social workers, and police are examples of "coping" bureaucracies. SEPTA does have a police force but limited experience or expertise in coping with social and economic fallouts.

51 Fitzgerald, Aubrey Whelan and Thomas. "Kensington Protests Closing of SEPTA's Somerset El Station, a Lifeline for a Battered Neighborhood." https://www.inquirer.com. The Philadelphia Inquirer, March 24, 2021. https://www.inquirer.com/transportation/septa-somerset-kensington-closed-drug-abuse-homelessness-crime-20210323.html.

52 *Ibid*

53 Refer to the CTA Red Line Appendix for some alternative strategies that can be explored for future transit reconstruction projects.

54 Hodges, Tina. "Public Transportation's Role in Responding to Climate Change." U.S. Department of Transportation/Federal Transit Administration, January 2010

55 Iam, Nazrul, and John Winkel. "Climate Change and Social Inequality." UN Department of Economic and Social Affairs (DESA) Working Papers, 2017. https://doi.org/10.18356/2c62335d-en.

56 Wilson, James Q. 1989. Bureaucracy: What Government Agencies Do and Why They Do It. New York: Basic Books.

57 Adams, Carolyn T.. From the Outside In : Suburban Elites, Third-Sector Organizations, and the Reshaping of Philadelphia. Ithaca: Cornell University Press, 2014. Accessed April 14, 2021. ProQuest Ebook Central.

58 Delaware Valley Regional Planning Commission. "Delaware Valley Regional Planning Commission Board Committee." DVRPC, July 24, 2014. https://www.dvrpc.org/.

59 "Public Participation Plan." *Pennsylvania Department of Transportation*, 2020, www.penndot.gov/ProjectAndPrograms/Planning/Pages/Public-Participation-Plan.aspx.

60 *Ibid*

61 Kitsko, Jeffrey J. Pennsylvania Highways: Interstate 676. Accessed April 14, 2021. https://www.pahighways.com/interstates/I676.html.

62 Weingroff, Richard F. "Federal-Aid Highway Act of 1956: Creating The Interstate System." U.S. Department of Transportation/Federal Highway Administration, January 31, 2017. https://www.fhwa.dot.gov/publications/publicroads/96summer/p96su10.cfm.

63 "Section 4(f) Overview." U.S. Department of Transportation Federal Highway Administration.

https://www.environment.fhwa.dot.gov/env_topics/4f_tutorial/overview.aspx?h=e#h

64 "Summary of Executive Order 12898 - Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." EPA. Environmental Protection Agency, July 23, 2020. https://www.epa.gov/laws-regulations/summary-executive-order-12898-federal-actions-address-environmental-justice.

65 United States. Federal Highway Administration. "Vine St Transportation Improvements (Proposed), Philadelphia : Environmental Impact Statement. D." HathiTrust, 1984. https://babel.hathitrust.org/cgi/pt?id=ien.35556030149744&view=1up&seq=1.

66 Ibid

67 Ibid

68 CTA Red Line South Reconstruction Project." CTA. Accessed April 14, 2021. https://www.transitchicago.com/redsouth/.

69 *Ibid*

Volume III

NJ 29

PATCO

Direct Connection

US 422

Schuylkill River Trail

Temple University
Masters of City and Regional Planning

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Executive Summary
Volume III

The Temple University's Master's in City and Regional Planning (MCRP) Studio Team wrote this volume, which presents five case studies of transportation projects under DVRPC's purview. The purpose of each case study is to look at how transportation infrastructure projects have a complex relationship with equity concerns, and to analyze each of these projects with an equity lens. Each case study includes the following components:

- Project theme
- Project background and relevant history
- Analysis of equity in the identified categories
- Equity score in identified categories
- Conclusion with key findings

The following sections of each case study investigate equity with regards to the six categories outlined in Volume I: equity in process, across protected classes, in access, environmentally, economically, and in funding.

By breaking down the equity analysis into these six sections, each case study provides an in-depth look at how the project considered and impacted distinct groups of people, with a particular focus on groups that have been historically disadvantaged. The equity analyses integrate a range of methodologies to examine these impacts, ranging from historical newspaper records, to U.S. Census data at various points in the project process, to public testimony and records. The variety in sources leads to a holistic analysis that considers both quantifiable trends and impacts that can only be discerned through storytelling and first-hand accounts. Below is a brief summary of the approach taken by the MCRP team in each section:

Process

The case studies primarily rely on information about public meetings, information about who was at the table during decision-making, and whose voices were integrated into final decisions.

Protected Classes

Each case study provides an overview of which demographic groups might be potentially most affected by the project, primarily relying on Census data in the project's area.

Access

Case studies examine information about who uses or has the option to use the route or line, what opportunities the project connects road, transit, or trail users to, as well as how the project affects accessibility for those who are not active users of the infrastructure, but are affected by it. Most of the case study analyses of equity in accessibility also examine the relationship between land use and transportation.

Environment

Case studies use data about carbon emissions, impervious surface and runoff, air quality, and health effects, as well as historical information from neighbors about effects of noise, smells, and changes in green space to examine who faced environmental burdens and who received environmental benefits.

Economic

Case studies dig into whether projects created or stifled economic activity, where growth and stagnation occurred and for whom, using data about development, job growth, and housing prices.

Funding

In exploring how much funding each project required, whether projects exceeded expected costs in construction or maintenance, and comparing that to what other projects were and were not prioritized, each case study provides a perspective on missed opportunities.

Key Findings

While each case study presents unique key findings from its equity analysis, there is consistency in the themes across the five case studies' conclusions. Below is a presentation of the findings throughout the report:

- Too much influence of high-powered decision-makers and the lack of communication with the communities who stand the most to lose is a significant contributor to inequities in projects.
- Unbalanced resource allocation which has historically leaned towards expensive highway projects has furthered lack of access, environmental issues, and disinvestment in already disadvantaged communities.
- Highways have served as physical barriers dividing people from public space, blocking light and noise, typically in areas with less wealth than those who use the highway.
- While most transportation improvements have neutral or positive impact on economic growth, they typically have little impact or just exacerbate racial wealth disparities.
- While all projects reviewed have benefited a whiter, wealthier, and oftentimes more suburban community more than other communities, with highway projects, that benefit is more likely at the expense at disadvantaged populations, whereas with transit and nonmotorized projects the benefit for one group may not cause as direct of a burden to another.
- While public transportation, bicycle, and pedestrian projects tend to have overall positive environmental impacts, those benefits and burdens are not necessarily evenly distributed across communities, oftentimes due to land use considerations.
- Equity has improved in transportation projects over time, in part due to regulations such as NEPA. By no means has equity been fully realized though, with even recent projects failing to apply equity actions until much later in the project development process, to the point when those actions lose a lot of their effectiveness.
- The longevity of transportation infrastructure means that inequitable decisions made decades ago continue to affect certain communities over others for generations.

Highway projects are not inherently inequitable, and transit, bicycle and pedestrian projects are not always equitable, but the balance of the region's transportation benefits have skewed towards certain populations over others for decades, especially with highway projects.

Recommendations and Next Steps

The analysis of best practices and case studies revealed equity issues that the region must begin to resolve, especially for people in protected classes. Below are some initial steps that DVRPC can begin to take start rectifying past mistakes to ensure a more equitable future.

DVRPC Leadership in Transportation Equity

DVRPC must become the regional leader in incorporating the equity framework discussed in this report into all stages of transportation projects, from initial feasibility studies to construction completion.

Public Participation Beyond Legal Requirements

DVPRC needs to continue and expand its practice of going beyond legal public participation requirements and prioritized the responses of those who traditionally have less influence.

Require Construction Mitigation at the Beginning of Projects

Project outcomes can be improved if money is directed toward studying and mitigating construction and project impacts, especially for people in protected classes.

Transparent and Accessible Final Project Costs

DVRPC needs to work with its agency partners to determine the actual final costs of projects and make this cost easily accessible to the public web-based tools.

Focus on Improving Access and Deemphasize Traditional Congestion Mitigation

Projects should be prioritized if the equitably increase access to goods, services, and employment opportunities across the region, and not be primarily based on whether the project reduces congestion for specific commuters.

Be a more Forceful Advocate for Integrating Land-Use Planning into Transportation Projects

DVRPC should strengthen its advocacy to remove land-use planning and transportation projects from their silos, especially since some of the worst transportation equity outcomes are due to poor land-use decisions.

Equity Scores

In order to make equity evaluations across transportation modes and time periods easily interpretable, “Equity Score Charts” were created. The charts display a 0-to-4 score for each equity dimension that a particular case study earned, with the score based on the equity ladders criteria shown in Figure 3. A score of “0” is represented by a point at the center of the chart, and a score of “4” is represented by a point at the outside rung of the chart. These points are then connected, and the resulting shape provides an overview of how the case study performed overall. A larger, more filled in shape indicates that a project performed better in the equity analysis. Equity Score Charts for each MCRP case study and the general project themes descriptions are shown on the following pages.

Figure 1 Spider chart with 6 dimensions of equity

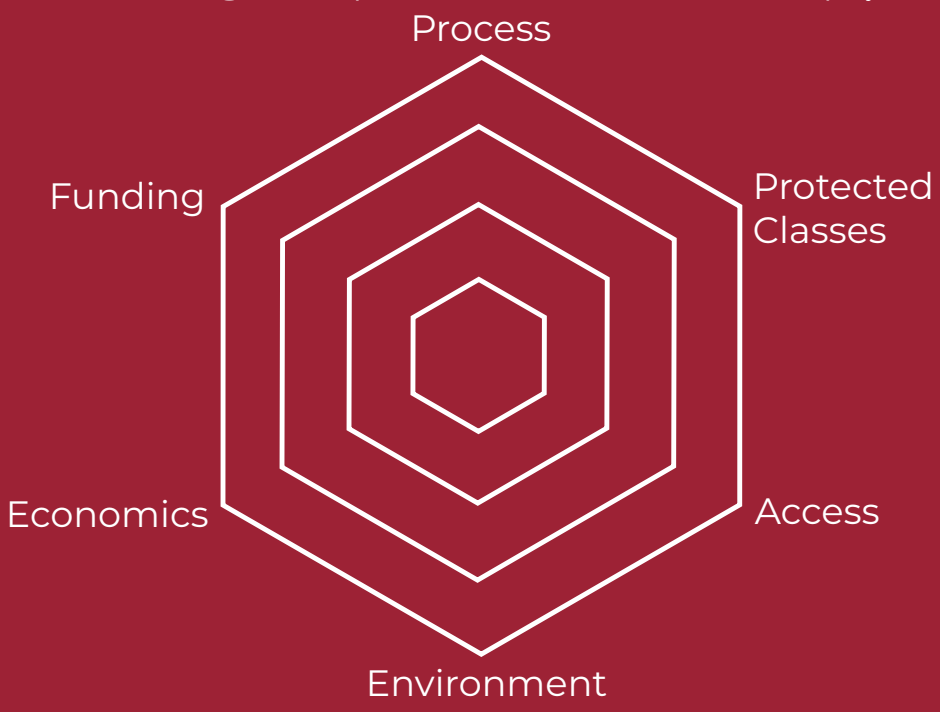


Figure 2 Spider chart with 5 levels of impact

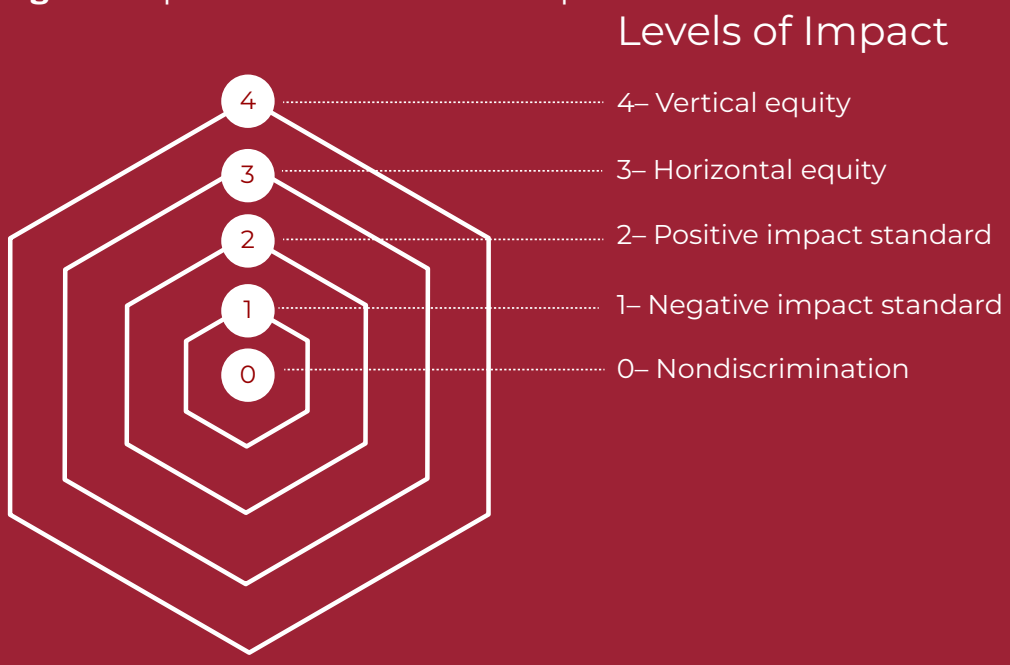


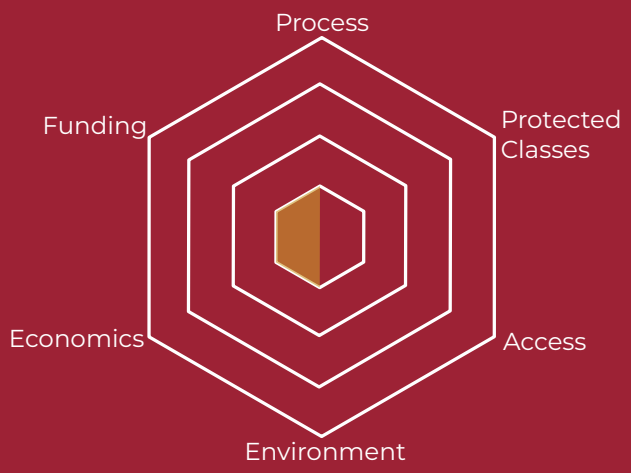
Figure 3 Table of Equity Scores

Rating	Impact Ladder of Equity	Process Ladder of Equity
4	Vertical equity: greater benefits go to historically disadvantaged groups in order to address past wrongs.	Those needs and priorities are identified, addressed, and progress is documented over time.
3	Horizontal equity: benefits are roughly evenly distributed across different populations.	Those needs and priorities are identified and are addressed with dedicated funding.
2	Positive impact standard: All populations receive meaningful benefits, although the amount of benefit may be disproportionate.	The needs and priorities of potentially affected populations are identified through a community-led process with sufficient resources, but are not addressed.
1	Negative impact standard: The benefits to one or more populations do not cause a burden to another group.	The potentially affected populations are consulted, but the process is not led by the community or adequately resourced.
0	Nondiscrimination: This standard falls outside of the definition equity but is included to provide a baseline reference for equity. Nondiscrimination can be linked to the language of Title VI. Nondescriminiation is the absence of overt discrimination against any particular group. Nondiscrimination is neutral to race, color, or national origin and requires no explicitly expressed attempt to provide or deny benefits to any group in particular.	The potentially affected populations are not consulted.

1. NJ-29

Largely as a result of state agencies enacting policies that eroded public trust, NJ-29 cut off communities of color in the City of Trenton, separating them from each other and environmental goods.

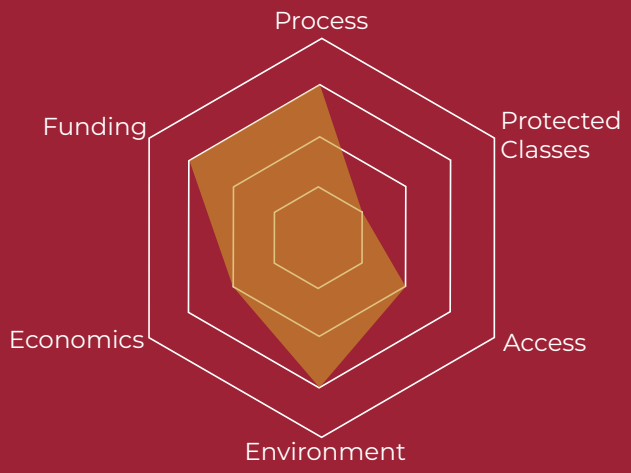
Figure 4 NJ 29 equity spider chart



2. PATCO

PATCO'S failure to integrate station and land use planning has had profound effects on the distribution of the real benefits that the line provides, from economic growth to environmental impacts.

Figure 5 PATCO equity spider chart



3. Direct Connection

While having a proper environmental review processes and successful community engagement, Direct Connection has exacerbated current urban vs. suburban inequities and allocated resources inequitably as the second largest roadway project in New Jersey's history.

Figure 6 Direct Connection equity spider chart

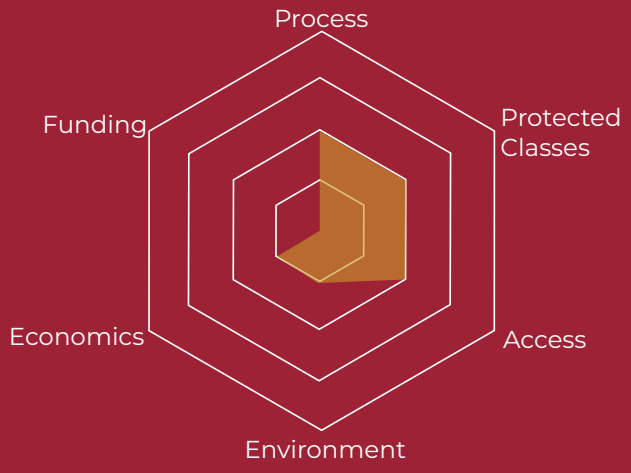
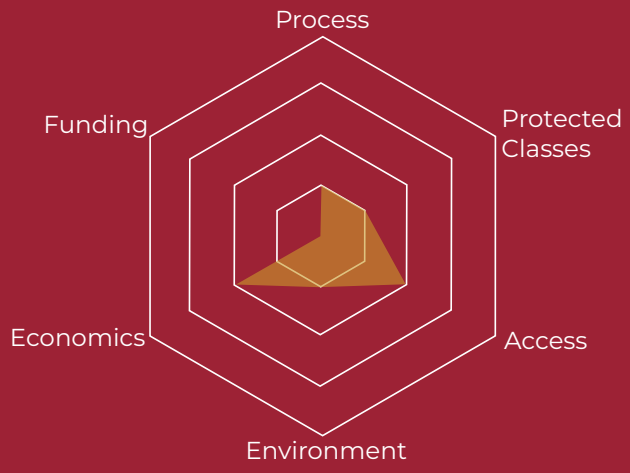


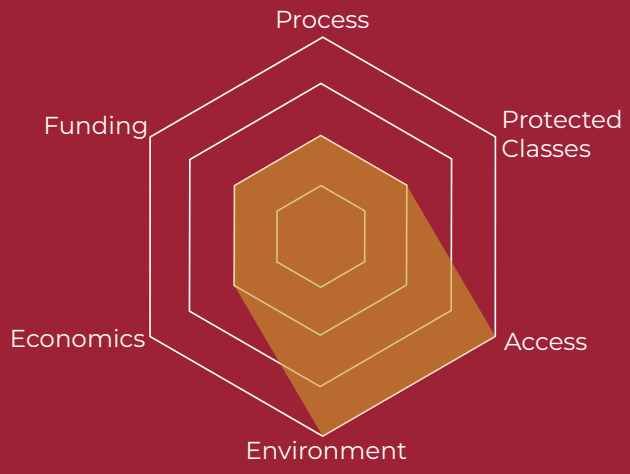
Figure 7 US 422 equity spider chart



4. US 422 (Pottstown Expressway)

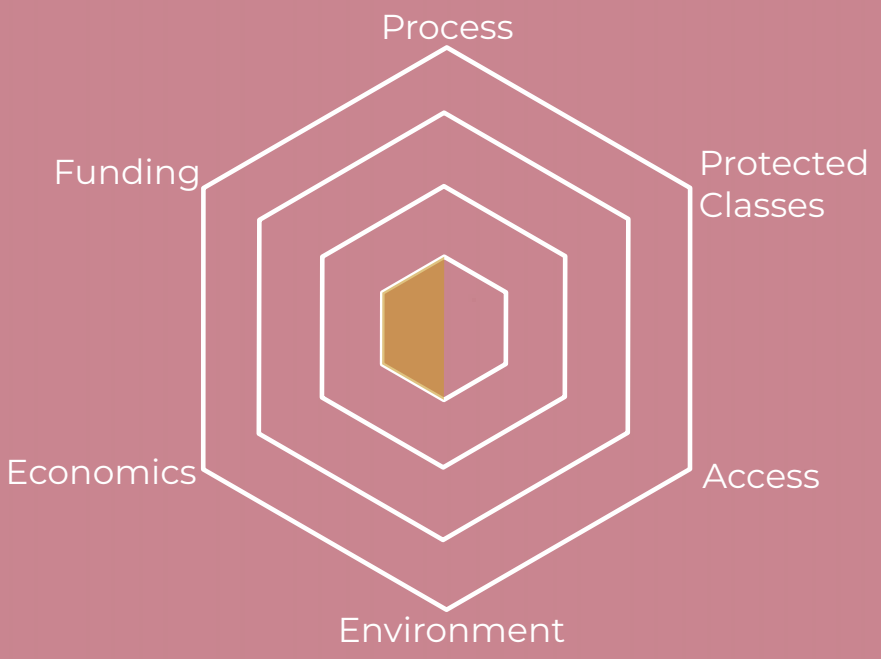
While bringing needed mobility and economic growth, the construction of US 422 led to a series of planning and transportation investment failures that have created an inequitable and inaccessible corridor.

Figure 8 Schuylkill River Trail equity spider chart



5. Schuylkill River Trail

In repairing past environmental damage and improving access for a variety of populations throughout the region, the Schuylkill River Trail is an example of how even a relatively cheap transportation project can improve equity for large numbers of people throughout the region.



Equity Dimension	Score	Reasoning
Process	1	While public outreach met legal requirements, the design was not influenced by it. The DVRPC Citizen's advisory committee was heard but largely ignored.
Protected Classes	0	Both NJ-29 & Lamberton Runnel negatively affected protected classes more than nonprotected classes, especially in downtown Trenton.
Access	0	Access benefits went mainly to suburban residents while negatively impacting Trenton residents, the majority of whom are people of color.
Environment	1	Noise and pollution impacts were negative for most groups. While the highway & tunnel destroyed waterfront access for city residents in order to benefit commuters, fewer wetlands were destroyed in the final plan, which benefits all, especially protected classes subject to flooding.
Economics	1	The highway had no major effect on employment in the project area, positively or negatively.
Funding	1	Little funding was provided to transit or non-motorized transportation projects, compared to the significant money spent on roadways. with commutes only temporarily reduced.

Figure 9 NJ 29 equity spider chart and table

Figure 10 Image of Trenton Waterfront, 1981 (Source: NJ State Library)

NJ-29
Chapter Summary

Theme: State agencies enacted policies that eroded public trust and highways cut off communities of color in the City of Trenton, separating them from each other and environmental goods.

Largely as a result of state agencies enacting policies that eroded public trust, NJ-29 cut off communities of color in the City of Trenton, separating them from each other and environmental goods.

The construction of NJ-29's first segment began in the height of the rise of the automobile, and the second segment through Hamilton Township was not built until the 90s, with the final segment filling in the freeway's gap by creating the Lamberton Tunnel through South Trenton, which created a barrier between the river and residents. The primary purpose of the tunnel was originally to alleviate truck traffic though the downtown, but ultimately legislation blocked that possibility. As a result, NJ-29 provides access for motorists who wish to pass through Trenton, but not for freight or Trenton residents.

Equity Analysis Key Takeaways:

Failure to deliver on critical promises hurt those who had the most to lose near the Lamberton tunnel in Trenton

Much of the reluctant support for the project relied on a promise that truck traffic would be alleviated, and burdened residents would no longer suffer from issues of noise, pollution, and safety posed by trucks; however, that central point was lost in the complexity of the project and Trenton residents continued to be burdened by ever-increasing truck traffic.

Funding priorities furthered inequities in safety and mobility: those living in downtown Trenton and residents without cars faced increased burdens

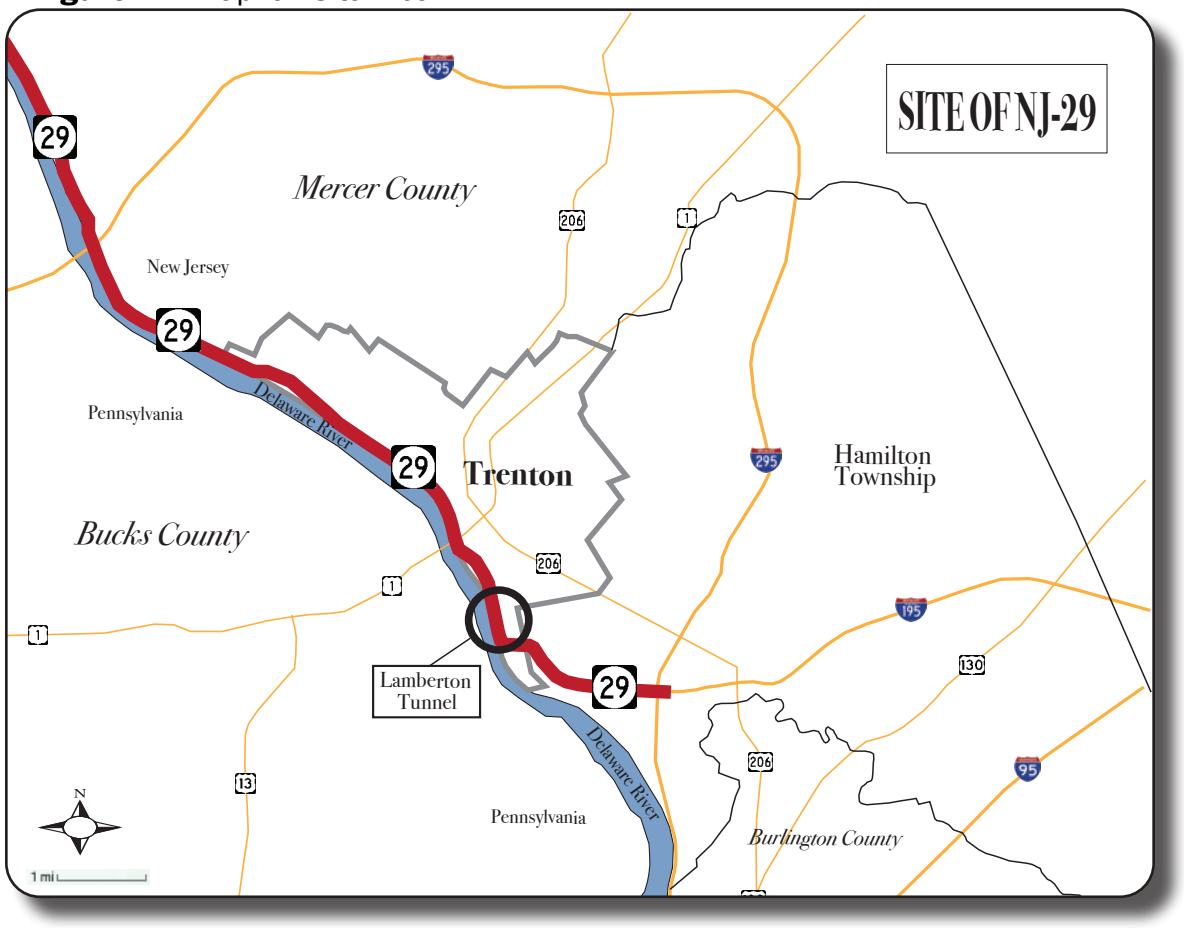
Earlier prioritization of highway funding over pedestrian and bicycle improvements created inequities in investment, safety, and mobility. More recently, transportation plans have recognized these issues and call for improvements that could greatly level the playing field.

Access to public green spaces such as the Trenton waterfront is a major consideration for quality of life, and was underemphasized by decision-makers, despite community input

While highways are about getting from one place to another, equally important--and often more important from an equity standpoint--is what sort of walls are erected as a result of highway alignment.

NJ-29

Figure 11 Map of Site Area



History

Trenton in the 1950s

Before the 1950s, Trenton was a typical industrial city in the northeastern United States, situated with prime access to the Delaware River. It was well known for production of rubber, ceramics, and other industrial goods, and accordingly, adopted the famous slogan "Trenton Makes, the World Takes" [1]. The population of Trenton grew in the first half of the twentieth century as people were attracted to the job prospects, with a peak population of 128,009 in 1950[2]. In 1950, 11.3% of Trenton's population was Black, while 88.7% was white. 57% of the eligible population was in the labor force, with an unemployment rate on par with the national average[3].

The Trenton of 1950 was dotted with industrial factories, many near the Delaware River or near the rail lines that ran parallel[4]. As the 1950s continued; however, Trenton saw a decline in the prominence of industrial jobs and an increase in people who worked in offices in downtown Trenton but who lived in the suburbs surrounding the city.

Car ownership spiked drastically in the years following World War II. This combination of longer commutes and higher automobile usage left many more residents of the Trenton metropolitan area travelling on congested local roads. Contemporary planning documents express concerns about declining public transit usage and increased congestion due to lengthier commutes[5]. While no specific statistics regarding transit usage in Trenton

Figure 12 Comparison of Trenton riverfront, prior to 1950 and today.

Stacy Park prior to the construction of NJ-29 (Source: The Trentonian)

Right: Trenton riverfront in 2012 (Source: Beautiful Trenton).

were available, Trenton's population put it in the category of cities that saw a higher than the national average decrease in transit usage in 1954, at a 12.99% drop in ridership from the previous year[6].

Nationally, transit ridership in 1954 was down 10.9% from 1953[7]. Transit ridership in 1953 was down by 8.2% from 1952[8]. This puts the 1954 national transit ridership of 12,386,000[9] down 3 million riders in just two years.

It was under these circumstances—shifting transportation modes from transit to automobiles, congested roadways, and lingering at the cusp of the spread of suburbanization but not yet caught in the population exodus that characterized much of the middle of the twentieth century—that the first section of New Jersey Route 29 (NJ-29) was constructed.

Construction of the first segment (1954-1957)

The first section of NJ-29 runs along a stretch of waterfront in North Trenton. Initial recommendations for a waterfront highway date back to the 1920s, but the first section ran from what was then I-95 and is now I-295 to South Warren Street in downtown Trenton[10].

NJ-29 as it was originally constructed was intended to help provide controlled north-south access to through traffic between New York and Philadelphia[11]. In effect, the section that was built allowed residents of Ewing Township - a suburb to the north of Trenton - increased access to downtown Trenton via NJ-29 and to Pennsylvania via US 1.

No neighborhoods were demolished or relocated for the construction of NJ-29, making it somewhat of a rarity among 1950s era freeways in industrial cities. However, to accomplish this, the state of New Jersey purchased a majority of Stacy Park from the City of Trenton[12]. Stacy Park was once a waterfront park abutting the Statehouse of New Jersey, with large open spaces and many walkways[13]. After the demolition of much of the park for NJ-29, only a narrow strip of riverfront remained[14], largely inaccessible beyond the freeway.

At the time of construction, the stretch of US 1 freeway that crosses from Pennsylvania into New Jersey was under debate. An urban renewal had been proposed as part of an attempt to revitalize downtown Trenton[15] – by targeting the largely Black neighborhood of Coalport with a blight designation[16]. The construction of US 1 went through without relocating a number of Coalport residents. Those residents who lived in public housing adjacent to US 1 could

Figure 13 Left, circa 1920s. Right, 2017. Source: Trenton Free Public Library, Michael Mancuso (NJ.com)

not be relocated through the city due to a dearth of public housing which would house nonwhite residents.[17] This routing left one of the three census tracts with the highest nonwhite population in the 1950s[18] bisected by a freeway, and public housing residents living along a primary corridor through the city.

Eleven years after the first section of NJ-29 was built, the 1968 NJDOT statewide "Master Plan for Transportation" recommended further construction of NJ-29 as a highest priority new construction project[19]. The suggested lengthening was 4.4 miles and would stretch from US 1 to the southern portion of I-295 along the Delaware River, along the waterfront. Benefits cited in the plan included a direct connection between Trenton and the shore, though that benefit was contingent on the construction of what was then called NJ-37, and is now called I-195[20]. This project was projected to cost $26,000,000 – or $191,008,103 in inflation-adjusted 2019 dollars. Additional plans for improvements on NJ-29 further north than Trenton were also listed. Total projected cost for all proposed improvements was $36.5 million[21] - $268,145,991 in inflation-adjusted 2019 dollars. This made improvements to NJ-29 between Hamilton Township and Frenchtown, approximately 35 miles along the Delaware River, more expensive than the recommended improvements to all but one rail line in the plan[22].

The construction recommended by NJDOT did not occur, and DVRPC's Adopted Freeway Plan from 1974 shows the same extension listed as a proposed freeway for 1985[23].

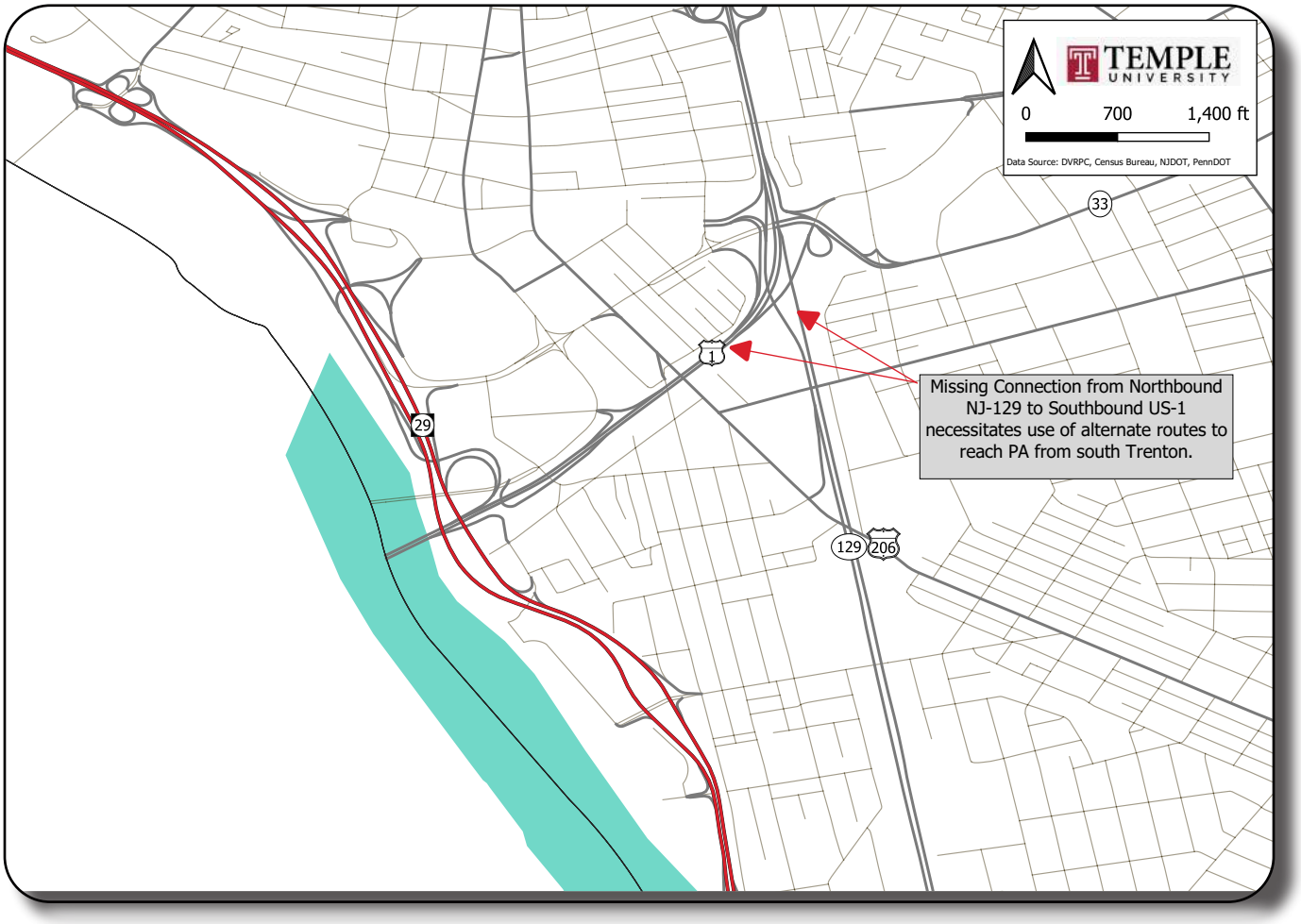
In the time following these recommendations, I-195 was built from 1970[24] to 1983[25], running east-west through central New Jersey. The western terminus was in Hamilton Township, a suburb directly to the southeast of Trenton, and the eastern terminus was in Wall Township, a town in Monmouth County on the coast[26].

Construction of the second segment (1990-1995)

Following the 1954-1957 construction of the northern section of NJ-29, no further segments of road were completed for several decades.

Further construction on NJ-29 began in 1990,

Figure 14 Map of NJ-29 and the missing NJ-129 to US 1 connection



when a section of freeway was built in Hamilton Township. This road was intended to connect to the planned north-south arterial road, Route 129, at the border between Trenton and Hamilton Township. The eastern terminus of this section of freeway was the I-195/I-295 interchange, where it became designated as I-195. This section was completed in 1995 and left a gap in the NJ-29 freeway in south Trenton.[10]

Route 129 itself was planned to be a highway with stoplights and businesses abutting it, which was a compromise between Trenton mayor Holland and NJDOT officials. NJDOT officials had recommended construction of a riverfront highway, but former mayor Holland opposed the development of the last remaining stretch of riverfront in Trenton. Instead, Route 129 was planned four blocks to the east and running parallel to the river.[11] Construction on Route 129 was completed in 1993,[12] A connection between northbound Route 129 and southbound US 1 could not be built, as homes in the neighborhood of Coalport lay in the path of any proposed on-ramp.[13]

Consequently, traffic using northbound Route 129 and seeking to take southbound US 1 into Pennsylvania were left to merge into US 1 northbound in downtown Trenton, take an exit off northbound US 1 onto Perry Street in North Trenton, cross to an on-ramp for southbound US 1, and then take the correct route.

Alternately, traffic looking to go from I-195 to Pennsylvania could skip Route 129 and instead use the two-lane residential Lamberton Street to connect from the Hamilton Township section of NJ-29 to the 1950s era NJ-29, which had a direct connection to southbound US 1.

John Dourgarian, NJDOT spokesperson for the NJ-29 project, said in a 1997 interview that traffic on Lamberton Street increased from 19,000 vehicles daily in 1994 to 33,000 in 1996.[14] In a 2002 interview after subsequent construction, Dourgarian stated that up to 10% of the vehicles on Lamberton Street were trucks during this time period.[15] Contemporary newspaper articles cite the construction of the Hamilton Township portion of NJ-29 as the cause of traffic troubles in South Trenton.[16] NJDOT's solution was to propose completing NJ-29 along the riverfront: precisely the road which former Mayor Holland had opposed.

Construction of the final segment (1997-2002)

NJDOT's proposal to connect the two portions of NJ-29 took the form of a waterfront tunnel, with plans to build a park along the top of the tunnel. The planned park on the tunnel's roof was meant to allow residents to retain some access to the river and to "enhance the area's economic future with the rejuvenation of its waterfront."[17]

The proposed connection was a contentious topic, with the South Trenton Area Residents Society advocating for the development of the river[18] and South Trenton Residents Against Route 29 protesting that the road would prevent the usage of the last remaining section of waterfront.[19] South Trenton Area Residents Society claimed that the river was used by drunks and drug addicts,[20] while South Trenton Residents Against Route 29 stated that the river was used for fishing and that views of the river were part of the attraction of Lamberton Street houses—views which would be blocked by the proposed tunnel construction.[21]

Despite community contention, construction on the tunnel to connect the two sections of NJ-29 began in 1997, just two years after the completion of the second section of freeway and took five years, opening to the public in March 2002.[22]

The 1998 TEA-21 federal transportation bill proposed the final section of NJ-29 to be built, connecting the 1950s-era portion in North Trenton to the 1990s-era portion in Hamilton Township.[23] The cost was projected at $105 million—$205 million in inflation-adjusted 2019 dollars—with $13 million in federal funding and the remainder coming from state funding.[24]

State officials communicated to residents of the area that one of the primary motivators for the projects was the alleviation of traffic problems along Lamberton Street.[25] Opponents of the road advocated for addressing these problems by simply banning trucks from Lamberton Street, as trucks were the primary traffic concern for residents.[26] Those opponents said that NJDOT told them that a ban on trucks from the street was impossible.[27]

As construction was ongoing, however, the New Jersey legislature passed a regulation prohibiting the passage of 102-inch-wide tractor-trailer trucks on state roads without dividers.[28] This regulation was passed in response to growing numbers of large trucks passing through New Jersey,[29] and a perception that the rise in fatal traffic crashes was due to interstate truck traffic that neither began nor ended in New Jersey.[30] This ban would have prevented truck traffic from passage along Lamberton Street, with escalating fees for violations of $400 for

"Here are people that used to have a view of the river. Now they look at a brick wall." – Bernardine Toth, South Trenton resident, 2002, Quoted in Road and Rail

Figure 15 Entrance to the Lamberton Tunnel

a first offence, $700 for a second, and $1,000 for a third and beyond.[31] This regulation passed in 1999,[32] two years after construction on the tunnel next to Lamberton Street began. The regulation was strengthened in 2006, when it was extended to all tractor-trailers rather than just trucks passing through the state.[33]

While residents were told that the tunnel would remove trucks from residential streets in the area, a ban on the passage of trucks along NJ-29 was in place before project completion, and made permanent by NJDOT in November 2002.[34] This ban was separate from the regulations already passed by the legislature, which regulated only trucks not doing business in New Jersey.

Despite this ban on the passage of trucks through the tunnel, the tunnel is large enough to accommodate tractor-trailers, a size which required that the tunnel be built into the Delaware River to avoid displacing homes along Lamberton Street.[35] Additionally, while NJDOT engineers told residents that the tunnel would not obscure views of the river,[36] the final construction blocks much of the view of the river for at least half of the affected part of the street. The original plans for the tunnel have less than a three-inch difference in elevation from what was constructed, according to then-Assemblyman Reed Gusciora, who represented the district[37].

When the ban on truck usage of NJ-29 was announced, Transportation Commissioner Jamie Fox said that then-Governor Jim McGreevey's administration was committed to "keep[ing] Route 29 a safe, attractive, and pedestrian-friendly roadway."[38]

Current status of Trenton (2021)

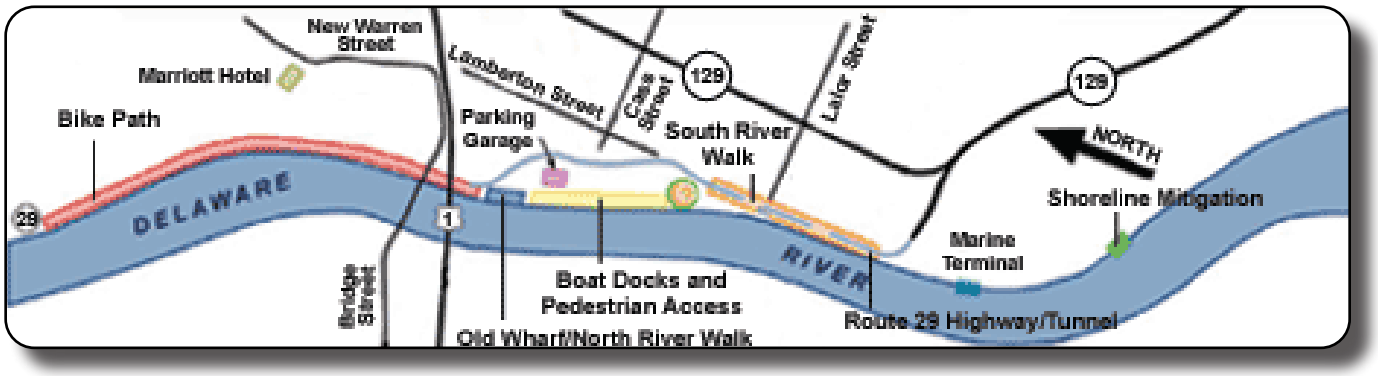
Today, much of Trenton is cut off from the waterfront by the path of NJ-29.

In the northern, historically affluent part of Trenton, the highway is bridged by pedestrian and bike overpasses.

As shown in Figure 16, this section of the riverfront is the bike path. On one side of NJ-29 are residences, with a mixture of single-family detached and multifamily residences. On the other is a waterfront trail, with paved sidewalks and grass and riparian trees. This waterfront trail is all that remains of Stacy Park, the waterfront park whose land was purchased in the 1950s for the construction of NJ-29.

In the far north section of Trenton, an entire neighborhood is directly on the waterfront, cut off from the rest of the city by five lanes of

Figure 16 Delaware River waterfront in downtown Trenton



traffic. This neighborhood is aptly named The Island, and the only meaningful connection it has to the rest of the city is the 608 NJ Transit bus running nearby, according to NJ Transit's 2019 Mercer County Rider Guide.

In the center of Trenton, there is a section of riverfront entirely cut off from the city. Between the Calhoun Street Bridge and the US 1 Bridge across the Delaware, NJ-29 entirely cuts off access to the water, with exit ramps from NJ-29 to US 1 built into the Delaware River. On the NJDOT project diagram, this section of riverfront was not named.

South of this inaccessible portion of land is the office park in which much of the administrative branch of the New Jersey state government works. As shown in Figure 16, this section of the riverfront is the area for boat docks and pedestrian access.

To access the waterfront by foot, residents closest to this area would have to cross a wide intersection, then a large parking lot, then pass between office buildings. Even then, the water is not wheelchair accessible, with stairs to approach the only point of water access. Despite the name in the NJDOT project diagram, no boat docks are evident. Two main drivers of public interest in this section of waterfront exist: The Arm and Hammer minor league baseball stadium, and Cooper's Riverview restaurant. The Old Wharf/North River Walk section of riverfront is also connected to this section of riverfront but is hidden behind a tree line and entirely fenced off from the public. The tunnel and its rooftop park, South Riverwalk park is located along the southernmost portion of the Trenton riverfront. As shown in Figure 16, this section of the riverfront is the South River Walk.

A mid-tunnel exit splits the tunnel park into two. The north section is a wall directly facing residences, with an on-ramp to NJ-29 along Lamberton Street. To access the park from residences along the northern portion of the tunnel, one must cross traffic entering and exiting NJ-29 from the ramp. The south section of the park does not face a brick wall, but the park is steeply sloped. The south section of the park does not involve crossing traffic from NJ-29 thanks to a one-way designation halfway up the street.

While many homes in the area are historic rowhouses built in the late 1800s and early 1900s, the residences facing the NJ-29 entrance and the tunnel wall are rowhouses built en masse in 2010,[39] At both ends of the tunnel, park access requires either a long ramp or steep stairs ascending roughly a story and a half.

Noise from the tunnel is audible several blocks away from the river. Access to the actual water of the riverfront requires using a second staircase which is not well-marked or advertised.

Equity Analysis of NJ-29

The following section provides a detailed assessment of how NJ-29 affected the six dimensions of equity. The chapter evaluates how the road affected protected classes environmentally and economically. The public participation section details how many voices were heard during the project, but those most affected by it were largely ignored. DVRPC's own Citizens Advisory Committee spoke out against NJ-29 and other auto-centric projects in the TIP. Promises were not kept regarding truck usage in the tunnel, and the project did not deliver on the benefits originally promised. Access was prioritized to white suburbanites driving through or into Trenton, despite cutting off riverfront access and depressing property values and tax revenues for the City. Funding for the project focused on roadway improvements, with some smaller bicycle and pedestrian projects being added in later years but failing to mitigate the destructive impact of the roadway.

Figure 17 Pedestrian overpass over NJ-29

Figure 18 The intersection of NJ-29 and S Warren Street, representative of intersections along the Boat Dock section of riverfront.

Figure 19 New Jersey state administrative office building.

In process, public participation, and decision-making

Public participation for this project would rank low on Sherry Arnstein's Ladder of Participation, and the promised goals of the project, such as removing trucks from city neighborhoods, were not achieved.

NJDOT began public outreach in 1996, and according to their website, "At that time [before the tunnel], steep slopes, retaining walls and unsafe stairways were the only access to the river." Despite the new park and cap on the tunnel, riverfront access was not restored. Public outreach was conducted, but trust was eroded after a truck ban went into place, rendering the large and expensive tunnel structure less than necessary after NJDOT repeatedly claimed that such a ban would be impossible.[40] The public participation process was undermined through this failed promise.[41]

Public comments and disproval of a project or an outcome can grow and have significant legislative impact, as evidenced by a recent bill in the New Jersey state legislature. In 2017, a bill in the New Jersey Senate passed the transportation subcommittee that reads: "The Legislature further finds that the use of State Highway Route 29 between the stated points, heavy vehicles constitutes a hazard to the traveling public, as evidenced by serious crashes on that roadway, some including fatalities, and confirmed by extensive formal public comments, in recognition of which the Department of Transportation issued a traffic regulation order on November 15, 2000 temporarily prohibiting heavy trucks and truck-trailer combinations from using State Highway Route 29 between the stated points for through travel. The Legislature further finds that there are nearby alternative through routings which have significantly better overall roadway conditions and geometric designs."[42]

Before the project was planned, former Mayor Holland spoke with NJDOT officials and reached a compromise to build Route 129 through the city. This plan would have allowed the city to avoid highway development on the waterfront and to route truck traffic north to Route 1. This extension never came to be because it would have required the demolition of many homes. The failed city routing of Route 129 laid the groundwork for the difficulties of the Lamberton Tunnel truck ban, and as much of the truck traffic that was planned to go through the tunnel was instead routed onto Route 129 and through the city.[43]

Residents opposed the Route 29 project for environmental reasons, even taking it to court, where the court held in favor of the State of New Jersey and the FHWA, citing that the project "fell within the grandfather provision of the ISTEA," and therefore did not require a Congestion Management Study or a Major Investment Study.[44]

Other residents were affected by construction, with many homeowners on Lamberton Street forced to purchase new windows while dealing with "noise, dust, and pollution."[45]

Though NJ-29 did not directly demolish homes as part of the project, it involved the demolition of Stacy Park, a cultural institution and green space in a post-industrial city. Additionally, though this project may not have directly displaced residents, the project is intrinsically linked to other urban renewal projects in Trenton which did more directly displace residents. And because transportation and land use policy are closely related, widenings and capacity expansions for roadways, coupled with

changing land use, resulted in public space and waterfront access being reduced for Trenton residents.

While the Lamberton Tunnel restores some modicum of waterfront access, bridge widenings and additional on and off ramps created the conditions for a wider NJ-29. The Southerly-Crossings Corridor study provided the foundation for increasing capacity. Conducted in 2001, the study relied heavily on data from DVRPC's traffic model and received DVRPC technical assistance. This project focused on capacity expansions for bridges spanning the Delaware River, inducing demand for vehicle traffic along Trenton's waterfront. The study has several "transit alternative" scenarios that consisted of an express bus service between two suburban malls and one infill rail station in Morrisville. Because neither project was likely to be successful in increasing ridership and therefore roadway congestion reduction, the stated goal of the project, the roadway widenings seemed all the more imperative. The project had little public outreach or participation. One public meeting was conducted at the College of New Jersey, which is a location outside of the study area and disconnected from sidewalks or frequent public transportation.

The Southerly Crossings project relied on DVRPC data to support its recommendations of several lane widenings at various crossings. The goals of the project were two-fold: to reduce congestion and highway use while also increasing public transit use, but the project contradicted its own goals by relying on clearly flawed transit proposals. The proposed transit projects did not connect dense areas that would generate ridership and resulted in an output that indicated that transit would not have the capacity to relieve congestion. Rather than study alternative transit projects or active transportation projects that could address congestion issues, the bridge widenings were chosen as the desired recommendation, with minimal transit improvements recommended. The recommended bridge widening was completed for the US 1 bridge from Pennsylvania to New Jersey, but the other bridge widenings were not constructed.

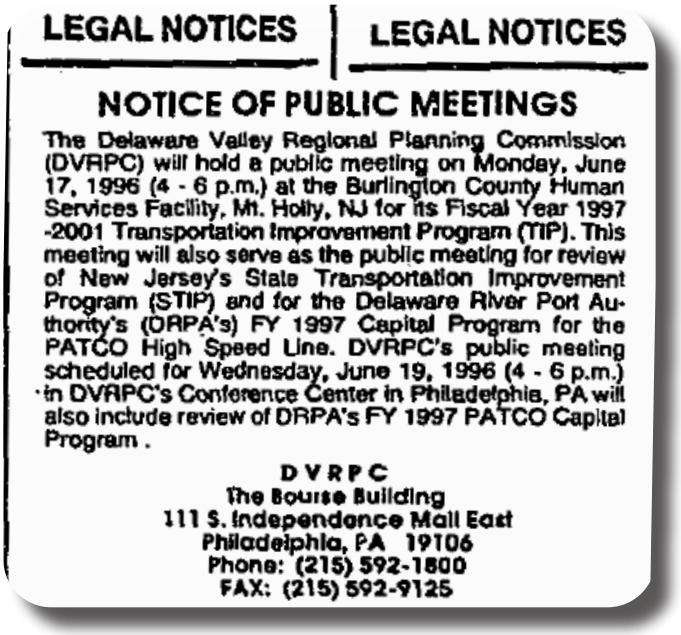
Widenings and capacity expansions did not solely affect Trenton residents. Across the river, Morrisville residents were also dissatisfied with NJ-29 as well, fearing that building into the river had serious environmental implications. A 1998 newspaper article expands: "The Delaware Valley Regional Planning Commission, which includes a representative from Bucks County, said it looked at the road mostly as a way to alleviate traffic problems. 'It addressed real traffic problems and seemed appropriate from that point of view,' said Donald Shanis, then the commission's deputy director for transportation, who added, 'We didn't look at detailed environmental concerns.' Charles Martin, who served on the Bucks County Board of Commissioners and represented the county on the DVRPC, said the commission traditionally defers on votes to the wishes of the state that is primarily affected by a project. He said disapproval at the time of the commission's vote last year came mainly from Trenton-area residents."[46] This project demonstrates a clear level of dissatisfaction from both Trenton residents, and Morrisville residents across the river (and across the bridges in the Southerly-Crossings Corridor Study), but decisionmakers at the time admit to deferring to the state over residents. This decision allowed them to avoid a more detailed environmental study of a large tunnel that required significant construction in and around the Delaware River, not to mention the environmental effects of construction on nearby residents or the particulate matter

captured from a continued truck ban in the tunnel. Funding decisions for large planning projects have large implications, and care should be taken to ensure that detailed environmental and equity concerns are always accounted for in those funding decisions.

DVRPC published a TIP for the years 1996–2000, as it does every other year. Public participation in accordance with ISTEA and other legislation is noted in the TIP document. The TIP notes that "Open house/public comment meetings were held in Cherry Hill, New Jersey; and in West Conshohocken and Philadelphia, Pennsylvania to allow the public to pose questions about the process and projects to state, county, transit, and DVRPC staff. Copies of the draft TIP were distributed to 56 regional libraries, and media releases announcing the meetings and availability of the TIP were sent to area newspapers and television and radio stations. Notices were sent to more than 3000 individuals and groups representing the various interests cited in ISTEA and the federal planning regulations. Legal notices of these meetings were published in the Philadelphia Inquirer, Philadelphia Tribune, Camden Courier Post, Trenton Times, and La Actualidad".[47]

Although these requirements may meet ISTEA minimums, it is notable that no meetings were held in the study area of this project for the TIP that was funding it. Residents in Trenton during this time would have only heard about a TIP meeting from the Trenton Times or at a local library, and TIP notices, as shown in Figure 20, did not broadly explain the purpose of a TIP or the potential ramifications of TIP funded projects. The NJ-29 project predates the RiverLINE light rail, so residents of Trenton without a vehicle would not have access to a rapid transit line to get to Philadelphia or Camden City, even if they were aware of the project. Additionally, meetings are often over-representative of demographics that have time, education, and childcare. Rather than holding

Figure 20 Notice of Public Meetings. Source: Philadelphia Tribune, 1996[411]



LEGAL NOTICES | LEGAL NOTICES

NOTICE OF PUBLIC MEETINGS

The Delaware Valley Regional Planning Commission (DVRPC) will hold a public meeting on Monday, June 17, 1996 (4 - 6 p.m.) at the Burlington County Human Services Facility, Mt. Holly, NJ for its Fiscal Year 1997 -2001 Transportation Improvement Program (TIP). This meeting will also serve as the public meeting for review of New Jersey's State Transportation Improvement Program (STIP) and for the Delaware River Port Authority's (DRPA's) FY 1997 Capital Program for the PATCO High Speed Line. DVRPC's public meeting scheduled for Wednesday, June 19, 1996 (4 - 6 p.m.) in DVRPC's Conference Center in Philadelphia, PA will also include review of DRPA's FY 1997 PATCO Capital Program .

DVRPC
The Bourse Building
111 S. Independence Mall East
Philadelphia, PA 19106
Phone: (215) 592-1800
FAX: (215) 592-9125

various meetings at various times of the day, the meeting was held from 4–6 PM. Though TIP meetings may have met ISTEA and other legal requirements, they likely did not include a broad cross section of residents in Trenton who were to be affected by the project.

The Regional Citizens Committee (RCC) of DVRPC offered one comment for the 1996–2000 TIP regarding Trenton: "Applying auto-only solutions to Trenton transportation needs is self-defeating. With support from Pennsylvania, would it not make sense for NJ Transit NEC trains to originate in Pennsylvania? Would this not help relieve automobile congestion in Trenton? Would this not have a positive impact on clean air in the Delaware Valley?"[48] The RCC was the primary citizen voice at DVRPC until 2011, when it became the Public Participation Task Force (PPTF). For NJ-29, a more powerful RCC that actually had voting status on the DVRPC board may have altered the outcome of NJ-29 and created a more equitable outcome for Trenton.

Across demographic groups that are geographically distinct and geographically diverse

The population of Mercer County grew 59.5% between 1950 to 2010 from about 230,000 to 366,000 residents. The City of Trenton, which is State of New Jersey's capital and the seat of Mercer County, accounted for 56% of county residents in 1950. With America's population migration to suburban communities coupled with the deindustrialization and loss of manufacturing jobs, the City of Trenton has lost about 34% of its residents over the last 60 years, from 128,000 to 85,000.[49]

The City of Trenton is no longer the largest municipality by population in Mercer County, having been surpassed by its suburban neighbor Hamilton Township in 2000. Over the last sixty years, Hamilton Township has grown 115% from 41,000 in 1950 to 88,000 in 2010. Today, the City of Trenton only accounts for 23% of all Mercer County residents.[50]

Figure 21 Population of Study Area by Year. Source: US Census Bureau[412]

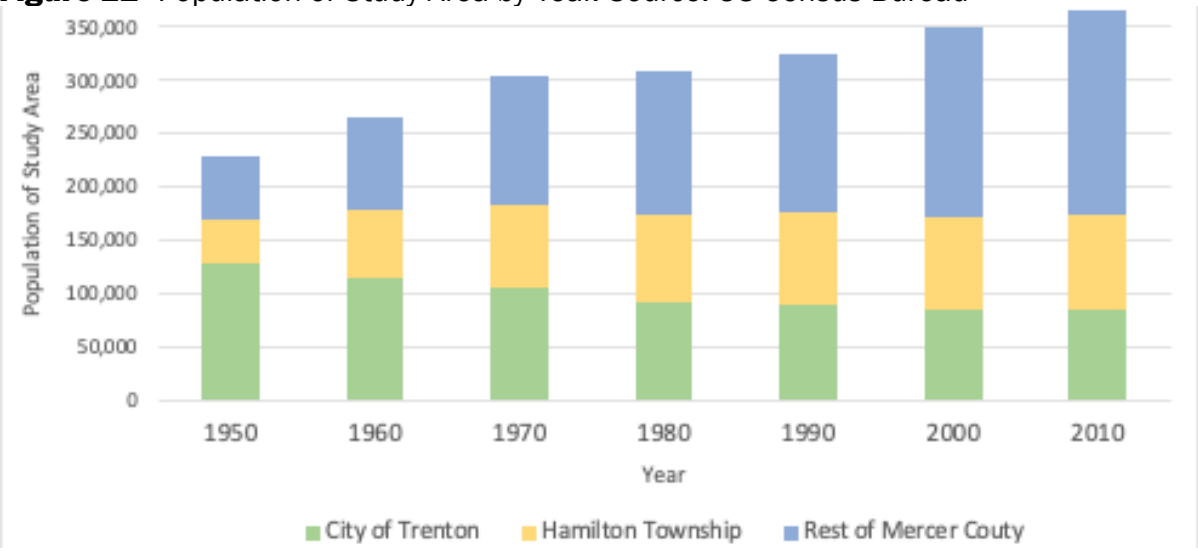


Figure 22 Population and Race in NJ-29 Area (2015-2019), Sources: US Census Bureau, ACS 5-Year Estimates

	Overall Population	White Alone	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone	Two or More Races
Trenton	83,412	40.9%	49.5%	0.4%	1.5%	0.0%	6.3%	1.4%
Hamilton Twp	87,424	75.2%	14.9%	0.1%	4.4%	0.1%	3.2%	2.2%
Mercer County	367,922	62.9%	20.7%	0.2%	11.1%	0.0%	2.9%	2.1%
DVRPC	5,725,345	66.1%	20.9%	0.2%	6.5%	0.0%	3.5%	2.8%
New Jersey	8,878,503	67.8%	13.5%	0.2%	9.5%	0.0%	6.3%	2.7%
USA	324,697,795	72.5%	12.7%	0.9%	5.5%	0.2%	4.9%	3.3%
Source: US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)								

Population of Area

The population by race for the City of Trenton, Hamilton Township, Mercer County, and the Delaware Valley can be seen in Figure 22.

Major Takeaways:

- Majority-minority city: The City of Trenton white residents only account for 40.9% of the total population. African Americans in Trenton at 49.5% account for more than double the percentages for Mercer County at 20.7% and the Delaware Valley at 20.9%. Asian Americans only account for 1.5% well below the percentage for the county and region at 11.1% and 6.5%.[51]
- Homogenous suburbs: Hamilton Township's white residents make up more than 75% of its population well above the proportion for Mercer County at 62.9%, the Delaware Valley at 66.1%, and the United States at 72.5%.[52]

Educational Attainment

The educational attainment rate for the City of Trenton, `Hamilton Township, Mercer County, and the Delaware Valley can be seen in Figure 23:

Major Takeaways:

- Disparity in Higher Ed: only 12.3% of residents in the City of Trenton have achieved a bachelor's degree or greater which is well below the rate of Mercer County overall at 42.6% and the Delaware Valley at 38.8%.[53]
- Incomplete High School Rate: in the City of Trenton 28.6% have less than a high school education well above the county and regional rate at 11.5% and 9.5% and the overall national rate of 12.0.[54]

Income and Poverty

The median household income and poverty rate by race for the City of Trenton, Hamilton Township, Mercer County, and the Delaware Valley can be seen in Figure 24:

Major Takeaways:

- Income Gap: in the City of Trenton the median household income is just $35,402 which is well below the figure of Mercer County at $81,057, and the Delaware Valley at $72,564. In Trenton, white, African American, and Asian American median household income is well below the figure of the county and region overall.
- Affluent Suburbs: Hamilton Township's median household income is $78,177 and its rate across all races is near or higher than the Delaware Valley. Along with Hamilton Township, Mercer County's suburbs are wealthy with the county having a median household income of $81,057 with white, African American, and Asian American households earning $90,052, $46,675, and $102,022 respectively.[55]
- Rampant Poverty: the City of Trenton experiences high rates of poverty across all races. 28.9% of white residents, 28.2% of African Americans, and 32.9% of Asian American residents live in poverty. [56]

Figure 23 Educational Attainment in NJ-29 Area (2015-2019).

Educational Attainment in Area of NJ-29 (2015-2019)

	Less than High School	High School	Some College	Bachelor's Degree	Master's Degree	Professional Degree	Doctorate Degree
Trenton	28.6%	34.9%	24.4%	7.7%	3.3%	0.6%	0.7%
Hamilton Twp	9.0%	31.9%	28.5%	21.0%	7.6%	1.2%	0.8%
Mercer County	11.5%	24.6%	21.3%	22.0%	13.9%	2.9%	3.8%
DVRPC	9.5%	28.3%	23.4%	22.8%	11.1%	2.9%	2.0%
New Jersey	10.2%	27.2%	22.9%	24.2%	11.2%	2.6%	1.6%
USA	12.0%	27.0%	28.9%	19.8%	8.8%	2.1%	1.4%

Source: US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)

Figure 24 Median Household Income in NJ-29 Area (2015-2019)[413]

	Median HH Income	White Alone	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone	Two or More Races	Hispanic or Latino	White Alone Householder, Not Hispanic or Latino
Trenton	$35,402	$37,651	$33,189	-	$36,417	-	$46,117	-	$37,946	$40,673
Hamilton Twp	$78,177	$83,926	$58,367	-	$102,022	-	$75,232	$63,839	$70,768	$85,762
Mercer County	$81,057	$90,052	$46,675	$93,438	$151,813	-	$53,839	$88,393	$50,742	$99,011
DVRPC	$72,564	$84,674	$42,347	$43,072	$86,320	$50,023	$34,628	$56,259	$44,632	$86,971
New Jersey	$82,545	$88,810	$53,247	$61,204	$121,111	$47,188	$49,881	$73,147	$57,068	$94,462
USA	$62,843	$66,536	$41,935	$43,825	$88,204	$63,613	$49,221	$59,184	$51,811	$68,785

Source: US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)

Figure 25 Poverty Rate in NJ-29 Area (2015-2019)

	White Alone	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone	Two or More Races	Hispanic or Latino	White Alone Householder, Not Hispanic or Latino
Trenton	28.9%	28.2%	1.7%	32.9%	-	31.1%	34.2%	29.8%	24.7%
Hamilton Twp	5.7%	12.9%	100.0%	14.1%	52.1%	13.6%	27.8%	15.3%	4.1%
Mercer County	9.3%	19.8%	9.6%	5.8%	39.6%	22.6%	15.0%	21.7%	6.0%
DVRPC	7.6%	23.5%	24.2%	12.1%	25.5%	34.3%	17.0%	27.0%	6.4%
New Jersey	7.8%	17.3%	17.1%	6.7%	25.3%	21.4%	13.1%	17.9%	5.9%
USA	11.2%	23.0%	24.9%	10.9%	17.5%	21.0%	16.7%	19.6%	9.6%

Source: US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)

Health Consequences

Residents in the City of Trenton, especially in communities of color experience significantly higher asthma rates than the rest of Mercer County and the State of New Jersey. The New Jersey Department of Public Health Asthma Awareness and Education Program in 2014 found that, "Trenton's rate was 3.8 times the state average and accounted for 76 percent of Mercer County's asthma emergency department (ED) visits while only holding 23 percent of the county's population."[57]

As seen in Figure 26, the City of Trenton's is the only municipality in Mercer County with visits to emergency rooms due to asthma complications being over 150% of the State of New Jersey's average. In Trenton, between 2008 and 2012, there were 2,430 visits per 100,000 residents well higher than neighboring Hamilton and Ewing Township at 283 and 276 respectively.[58]

In Mercer County, African Americans are 6.6 times more likely than non-Hispanic whites to visit the emergency room due to asthma complication and Hispanic residents are 2.8 times more likely than non-Hispanic whites.[59]

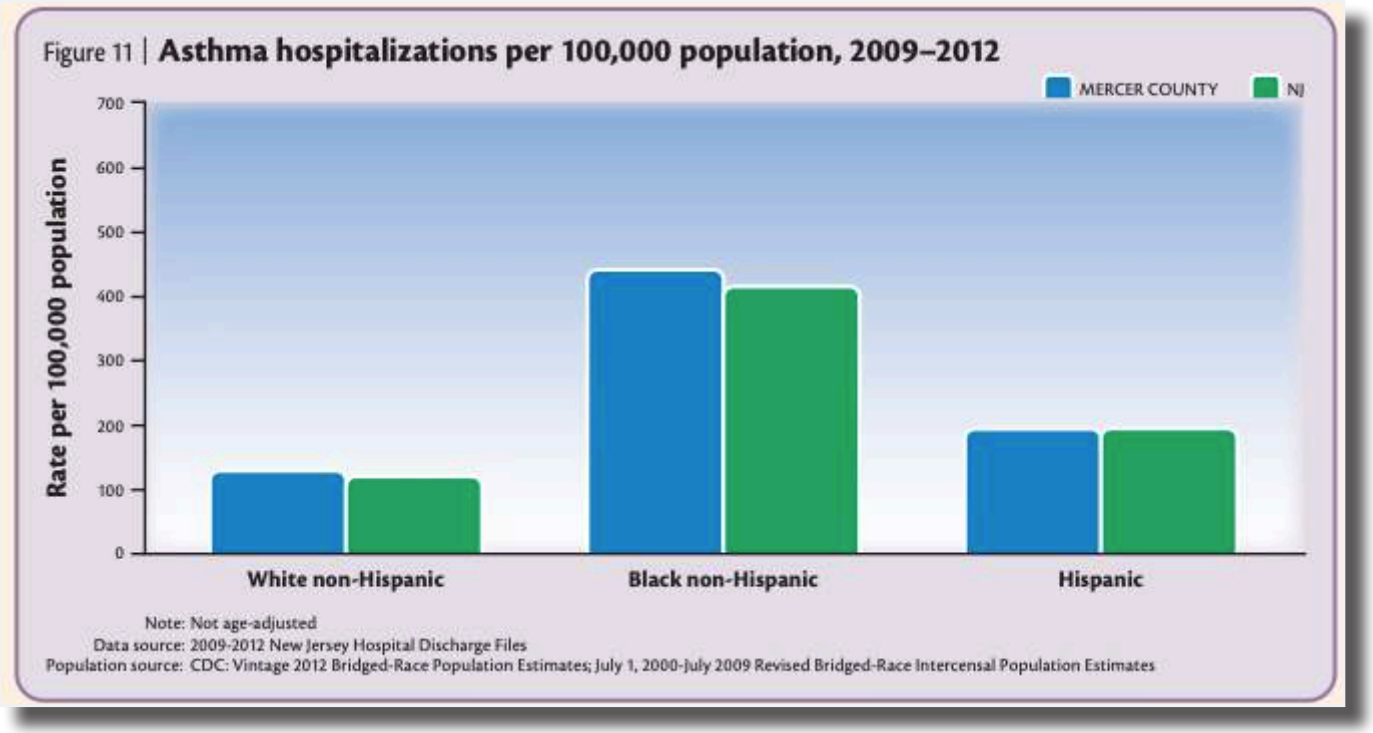
In 2016, Virginia Commonwealth University's Center on Society and Health published a study on anticipated life expectancy in Mercer County. The sobering results found that residents of south Trenton, along Route 29, have a life expectancy of just 73 years while neighboring Hamilton Township and Lawrence Township have life expectancies of 80 and 83 years respectively.[60]

While researchers acknowledge that many potential factors can lead to such a stark disparity in life expectancy, the Center on Society and Health at VCU identified seven potential factors, including:

1. Education and income are directly linked to

Figure 26 Asthma Emergency Room Visits in Mercer County, source: NJDPH[414]

Figure 27 Hospitalizations in Mercer County due to Asthma Complications, source: NJDPH[415]



health: Communities with weak tax bases cannot support high-quality schools and jobs are often scarce in neighborhoods with struggling economies.

2. Unsafe or unhealthy housing exposes residents to allergens and other hazards like overcrowding. Stores and restaurants selling unhealthy food may outnumber markets with fresh produce or restaurants with nutritious food.
3. Opportunities for residents to exercise, walk, or cycle may be limited, and some neighborhoods are unsafe for children to play outside.
4. Proximity to highways, factories, or other sources of toxic agents may expose residents to pollutants.
5. Access to primary care doctors and good hospitals may be limited.

Figure 28 Life Expectancy in Trenton and the Area, source: VCU Center on Society and Health[416]

6. Unreliable or expensive public transit can isolate residents from good jobs, health and childcare, and social services.

7. Residential segregation and features that isolate communities (e.g., highways) can limit social cohesion, stifle economic growth, and perpetuate cycles of poverty. [61]

Means of Transportation

Residents in the City of Trenton and Mercer County are heavily reliant on the automobile in traveling to work. In Trenton, about 84.8% of residents drive to work while 8.4% ride public transportation, and 4.5% walk. In neighboring suburban Hamilton Township, 90.1% drive to work, 4.3% ride public transportation, and 1.6% walk. [62]

Overall Mercer County transportation modes to work reflect the City of Trenton with 81.6% of county residents driving to work, 8.1% riding public transportation, and 4.3% walking. Mercer County is more dependent on the automobile than the Delaware Valley which has 79% of residents driving to work, 10.4% riding public transportation, and 3.8% walking.[63]

Select Link Analysis

To gain a more detailed picture of which populations benefit from using NJ-29, DVRPC provided simulated traffic flow data to the analysis team. This data included only simulated vehicle counts along roadways in the region. Trip generation by zone may have been available but was not provided for this project. As a workaround to try and understand the discrepancy between impacted populations and the population using the project, the Natural Breaks algorithm was used to identify routes with a non-negligible number of trips (>100). Census tracts containing these routes were identified as the primary catchment zone for the project. Census tracts containing the project under analysis were identified as the proximate zone.

The proximate zone's population was compared that of the catchment zone and the region to identify differences in potential disadvantage, based on ACS 2019 5-year estimates. This analysis shows that the area in which NJ-29 is located is currently more disadvantaged than much of the region, while the area served by NJ-29 is less disadvantaged than much of the region, particularly in income and racial diversity.

Figure 29 Comparison between Proximate Zone and Catchment Zone, NJ-29

	Population Affected vs Population Benefiting in Area of NJ-29 (2015-2019)								
	Disabled	Low Income	Older Adults	Racial Minority	Youth	Female	Ethnic Minority	Foreign Born	Low English Proficiency
Proximate Zone	19%	45%	13%	52%	21%	52%	29%	16%	15%
Catchment Zone	12%	19%	16%	25%	21%	52.1%	9%	12%	6%
Regional Average	13%	28%	16%	34%	22%	52%	9%	11%	6%[417]
	Source: American Community Survey (ACS) 2015-2019 (5-Year Estimates)								

In mobility and accessibility

Analyzing the equity of the mobility and accessibility impacts that NJ-29 has had on Trenton reveals several major implications.

Following the best practices framework, the analysis of this project's equity in mobility and accessibility relies on the questions taken from the 1999 FHWA memo with questions for determining Title VI compliance. The relevant question to mobility and accessibility is as follows: What measures have been used to verify that the multi-modal system access and mobility performance improvements included in the plan and Transportation Improvement Program (TIP) or STIP, and the underlying planning process, comply with Title VI?

The first segment of NJ-29 was constructed between 1954 and 1957 before the passage of the Civil Rights Act in 1964 and the EJ mandate of 1994. While the project was under no requirement to uphold these future legal standards, addressing how all the various segments of NJ-29 fare under Title VI presents an important perspective in looking at the impact that the project has had on Trenton today.

Figure 30 Select Link Analysis for NJ-29

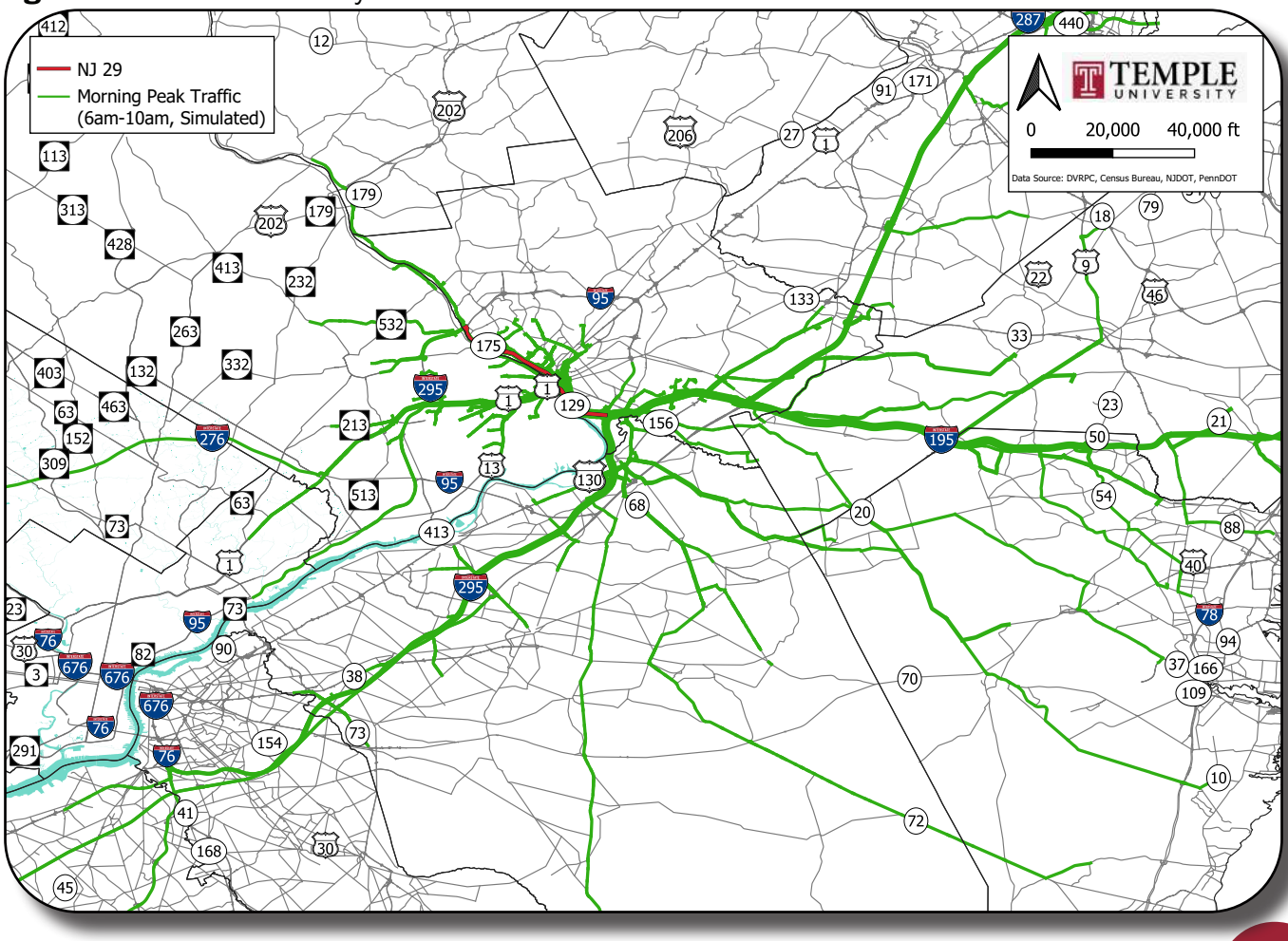
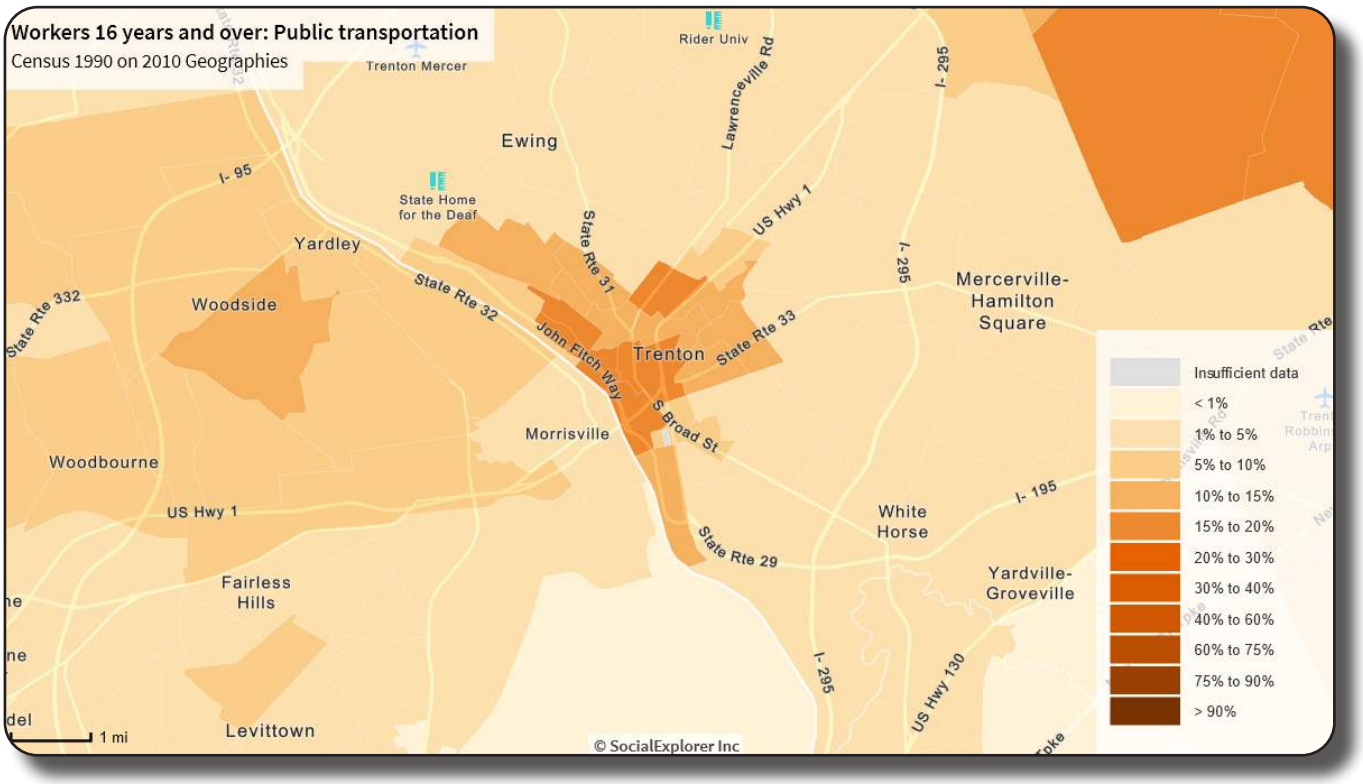


Figure 31 Public transit commuters of the Trenton area in 1990 (Source: Social Explorer)



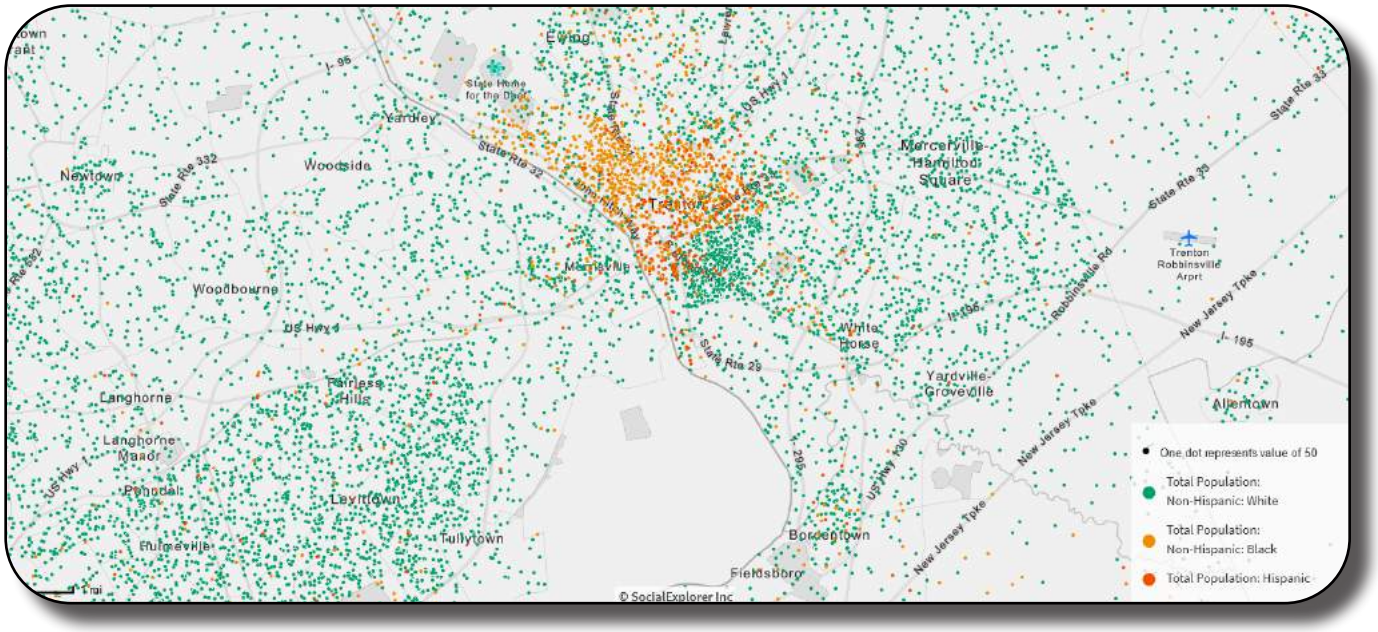
No measures were taken to verify that the planning process complied with Title VI given that it predated these legal requirements, but we still can evaluate the first segment under this lens. The construction of the initial section of NJ-29 took place in the heyday of renewing-the-city-by-declarations-of-blight as the preeminent planning process. Contemporaneous planning articles were centered around the rapid decline of transit in the early 1950s, managing congestion resulting from increased car ownership, and triumphant declarations about the latest cities to accrue government funding for their urban renewal process.[64]

In this context, with parts of Trenton that were majority Black and already under threat of blight declaration and displacement, the section of NJ-29 in North Trenton does not primarily benefit the access of classes protected by Title VI, and rather prioritizes those fleeing from them. NJ-29, like many freeways constructed in the 1950s, connected suburban car owners with downtown jobs at the expense of bringing congestion, pollution, and lower property taxes to downtown residents, under the guise of beneficial congestion-lowering actions. The first section of NJ-29 was constructed in the whiter, more affluent portion of Trenton's waterfront but that does not absolve it of the repercussions to those living in the city.

Subsequent sections of NJ-29 more egregiously set aside consideration beyond the bare minimum for compliance with Title VI about the accessibility of the multimodal system to residents of the neighborhood.

In 1990, just as the Hamilton Township section of NJ-29 began construction, the census tract in Hamilton Township that contained the new road (tract 25) was 93% white, with much of the population further from the new road.[65] The

Figure 32 Non-Hispanic white, non-Hispanic Black, and Hispanic or Latino residents of the Trenton area in 1990 (Source: Social Explorer)



census tract in Trenton that abutted the road (tract 1) had a 28% Hispanic population and 8% Black population.[66] The census tract in which through traffic on Lamberton Street joined US 1 (tract 10, which was historically nonwhite) had a 41% Black population, 44% Hispanic population, and less than 14% white population.[67]

As a result of this demographic distribution, the additional burden of traffic passing through from the new section of NJ-29 to US 1 was felt disproportionately by nonwhite residents of Trenton.

At the same time, 91.91% of residents of Hamilton Township drove to work, as compared to 76.15% of residents in South Trenton and only 63.27% of residents in downtown Trenton.[68] A larger share of residents in Trenton used public transportation to commute than did residents of Hamilton or Ewing Townships.

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The residents who bore the brunt of traffic displaced onto local streets may have benefitted from the new roadway, but they did not receive as much benefit as residents further away. In a strict interpretation of Title VI's prohibition of "denying the benefits" as *any* benefits, the result may pass muster, but in an interpretation that requires proportional or even restorative distribution, it certainly does not. Furthermore, the harm caused falls along racial lines.

In addition to addressing the question of whether the people whose quality of life was negatively affected were able to reap some

benefits of the roadway, it is equally important to examine whether these same residents lost access and connection.

North Trenton residents lost easy access to the riverfront when the first section of NJ-29 was built. A waterfront trail, the only remains of Stacy Park, does exist in North Trenton, but residents can only access the trail through two highway overpasses or at the end points. One endpoint is in the only remaining residential waterfront neighborhood in Trenton, the Island. The other is in the parking lot of the Trenton Water Works, which was constructed in the 1950s as a direct result of NJ-29's routing. No transit leads to the waterfront trail, and the freeway is fenced off from it. The highway overpasses have ramps for access, but those ramps are far steeper than the ADA-compliant maximum slope of 8.33°. The waterfront trail is a nod towards water accessibility but does not make meaningful contributions to the ability for North Trenton residents to access the Delaware River unless they live in the Island.

When the second section of NJ-29 was constructed in Hamilton Township, residents of South Trenton lost access to a quiet neighborhood safe from vehicular crashes. Conversely, residents of Hamilton Township gained easier access to downtown Trenton via NJ-129, and residents of Trenton who owned cars gained access to an easier connection to I-195 and the shore.

As the last section of NJ-29 was constructed, residents of Trenton were fully cut off from the Delaware River. The state buildings in central Trenton do not make a meaningful connection to the water for most residents, particularly when all access points to the water itself are either fenced off or across nearly half a mile of parking lots and anonymous buildings, as the City of Trenton discussed in its 2008 Downtown Master Plan.

Residents of Hamilton Township retained access to the tidal portion of the Delaware River, with both public and private boat ramps along the riverfront. As discussed previously, this dichotomy may not have been driven by race, but the impacts are felt disproportionately along racial lines.

Due to the ban on truck traffic along NJ-29 and in most of Trenton proper, truck drivers lost access to one of the most direct routes to cross between Pennsylvania and New Jersey. Truck drivers are now left with three options: to navigate the often-contradictory routes provided by NJDOT (which include travel along a residential street in North Trenton – See Box Story: Truck Routing Through Trenton, pages 56–57), to pay toll road fees for access to the interstate system, or to disobey the posted signs banning trucks.

Research has generally shown that increasing car dependence decreases equity, as the costs of traveling by car are regressive and scale more rapidly than the cost of public transit while car usage is not available to many sections of the population. An examination of equity in mobility and accessibility must therefore analyze whether the project increased car dependence.

Only one line of public transit in Trenton uses NJ-29 for any significant duration, according to NJ Transit's 2019 Mercer County Rider Guide. The 418 bus line travels along NJ-29 in Hamilton Township, between NJ-129 and I-295. For most of its length, 418 runs on NJ-129 and the RiverLINE runs directly next to it. The 608 bus line in north Trenton runs parallel to NJ-29 but

Figure 33 Equity Through Access transit accessibility map for Trenton, showing transit service, population-service mismatch, and areas identified as having access gaps

does not use NJ-29 itself until it leaves the city border.

In examining DVRPC's Equity Through Access map of transit accessibility, transit routes pass along NJ-29 but do not generally make stops on it.

Much of Trenton has a higher number of vulnerable populations and lower number of services, as defined by IPD indicators, though the scores are not extremely high. Only one census block group directly on NJ-29 registers as having a service-population-transit gap large enough to require a priority score for low transit accessibility, while downtown Trenton registers as having higher number of services and low transit accessibility. NJ-29 runs directly through this census block group. Services identified in the area include Parker Elementary school, four food stores, a healthcare and rehab facility, and two areas of open space. The secondary block group noted as an area of excess services and low transit accessibility, is the New Jersey State Prison, which is categorized as a public school in the Equity Toolkit.

While the area close to in general shows as having a relatively high amount of transit for the vulnerable population, it is still striking that NJ-29 is little-used for increasing the area's transit accessibility. There is also limited transit access to jobs or opportunities across the Delaware River. While Figure 33 shows many NJ Transit bus lines operating on the New Jersey side of the river, there is little SEPTA service. Regional rail is available from Trenton into southeastern Pennsylvania, but high fares limit the utility of such a service for many low-income Trenton residents who otherwise might use it to access jobs and services.

Not only did NJ-29 prioritize car usage over transit usage, but its primary goal was to do just that: it was not meant as a boon to those without vehicle access, but rather its purpose was to ease conditions for drivers. Contemporary newspaper articles show that the concerns behind its construction were the need for direct routes in the 1950s. In the 1990s, as the second and third sections of NJ-29 were being built, quotes from county and DVRPC representatives suggest that the primary goal was to minimize congestion and traffic issues that were caused by other projects in the region.[70]

In environmental impacts

At the core of the environmental equity concerns of NJ-29 in Trenton are the relationship between Trenton and the Delaware River, the health of Trenton, residents, and environmental health of nearby wetlands.

The Public Trust Doctrine and its application to the waterfront provides important context by which to examine Trenton's relationship with the Delaware River. The New Jersey Department of Environmental Protection (NJDEP) has understood the Public Trust Doctrine—which has foundations in Roman jurisprudence, English common law, and the rights and responsibilities of US states—to explicitly allow the public access to tidal waterways and shorelines.[71] New Jersey is a highwater state, meaning that all tidal lands from the water to the mean high-water mark are held in trust by the state.[72] The current status of the Public Trust Doctrine, as delineated by the State of New Jersey in S1074, says that NJDEP "has the duty to make all tidal waters and their adjacent shorelines available to the public to the greatest extent possible, protect existing public access, provide public access in all communities equitably, maximize different experiences provided by the diversity of the State's tidal waters and adjacent shorelines, ensure that the expenditure of public moneys maximizes public use and access where public investment is made, and remove physical and institutional impediments to public access to the maximum extent possible."[73] Public access is further specified to include "visual and physical access to, and use of, tidal waters and adjacent shorelines, sufficient perpendicular access from upland areas to tidal waters and adjacent shorelines, and the necessary support amenities to facilitate public access for all, including public parking and restrooms."[74] Per the Delaware River Basin Committee (DRBC), the Delaware River is tidal at Trenton with tidal changes up to 10 feet. The DRBC identifies the tidal line to be just south of the City of Trenton, at approximately the location where NJ-29 turns away from the riverfront – thus preserving public access to the tidal waters and depriving the public of access to the nontidal waters.

Today, the I-195/I-295 interchange and the Hamilton Township section of NJ-29 all lie entirely within the Abbott Marshlands,[75] which are designated as both a protected wetland and a protected National Historic Landmark due to their significance in prehistoric artifact.[76] The Abbott Marshlands lie along the tidal portion of the Delaware River and are home to a wide array of wildlife.[77] Trails run through the wetlands, with three sections of parking available along an off-ramp from NJ-29. Most of the park access, however, lies in historically white Hamilton township or along I-295.

The original routing for NJ-29, I-195, and I-295 in the Abbott Marshlands would have led to the loss of 400 acres of historic landmark. The route as constructed led to the loss of roughly 264 acres of historic landmark and loss of only one acre of tidal wetland, while a further 23 acres were spanned by the I-195I-295 interchange structure.[78]

At the time of the environmental impact planning, 2,900 acres of wetlands remained in the system.[79] Today, 1,250 acres undeveloped acres remain classified as wetlands,[80] a nontrivial proportion of the original acreage having been lost.

The routing of I-195 that was constructed paved over 8.8 acres of wetland, but NJDOT committed to building an equivalent amount of wetland out elsewhere in the marshland.[81]

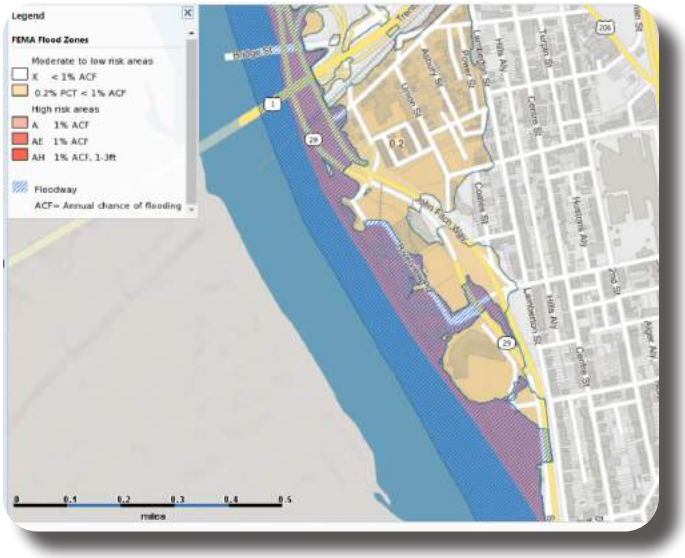
Along the river, only the portion of riverfront along the NJ-29 tunnel is beyond the 1% chance of flood risk area (hundred-year floodplain) based on the 2016 FEMA floodplain maps. Floodplain maps for Trenton prior to the construction of NJ-29 could not be located for direct comparison.

Most riverfront sections of Trenton experience flood risk for one or two blocks inland from NJ-29, but the downtown section of Trenton has a heightened flood risk further inland in the area where NJ-29 meets US 1. This census tract also has the highest IPD score in all of Trenton using the DVRPC Equity Analysis methodology, at 29 out of a potential 36 on a ranking system for how many potentially disadvantaged persons live in a census tract, putting it among the highest scoring census tracts in the DVRPC region for potential disadvantage indicators.

The project involved increasing the amount of impervious surface along the riverfront, as well as creating a barrier between much of the city and the river. Increases in the quantity of impervious surface are well documented to increase surface runoff, thus leading to an increased flood risk, particularly in riparian areas. While NJ-29 likely was not the sole cause for flooding risk in a potentially disadvantaged area, the project may have added to the cumulative weight of existing flooding risk in the area. A more rigorous analysis would be required to verify a causal link between the NJ-29 and the heightened flood risk in downtown Trenton.

This environmental equity analysis must also examine effects that the project has on the health of residents affected by the project. Before the second and third portions of NJ-29 were completed, contemporaneous reports acknowledged that residents near the roadway would suffer adverse noise impacts and that

Figure 34 Map of floodplains in Trenton. Source: Propertyshark.com



residents of Lamberton Street would face adverse aesthetic impacts.

During construction of the Hamilton Township portion of NJ-29, a walkway named Lamberton Field existed along the Delaware River with more than 100 large trees. The removal of 50 of these trees was planned to allow for the construction of the NJ-29 tunnel, with plans to make the "roadway immediately adjacent to the river... barely visible from the Lamberton Street residents"[82]. The roadway as built, as previously discussed was most certainly not barely visible to the residents of Lamberton Street.

Noise impacts along NJ-29 were expected to be roughly 70 dB in the project area, with 200 affected residences. Forty of these residences, along Lamberton Street, were faced with the choice of eliminating their view of the Delaware River or accepting higher levels of construction noise.[83] Residents chose to preserve the view of the Delaware River, given that ambient noise levels in the area routinely exceeded 70dB at the time.[84]

Studies have shown significant and long-term physical and mental health detriment to exposure to noise above 70dB. Effects such as increases in hypertension, heart disease, sleep disturbances, and inability to focus have all been observed as a result of chronic noise exposure.[85] The rationale that because residents were already exposed to noise at that threshold, an increase of 2-3 dB was not significant leads to disparate impacts to protected classes.

The environmental costs of highway projects often have health impacts, as detailed earlier in this section. As the World Health Organization states in its constitution, health is not merely the absence of disease or infirmity. Health is well-being across many different axes. The construction of NJ-29 eliminated waterfront access and condemned Stacy Park, removing vital opportunities for health and wellness for many residents, for the benefit of suburban commuters.

In economic impacts

The base function of NJ-29 at every point in its construction has involved lessening traffic congestion in and around Trenton, allowing suburban commuters easier access to downtown Trenton, and allowing through-traffic an easier route to pass through Trenton without harming residents. Converting riverfront property to a highway and parking lots has undoubtedly had profound impact on Trenton's tax base, reducing municipal revenue by removing taxable land from productive use. To investigate the question of equity in the economic impacts, the effects to be discussed are those that NJ-29 had on employment, income, and generational wealth in the census tracts most directly affected.

Employment in Trenton

Much of downtown Trenton is currently positioned best for office uses. However, as noted in the 2008 Trenton Downtown Master Plan, 90% of office space in Trenton is occupied by state agencies, leaving little space for nongovernmental anchor institutions to invest in job opportunities in the city.

This section uses US Census data for comparisons of employment rate. However, after 2000 the long-form sample on the decennial census was replaced by the ongoing

American Community Survey (ACS). To gather data at a level narrower than the city of Trenton, 5-year estimates from the ACS are needed so datapoints from after the construction of NJ-29 will be made using the ACS 5-year estimates from 2015. The year 2015 was selected to avoid seeing effects from the 2008 recession or the immediate recovery afterwards.

The tracts in Trenton and Hamilton Township through which NJ-29 runs are tract 25 in Hamilton Township, which contains the connection between NJ-129 and the I-295/I-195 interchange; tract 1 in south Trenton, which contains the tunnel and was affected by traffic on residential streets; and tract 10 in downtown Trenton, which contains the US 1/NJ-29 junction and the state government offices.

In 1990, the national unemployment rate was 5.6%[86]. In 2000, the national unemployment rate was 4.0%,[87] the unemployment rate in Mercer County was 3.8%,[88] and in downtown Trenton the unemployment rate was 7.7%.[89]

In 2015, the national unemployment rate was 5.3%.[90] In Mercer County, the unemployment rate was 6.2%,[91] and the ACS 5-year estimates of unemployment for the tracts most affected by NJ-29 were 10.33% (Tract 12), 17.33% (Tract 11.01), 15.29% (Tract 11.02), 9.58% (Tract 10), 3.52% (Tract 1), and 13% (Tract 25).[92] These data show that only the tract through which the NJ-29 tunnel runs had an unemployment rate lower than the county and national unemployment rate.

Based on this data, it appears that the presence of NJ-29 has not had either a beneficial or adverse effect on the unemployment rate in tracts along its length, with relative unemployment rates unaffected by the construction. The overall unemployment level rose from 1990 to 2015 in the study area but did not increase beyond the average unemployment rate in the area, and the spatial distribution of unemployment remained steady. Trends in the racially disaggregated unemployment rate and labor force participation match well with the overall unemployment rate and labor force participation rates in this area. Unemployment remains centered primarily in the Capital District area in North Trenton, as it had been before the most recent two sections of the freeway were built.

According to a DVRPC journey-to-work report studying the period between 1990 and 2000 (the time just before the second section of NJ-29 was built to halfway through the construction

Figure 35 Unemployment rate by census tract along the NJ-29 corridor in Trenton and Hamilton Township. Data source: Social Explorer Employment report

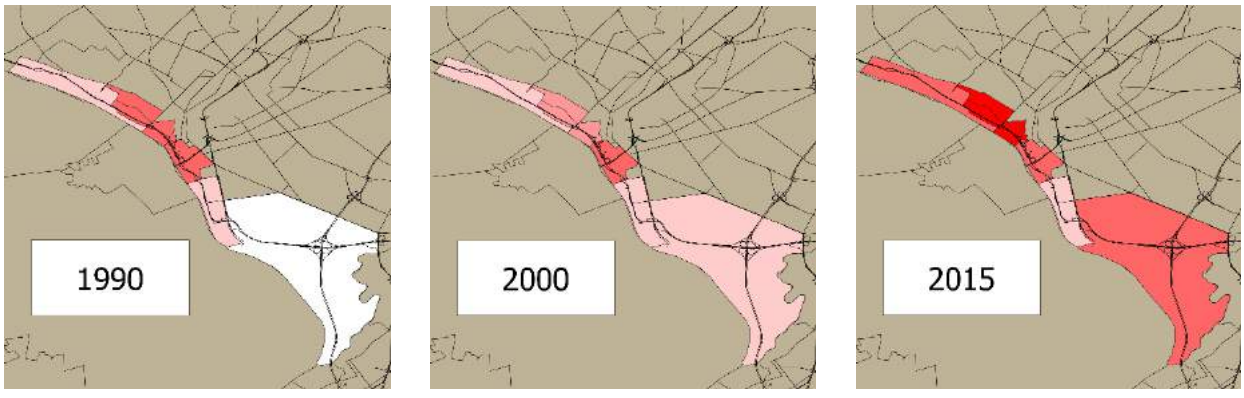


Figure 36 Distribution of City of Trenton Employed Persons by Place of Residence.

Distribution of City of Trenton Employed Persons by Place of Residence					
	Census Year				
	1990		2000		1990-2000 % Change
Place of Residence	Number of Workers	Share of Total	Number of Workers	Share of Total	
Trenton, Mercer Co. NJ	17,844	30.9%	11,651	23.1%	-34.7%
Hamilton Twp, Mercer Co. NJ	10,899	18.9%	8,132	16.1%	-25.4%
Ewing Twp,Mercer Co. NJ	4,351	7.5%	3,61[4185]	7.2%	-16.9%
Lawrence Twp, Mercer Co. NJ	1,632	2.8%	1,584	3.1%	-2.9%
Falls Twp, Bucks Co. PA	1,532	2.7%	943	1.9%	-38.4%
Lower Makefield, Bucks Co. PA	1,235	2.1%	952	1.9%	-22.9%
Bristol Twp, Bucks Co. PA	992	1.7%	721	1.4%	-27.3%
Morrisville Bor, Bucks Co. PA	886	1.5%	554	1.1%	-37.5%
Willingboro, Burlington Co. NJ	881	1.5%	746	1.5%	-15.3%
Middletown Twp, Bucks Co. PA	660	1.1%	614	1.2%	-7.0%
Bordentown, Burlington Co. NJ	651	1.1%	680	1.3%	4.5%
Hopewell Twp, Mercer Co. NJ	607	1.1%	851	1.7%	40.2%
Subtotal	42,170	72.9%	31,043	61.4%	-26.4%
Other	15,638	27.1%	19,501	38.6%	24.7%
Total	57,808	100%	50,544	100%	-12.6%
Source: US Census Bureau, DVRPC					

of the NJ-29 tunnel), less than a third of people employed in Trenton resided in Trenton in 1990, and less than a quarter of the people employed in Trenton resided in Trenton in 2000.[93]

The number of jobs located in the city declined overall from 1990 to 2000, and the share of those jobs that were held by residents of Trenton declined further. During the time NJDOT was making improvements to facilitate travel from the south and the east along NJ-29, the share of employment going to city residents was decreasing and the share of employment going to suburban residents was increasing in Hopewell Township to the north and in other, more scattered locations. Trenton residents, meanwhile, were increasingly employed in West Windsor Township, to the northeast along US 1.

As NJ-29 was being improved for connections to the south and the east, most Trenton residents and a large share of people employed in Trenton were not benefiting from the improvements on their daily commute.

Income in Trenton

The poverty rate in Trenton does not appear to follow directly from NJ-29. See Figure 39.

Note the lack of specific correlation to the NJ-29 corridor, though poverty rates are much higher in Trenton than surrounding suburbs across all demographics.

Figure 37 Distribution of City of Trenton Resident Workers by Place of Work. Sources: US Census Bureau, DVRPC Journey to Work (2005)

	1990		2000		
Place of Work	Number of Workers	Share of Total	Number of Workers	Share of Total	1990-2000 % Change
Trenton, Mercer Co. NJ	17,844	49.4%	11,651	37.1%	-34.7%
Hamilton Twp, Mercer Co. NJ	3,934	10.9%	4,000	12.8%	1.7%
Ewing Twp,Mercer Co. NJ	3,433	9.5%	2,575	8.2%	-25.0%
Lawrence Twp, Mercer Co. NJ	2,678	7.4%	2,259	7.2%	-15.6%
Princeton Bor, Mercer Co. NJ	1,564	4.3%	1,401	4.5%	-10.4%
West Windsor, Mercer Co. NJ	451	1.2%	1,316	4.2%	191.8%
Princeton Twp, Mercer Co. NJ	363	1.0%	485	1.5%	33.6%
East Windsor, Mercer Co. NJ	330	0.9%	405	1.3%	22.7%
Morrisville Bor, Bucks Co.	248	0.7%	151	0.5%	-39.1%
Subtotal	30,845	85.3%	24,243	77.3%	-21.4%
S Brunswick, Middlesex Co. NJ	350	1.0%	306	1.0%	-12.6%
New York City	237	0.7%	339	1.1%	43.0%
Montgomery, Somerset Co. NJ	228	0.6%	141	0.4%	-38.2%
Other	4,481	12.4%	6,335	20.2%	41.4%
Total	36,141	100	31,364	100%	-13.2%

The Hispanic or Latino poverty rate was not recorded in the 1990 census.

Regionally, poverty rates have increased since 1990 across all racial and ethnic groups. The increase in poverty rates is highest among Black residents. This increase does not appear to be driven by the NJ-29 corridor.

There does appear to be some correlation between the location of NJ-29 and lower median incomes across all races.

All three time series maps show that low median incomes are centered primarily in downtown Trenton, with higher median incomes in the surrounding suburbs than in the city itself. Additionally, these maps show that median income is lower along the riverfront in Trenton than in the city as a whole regardless of racial or ethnic group.

Generational Wealth in Trenton

The impact of a project on property values is a primary concern in discussing economic equity. Homeownership is a primary way of gaining generational wealth in the current day, so it is important to evaluate the potential impact on property values in areas with higher proportions of nonwhite homeowners.

To effectively examine the impact that construction of NJ-29 may have had on generational wealth among Black and Hispanic or Latino households in Trenton, this section will use an assessment of the demographics of residents and tenure of households in the tracts most directly affected by the construction of NJ-29 and NJ-129 in the 1990s and 2000s.

While an assessment of the impact of the 1950s era construction of NJ-29 in north Trenton would also be useful to analyzing any potentially disproportionate economic impacts of NJ-29 different populations, neither demographic

Figure 38 Map of Poverty Rate by Race around NJ-29, 1990, 2000, 2015. Darker colors indicate a higher poverty rate, lighter colors indicate a lower poverty rate. Sources: Social Explorer, US Census, ACS 5-Year Estimates

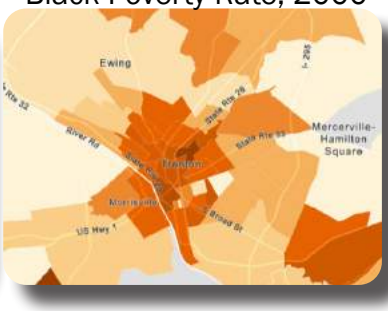
White Poverty Rate, 1990

White Poverty Rate, 2000

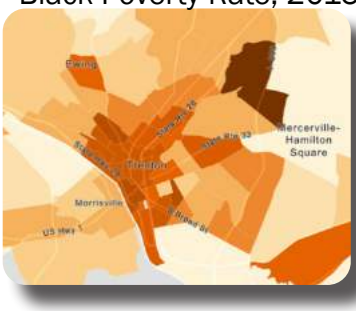
White Poverty Rate, 2015

Black Poverty Rate, 1990

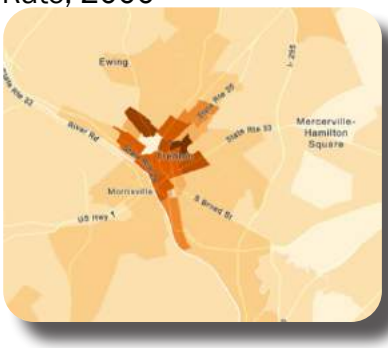
Black Poverty Rate, 2000



Black Poverty Rate, 2015



Hispanic or Latino Poverty Rate, 2000



Hispanic or Latino Poverty Rate, 2015

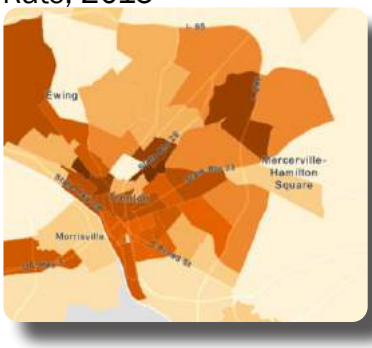
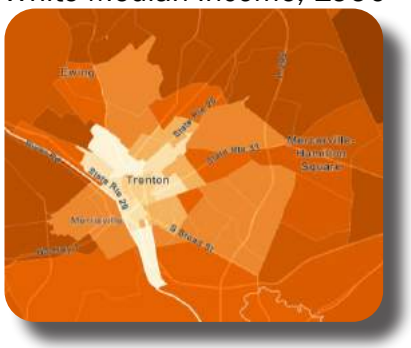


Figure 39 Map of Poverty Rate by Race around NJ-29, 1990, 2000, 2015. Darker colors indicate a higher median income, lighter colors indicate a lower median income. Dollars are not adjusted for inflation. Sources: Social Explorer, US Census, ACS 5-Year Estimates

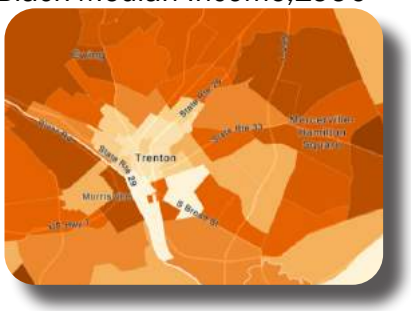
White Median Income, 1990



White Median Income, 2000

White Median Income, 2015

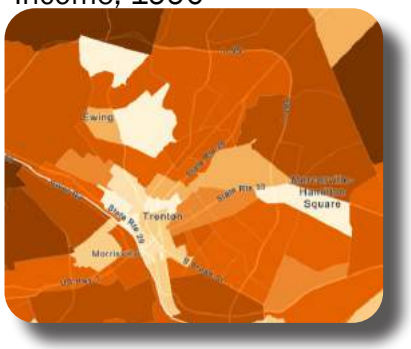
Black Median Income,1990



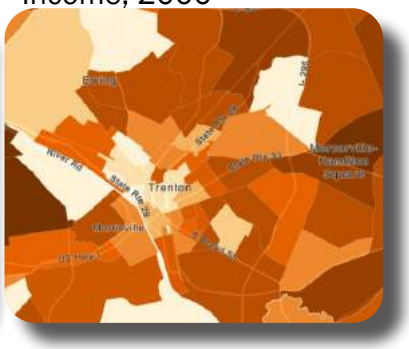
Black Median Income,2000

Black Median Income, 2015

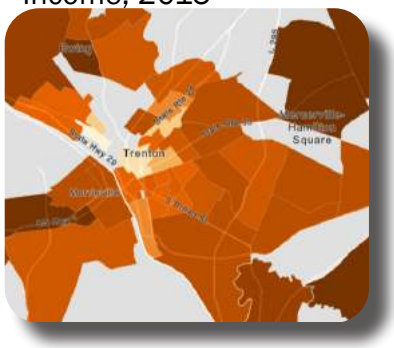
Hispanic or Latino Median Income, 1990



Hispanic or Latino Median Income, 2000



Hispanic or Latino Median Income, 2015



data of homeowners and renters nor housing prices in a racially disaggregated manner were available between 1950 and 2000. The lack of interim data makes such an analysis beyond the scope of this report. The year 1990 is included for the tracts in downtown and south Trenton as a reference point, though the lack of racially disaggregated data on housing tenure at the census tract level renders direct comparisons challenging.

The study area for this detailed analysis are the tracts in Trenton and Hamilton Township through which NJ-29 runs: tract 25 in Hamilton Township, which contains the connection between NJ-129 and the I-295/I-195 interchange; tract 1 in south Trenton, which contains the tunnel and was affected by traffic on residential streets; and tract 10 in downtown Trenton, which contains the US 1/NJ-29 junction and the state government offices.

Overall, Hamilton Township grew more diverse from 1990 to 2015, primarily driven by Hispanic or Latino residents. South Trenton's white population declined while the Hispanic or Latino population grew, and downtown Trenton's racial and ethnic demographics remained much the same from before construction of the portion of NJ-29 in Hamilton Township.

In 1990, 74% of all 32,576 housing units in Hamilton Township were owner-occupied. Of those, 22,836 had a white non-Hispanic owner. 689 units were occupied by a Black owner, and 288 units were occupied by a Hispanic owner.[94] In Trenton, 51% of all housing units were owner-occupied. Of those, 9,465 had a white non-Hispanic owner. 5,185 units were occupied by a Black owner and 1083 units were occupied by a Hispanic owner.[95] In both Hamilton Township and Trenton, white non-Hispanic households were the only demographic to own more housing units than rent.

White householders are the only demographic more likely to own the housing unit they occupy than to rent, in all three of the identified tracts at all periods of time discussed. Furthermore, more than 50% of households in the tract were white despite only 34% of the tract population being white in tract 1 when construction on NJ-29 was ongoing. In downtown Trenton, 22% of households were white despite only 12% of the tract population being white.

In downtown Trenton, the number of households dropped from 1,300 to 1,000, while demographic share remained the same. Hispanic owner-occupancy decreased from 111 households in 2000 to 37 households in 2015, and white owner-occupancy decreased from 80 households in 2000 to 49 households in 2015. Black owner-occupancy increased from 62 households in 2000 to 165 households in 2015. The overall rental share has decreased, from 82% in 2000 to 75% in 2015. By comparison, Trenton had a rental rate of 54% in 2000 and 62% in 2015.

In South Trenton, the absolute number of households remained steady, but the share of all renters rose from 63% in 2000 to 72% in 2015.

In Hamilton Township, the number of households dropped from 2,700 to 2,300. Rental occupancy remained low, at 23% in 2000 and 26% in 2015. Hamilton Township has higher homeownership rates than south and downtown Trenton, and higher rates of white residents.

[Note: under ideal circumstances, wherein county archives were open to the public, this comparison would involve digitization of tax records on a parcel-by-parcel basis. Those records exist and are legally available to the public but have not been digitized and are

rendered inaccessible in 2020 and 2021 due to COVID-19 conditions. Census tract level data is the highest level of detail available for the moment.]

Households in Hamilton Township have a higher homeownership rate and are therefore more able to benefit from generational wealth accrual due to home values. 82% of owner-occupied households are white. Hamilton Township housing values in 2015 were 94% of what they were in 1990 and remain below the average increase in home value from 1990 for Mercer County, but higher rates of homeownership indicate a higher percentage of residents are able to capitalize on the home value.

Households in South Trenton are generally more likely to be renters and therefore not to benefit from home values. Furthermore, while the number of Black and Hispanic or Latino owner-occupied households has increased relative to the previous disproportionate share of households, the property values in South Trenton in 2015 were only 85% of what they were in 1990, adjusted for inflation.

Homeownership rates in downtown Trenton increased from 2000 to 2015, driven by an increase in Black owner-occupied households. Property values in 2015 were 130% higher than in 1990, the only tract among the study area in which home value increased beyond the county average. These data show that Black households that own their homes are accruing generational wealth now in the area along NJ-29, but most households in the area rent and are excluded from that wealth accrual.

This analysis does not control for the many possible confounding factors involved in the changing property values between 1990 and 2015. Nonetheless, it appears that the presence of NJ-29 may have been a contributing factor to the decline in value of owner-occupied housing units in South Trenton, even as the share of renters increased.

While property values have been generally negatively affected along NJ-29, they have not been in the downtown region, which is a type of housing that has been growing in desirability for all cities in recent years and may be unrelated to the freeway.

Figure 40 Median Home Value in Affected Location, 2019 Inflation-Adjusted.

	1990 Median Value Owner-Occupied Units	2000 Median Value Owner-Occupied Units	2015 Median Value Owner-Occupied Units (ACS 5-Year estimates)	2015 Median Value / 1990 Median Value
Downtown Trenton	$92,699	$80,765	$129,545	1.39
South Trenton	$112,649	$93,087	$95,460	0.85
Hamilton Township	$199,674	$144,611	$188,439	0.94
Mercer County	$267,980	$218,837	$298,245	1.11
Source: US Census Bureau				

In allocation of project funds

Transportation funding in Trenton during the time of this project was heavily tilted towards highway development and roadway improvements. Three TIPs, FY1991, FY1996, and FY2001 before, during, and after the project were analyzed to provide a broad cross-section of funding within the NJ-29/ NJ 129 corridor. The analysis looks at the TIPs at the time of adoption, not at the TIP at the end of its lifecycle. As a brief disclaimer: obligation reports for funding are not available online before 2006. Due to the COVID-19 pandemic, paper archives that may contain such reports in DVRPC headquarters could not be accessed by the student team. The TIP does not reflect how money was obligated, but it does represent regionally significant planning priorities. For that reason, totals in this section are not meant to be representative of actual obligated money or construction costs, they are used to analyze the mix of project types and the planning prioritization of funds, with the understanding that money comes through state and federal pipelines. Federal and state transportation funds are often not fungible and cannot be reappropriated with ease or at the MPO's discretion, but legislation such as ISTEA certainly creates greater flexibility, and political shifts at the federal level may further this shift in the coming years.

Despite strong regional transit investments in the 1991–1996 TIP, transit improvements in Trenton were limited. Figures in the TIP Figures show regional transit funding by mode and New Jersey Highway funding by primary improvement type. Total highway/roadway funding within the study area (Route 29 and Route 129) was $1.2 billion dollars while transit funding was $28 million. Note that there are a variety of funding

Figure 41 FY91 Regional Public Transit TIP Funding by Mode. Source: DVRPC

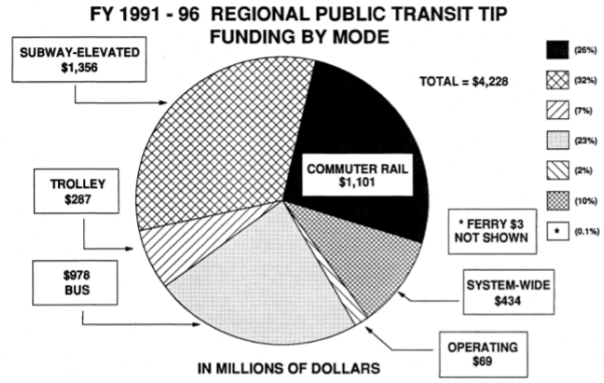
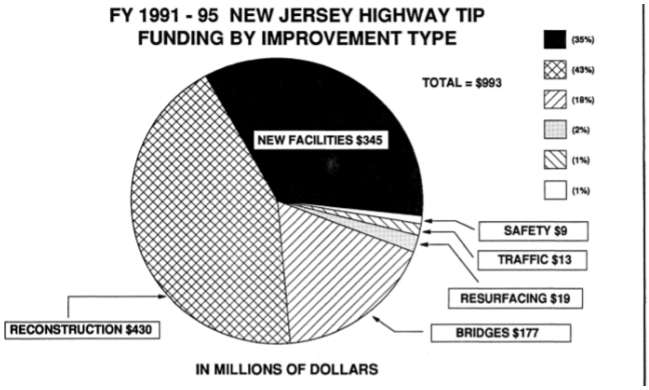


Figure 42 FY 91 New Jersey Highway TIP Funding by Improvement Type. Source: DVRPC



sources and transit operations are not included in the TIP, so money may have been allocated for transit operations, but not as regionally significant capital projects. Compared to other TIP years, this timeframe had a more balanced regional spending mix.[96] Bicycle and pedestrian projects were absent from Trenton in this TIP (unless they were rolled into other line items, which would require a detailed review of historic obligation reports to say with certainty), though they begin to be included in subsequent TIP line items . Transit represented about half of regional funding in the 1991–1996 TIP, with

roughly $3 billion dollars going to both highways and transit, yet Trenton's transit capital improvements were more limited.[97]

Planned TIP allocation from 1996–2000 was more favorable to transit. Out of $22 million allocated to Trenton, 76% was allocated to transit projects. However, transit projects were limited to parking improvements around existing stations and operating support rather than new facilities or major investment. Bicycle and pedestrian projects were added as full line items during this TIP, obtaining 6% of funding. Improvements were centered around the D&R trail as well as improvements on top of the Lamberton Tunnel. Highway and roadway improvements, making up the remaining 16% of funding, were centered around capacity increases and improvements on NJ-29 with new ramps and wayfinding for automobiles. Some improvements in each bucket were allocated to Mercer County, presented without detail, so some funding may have been allocated to Trenton based on those line items, but such is not clear or evident in the TIP.[98]

TIP funding from 2001–2004 added significant bicycle and pedestrian funding for the D&R path as well as for the park on top of the Lamberton Tunnel. Sidewalk improvements were also added around the Trenton Transit Center (note that the Trenton Transit Center and the River Line light rail, studied and constructed during this time, were funded from NJ Transit's Transportation Trust fund without any federal money, and were therefore not included in DVRPC TIPs. These projects are still significant transit improvements, even though they do not show up in DVRPC's TIP). Highway and roadway improvements were related to rockfall on NJ-29 as well as boulevard landscaping and streetscape improvements on NJ-29. TEA-21 funding provided funding for much of the bicycle, pedestrian, and streetscape improvements in this TIP.[99]

When these three TIPs are totaled and the mix is analyzed, the large highway invested in the first TIP discussed here (1991–1996) overshadows later improvements. Totaling these line items is not meant to convey the total the obligation of funds, which would require further research. Rather, totaling the TIPs in this analysis is used to evaluate the project mix and provide a rough estimation of how funds were dedicated. Projects that were present in multiple TIPs were not double counted. 92% of TIP money was allocated to highways or roads, 7% was allocated to transit, and .05% was allocated to bicycle and pedestrian improvements. Again, projects are sometimes rolled into other line items and there may have been other transit improvements that received money outside of the TIP. TIP money is often reallocated from year to year, but the recorded funding allocation shows that most funding in Trenton was centered on capacity increases for the automobile.

TIP funding that so strongly prioritizes the automobile is inconsistent with earlier recommendations from DVRPC. A 1997 report writes:

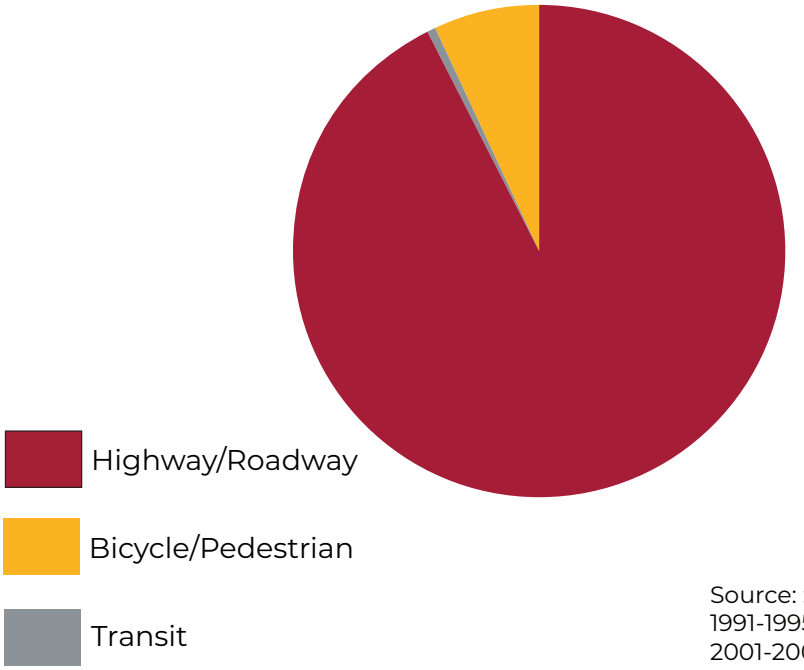
> While the heavy reliance on single passenger automobiles is consistent with regional and national trends, it limits opportunities for households with restricted access to automobiles. The 1990 Census reports that Trenton's 30,673 total households include 9,134 zero-car (30%) and 12,144 (40%) one-car households. While one car may provide sufficient options for a family with a single wage earner, a single auto may restrict the employment options of two income

households where both workers must travel to a different job site. Because a significant proportion of the existing and potential workforce has limited or no access to private automobiles, *strategies that seek to improve access for low-income Trenton residents to suburban job sites must focus on non-auto alternatives to be successful*.[100] [emphasis added]

Funding for Trenton in TIPs reviewed for this analysis does not represent the imperative for non-auto alternatives presented in the 1997 report. Although in some years, regional funding represented a more balanced mix of highway and transit funding, particularly in 1996–2000, that balance was not reflected at a local level in Trenton, where investment was heavily tilted towards widenings on NJ-29 and the creation of the Lamberton Tunnel. Despite public opposition to these improvements from Trenton residents, a DVRPC board member at the time reflected that the board generally defers to the opinion of the state of the project in question.[101] The tradition of deferring to the state in question, rather than the agency's own staff recommendations or those of the RCC, created unfavorable funding conditions for low-income and carless households in Trenton. These conditions and the need for stronger transportation alternatives will only grow in importance if job-suburbanization continues at pace.

To place the project in context, the "Trenton Complex," which includes NJ-29, NJ 129, as well as I-295, was created to save motorist's time. 1968 NJDOT statewide "Master Plan for Transportation" recommended further construction of NJ-29 as a highest priority new construction project.[102] The suggested lengthening was 4.4 miles and would stretch from US 1 to the southern portion of I-295 along the Delaware River, along the waterfront. Benefits cited in the plan included a direct

Figure 43 Allocation of $1.3 Billion in TIP Funding for Trenton.



Source: : DVRPC TIP, 1991-1995, 1996-2000, 2001-2004

Note: the TIP is primarily for capital funding, so FTA money for operating costs is not reflected here

connection between Trenton and the shore, though that benefit was contingent on the construction of what was then called NJ-37 and is now called I-195.[103] This project was projected to cost $26,000,000 – or $191,008,103 in inflation-adjusted 2019 dollars. Additional plans for improvements on NJ-29 further north than Trenton were also listed. Total projected cost for all proposed improvements was $36.5 million[104] ($268,145,991 in inflation-adjusted 2019 dollars). This made improvements to NJ-29 between Hamilton Township and Frenchtown, 35 miles along the Delaware River, more expensive than the recommended improvements to all but one rail line in the plan.[105]

A 1993 Inquirer article writes: "In the end, motorists will cut off 10 minutes of drive time through the Trenton-Bordentown area. The price tag for their time savings will be more than $300 million. No one is quite sure of the exact amount since the project has gone on for so long".[106] Costs ballooned well beyond the $300 estimate in 1993, with DVRPC's 1991–1995 TIP allocating $690 million alone for NJ29 and NJ 129 for "grading, paving and structures [between] Hamilton Township and Trenton City".[107] Much of the cost increase is likely due to the environmental costs associated with cleanup efforts, discussed in detail in the environmental section of this report.

The complexity of TIP funding, with overlapping years and the bundling of line items, makes producing exact dollar amounts of funding for specific subsections of projects difficult. Ambiguity is heightened when press or other sources parse projects differently and provide differing cost estimates for projects. DOTs do not consistently report total project expenditures to MPOs, so the total cost of many projects is difficult to tabulate. The NJ-29 project was over budget due to a host of factors and represents the largest allocation of federal and state transportation funds in Trenton for the years between 1991 and 2004. The project has spurred new costs, such as rockfall mitigation and conversion of the highway to more of a "boulevard" for pedestrian safety to remedy issues caused by previous expansions. The funds for this project were procured even though "Trenton officials said that part of the project might not be needed because Route 129 would carry the traffic".[108] Former Mayor Holland and other politicians working in Trenton wanted to route trucks onto 129 rather than build the Lamberton Tunnel for truck traffic, and in large part it was for the anticipated effects on land use and economic development, in addition to specific transportation concerns. One newspaper article summarized the predicted effects on the economy as follows: "To supporters, the 1.7-mile road would alleviate the crush of truck traffic that has rumbled down Lamberton Street in recent years. It would also, they say, spur economic redevelopment near the stadium reminiscent of that around Baltimore's waterfront stadium. But to detractors, a more appropriate analogy would be the argument, decades ago, against the West Side Highway in Manhattan, which brought in cars and pollution and cut off riverfront access" [emphasis added].[109] The stadium and the highway were both built for suburbanites, both to facilitate faster entry into Trenton, and to facilitate more reason to stay and spend money. "It [Trenton] has little to entice the 23,000 state employees who work in the city to stay after 5 p.m."[110] Although arguments can be made in terms of jobs created, NJ-29 and surrounding economic development projects were oriented towards attracting and retaining wealthy suburbanites rather than towards advancing equitable economic development opportunities for existing residents. This focus on urban renewal and

Truck Routing Through Trenton

The tunnel near Lamberton Street was designed and opened originally for trucks that are now prohibited. NJ-129 was built as an alternative to building NJ-29, as Mayor Holland wanted to preserve the Trenton waterfront and pushed back on the idea of a highway that would not do so. US 1 was the only accessible crossing between New Jersey and Pennsylvania south of I-295 and north of I-95, and through trips are more direct on US 1 than either of the alternatives.

In the time between the construction of NJ-129 and NJ-29, trucks traveling from Northern New Jersey or Pennsylvania could make easy connections

Trucks coming from New Jersey on northbound NJ-129 began to take local roads to make the connection onto US 1 and cross into Pennsylvania, due to the lack of options. Specifically, even before the Hamilton Township section of NJ-29 opened in the 1990s, connections between the 1950s-era section of NJ-29 and US 1 already existed. Northbound trucks into Pennsylvania were left detouring the long way around the city on interstate highways or traveling along local roads to utilize the NJ-29/US 1 interchange.

The opening of the NJ-29 tunnel could have provided freight traffic in Trenton with better access to crossings into Pennsylvania that did not use local streets, and residents were told that the NJ-29 tunnel would get freight traffic off local streets.

Due to the hazardous waste materials ban which escalated into a full, permanent ban of truck traffic along the NJ-29 freeway, however, the opening of the NJ-29 tunnel in 2002 only made the situation worse.

NJDOT regulations now do not just ban trucks from the NJ-29 tunnel, the designated travel routes for 102-inch-wide trucks and double-trailer truck combinations (the standard size for interstate freight) place truck routes on NJ-129 and US-206 in south Trenton.[118] These highways include stoplights, short turns rather than ramps, and pedestrian traffic. NJ-129 runs parallel to the RiverLINE, a major transit line between Trenton and PATCO in Camden. Routing truck traffic onto these highways increases the number of truck-car and truck-pedestrian interactions, and therefore crash risk.

Pedestrian, motorcyclist or bicycle crashes involving large trucks are fatal an estimated 24% of the time, and passenger vehicle crashes are fatal an estimated 0.7% of the time. Of the 415,00 crashes in 2015 involving large trucks,[119] roughly 85% involved a passenger vehicle and roughly 0.5% involved a bicyclist or pedestrian.

Most if not all routes that could be an alternate option to Route 129 or Route 206 are toll roads, whose costs add up steeply according to truck drivers.[132]

Today, trucks have a route which automatic route-planning software will suggest for them that is shorter, faster, and decreases crash risk, but which trucks are forbidden to take.

Instead, the route along northbound NJ-129 to reach US 1 includes multiple stoplights and gives only signage to reach northbound US 1, with two other turns indicating ‘No Trucks’. There are five total instances where trucks are banned from making an otherwise available turn, adding an extra ten minutes of travel and doubling the distance traveled through Trenton.

Note that the turn-around in north Trenton takes place along a roundabout on a residential street. This turn-around is officially recognized and includes posted signs for truck traffic for US 1 South.

*These rates were calculated based on Federal Motor Carrier Safety Administration data regarding all crashes involving large trucks. 2,667 deaths of passenger vehicle occupants occurred in 2015. To estimate the total number of collisions involving large trucks and passenger vehicles, the “Vehicle in Transport” and “Parked Motor Vehicle” categories were assumed to involve passenger vehicles. This produced an estimate of 354,697 total collisions. Thus, the estimated rate of fatal accidents is 752 out of every 100,000 collisions involving a passenger vehicle and a large truck.

A similar process was followed to calculate the fatality rate for motorcyclists, bicyclists, and pedestrians. 568 motorcyclists, bicyclists, and pedestrian fatalities due to collisions with large trucks occurred in 2015. To estimate the total number of collisions, the “Collision with Pedestrian” and “Collision with Pedalcycle or Other Personal Conveyance” were assumed to involve either pedestrians, bicyclists, or motorcyclists. This produced an estimate of 2,333 total collisions. Thus, the estimated rate of fatal accidents is 4,346 out of every 100,000 accidents.

Figure 44 Google Maps directions from a location in Hamilton Township to the former Morrisville Steel plant as a car would travel them.

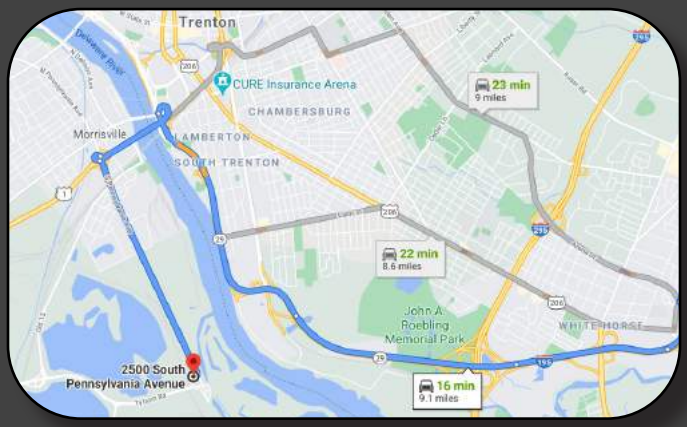
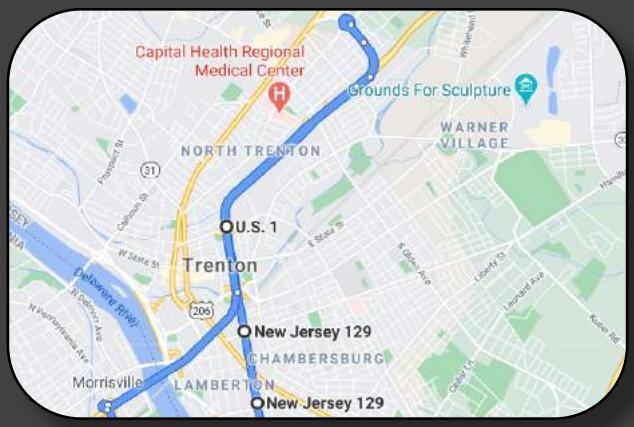


Figure 46 Google Maps directions from the same location using streets where trucks are permitted. Source: Google, 2021



Heavy trucks as defined by this data are not synonymous with the category of truck banned from the NJ-29 tunnel, but these truck traces do highlight the high rate of heavy trucks using Cass Street to cross between NJ-29 and NJ-129 in south Trenton.

Public comments from NJDOT on the truck ban along NJ-29 have been, variously:

- That the road is operating safely, and it should continue to operate as it has been[120]
- That the engineering schematics don't match up[121]
- That it was "in the interest of public health, safety, and welfare to issue a permanent traffic regulation"[122]

No definitive statement regarding the reason for this assessment of necessity of the truck ban in the NJ-29 tunnel has been given by NJDOT, but the traffic pressure due to truck traffic in south Trenton is not going to ease up in response to the construction of a tunnel that trucks are banned from.

Figure 45 GPS traces for sampled heavy truck traffic passing through but not terminating in Trenton,

suburban convenience was not uncommon; such was the status quo at the time the project was conceived. But the legacy of NJ-29 was expanded far beyond the urban renewal age in the United States with continual pursuit of the project.

The total amount of money allocated for Trenton in TIPs in the NJ-29 and NJ 129 area over the period above was $1.3 billion dollars. NJ DOT's 1968 Trenton Statewide Masterplan originally allocated $36 million for the project (in 1968 dollars). For comparison, the same plan gave cost estimates for several railroad improvements. The Central New Jersey Railroad was estimated at than $32.1 million; the New York and Long Branch Railroad was estimated at $44.8 million; the Penn Central railroad was estimated at $26.1 million; and the Erie-Lackawanna railroad was estimated at $105 million.[111] Since cost estimates in that plan grew well beyond what was originally anticipated, a more contemporary comparison using allocated TIP money is also useful. For the $1.3 billion dollars allocated in the TIP over a 12-year period, one of the following projects could have been funded:

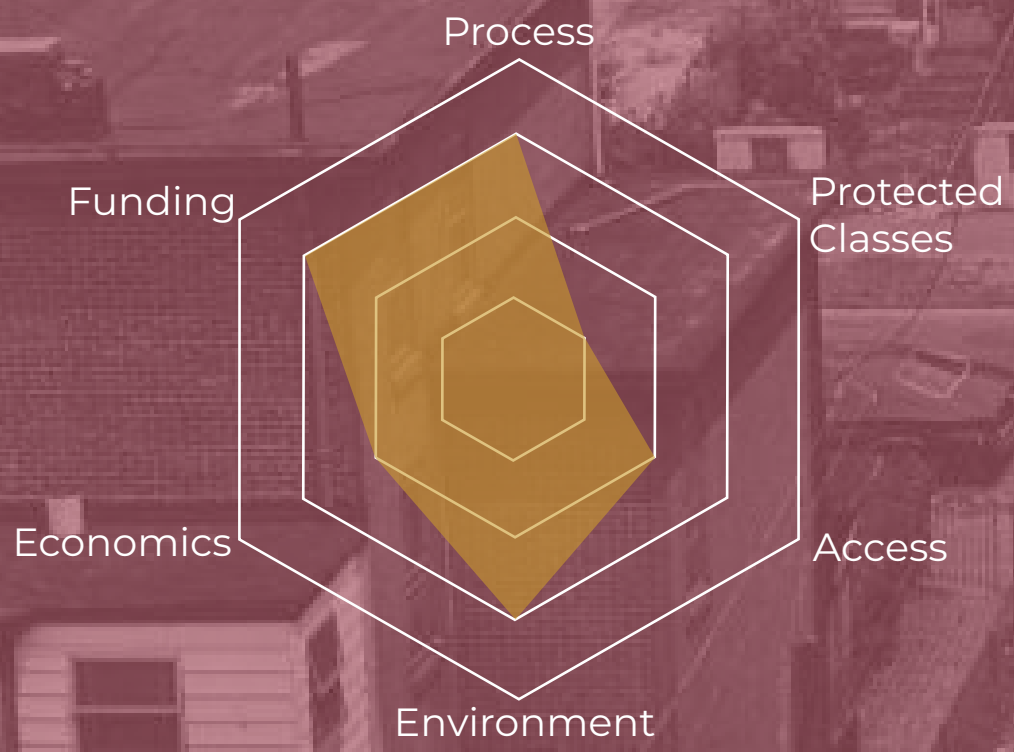
- 40 miles of light rail, or roughly the distance from Trenton to Asbury Park (using cost estimates from the total cost of the River Line)[112]
- 65 miles of bus rapid transit, or roughly the distance from Trenton to Pottstown[113]
- 2,462 miles of paved multi-use side path (using PBIC average cost per mile, adjusted for 2019 dollars)[114]
- 8,895 miles of protected bike lane (using PBIC average cost of a protected bike lane, adjusted for 2019 dollars)[115]

In the short term, the use of funds may well have alleviated some congestion temporarily. But due to the state's truck ban, the tunnel has not been used as intended, leaving truck traffic confined to city streets in Trenton, causing congestion elsewhere. Congestion has been shown to have a negative effect on traffic, with increasing capacity to decrease congestion having the opposite effect.[116] The pollution effects, sewer disruptions, disruption of spawning fish, and the oil contaminated roadway were all short-term effects on residents of South Trenton.

In the longer term, the project has solidified NJ-29 as a barrier to the water, forcing expensive capping projects such as the park to reconnect any part of Trenton with the water. The project solidified the legacy of years of urban renewal-era planning. The last section of NJ-29 was built to shave 10 minutes off commuters' drive time, at huge expense environmentally, socially, and in terms of the opportunity cost of what other restorative projects could have been funded with such a large sum of money.[117]

Conclusion

NJ-29 was a complex and expensive project, and its history demonstrates that DVRPC is not always able to control or predict political outcomes; there are other regional actors. The State of New Jersey ultimately implemented the truck ban that created many of the environmental justice issues around the freeways and highways in South Trenton. The board's tradition of "deferring to the state's opinion" on projects is worth reconsidering, however. DVRPC's own Public Participation Task force, as well as residents who live in Trenton and surrounding suburbs all expressed opposition to the project for many of the reasons contained in this section. Elevating the voices and concerns of residents who have been most impacted by urban renewal, environmental issues, and decades of disinvestment is a critical component of building a more equitable region. Though the project had many flaws, the region's MPO has been supportive of bicycle and pedestrian projects in the area, funding many bike facilities, trails, and even creating a "Complete Streets" guide for Trenton, to be published in 2021. Such endeavors are far less expensive and offer benefits for all residents, not only those commuting into the city.



Equity Dimension	Score	Reasoning
Process	3	DRPA listened to the community input and changed its plans multiple times based on public opinion
Protected Classes	1	While PATCO has served low-income passengers, it still has been much more useful to white commuters. Ridership for the lowest income is low, and the system is not fully physically accessible.
Access	2	Although PATCO increases accessibility for all, surface parking lots significantly reduce its usefulness, since there's less utility for reverse commuters.
Environment	3	Significant emission reductions and health benefits are similar for all. Negative effects of surface parking runoff may be worse in Camden, but there are equity benefits to keep cars out of Philadelphia.
Economics	2	Benefited white, suburban residents more in building wealth and employment, due to station area land uses.
Funding	3	Using DRPA bridge tolls to fund PATCO helps to reduce car-dependency. Low system costs allows for 24/7 service that helps 3rd shift workers the most, but consistent justification for low-transit funding was harmful to some groups over others.

Figure 47 PATCO equity spider chart and table

Figure 48 Family home near the Benjamin Franklin Bridge, Courtesy of the Special Collections Research Center. Temple University Libraries. Philadelphia, PA.

PATCO
Chapter Summary

Theme: The connection between station location and land use has profound effects on who benefits from access to opportunities and economic growth.

PATCO'S failure to integrate station and land use planning has had profound effects on the distribution of the real benefits that the line provides, from economic growth to environmental impacts.

PATCO is the primary public transportation system connecting Philadelphia and Southern New Jersey, and is particularly notable for its integration with other regional transit, its 24/7 service, its relatively low costs, and its large amount of parking on the New Jersey side. When PATCO opened as the Lindenwold Line in 1969, it expanded Camden-Philadelphia access to reach the farther-out South Jersey suburbs, in an effort to better facilitate the standard commute, with less focus on the reverse commute that has become increasingly in demand in recent years. PATCO has made a huge positive impact on the environment and the adverse effects that pollution has on disadvantaged populations, as well as providing increased mobility for carless households, but could have done more in both regards.

Equity Analysis Key Takeaways:

Land use and transportation were not always considered together throughout the planning of PATCO.

Because parking lots were prioritized over careful consideration of how to best use the land surrounding many stations, access was limited for people without cars and reverse commuters.

Transit can greatly reduce carbon emissions while still posing other environmental concerns.

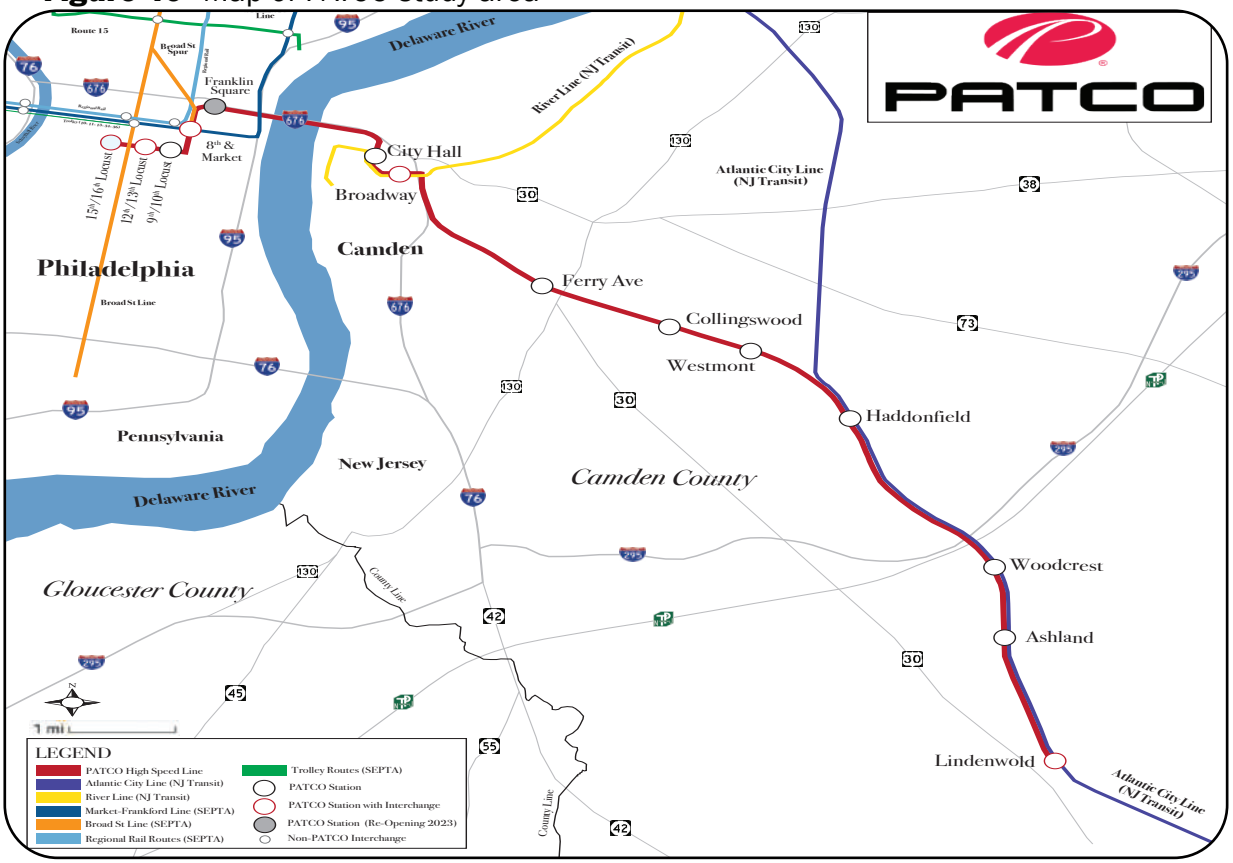
While public transportation such as PATCO does positively impact pollution, runoff from impervious surfaces had disproportionate effects, with greater burden going to those in lower-income and higher minority neighborhoods of Camden.

Investment in transit alone does not bring economic benefits to its surrounding areas.

While economic growth is clearly connected to transit and to PATCO specifically, greater benefits were seen in suburban communities than in more urban areas, and the opportunities that PATCO brought to Camden must be evaluated in conjunction with the climate of disinvestment generally in that area.

PATCO

Figure 49 Map of PATCO study area



PATCO is a rapid transit line serving the New Jersey suburbs around Philadelphia. The project was selected for this report because it demonstrates many elements of a successful transit project. The line operates with frequent round-the-clock service, operating 24 hours a day. But stations are underutilized, relying on park-and-ride lots to generate ridership rather than using land efficiently around stations. PATCO was built for suburban commuters into Center City Philadelphia using existing right-of-way. The line is well-utilized during peak hours, but underutilized during the off-peak, mostly due to the lack of jobs or housing directly around its stations. There are great environmental benefits to PATCO in terms of emission reduction, but there are environmental challenges related to stormwater runoff and pollution from the 83 acres of surface parking around its stations. Several PATCO parking lots are in the City of Camden where residents are particularly vulnerable to environmental justice issues. One of PATCO's greatest strengths is in its potential to greatly contribute to equity in transportation and land use in southern New Jersey with relatively modest investment. This section will explore that potential, starting with the transportation equity throughout its history, and then take a closer look at how the project has affected and could have affected those in and around South Jersey.

History

Context of area

Between the 1950s and 1970s, the City of Camden's population dropped significantly, from a peak of almost 125,000 to 102,551; this is about double the rate of 'white flight' experienced by the City of Philadelphia between 1960 and 1970. At the same time, Camden's Black population increased by 12,300 residents from 1960 to 1970 due

Figure 50 Family home near the Benjamin Franklin Bridge, Courtesy of the Special Collections Research Center. Temple University Libraries. Philadelphia, PA.

to the migration of Southerners seeking job prosperity in manufacturing, which was in the process of declining in Camden and other northern cities.[123] Suburbanization and the migration of white urban dwellers to the towns of Cherry Hill, Lindenwold, and other previously more rural areas occurred due to a myriad of factors. This included the desire to own a home and the financial incentives offered with it, widespread automobile use among the middle class allowing accessibility to areas with lower property values, and to escape social issues in cities like Camden and Philadelphia involving poverty, crime, and racial conflict, both perceived and real. Opportunities for Black residents to participate in this burgeoning movement of homeownership were hampered by redlining, blockbusting, and both de facto and de jure segregation. Institutional racism shaped the land use context of the time. It is within the context of suburbanization that PATCO officially opened in 1969, extending beyond Camden to Lindenwold.

Construction

The construction of the train line that would later become PATCO began with a need for a connection between Camden and Philadelphia. With no way to cross over the river that separated the two growing cities except by boat, it was clear that a bridge would be well-traveled as ferries that were primarily operated by railroad companies had heavy traffic. That bridge was the soon-to-be Delaware River Bridge, later renamed the Benjamin Franklin Bridge. While proposals for the bridge date to as early as 1818, the Delaware River Joint Commission (DRJC) was formed one hundred years later to replace the two states' independent commissions and accept designs for the project. Construction began in 1922 and was completed in 1926 as the longest single-span bridge in the world at the time. At the time of designing, streetcars were the dominant mode of public transportation, and provisions were in place for the development of both street tracks and high-speed rail, but ultimately the latter was the only one to be implemented.[124] In the ten years which the Delaware River bridge was open to automobile traffic, but high-speed rail had yet to be built, the need for high-speed rail became even more evident: ferries remained crowded and buses crossing the bridge were also in high demand.[125]

Despite setbacks due to the Great Depression, the High Speed Line which ran across the bridge began construction in 1932 with the line opening on June 7th, 1936. The line had four stops: Broadway and City Hall in Camden, and Franklin Square and 8th and Market in Philadelphia. 8th and Market shared a track with the Broad-Ridge line trains. DRJC had an agreement with the Philadelphia Rapid Transit Company (PRT) who operated the newly created Bridge High Speed Line. In its early years, the

line saw such low ridership that cars were modified to allow for single-car operation.[126]

Despite low ridership, there were many proposals for expanding connections, including a 1938 proposal to create four lines from the line that would go to Glassboro, Clementon, Haddonfield, and Moorestown that would follow preexisting rail lines, but ultimately, DRJC did not have the necessary powers to create these extensions. But in 1952, the Delaware River Port Authority was formed and succeeded the DRJC. DRPA had more authority and could operate rapid transit further into Camden than the DRJC. The next year, the line was extended for the first time to 16th and Locust Street in Center City Philadelphia, which was facilitated by Philadelphia's ownership of the Locust Street subway which had been built but not completed in the late 1930s. This extension also saw low ridership, and despite the ferry service between Camden and Philadelphia ending in 1952, the line saw little increase in patronage as a result.[127]

Soon after taking over the line, DRPA began to study the potential for increased public transportation in South Jersey. After several studies and various proposals, a site was chosen for the extension's terminal station: Lindenwold. The alignment was selected due to lower costs and the ability to use existing rail facilities. Plans were made for Automatic Train Operation (ATO) which allows the train to operate without a conductor. It was at this point that the "Lindenwold Line" replaced "The Bridge Line." Construction began in 1964, and one of the first provisions was to purchase 285 properties along the proposed route and an existing 10.5 miles of existing railway for $2,150,000. Important to DRPA was that the new line would not be classified as a railroad, as the right-of-way once was, so that it would not be subject to certain safety and inspection law governing railroads.[128]

DRPA voted to run the line itself, rather than contract with another agency, and in 1967 the Port Authority Transit Corporation (PATCO) was officially certified. When construction began, there were no union employees, but at the end of 1968, just before the line opened, Local 234 claimed jurisdiction and forced PATCO to hire former SEPTA employees who had been laid off due to SEPTA losing control over the Bridge Line. Training and testing began the next year, and the first day of operation was on January 4th, 1969. Daily ridership the next month was up to 18,000 and by the end of the year, daily ridership had reached 28,000.[129]

While the original plans proposed 4,400 parking spaces, there were over 5,700 spaces by December 1969, and by fall 1970, there were about 8,000 parking spaces at transit stations. Parking continued to be constructed every few years until it reached 9,500 in the mid 1970s when Woodcrest Station was built as an infill station between Haddonfield and Ashland with 2,600 parking spaces and a connection to I-295.[130]

Current status

PATCO operations continue as originally designed, with a large proportion of commuters driving to stations. The system continues to operate around the clock, with frequent service. Frequent service allows users to board the train without the need to check a schedule, simplifying the system. 24/7 service is critical for non-traditional workers and those employed in the service industry. PATCO is in the process of modernizing stations, with ADA upgrades, such as new elevators, and photovoltaic solar systems being installed at various stations. These modernizations are critical for environmental reasons and for making PATCO

accessible for disabled people, as well as users with small children, carrying groceries, or using mobility devices.

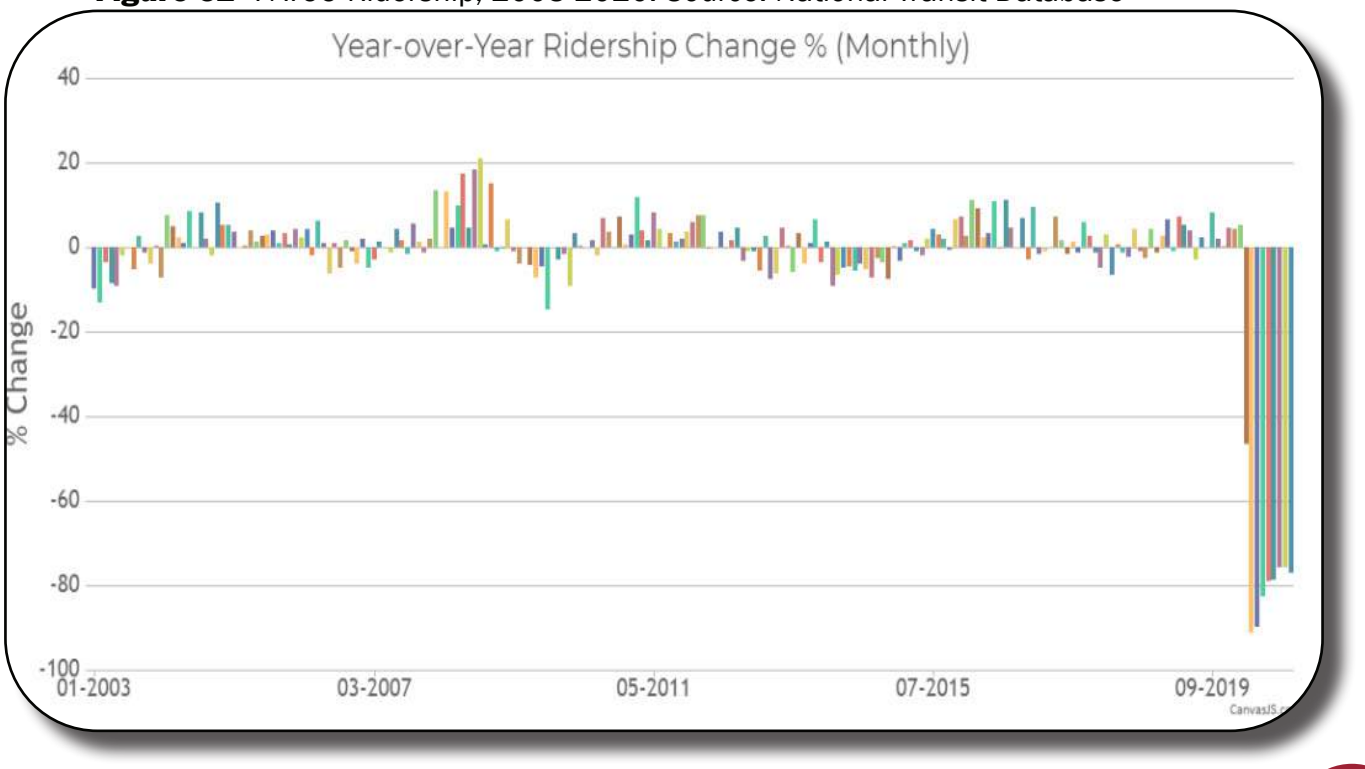
Although the operator has not been picked, the Glassboro-Camden line recently completed an environmental impact statement. The return of service to that corridor would add to the original planned spurs of PATCO that were approved in DVRPC's earliest plans.

Ridership has shifted dramatically during the COVID-19 pandemic, and the shift to remote work for many workers along PATCO. The full effects of this remain to be seen, but farebox recovery will be an issue for many transit agencies. PATCO may need to adjust service and operations to accommodate the all-day rider, rather than primarily the peak rider, particularly with the longer-term suburbanization of both jobs and poverty (discussed later in this report).

Pre-COVID ridership had increased over the years, with 11 million riders choosing PATCO in 2019. DVRPC collects and anonymizes license plate data to determine passenger origins along different heavy rail lines. Figure 52 shows results from a 2019 survey, where 799 drivers parked at the Haddonfield PATCO station. Vehicle origins are shown in red. This survey is similar to other stations along the line.

The creation of the Freedom Card, a fare card for PATCO and SEPTA users, allows closer coordination between the two systems. Further integration or bundling of fares between the two systems would increase the utility of the system for riders making transfers between the two systems, and would incentivize such use, increasing ridership and operating efficiency throughout both systems. PATCO uses transit police for fare enforcement and general system safety, but practices from other transit agencies are emerging that do not rely on police for safety.

Figure 51 PATCO Ridership, 2003-2020. Source: National Transit Database



Franklin Square Station

Franklin Square Station opened in 1936 as one of four stops on the Bridge Line operation between 8th and Market in Philadelphia and Broadway in Camden but closed after World War II. It reopened briefly in 1953 and again sporadically between 1976 and 1979 but was ultimately closed due to low ridership and illegal activities in Franklin Square park.[419] Today, PATCO is working to reopen Franklin Square Station, with an estimated opening date of 2023.[420]

The series of openings and closings have not benefited and burdened everyone equally. The historical context sheds light on the inequities.

The location of Franklin Square Station on the square had some initial problems: It was discovered that the square served as a burial ground in 1741 for the Old First Reformed Church, a church founded by German immigrants on 4th and Race Streets. In the 1930s, workers dug tunnels for the east and westbound trains, undoubtedly uncovering the interred bodies, but called no attention and continued the work, despite disturbing a culturally significant site.[421]

Accounts of the area refer to it as “Skid Row” as early as the 1890s, in reference to the high homeless population.[422] The station opened in “Skid Row” in 1936 with two entrances, headways of four minutes, and 24/7 operation, but did little to change the reputation of the area and just three years later in 1939, the station was closed. Ten years later, the first Philadelphia newspaper used the term “Skid Row” to describe the area, demonstrating that little had changed.[423]

Franklin Square Station reopened on March 31st, 1952 as a transfer between Philadelphia and Camden because ferry service was discontinued, but it only remained open for seven months.[424] In 1969, *The Philadelphia Inquirer* publicized the reopening of the station which was expected to thrive thanks to increased ridership anticipated from demand from Metropolitan Hospital at

8th and Race, as well as the Police Administration Building and US Mint which had been built not too long before.[425]

In 1976, PATCO spent $1.1 million to renovate and reopen the station which closed again in 1979. It closed due to low ridership despite 23,000 riders on July 4th, 1976 for the Bicentennial.[426] Although "Skid Row" was no longer the popular name, throughout this time, Franklin Square was known as "Bum Park". The Callowhill area in which the station is located remained depressed throughout urban renewal of the 1960s and 1970s.[427]

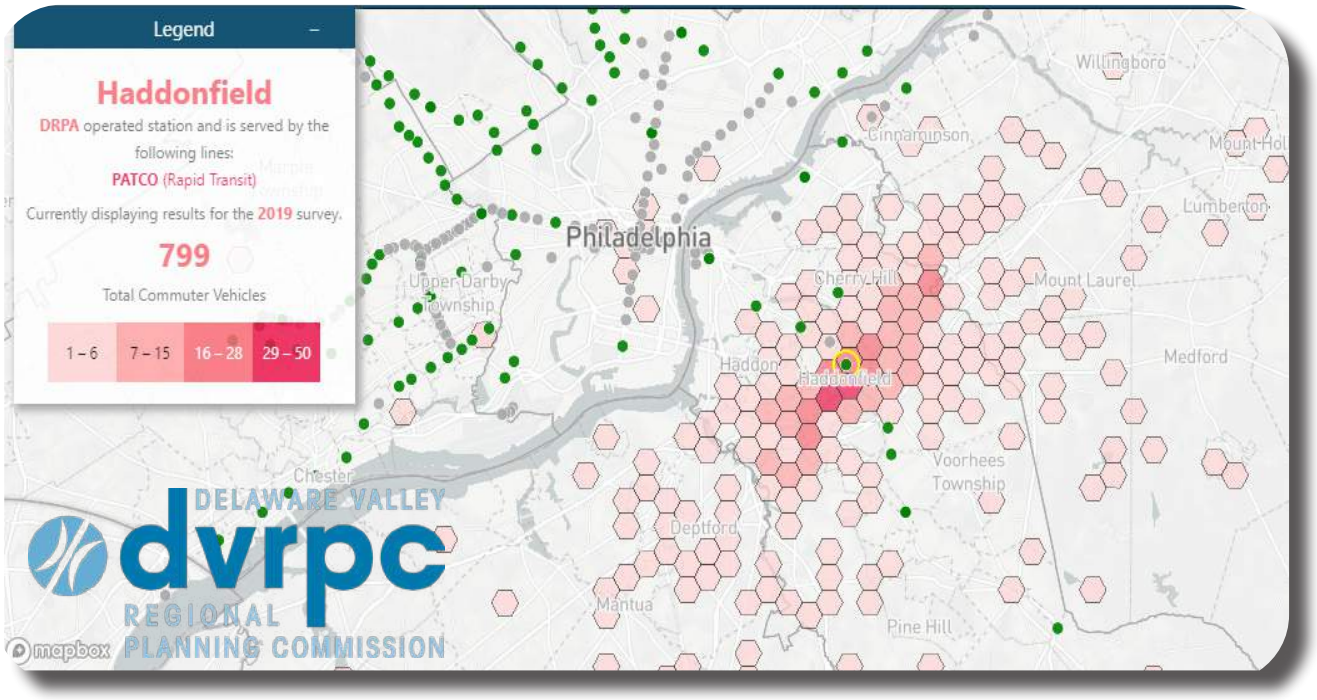
The project to reopen the station today is expected to cost $30 million, and will include structural alterations, elevator and escalator installation, rerouting of major city water main, meeting ADA requirements, and replacement of antiquated electrical and other systems.[428]

In reflecting on the facts of the Franklin Square Station repeated closings and re-openings, and the costs associated with it, it becomes clear who the station has primarily served: The station was repeatedly deemed not viable when there were many who were suffering in the area during the decades of "Skid Row" and "Bum Park;" however, today, the area is relatively affluent with a median income of over $103,000 compared to the Philadelphia median just above $45,000 and the Metropolitan Statistical Area just above $72,000.[429] The years of neglect in the area made it difficult to keep Franklin Square Station open, but its closings due to the homelessness and poverty in the area hurt the people living and using that area the most. Today, a station in the area will benefit significantly more affluent residents than it would have if the closings of the 30s, 40s, 50s, and 70s had not happened. It is important to consider the possibility that if the station had remained open, it would have provided access and opportunity to the homeless population that could have transformed their lives during those decades.

Equity Analysis of PATCO

The sections that follow provide the equity analysis for PATCO across the six categories of impact. This analysis highlights the way in which PATCO has provided equitable outcomes as a high-speed public transportation alternative to the private automobile in Southern New Jersey. With this lens, the chapter examines the decision-making process, primarily using the planning of the Haddonfield station as an example; the impact of the project on protected classes, especially among people of color, low-income, and disabled people; the environmental wins and difficulties; disparate economic impacts; and what the funding structure means for equity. PATCO levels the playing field in many ways by providing a low-cost, environmentally better, 24/7, rapid transportation alternative to private vehicles, but due to decisions around parking, office and housing construction, those advantages have not been as beneficial as they could have been to disadvantaged groups. Issues in disparate benefits from PATCO among these groups may continue to grow as development and job patterns continue to suburbanize, but opportunities for leveraging PATCO's high-quality services to provide more equitable distribution of benefits are plentiful, and are primarily in issues around the environment, accessibility, and economic development and their intersection with land-use planning.

Figure 52 Passenger origins at Haddonfield Station.



In process, public participation, and decision-making

The public has had an impact on PATCO projects since its initial construction. One of the most significant instances of public influence in PATCO's history is the design of the Haddonfield Station. The Haddonfield Civic Association was the driving force behind Haddonfield's opposition of DRPA's original design proposal of the PATCO station being built aboveground. The Association's primary goal is to keep the community informed of and involved in decisions that would impact the general welfare of residents.[131] In the 1940s, the Association encouraged businesses to adopt a colonial appearance as they asserted that it would improve the downtown's aesthetic.[132] The borough has tried to maintain this colonial character since then.

Haddonfield opposed DRPA's rapid transit system idea years prior to its construction in the late 1960s. The initial design proposal showed the location of the station to be in the downtown and aboveground, which received immediate pushback from the community. In response, the community enacted the Historic District Ordinance in 1971 "to safeguard the heritage of the Borough of Haddonfield by preserving that part of the Borough which reflects elements of its cultural, social, economic and architectural history".[133] This Ordinance applied to the entirety of the streetscapes in the downtown, including where DRPA proposed a PATCO station. The Association and community used the Ordinance to prevent DRPA from building the station based on its initial proposal. This led to DRPA agreeing "to depress the commuter line through the center of Haddonfield, the only town along the right-of-way to obtain such a concession from the port authority".[134]

Figure 53 illustrates DRPA's altered design proposal in response to the community backlash. While the section drawings show the station below ground level, DRPA decided

Figure 53 Historic Drawing of Haddonfield Station. Source: Courier Post, February 21, 1964.

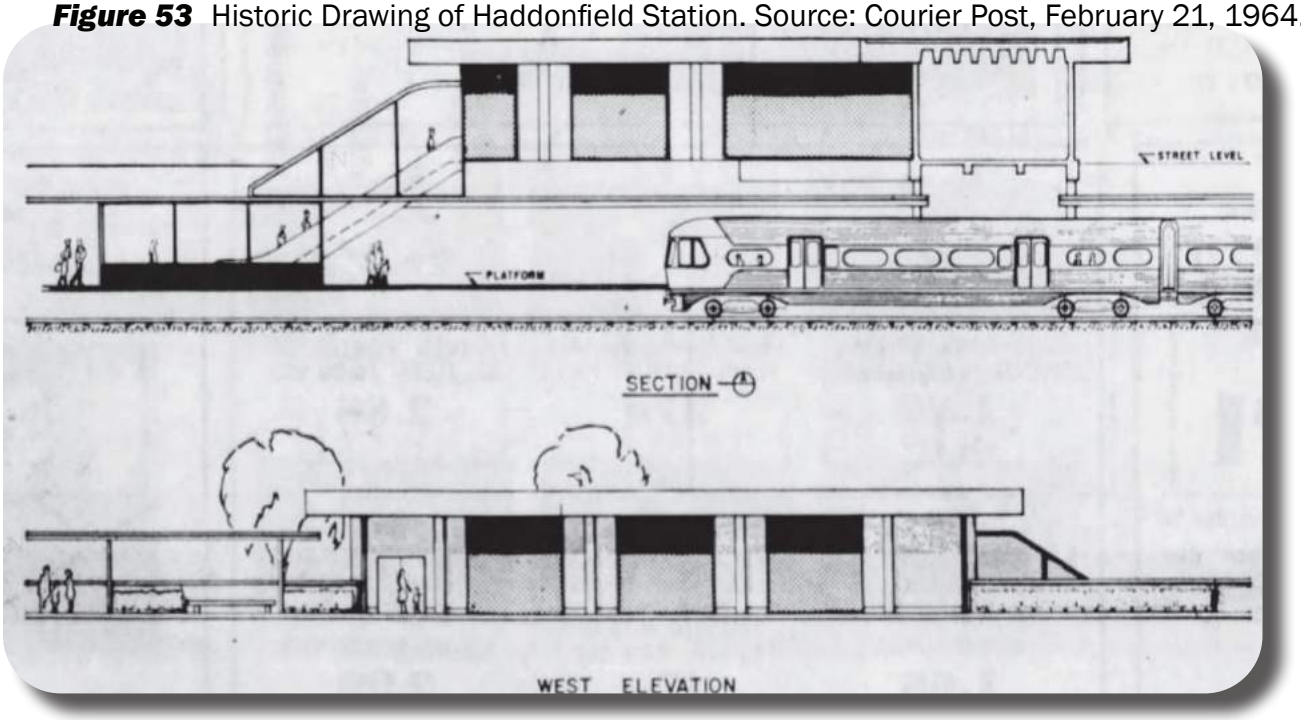
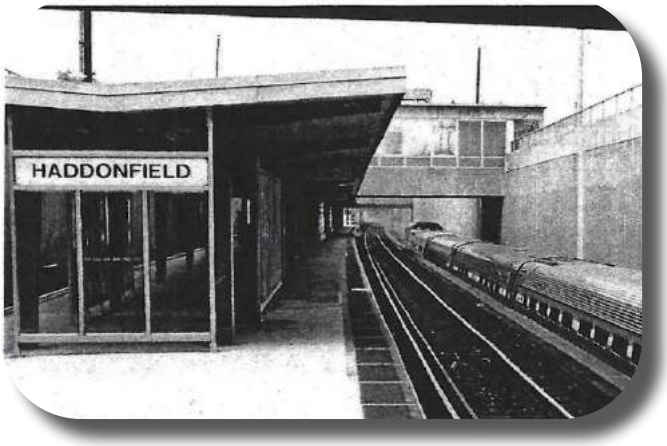


Figure 54 Haddonfield Station in July 1989. Source: Vigrass, 1990



that the station should be modern and made of glass and concrete materials. This contradicted the Ordinance and what DRPA told the mayor of Haddonfield at the time, Albert Boyd Sharp. It was agreed upon that the station facilities would blend into the existing architectural aesthetic of Haddonfield and be in harmony with the surrounding towns as well, which was not reflected in the updated section drawings. Mayor Sharp noted that the Haddonfield Station controversy was resulting in both civil pride and moral pressures, and he also said that he was certain that the borough will do whatever it must to see that changes to the design of the station were made. However, DRPA's executive director at the time, Paul MacMurray, and project engineer at the time, Robert Johnson, did not say that there would be any changes to the modern design to suit Haddonfield and "indicated they had more important things to worry about". The Pennsylvania Commissioner to DRPA at the time, Frederic R. Man, contradicted them by asserting that "'the port authority has always been extremely sensitive to public opinion. [They] have always tried to do what the public has demanded of [them]"'.[135] Ultimately, DRPA honored their commitment to build most of the station below ground. Figure 54 shows the portion of the station that was built below ground. PATCO riders would enter the station aboveground then take the stairs, elevator, or escalator down to the line's platform where they then would board the system's cars. With this design, the residents of Haddonfield would not see PATCO's platform, cars, or tracks, only the above-ground building.[136]

More recently, public outcry has also impacted station facility improvements and service. The PATCO stations have had a history of on-going issues with their elevators and escalators breaking down. Riders have said that the facility malfunctions have made their commutes to work difficult, sometimes simply a nuisance and sometimes dangerous. One rider said that she had to quit her job because of the continued escalators and elevator issues. She referred to one event where she got stuck in an elevator for "almost 30 minutes and three PATCO employees had to pry the door open".[137] Other PATCO riders have also gotten stuck in the elevator for extended periods of time. Older people must walk up and down the steps when the elevators and escalators are out of service, which is both a major safety and liability issue. A regular PATCO rider for 14 years at the time stated that the escalator and elevator issues "make for an unpleasant commute".[138] The elevators and escalators have been called extremely unreliable. Another regular rider said, "'I have been taking PATCO for 23 years, and historically the escalators are down more than they are working'".[139] Complaints from the public were coupled with serious scrutiny from the Federal Transit Administration.

In 2014, PATCO was given a citation by the Federal Transit Administration (FTA) for its broken escalators and elevators at multiple stations. Only 56% of the escalators were

operating properly at the time. The problem was on-going and never fully addressed until the FTA cited them and, along with the citation, said that "PATCO was not maintaining its elevators and escalators in good repair, not performing preventative maintenance as needed, and not accommodating passengers when elevators were out of service".[140] As a result of the citation, PATCO was then required to provide the FTA with monthly maintenance reports with updates on the status of the elevators and escalators, reasons for when and if they are not functioning properly, how they are being fixed, and the timeline of repairs.

DRPA issued a statement that it would make these changes and an apology to PATCO riders. The spokesman for DRPA, Tim Ireland, stated, "'We work every day to maintain compliance with the Americans with Disabilities Act. Moreover, the DRPA/PATCO five-year capital plan allocates more than $20 million to take us beyond compliance... While the act does not require us to install elevators in every PATCO station, we have made it an institutional goal to make every station completely accessible to people with mobility-related disabilities by 2017.'"[141] DRPA's apology consisted of them saying that their customers deserve better and that DRPA hopes to win back their trust. This apology was heard but not well-received by all PATCO riders. A rider went so far as to say, "'Forget the apology, just fix it. I don't think an apology matters at this point.'"[142]

Since then, DRPA has not only been fixing these issues more quickly than but is also in the middle of a multimillion-dollar project to install elevators in multiple stations. The $32 million project began construction in Fall 2017 and is expected to be completed in Fall 2022. The Haddonfield, Collingswood, Westmont, Ashland, Camden City Hall, and 12/13th & Locust Street stations are receiving elevators. The other stations already have elevators. This project is being carried out in three phases: the Haddonfield and Collingswood stations are in the first phase, the Westmont and Ashland stations are in the second phase, and the Camden City Hall and the 12/13th & Locust Street stations are in the third phase. The stations in the first and second phases are having one elevator installed while the stations in the third phase are receiving two elevators. In addition to the installation of elevators, the stations will all be undergoing the following types of construction at varying degrees according to the existing station designs: demolition; site and landscape clearing; construction of machine rooms, control rooms and station additions or reconfigurations; Infrastructure upgrades; utility relocation; plumbing, mechanical, electrical, structural and fire protection system work; ticket vending machine installation and relocation; removal and installation of ornamental ceilings, paint and tile application; and lighting, signage and railing relocation and installation.[143] While all the improvements were catalyzed by the FTA citation back in 2014, the public was also heard by DRPA and did contribute to the process.

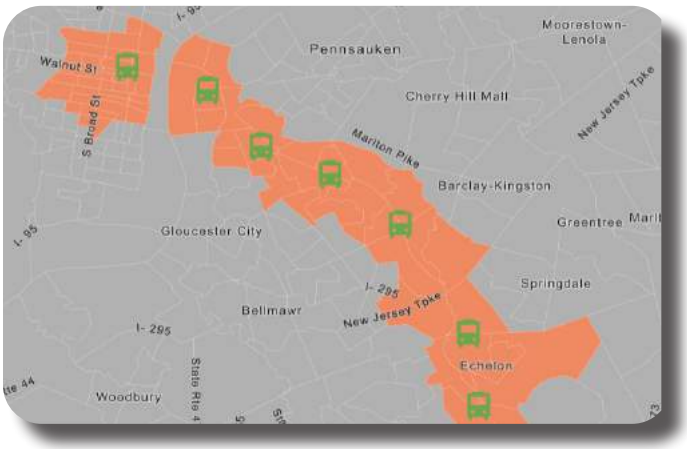
Public input and pushback also influenced DRPA's decision to not alter PATCO's overnight service. In 2019, DRPA announced that PATCO would reduce its number of operating trains, close seven stations during overnight hours, and stationing a police officer on every train during "Owl Service" hours. DRPA said that safety was the main reason behind these changes as there were two crime incidents and the agency wanted to prevent a trend in crime. Between midnight and 4:30AM, trains would run every 60 minutes instead of every 45 minutes. Weekend service would consist of trains operating every 45 minutes and stopping at every station except for 9th/10th and Locust from midnight to 2AM. After 2AM, the trains would run every

60 minutes and only make stops at 6 of the 13 stations: Lindenwold, Woodcrest, Ferry Avenue, Broadway, 8th and Market, and 15th/16th and Locust. All other stations (Ashland, Haddonfield, Westmont, Collingswood, City Hall, and 12th/13th and Locust) would be closed. Service with stops at all 13 stations would not resume until 4:30AM for trains leaving from 15th/16th and Locust and 5AM departing from Lindenwold.[144]

DRPA faced immediate pushback from the public. They planned to implement the changes to service only a week after announcing them to the public. Just as quickly that DRPA announced Owl Service, the transit agency announced that it would not move forward with it after a week of public outcry and social-media backlash. DRPA received over 150 complaints from PATCO riders within a few days of announcing Owl Service. Complaints were centered around station closures, the timing of the announcement being less than a week before it was supposed to go into effect, and the public not being included in discussions about changing the schedule at all. The complaints focused on the closures of Collingswood, Westmont, and Haddonfield stations pointed out that these stations are a mile apart from each other and closing them would leave a six-mile gap between Ferry Avenue and Woodcrest stations.[145]

The mayors of Collingswood, Haddon Township, and Haddonfield all publicly opposed the implementation of Owl Service. James Maley, the mayor of Collingswood, stated "It's a service that everyone feels safer knowing that it's there... For people that are working, or are out late and shouldn't be driving, or something happens unexpectedly, something bad happens, it's real helpful to know you can jump on public transportation".[146] Randy Teague, the mayor of Haddon Township emailed DRPA requesting that the agency reconsider its decision "due to the negative impact to Haddon Township residents that rely upon PATCO as a means of transportation at all hours of the day".[147] Lastly, the mayor of Haddonfield, Neal P. Rochford "reached out to (PATCO General Manager) John Rink [who] is reviewing concerns from several communities (including) Haddonfield, Collingwood and Haddon Township".[148] It speaks volumes about DRPA's Owl Service that government officials oppose it because they are working in the best interest of their residents. Concerns of equity arose with the Owl Service announcement. Individuals who work during nontraditional hours overnight were not being considered. The owner of the Twitter account @ PATCOWatchers, Larry Davis, said, "Maybe these two to seven people bought their homes near the stations because they work overnight shifts at a hospital, or they're restaurant workers".[149] Residents of the stations that would be closed overnight would potentially have more difficulty getting from home to work or from work to home during these hours. The Owl Service would not adequately serve all its passengers' transportation needs. Because of these officials and the community leaders and individual PATCO riders who also expressed their concerns, DRPA halted its implementation of Owl Service and eventually scrapped it entirely.

Figure 55 Tracts making up the "PATCO Corridor"



Across demographic groups that are geographically distinct and geographically diverse

PATCO, like any public transportation, brought opportunity to low-income and carless households by being a more affordable, non-private vehicle mode of transportation that connected the city and suburbs. However, upon closer examination of who PATCO serves and has serves throughout its history, it is clear that the line does not always provide for those who might be served by it the most.

Low-income populations

Historically, PATCO has not served low-income populations at higher levels than it has higher-income populations. Figure 56 shows a comparison between the median household income of 70 census tracts within a one-mile radius of PATCO stations (hereon the PATCO corridor) and the entirety of Camden County. Data for median household income was only available in decennial censuses at the tract level for 1970, the year after PATCO had its first trip, and 2010. The data show that at the time of opening, the median income along the corridor was over 5% greater than the median income of Camden County. While by 2010, the PATCO corridor had a 15% lower median household income than the rest of the county, less than a decade later, the PATCO corridor was once again about 5% higher in median income.

This analysis shows how, despite changes over the decades, PATCO has continuously been most proximate to those who are at or above the median income, and not likely to be serving a high population of low-income people. However, this analysis shows proximity and not ridership. While historical ridership data is mostly unavailable, PATCO conducted a ridership survey in 2018 in compliance with Title VI that tells a similar story.[150] Figure 58 shows the number of riders based on that survey data and their income levels at peak and all-day times.

The survey results indicate that an estimated 6.4% of riders have household incomes under $24,999 while 21.1% of the PATCO Corridor and 19.8% of Camden County in 2018 had the same household income, indicating that the lowest income people in the area are underrepresented on PATCO. The gap begins to decrease at the next income bracket but is still present among this lower income group: In 2018, Camden County had about 6% more and the PATCO Corridor had about 5% more people making between $25,000 and $49,999 than the estimated riders of PATCO.

Race and Ethnicity

A similar comparison of race and ethnicity demographics between the PATCO corridor and Camden County show disparities in who PATCO is serving. Figure 58 and Figure 59 show how the PATCO corridor has shifted in demographics since it opened. In those 50+ years, the

Figure 56 Median Household Income of PATCO Corridor vs. Camden County.

	Years		
	1970	2010	2019
Median HH income (PATCO corridor)	$82,989	$62,535	$74,206
Median HH income (Camden County)	$78,539	$73,547	$70,451
Difference between Camden and Corridor	-$4,450	$11,012	-$3,755

Sources: 1970 US Census, 2010 US Census, 2019 ACS 5-Year Estimates. All dollars are adjusted to 2019 inflation

Figure 57 Racial Breakdown by Decade in PATCO Corridor. Source: US Census, 1970, 1980, 1990, 2000, 2010, 2019.

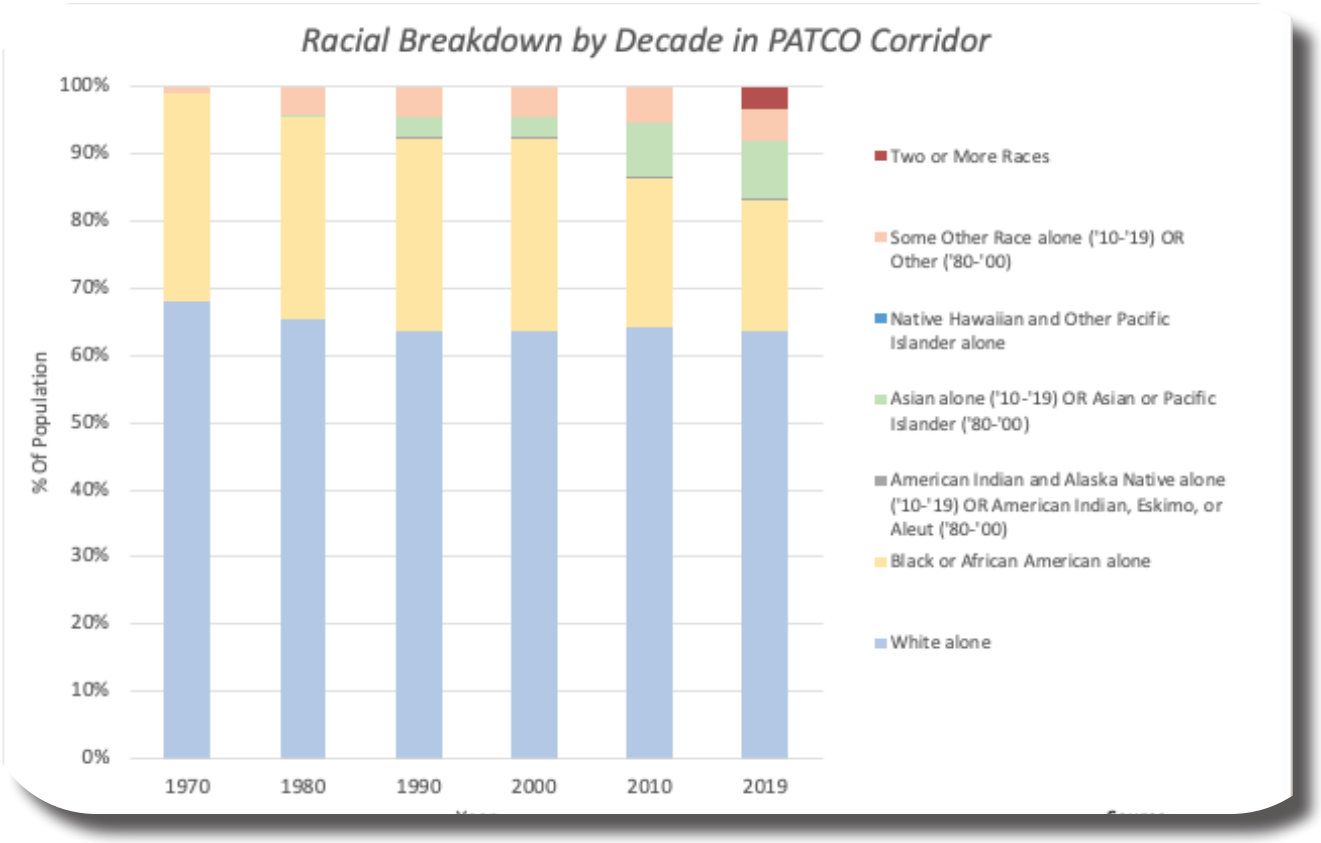


Figure 58 PATCO Ridership by Income. Source: PATCO Ridership Survey Household Income Results, 2018.[430]

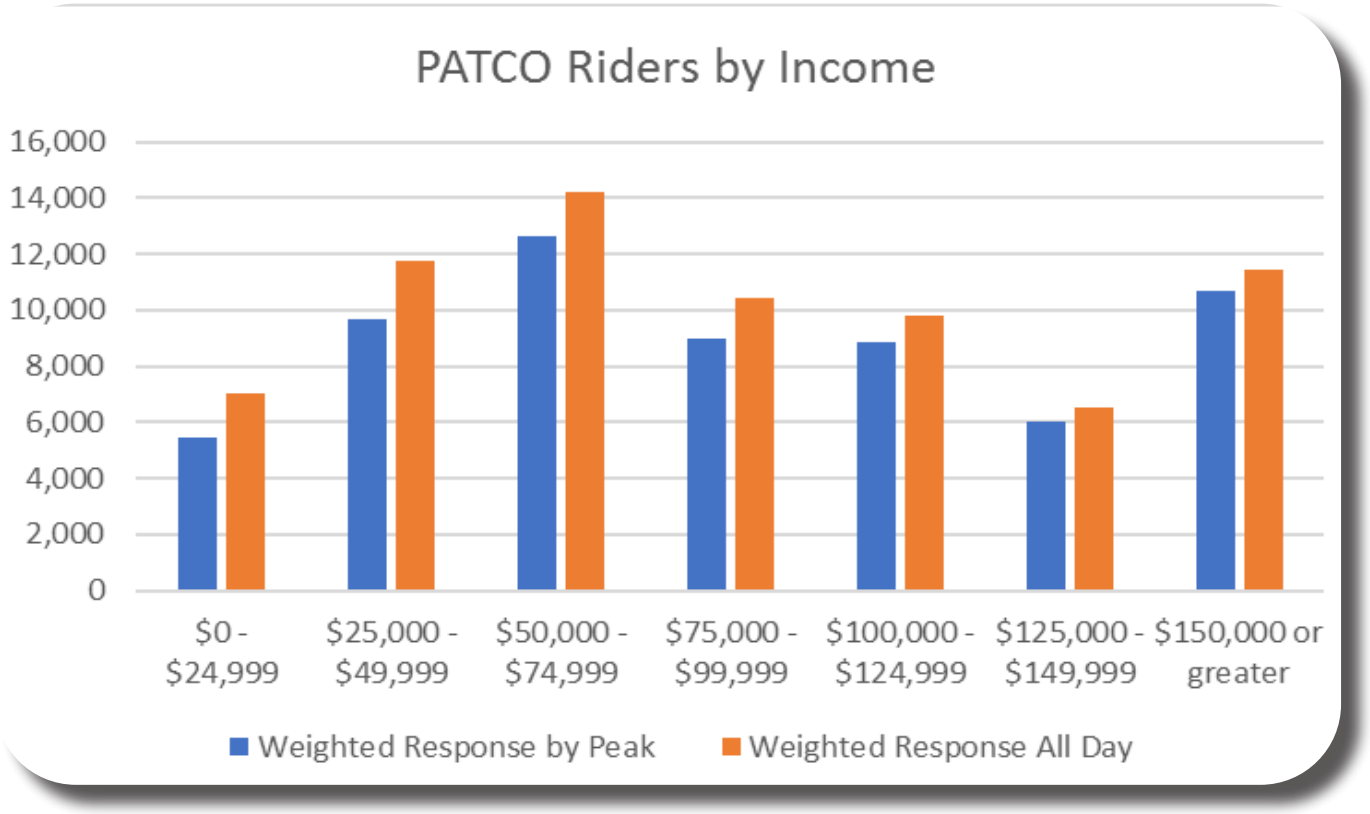


Figure 59 Ethnicity Breakdown by Decade in PATCO Corridor. Source: US Census, 1970, 1980, 1990, 2000, 2010, 2019

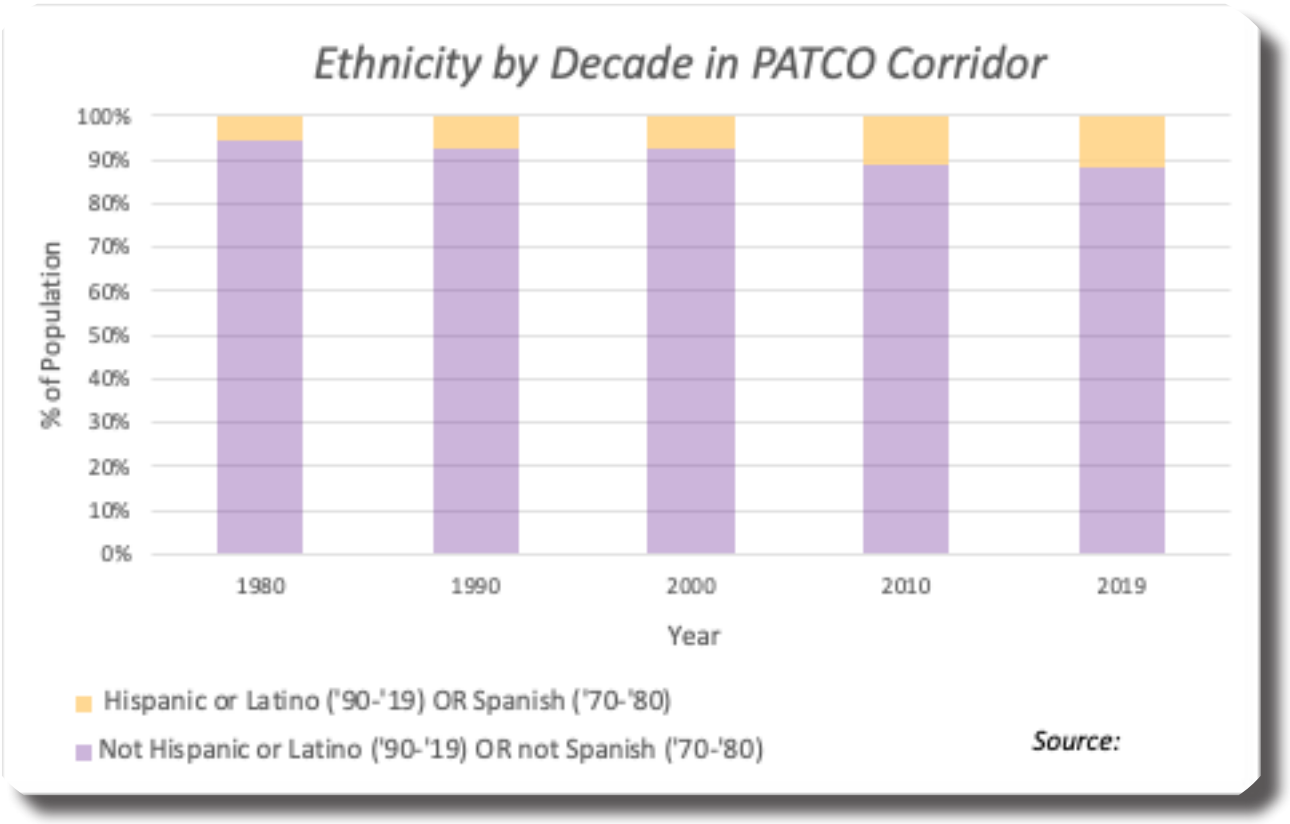
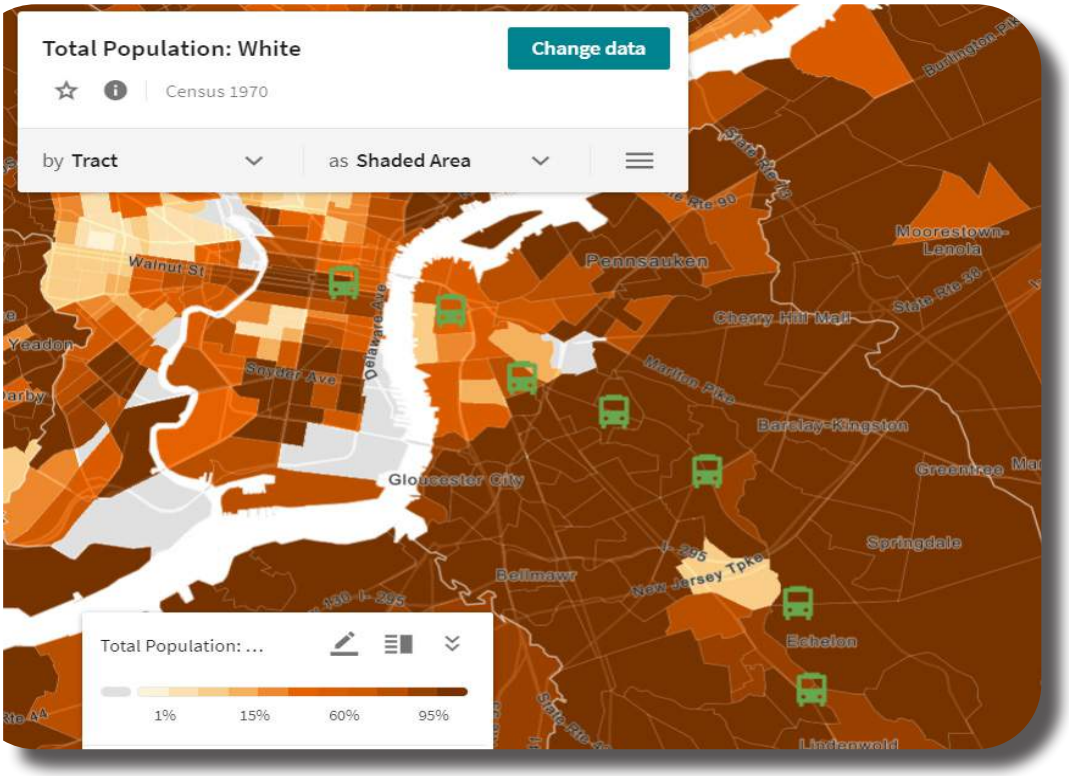


Figure 60 Maps of White Population around PATCO, 1970 and 2019. Source: US Census



corridor's white population has decreased by 4.3% and the Black population has decreased by 11.5% as a share of the population. The racial groups that increased in share of the population are harder to evaluate because of lack of data, but it is clear that the Asian population has grown significantly, by about 8%.

Figure 60 shows how the distribution of the white population has changed between the early days of PATCO operation in 1970 and today.

The data show in 1970, the PATCO Corridor, or the area closest to PATCO stations was slightly whiter than the average for Camden County, but by the following decade, the reverse became true. This chart also shows that when PATCO first opened, the surrounding corridor was more white than Camden County, but the opposite became true by the following decade, and in 2019, the PATCO corridor was 25% less white than the county overall.

The 2018 ridership survey indicates that 66% of riders are white or non-minority.[151] This estimate is close to the 63.7% white population of the PATCO corridor in 2019, indicating that the race of ridership is not too different from the race of those living in the nearby area.[152] The PATCO Ridership Survey indicated that 8.7% of riders were of Hispanic origin, compared to the 2019 census data in the PATCO corridor with 11.6% of residents of Hispanic origin.[153]

Other Demographic Categories

The 2018 PATCO Ridership Survey also shows that people with lower educational attainment levels are underrepresented on the line. In 2018, 9.3% of people in the PATCO corridor had less than a high school degree, while only 0.7% of respondents to the survey had the equivalent education.[154] While ridership among people without a high school degree might be low due to higher unemployment numbers, the discrepancy here is large enough to be worth investigating whether there are also barriers to this population to using PATCO, whether it is cost, lack of access to the stations, lack of opportunities of interest near stations, or another factor within PATCO control.

While vehicles available per household data is not available for the PATCO corridor in 2018 to serve as a comparison point, the ridership survey indicates that very few PATCO riders—only 9.6%--do not have a car in their households. If one of the primary purposes of public transit is to level the playing field for households without cars, this ridership survey may indicate that many people without car access are still not using PATCO.

Physical Accessibility

PATCO is not currently accessible to those who need to use elevators due to a physical disability, or because they are using a wheelchair stroller. This lack of physical accessibility is a major equity concern. As discussed in this case study's section on process, PATCOO has already begun to address this concern through the construction of elevators at the six stations without elevators.[155]

The stations receiving elevators represent almost half of all PATCO stations that have not been accessible—at all—for over 50 years. While PATCO is addressing the issue now, the lack of elevators at these stations over the entirety of PATCO's lifetime mean that many people

are effectively barred from using these transit stations. Wheelchair users are currently unable to use the PATCO stations without elevators, meaning that they must find alternate means of transportation to a station that may be further away, costing them time and money. If they arrive at a PATCO station with an out-of-service elevator, PATCO will offer transportation for them to the closest station with an operating elevator.[156] Despite PATCO's alternative transportation service, this is still a significant burden on people who rely on elevators as it is logistically difficult, time-consuming, and reduces a disabled person's independence. Other people who rely on elevators who are not disabled, such as parents, particularly women pushing children in strollers, may simply opt to carry their strollers and children up the stairs rather than go to a different station, which is difficult and could even be dangerous.

In mobility and accessibility

Any transportation project provides access and mobility, but the allocation of these elements is a central question of this report. Who benefited from PATCO? Who was it designed for? What kind of access does it provide? How was that access strengthened or weakened by other projects? What are the access implications of creating 83 acres of surface parking around all stations in the PATCO system?

PATCO was explicitly designed for motorists looking to travel into Center City, evidenced by the thousands of parking spaces built around the stations. Land around rapid transit stations is a finite resource, and decisions about what to build around stations are always tradeoffs. In the case of PATCO, parking was generally given priority over uses such as higher density housing, employment centers, or other uses. This decision directly reduced the access that PATCO provides, because it limited how many jobs or housing developments could be

Figure 61 Job Density in PATCO Station 10-minute walkshed. Sources: Census OTM

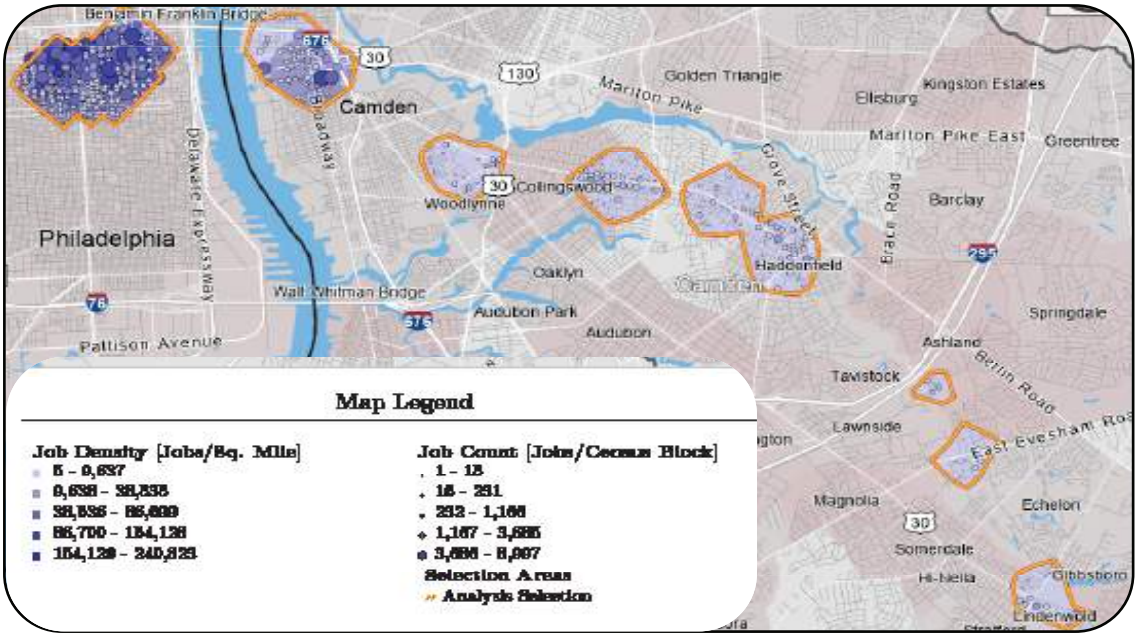
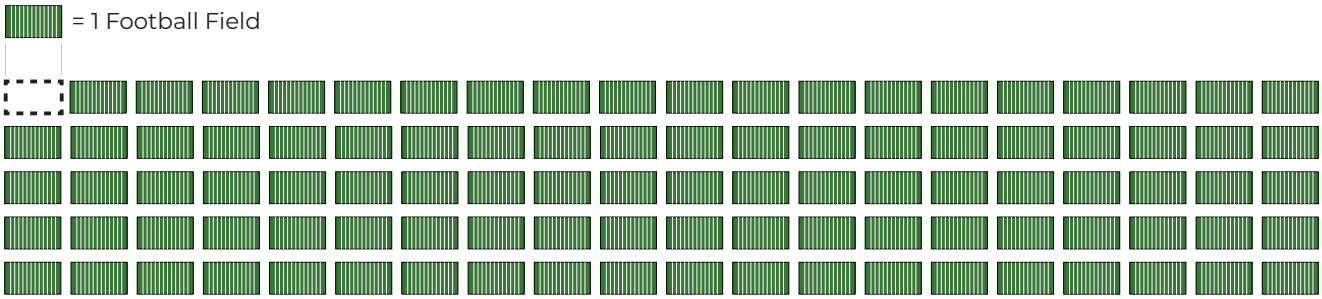


Figure 62 PATCO's surface parking lots measured in football fields



placed proximate to stations. Although there are many jobs and housing options along PATCO at present, as well as along lines that connect to it, relegating land use directly around stations for parking has capped the number of destinations that are useful when using the line. The footprint of current parking facilities, according to a total area query and calculation of DVRPC's OpenData GIS layer, is 3,647,996 square feet. This amounts to 83.74 acres—the equivalent of 109 football fields—devoted entirely to storing private vehicles of suburban commuters. Although keeping idling vehicles out of Center City Philadelphia is a positive element of the project, the decision to prioritize station area parking, which was made very early in the planning process, placed a cap on the access (number of destinations) available from the line. The effects of this decision are clear in Figure 61, which shows the number of jobs available within a 10-minute walk of PATCO stations. While many jobs are clustered in Center City Philadelphia and in the City of Camden, other job clusters remain at locations that have smaller parking lots and tighter development patterns. The walkshed analysis using the On the Map tool in Figure 61 indicates that there are 229,002 jobs located within a 10-minute walk of PATCO stations. More efficient land use around stations could boost access and opportunity to jobs along the entire corridor, particularly for those in carless households.

In William Vigrass' report, he writes that "the Delaware Valley Regional Planning Commission's plans called for adding about 10,0000 parking spaces in center city over about a decade. PATCO has provided more than that, and moreover, keeps those cars out of center city".[157] For better or worse, PATCO has undoubtedly met the mandate to absorb center city parking demand for commuters from New Jersey. When PATCO was created in 1969, parking was considered a central part of the system. 8000 parking spots were available.[158] That number has grown steadily over the years, as the Authority has purchased and paved over additional land. The motorist has always been a target user for PATCO. William Vigrass describes how PATCO's success lies in the fact that it has "attracted the suburban motorist from his car," with 90% of riders in 1970 traveling to the station by private car.[159]

The PATCO line predates the modern rendition of transit-oriented development, and to this day stations are largely surrounded by surface parking lots. Such development limits the utility of the station for people who do not own a car. The walkshed around PATCO stations, shown in Figure 61, demonstrate that most employment opportunity exists in Philadelphia and Camden, with fewer employers locating close to other stations. Similar isochrone maps can also be created for wheelchair users, and such maps are a useful tool to measure accessibility (in several dimensions, both ADA accessibility and accessibility in terms of the number of destinations one can access at once). The 88 acres of parking around PATCO stations severely limit access by limiting how many jobs or housing units can be built next to the rapid transit facility. This limited access decreases utility of PATCO for reverse commuters, who might live in Philadelphia but commute to the

suburbs. The reverse commute is a well-defined need in Philadelphia: A Pew report found that "Since 1970, the number of jobs in Philadelphia has declined substantially, although it has increased somewhat in recent years. At the same time, total employment has more than doubled in the seven suburban Pennsylvania and New Jersey counties closest to Philadelphia. That combination—fewer jobs in the city and more in the 16 suburbs—has made it harder for many city residents to find work."[160] For carless households living in Philadelphia, walkability around suburban transit stations is a critical issue. PATCO's design and focus on the suburban commuter limits the utility of the system for reverse commuters, who would otherwise find immense benefit in a system that provides such frequent and reliable service with a 24-hour schedule.

Although many of the benefits of any rapid transit project are well-documented, it is notable that an early unpublished report on PATCO noted that the elderly and disabled residents of Greater Philadelphia would benefit the most from the line. Despite some limitations in access created by auto-oriented land use and parking facilities, many people benefit from mobility gains due to proximity to PATCO. For example, the Haddon Township Housing Authority, a social housing tower for senior citizens, is only an 8-minute walk from the Westmont PATCO station. A resident of this facility could get to center city Philadelphia in 20 minutes, the exact same time driving would take, without worrying about parking. With PATCO's recent financial commitment to ADA upgrades by Fall 2022, mobility and utility of the line will increase dramatically for users who could not access certain stations before.[161]

The unpublished report cites increased high-density development and commercial activity proximate to PATCO stations, but also that specific municipalities blocked affordable housing. Stratford Borough, for example, implemented a moratorium on affordable housing construction for several years. Exclusionary housing policies such as this moratorium certainly hindered great potential to increase access to housing and job opportunities in Southern New Jersey for disadvantaged populations. Such historic policies are strong reminders of the ways in which land use and transportation are interlinked, and many potentially positive equity impacts of a transportation project might be negated by land use policy in local municipalities.

Such land use policy may become more imperative with the increasing suburbanization of both employment and poverty. Land around PATCO stations represents a tremendous opportunity to develop affordable housing and jobs, directly increasing accessibility. TOD is explored in more depth in the Economic Impact section of this chapter. Additionally, the recent publication of the City Transit Plan by the City of Philadelphia reinvigorates historic plans to extend the line to West Philadelphia, which has tremendous potential to further increase access to jobs, housing, and opportunity along the 24 hour, high-frequency line. The recent publication of the City Transit Plan by the City of Philadelphia reinvigorates historic plans to extend the line to West Philadelphia, which has tremendous potential to further increase access to jobs, housing, and opportunity along the 24 hour, high-frequency line. Although PATCO was intended for suburban riders, it was an important investment and has tremendous potential to become more useful for all types of riders if land use and transportation decisions are made that open its benefit to all.

In environmental impacts

Rapid transit projects like PATCO reduce vehicles miles traveled (VMT) and vehicle emissions by replacing vehicle trips. Although PATCO was explicitly designed for the motorist, with large parking facilities, it has removed the need for tens of thousands of commuters to drive into Center City Philadelphia for work. An unpublished report from the Development Research Associates suggests that there may have been significant reductions in emissions directly attributable to PATCO's usage and ridership. Although emission standards have been tightened and vehicles today do not emit the same amount of pollution as when the report was published, PATCO has undoubtedly had a significant impact on carbon dioxide emissions, replacing millions of car trips per year.

PATCO has had a measurable effect on emission reduction in the DVRPC region. To estimate the extent of that effect, available data from the National Transit Database (NTD) was utilized to approximate the emission reduction of 16 years of PATCO operation (data was only available from 2002–2018). PATCO ridership and passenger miles traveled (PMT) data was collected from the NTD. Passenger miles were divided by ridership, to produce an average trip length. There are several methodologies for estimating PMT to VMT conversions to approximate emission reductions for transit projects, but for the purpose of this analysis, a factor provided by the APTA was used. "Transit passenger surveys show 33% of passenger miles would otherwise be replaced by personal vehicle miles."[162] The 33% figure likely underestimates emissions savings, as PATCO riders are more affluent than other transit riders, and the APTA figure uses national passenger survey data. Using this conversion factor, potential VMT (I.e., VMT for the 2002-2018 period had PATCO not been in operation) was estimated per year. Multiplying yearly potential VMT by yearly grams per mile emission data from the NTD produces an estimate of yearly grams of produced pollutants, which can then be converted to pounds or tons.

C02 data was not available in the NTD yearly grams per mile estimates, this analysis uses an EPA figure of 404 grams per mile.[163] However, because vehicle emission standards improved during this timeframe, the result of the C02 estimate is likely underestimated. A standard passenger vehicle in 2002 would emit more than 404 grams of C02 per mile. Nonetheless, because the purpose of this analysis is to estimate potential emission reduction due to PATCO, using 404 grams per mile for C02 is acceptable with the understanding that the estimated C02 reduction due to PATCO is an underestimate.

Figure 63 highlights the results of the analysis, totaling all values from 2002 to 2018. The analysis indicates that PATCO trips saved an estimated 441 million pounds of C02 that would've otherwise been emitted by passenger vehicles, along with 8 million pounds of carbon monoxide. 900,000 pounds of hydrocarbons, responsible for smog, were prevented by the construction and operation of PATCO during this timeframe. Tens of thousands of pounds of particulate emissions from brake wear, exhaust, and tire wear were also avoided. About 500 million vehicle miles were not driven due to this 16-year operating period during PATCO's larger history.

A UN report found that "people living in low-income countries are at least four times more likely to be displaced by extreme weather compared to people in rich countries, despite

being the least responsible for climate change".[164] Although low-income countries outside of the U.S. will shoulder the worst effects, climate change and climate migration will absolutely affect the region. Projects like PATCO have substantial impact on C02 emissions, which have well-documented effects on climate change. For large urban areas like the Greater Philadelphia region, mass transit projects are a climate imperative. The most severe effects of climate change will be felt by the region's most vulnerable residents. In the DVRPC region, many of those residents live in Camden City.
A report from the US Water Alliance writes:

> Camden is also projected to face more extreme storms and flooding. The city's aging infrastructure is already easily overwhelmed by heavy rainstorms, and the frequency, intensity, and severity of tidal flooding events will increase with sea level rise. By 2030, the 10-year storm event will result in flooding similar to that caused by Hurricane Sandy (a 100-year storm event). And by 2050, a Sandy-type storm event will cause inundations of about six feet. . . Other potential climate impacts include increases in mosquito-borne diseases, land subsidence, heat-related illnesses and injuries, worsening air quality, and decreased reliability in public transportation. Climate change is expected to lead to more frequent and intense heat waves. These impacts will likely create greater disparities between wealth and poverty as communities deal with increased environmental stress. Camden's houseless population is especially vulnerable to heat and air quality issues.[165]

Carbon emissions will certainly have substantive impact on the region in terms of warming and the global effects of climate change. Beyond C02 emissions, particulate emissions disproportionately affect low-income people of color, partially Black residents of urban areas. A 2018 research study funded by the EPA states: "Our analysis considered disparities at various scales. Racial disparity at the national scale is driven by high emissions in areas with high non-White populations. However, areas with a proportionately higher White population may still be internally inequitable."[166] A table from the study shows the mean absolute and proportional particulate matter burden by race/ethnicity and poverty level in Figure 64.

Although particulate matter does not solely come from transportation projects, the importance of rapid transit projects for reducing VMT and therefore reducing particulate matter,

Figure 63 Emission reductions due to PATCO ridership from 2002-2018.

Emission reductions due to PATCO ridership from 2002-2018

	Grams	Pounds
Total HC	411,930,787	908,152
Exhaust CO	3,918,717,563	8,639,293
Exhaust NOx	444,476,987	979,904
Exhaust PM2.5	9,173,012	20,223
Brakewear PM2.5	1,485,447	3,275
Tirewear PM2.5	495,149	1,092
CO2	200,040,132,786	441,013,002

Source: National Transit Database, BTS, EPA. See full calculation table in Appendix A

which disproportionately burdens low-income Black residents, cannot be understated. From an environmental perspective, PATCO and similar rapid transit projects have a high environmental impact and payoff on emissions, especially when coupled with efficient land use. The recent addition of photovoltaic solar systems above parking facilities further decreases PATCO emissions, resulting in less polluted air for residents in the region who live near roadway facilities that would see increased emissions if PATCO was not in operation and riders were driving instead. Recently installed photovoltaic panels were estimated to replace half of DRPA's energy footprint with solar energy. The benefit of sustainable energy sources for PATCO is compounded by the fact that PATCO is an electrified line, which provides zero point-source emissions versus the emission potential of other lines like the River Line, which uses diesel multiple-unit trainsets. Future study should examine other sources of potential energy and means of transmission. New Jersey's recent investment in offshore wind near Atlantic City is a potential opportunity. Since the Atlantic City line and PATCO share trackage in Camden County, one potential project to consider is electrifying the Atlantic City Line and conveying power from the wind farm to PATCO. This would help PATCO decrease passenger emissions to an even greater degree.

The environmental benefits of any rapid transit project correlate with the access that they provide. Access is discussed extensively in the access and mobility section, but from an environmental perspective, greater access is an environmental benefit. The more goods, jobs, housing opportunities, and services are available within a short walk from a transit line, the fewer private vehicles are required to make trips for day-to-day activities. Greater clustering of goods and services around transit also results in increased ridership, which increases the energy efficiency of transporting passengers.

In this regard, PATCO lacks strong access that other transit facilities provide. Land use around stations is underutilized. The analysis in the access and mobility section of this report found that there are 83 acres (about the area of a large shopping mall) of parking surrounding PATCO stations. Although vehicle miles traveling into Center City Philadelphia are reduced by the existence of PATCO, there are still emissions associated with transporting thousands of riders a day in SOV's to PATCO stations. Due to underutilized land around stations, lower quality bicycle and pedestrian infrastructure, and lack of workforce housing around many PATCO stations, the environmental benefits of PATCO cannot be fully realized.

Figure 64 Disparities in Distribution of PM Emission Sources by Race and Poverty Status

Mean Absolute and Proportional Burdens from Facilities Emitting Particulate Matter

Variable	% of Population	$PM_{2.5}$ Burden, Absolute (Proportional)	PM_{10} Burden, Absolute (Proportional)	Facility Burden, Absolute (Proportional)
Overall Population	1.0	22.4 (...)	29.2 (...)	5.7 (...)
White	0.63	18.8 (0.84)	24.7 (0.85)	4.1 (0.72)
Non-White	0.37	28.6 (1.28)	37.0 (1.27)	8.5 (1.49)
Black	0.12	34.5 (1.54)	43.6 (1.49)	6.2 (1.09)
Hispanic	0.17	26.9 (1.20)	35.9 (1.23)	9.8431 (1.74320)
Poverty Level				
Above Poverty	0.85	20.9 (0.93)	27.2 (0.93)	5.5 (0.95)
Below Poverty	0.15	30.3 (1.35)	39.3 (1.35)	7.2 (1.26)

Source: Mikati et al, 2018

The infrastructure for parking is expensive and environmentally costly. Parking uses tar sealers and other coating materials, which can increase pollution in waterways and lakes. Tar sealers can also release a dust that is detrimental to air quality, adding to particulate emissions.[167] Parking also consumes open space, while creating stormwater runoff that must be managed carefully. Runoff from parking pushes pollution into the watershed, as oil and dust from tires or other components of a vehicle are washed into nearby streams. With such a large parking footprint for the entire system, PATCO has significant opportunity to improve environmental outcomes around stations, which would help relieve the burden for residents who are burdened by environmental impacts.

PATCO's high level of impervious surfaces also affect Camden City's combined stormwater system. "Flooding is dramatic and frequent in Camden: close to 70 combined sewer overflow (CSO) events take place in the Camden wastewater system in an average year. CSOs are not only a problem for water quality, but for public health and property damage as well."[168] Such frequent CSO overflow events are a pressing environmental justice concern, considering the racial and socioeconomic composition of the City of Camden. Surface parking and other impervious surfaces contribute to these CSO events, while also contributing to the urban heat island effect. There are approximately 12 acres (about twice the area of Rittenhouse square in Philadelphia) of parking outside of the Ferry Avenue station alone. Camden City gets about 45 inches of rainfall per year, and every inch of rain generates 62 gallons of water per 100 square feet.[169] With 12 acres (about twice the area of the Lincoln Memorial Reflecting Pool) of parking, the Ferry Avenue station generates an estimated 15 million gallons of stormwater runoff per year. Reducing surface parking at this station has strong potential to reduce flooding and pollution from runoff for Camden City residents. Surface runoff would ideally be captured by redeveloped station areas with stormwater capture on new buildings and through GSI. If redevelopment does not occur, DRPA and PATCO should explore funding options to replace pavement with permeable pavement, GSI planters, cisterns, infiltration reservoirs, and trees to hold water and reduce the heat island effect of the parking facility.

Although many of PATCO's stations are not within the Camden City limits, water quality and stormwater runoff all have downstream effects. The continued suburbanization of poverty also means that these environmental issues will have a higher burden on Black low-income communities if trends continue. The US Water Alliance report found that "The monthly average rainfall in Camden is two to four inches, but just one inch of rain can flood the city's streets, parks, businesses, and homes with a mix of stormwater and untreated wastewater."[170] There is a demonstrable imperative to reduce runoff in Camden City to avoid these environmental issues, and the PATCO system has a large part to play in that solution, considering the amount of impervious surface and runoff that the transit as a whole produces with surface parking, and the downstream effects of pollution. Recent projects such as the Woodcrest Station parking lot rehabilitation include stormwater management as part of the project scope. Such efforts are important but incomplete steps toward rethinking the land use and environmental impact of PATCO stations. Removing the dominance of the single-occupancy vehicle from the system's operating model is critical to create equitable spaces around stations that provide housing, employment opportunities, ecosystem services, green spaces, and habitat restoration.

In economic impacts

The development of a rail line such as PATCO in the south New Jersey suburbs of the Philadelphia Metropolitan area is often lauded before and after it opens for its ability to provide economic development benefits to the community. Planners, politicians, and the media cite the benefits of rail to commuters in connecting workers to employers and creating growth around transportation centers. PATCO was built with the intention of doing just that by providing employees in southern New Jersey a more efficient way to get to and from the employment centers of Philadelphia's Central Business District and Camden City, the county seat of Camden County. While PATCO largely achieved its objective, both low-income and Black communities do not appear to have received the same level of benefit from the High Speed Line. Prioritizing the interests and needs of largely white, middle-class commuters in the construction of the PATCO line had a positive economic impact on development, land and property values, business activity, and employment in suburban municipalities along the route while not having a remotely similar effect for Black residents in Camden City, which has continued to decrease in population and investment like other small, industrial cities since the 1960s with the exodus of manufacturing jobs and white residents.

The opening of the PATCO line in 1969 further continued suburbanization and job loss from an economic perspective in Camden City, providing a conduit to develop areas to the East of its inner suburbs within Camden County. While population migration from Camden City was already occurring by that time, PATCO did influence homeowners and businesses to move away from Camden City in development patterns along its stations. Numerous reports have evaluated the impact of PATCO after it opened and found that development, business activity, property values, and ancillary benefits increased in the newer, outer ring suburbs. These reports did not study the impact of PATCO on the two central Camden stations of City Hall and Broadway, simply stating that the more urban stations in Camden City were not positively impacted in the same way as their counterparts in more rural areas and suburbs.

Development and Increased Property Values

Both residential and commercial development increased substantially around the suburban PATCO stations after the High Speed Line was built. Closer into Camden's core, stations in more dense areas, such as Ferry Avenue Station on the east side of Camden and Collingswood Station, did not see much redevelopment immediately prior to or within three years of PATCO opening. Developers did build one residential development near the Ferry Avenue Station, the Ferry Station Apartments, which opened in 1968 three months prior to the High Speed Line's first trip. Sandra Harbora, the rental agent for the fully occupied 462-unit building in 1970, stated in an interview for a Philadelphia Inquirer article that the reason behind the complex's success is its proximity to PATCO.[171] An unpublished report from the DRPA further suggests that property values may have increased in the immediate area around Ferry Street Station within the first three to four years since PATCO commenced operation. However, the difference is significant when one contrasts the limited development along PATCO stations in Camden and Collingswood, before and directly after PATCO began running, with the growth of construction and land use values around the stations further to the East, in what would

become outer ring suburbs, marking PATCO's much great impact in the more suburban and rural areas.

Haddonfield is a prime example of an established municipality, and one of the most affluent in southern New Jersey, benefiting from a boon of development near its station. While mostly built out already by the 1960s, between 1969 and 1975 developers built 230,400 square feet of office space in Haddonfield, accounting for 16% of all new office space in New Jersey suburbs.[172] Although commercial development did not necessarily increase due to PATCO during this period, it's estimated that 24% of office space built in suburban New Jersey would not otherwise have been located within two miles of its stations.[173] Therefore, PATCO had a significant direct effect on where economic development occurred.

On the whole, the PATCO corridor grew at the same rate as the rest of Camden County between 1960 and 1970, but the more rural municipalities serviced by rapid transit surpassed the growth rate of the county. A significant number of multifamily apartments were constructed in Lindenwold, and nearby Voorhees Township was selected as the location of Eschelon Mall, a regional shopping center with both apartments and townhomes. Development was most directed in the vicinity of the outer ring stations where the value in assets for property owners and each towns' property taxes increased.

Land Use

The importance of local policy on whether or not dense, multifamily housing was developed in a municipality, impacted how much of an effect PATCO would have on creating equity and accessibility in housing for low-income populations. PATCO began operations six and fourteen years prior to the Mount Laurel I and II decisions respectively, which regulated the need for each municipality to plan, zone, and create their "fair share" of affordable housing.[174] Lindenwold borough was more progressive than most of the other municipalities along the High Speed Line at the time of opening in this respect. It had a significant amount of open space and a democratic City Council that was open to new land uses, density, and industries upon the opening of its PATCO station. In 1964, prior to creating zoning specifically for apartments, Lindenwold approved multiple variances for apartment development proposals. Lindenwold's housing stock doubled between 1960 and 1970 and 80% of new units built were apartments.[175]

Both commercial and residential land and properties in Lindenwold grew in value after commuter rail operations began with some commercial properties rising two to four times and residential lots increasing about two to three times, depending on the area. In 1972, developers of The Coachman East apartments in the borough believed that the High Speed Line had helped them rent units and advertised access to Philadelphia to potential tenants.[176] Overall, travel cost and time saved with the use of PATCO did have a positive impact on residential property values in the immediate years after opening.[177] However, these benefits did not affect the city of Camden with the highest percentage of Black and Latino residents due to lack of investment and proximity to the Central Business district. The rural communities of Voorhees township surrounding Ashland station and Lindenwold borough at the terminal Lindenwold station all benefited from a rise in land use values in areas closest to the station.

In contrast, other municipalities along the PATCO corridor did not want multifamily housing in their boroughs, despite its fit in creating demand for retail and commercial activities, benefits in property tax revenue, ridership on the High Speed Line, and potential for TOD if within one mile from the stations. Voorhees Township had similar growth to Lindenwold in its housing stock in the first several years after PATCO operations began but, due to the zoning requirements of the municipality, 80% of residential growth was the building of single-family homes.[3] The lack of multifamily apartments in Voorhees was a political decision, with no formal zoning options for multifamily properties and variances the only route to their approval. Similarly, Stratford had a moratorium on the construction of apartments for at least five years as of 1972 due to previously moderately priced apartments not attracting what the Borough and residents wanted in their municipality. Both single-family zoning and a lack of land use options for multifamily housing in many municipalities along the PATCO corridor did not accommodate housing access and opportunity for lower income residents. These factors influenced diversity in race and ethnicity in Voorhees, Stratford and other municipalities along the corridor. Lindenwold is more diverse in race than Camden County as a whole, whereas Voorhees and Stratford are less so, likely due to its early progressive policy encouraging multifamily housing.

PATCO's benefit in savings to residents does not have a traditional concentric circle phenomenon around stations or bands along each side of the rail representing a decrease in time and money spent commuting to work. In the case of the High Speed Line, as the distance from the Central Business District increases, areas where savings are experienced increase in a fan-like pattern around the line.[178] This is likely due to PATCO being built without existing density at its outer ring stations and with massive parking lots that prevented the establishment of dense development immediately surrounding certain stations to this day.

Employment

Black and Latino residents are disproportionately affected by the lack of investment and economic opportunity in Camden City. Transit accessibility from PATCO did not spur much, if any, investment in Camden, while between 1960 and 1970, Cherry Hill Township and Stratford township doubled in population, thanks in part to PATCO making these more rural areas accessible to jobs in Philadelphia. PATCO suburbanized the outer ring townships and boroughs by pulling population from Camden City and, to a lesser extent Collingswood and Haddonfield, creating more dense populations in former rural areas near Ashland and Lindenwold stations, such as Berlin borough and township, Lindenwold borough, Stratford borough, and Voorhees township. Coupled with the loss of jobs in Camden City, estimated to be at least 157,000 jobs between 1950 and 2001, some of the smaller commercial jobs have moved to the nodes around suburban PATCO stations. According to an unpublished report, three years after PATCO opened a significant percentage of the new professional businesses in Haddonfield had relocated from Camden City. The job data from the On The Map tool in 2018 referenced in Figure 61 highlights that just 17,397 jobs remaining in downtown Camden are within a ten-minute walk of PATCO stations, while Haddonfield now had 2,882 jobs and Lindenwold had increased its jobs to 1,449

within a ten-minute walk of their respective stations.

Other stations along the High Speed Line in New Jersey are lacking in jobs, with Ashland only employing 91 people, Woodcrest just 170, and Westmont only 283 within a ten-minute walk. Outside of Haddonfield, Lindenwold, and Collingswood, these suburban stations have traditionally not leveraged TOD for compact employment and housing development close to the stations. This is likely because the PATCO line was built before the modern concept of TOD and was viewed more as a suburban commuter line with expansive parking lots to support as many residents driving to the station as possible. However, in more recent years Haddonfield, Woodcrest, and Collingswood, in particular, have had projects near their stations, with the latter receiving the designation of a transit village and $200,000 in state funding for streetscaping, traffic calming measures and bicycle paths which then spawned a mixed-use development called The Lumber Yard.[179] By comparison, The River Line, a nearby more recent transit project, has spurred economic development due to its strategic location of stations along an economically distressed corridor, resulting in increased property values, wealth and development of multifamily housing.

New Jersey's River Line

New Jersey's River Line, the light rail service that opened in 2004 across 24 stations between Camden and Trenton, offers a comparison and potential alternative to having an economic impact in a more equitable way. While not serving nearly the same number of riders or dense suburban municipalities like PATCO currently does, it has had an economic impact on the river towns it serves. Many of the stations do have parking lots, but a 2012 property value analysis noted that properties near River Line stations, which were sold after the River Line began operations, increased in value.

There is a distinct correlation between proximity to the stations and increased property value at the point of sale. Furthermore, "about 90 percent of properties within a mile of stations are low-income census tracts," and there was an increase in multifamily developments near the line.[180] This more equitable development pattern generates increased wealth for the low-income residents closest to the stations whose home values are appreciating. While the risk is that they could be priced out of a gentrifying area, residents that must sell can at least make money on the sale of their homes.

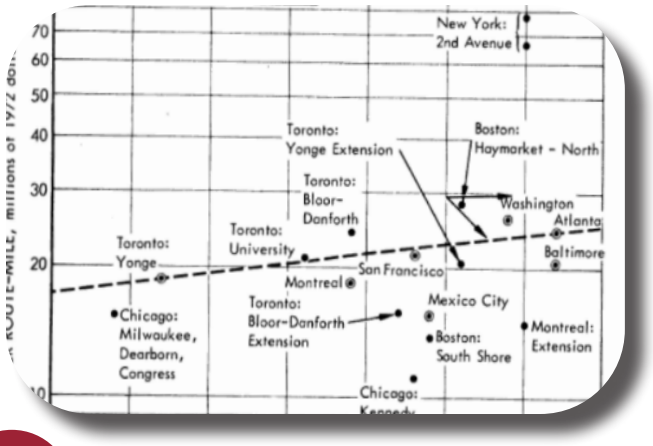
The River Line illustrates that the mile from a station is a crucial area for property values and economic development. TOD needs to be fostered along PATCO as well by consolidating

Figure 65 Property Value Increase for Properties Sold within Proximity to NJ River Line Stations[433]

Property Value Increase for Properties Sold within Proximity to NJ Transit River Line Stations		
Within ½ Mile of Station	½ mile - 1 mile from Station	1-4 Miles from Station
12-14%	11%	4-5%

station parking lots into garages, making necessary zoning changes to accommodate dense, mixed-use development, and public-private partnerships to take advantage of the land's potential. TOD can also serve as a place for multifamily development, with affordable options for lower-income residents that may not have cars and will use PATCO to get to work and run errands. There are opportunities for TOD at current PATCO stations surrounded by parking lots, as identified by the 2006 Wallace Roberts & Todd Master Plans Study on TOD in the PATCO corridor for DRPA, which should be updated to include the two downtown Camden stations, and can bring jobs, housing, property and sales tax impacts, and be a catalyst for redevelopment.[181] It would also be worth providing transit access to Campbell's Soup and Subaru headquarters in the Admiral Wilson economic development corridor of Camden to establish a connection with these employment hubs and revitalize the surrounding neighborhood of Black, low-income residents with better mobility and access to additional jobs along the PATCO corridor. The TOD proposals from the 2006 Wallace Roberts & Todd Master Plans Study have likely not been implemented due to the 2008 economic downtown and changes in leadership at DRPA.

Figure 66 Rail Transit System Costs Versus Mid-Year of Construction.[434]



In allocation of project funds

Decisions about how to spend funds for a large and complex project like PATCO are complex, and have great implications for equity. This section will examine how different parts of PATCO were funded and who received the greatest benefits from the allocation of those financial resources.

One concern for equity is simply whether funds are well-used, or if projects exceed anticipated costs and continue to cost taxpayers. Mismanagement of projects that result in increased costs is an equity issue because of the potential to use taxpayer dollars elsewhere where they can directly support underserved populations. While more dollars invested in public transit frequently has a positive impact on equity, it is not positive to overrun expected costs. The cost of the Lindenwold Line extension completed in 1969 was $544.9 million including transit cars and $463.8 million without cars adjusted to 2021 dollars.[182] As shown in Error! Reference source not found., PATCO (then the Lindenwold Line) had a very low cost per route-mile compared to peer transit projects around the country. Operating costs in 1970 were similarly low, with the Lindenwold Line costing $1.18 million per passenger-car-mile compared to a median operating cost of $1.57 million of US transit systems at the time in 1972 dollars.[183] The construction costs remained low largely thanks to the reuse of an old Pennsylvania Railroad commuter line, which meant that costs were primarily for station construction, welded rail line, and new equipment, but not an entire railway.[184] The low cost of the Lindenwold Line is summarized by Robert W. Edgar, a Representative in Congress from Pennsylvania in 1979: "The Lindenwold Line and the PATH line show us that rail transportation does not have

to be expensive as the Federal Government is making it."[185]

Edgar also shed light on how project funds were spent in order to keep those costs low: "I wonder if we placed too much emphasis on the new systems with pulsating lights, computerization, and some of the other fancy overdesigns that we have seen of late. Lindenwold is just a meat-and-potatoes system that does not have air-conditioned stations, and that does provide clean, efficient, public transit services."[186] The question that Edgar raises is an important one to how public transit might equitably allocate funds: who are "fancy overdesigns" built for? Who benefits? Arguably, everyone benefits from fancy finishing touches; however, these types of extras are often implemented to cater to a higher-income ridership who have access to a private automobile in order to compete with that mode. While these finishing touches, such as air-conditioned stations may provide a level of comfort to riders, and to exclude riders from comfort is an equity issue, keeping operating costs low and passing saved costs onto the rider more directly benefits low-income riders and therefore is a more equitable solution.

Automatic train control is another cost-saving measure from PATCO. In 1970, the average wage of employees to operate the train was $.326 per-car mile, generally with two employees on board, an operator and an attendant.[187] But PATCO could have only an attendant and no operator, cutting the costs in half, and likely more because the training and wages for an attendant are lower as the position requires less technical knowledge. This cost-saving measure directly allows PATCO to operate 24 hours a day, which has positive benefits for low-income and minority workers who are more likely to work shifts in the night. However, creating an automatic train system saves the system money, and that can be passed onto the rider, this decision also meant that PATCO has the potential to create fewer jobs than systems with manual train control.

To help expand good paying jobs while increasing the utility and safety of the system, PATCO should consider reallocating staff to other parts of the system. PATCO currently employs transit police to monitor the system. Other transit agencies, such as San Francisco's Muni, have begun to explore alternatives to this approach. Muni has a Community Transit Assistants Program, which hires ambassadors trained in de-escalation and customer service to assist riders in need.[188] Such an approach sharply decreases the risk of death or brutality by police by low-income minority riders who disproportionately face such outcomes. Reallocating funding from transit police to an ambassador program would also increase the usability of the system for non-traditional riders, particularly if the ambassador program prioritizes hiring multilingual ambassadors.

Despite low costs being a benefit to the system, overall, the relative low funding for PATCO over has significant equity implications. A 1973 Philadelphia Inquirer article noted that the proposed extension to Woodbury, West Berlin, Wenonah, Glassboro, and Moorestown was primarily blocked because of lack of funding, and that with each year of delay the project cost would increase by twelve percent.[189] That December, DVRPC voted to not approve a $1.6 billion capital improvement project that would have benefited the entire region, including an expansion of the Broad Street Subway because the capital program did not fund this Lindenwold Line extension fast enough. The final plan with the extensions was approved a month later; however, that line ultimately never was built. In fact, a version of that extension is in

Tel-A-Tran

In 1974, DVRPC approved a feeder bus system called "Tel-A-Tran" to be operated by the Black People's Unity Movement (BPUM) organization. Henry Singleton, former Director of Community Development at BPUM, said in a 1974 Philadelphia Tribune article that "We hope to provide special loop service to area shopping centers, round-trip service to hospitals for ambulatory and wheel chair out-patients, and special services for senior citizens, high-rise residents and speed-line patrons."[435] He adds that the intention of the plan is to support PATCO service, along with other transit services operating at the time by acting as a feeder system rather than a competing line. The service plan was slated to expand from a small area to the entire City of Camden in 18 months.

The service had pledged funding from a variety of public, private, and nonprofit sources, and the project was supported by DVRPC at the time. "Analpol [from DVRPC] predicted the BPUM would get its UMTA grant this year".[436] The state approved funding and allocated $219,340 for the project to cover the cost of operations, the purchase of ten 16-passenger vans, and a facility to store them. The service would have been the nation's first minority-operated bus service and Singleton said that "most personnel should come from the City" [of Camden] as a way to help alleviate unemployment.

The project became a flashpoint with local transit workers unions. "Buses were to start rolling this month. But after two years of planning and preparation, the BPUM cannot begin the system, because they may have to pay union wages. They are receiving federal funds and are required to pay prevailing wages. That requirement, however, is not effective until an agreement is signed with the local Amalgamated Transit Union- Drivers for the Transportation of New Jersey (TNJ)"[437]Though there is little documentation of what happened to Tel-a-Tran beyond this article, the project likely fell through after an agreement could not be reached with the union.

Tel-A-Tran would have been an opportunity to fund the nation's first Black-owned bus service, providing jobs and affordable transportation, while also increasing access to PATCO, eliminating some of the demographic and geospatial disparities in the rail line. Tel-a-Tran is a great example of a project to be emulated in the future to create restorative mobility justice. Blame should not fall on BPUM for lacking the funds to pay union wages, rather funding for projects such as this should calculate and include funding for union-rate wages, to ensure that transit workers are paid a living wage while also ensuring that beneficial and equitable projects that are Black-led do not fall between the cracks.

Figure 67 Tel-A-Tran Article. Source: Philadelphia Tribune, April 15, 1975[438]

BPUM Moves on Camden Transportation

HENRY SINGLETON III, Director of Community Development at Camden's Black People's Unity Movement, promises a transportation system for the community.—Photo by Amana.

HARRY AMANA
PART I

Across the Delaware river, in Camden, N.Y., the Black People's Unity Movement (BPUM), the moving and shaking organization in that city, recently announced its new involvement in the area of public transportation.

Director of Community Development, Henry Singleton III, talked about the details of the Demand Activated Transit System, which will provide much needed transportation for the Camden community.

"The Delaware Valley Regional Planning Commission passed and approved our program which will initially put 16 buses on the streets by late summer or early fall," he said.

"We hope to provide special loop service to area shopping centers, round-trip service to hospitals for ambulatory and wheel chair out-patients, and special services for senior citizens, high-rise residents and speed-line patrons."

He said BPUM's transit system would not be in competition with Public Service buses or with Yellow Cab. "We want to coordinate the services of PATCO, Public Service and Yellow Cab so the community will be able to move the way it wants to."

He added that special rates would be available for senior citizens, students and welfare recipients.

The scope of the program is impressive. Initially, said Singleton, a four-square mile area will be affected, but "in 6-9 months after operation" all of south and north Camden should be serviced, and after 18 months, he said the entire city should be serviced.

planning stages today--more than 30 years ago. The lack of funding available for that project means that there are 13 stations of the 14 planned stations located in census tracts with at least one IPD indicator at the above-average level that did not receive that investment and those transportation services and associated opportunities.

Another example of low costs not always being a boon to equity is the way in which public transportation has been historically leveraged for more funding for new highway facilities that contribute to a more car-dependent economy and region: In the 1985 DVRPC Transportation Plan, less funding for public transportation compared to more funding for highways was rationalized as such:

> "A transit facility can accommodate added travel demand either by increasing train length or by improving headways, or both. In contrast, substantial capital costs are involved when added lanes or new highway facilities must be built...Whereas the region has few limited access, high speed, high capacity roadways, its twelve commuter lines...serve all of the communities in the region....With this wealth of transit facilities, it would seem to be more important to develop their maximum potential than to construct new lines which could impair the ability of the present systems to continue in operation."[190]

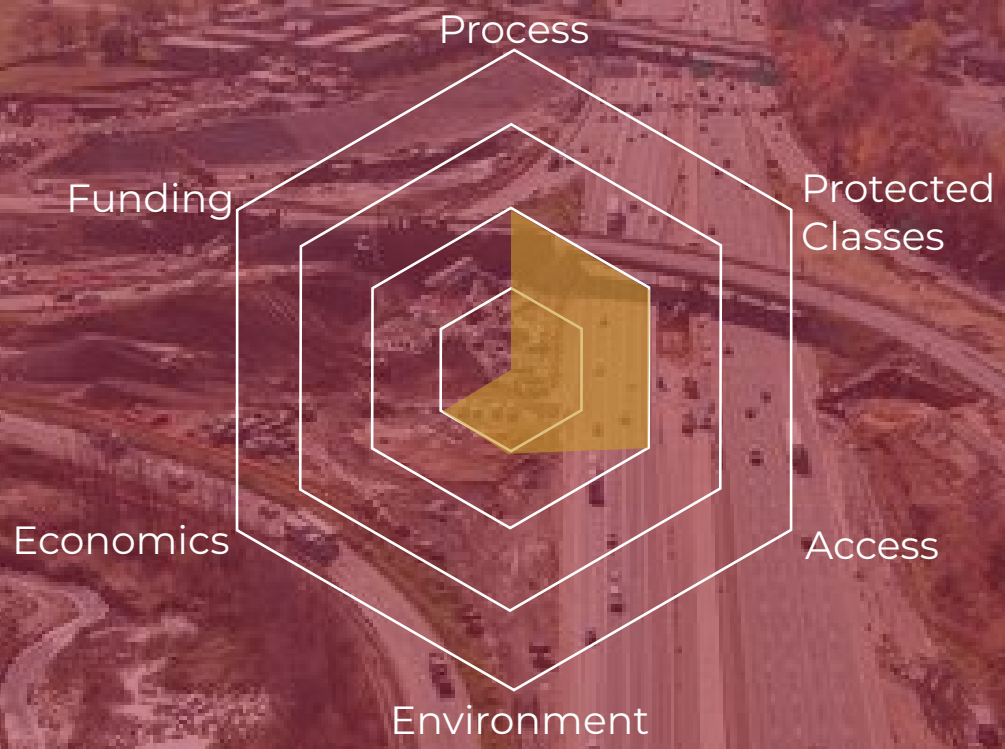
This justification falsely pits operations and maintenance against capital projects, and only does so for public transportation without explaining why the same tradeoff is not at issue for highway expansion. A proposed extension of the Lindenwold Line to Berlin was not included in the 1985 plan, despite public pressure to include it, including from the then-executive director of DRPA, Thomas Lipscomb.[191] DVRPC agreed to study the Berlin extension, but it ultimately was not included in the final plan and was never built. The funding priorities of new miles of highway over new miles of rail are at play and resulted in a more car-dependent, less-transit accessible region.

One unique feature of PATCO's funding structure is that as it is run by DRPA, its operating budget is subsidized by DRPA whose operating revenues come primarily from bridge tolls on the Benjamin Franklin Bridge across which PATCO runs.[192] Using tolls on automobiles, trucks, and motorcycles to fund a mode which is both less expensive to take and more environmentally friendly, is ultimately a win for disadvantaged populations who cannot afford vehicles and are disproportionately impacted by environmental issues. As tolls and PATCO fares have increased to cover the cost of operations and capital expenditures, tolls have increased more rapidly: In 2011, the price of crossing into Pennsylvania across the bridge in a private vehicle rose from $4 to $5, an increase of 25%, whereas the same year PATCO fares were increased by 10%. Both of these prices were increased to fund a $216 million redecking and refurbishing of the Walt Whitman Bridge and a $202 million upgrade of the PATCO train fleet.[193] Even though tolls help fund PATCO, the increase in charges overall went primarily to a bridge which is for cars only.

Conclusion

PATCO was built for the convenience of the suburban motorist. Station design, scheduling, rolling stock design, and subsidized parking were all aimed at accommodating the comfort of suburban residents commuting into Center City Philadelphia. In terms of emission reduction, the project has been a huge success, diverting millions of vehicles from Center City Philadelphia and eliminating 500 million vehicle miles traveled in the last 16 years alone. But the design around the peak hour commuter, coupled with the embrace of surface parking around stations, has limited the utility of the line for vulnerable residents, as demonstrated by ridership data that indicates minority races and low-income riders are underrepresented on the line. 83 acres of surface parking contributes to flooding and watershed pollution, as well as to the urban heat island effect. Camden City residents are the most vulnerable to these effects, living literally downstream from many PATCO stations, as well as housing several stations and parking lots. Camden's combined sewer system overflows almost 70 times a year, making residents particularly vulnerable to the environmental justice issues associated with such events.

But the PATCO system is well primed to advance equity into the future. Current projects are addressing issues for ADA compliance and investments are being made in photovoltaic solar systems, reducing the carbon footprint of riders to a higher degree. Transit Oriented Development has been studied by DVRPC as well as DRPA and other agencies, and land around stations is prime for redevelopment. The added jobs and housing that could result from such redevelopment would make the line more useful for riders besides the peak-hour suburban commuter, allowing greater access and mobility to opportunity and services along the corridor. Continued investment in expansion of related lines, such as the Glassboro-Camden line, offers a chance to increase the network effect of PATCO, multiplying the amount of jobs and opportunity available to those without a private vehicle. The importance of investment in expansion of other similar projects will only be amplified with the continued regional suburbanization of both jobs and poverty. Making strong investments in rapid transit projects, with the aim of providing frequent, all-day service connecting a variety of destinations will become critical. This importance is heightened by the increasing urgency of the climate crisis. Vulnerable populations will feel the effects first (and already do, as evidenced by recent flooding in Camden City). PATCO is well-poised to advance equity for vulnerable populations with proper investment and regional leadership surrounding the intersection of transportation, accessibility land use, and equity.



Equity Dimension	Score	Reasoning
Process	2	There has been a quality public outreach process during the later project stages, but the alternatives analysis gave little consideration to more equitable transportation alternatives
Protected Classes	2	The project provides safety and mobility benefits for those with cars, and does not directly harm protected classes
Access	2	There were few access improvements, and only those with a vehicle will realize mobility benefits
Environment	1	There were no major environmental benefits to the project, while producing some burdens
Economics	1	Economic benefits go mainly to white suburbanites with vehicles, but not as a burden to other populations
Funding	0	The amount of money spent relative to other projects is significant, especially when considering how money that could have been spent for other alternatives that would have promoted equity, such as improved transit

Figure 68 Direct Connection equity spider chart and table

Figure 69 I-295/I-76/Route 42 Before Construction. Source: Stokes Creative Group

Direct Connection
Chapter Summary

Theme: While having a proper environmental review processes and successful community engagement, Direct Connection has exacerbated current urban vs. suburban inequities and allocated resources inequitably as the second largest roadway project in New Jersey's history.

Direct Connection is a large ongoing project in Camden County, New Jersey to reconfigure the I-295, I-76, and Route 42 interchange. At $1.1 billion, it is the second largest roadway project in New Jersey's history and has two intended goals: to improve safety and reduce congestion at both the interchange and the local roadways. Although the planning process took almost thirty years and NJDOT followed the proper environmental regulations while conducting extensive community outreach, Direct Connection is an example of how modern projects can fail to improve equity despite following the latest guidelines.

Equity Analysis Key Takeaways:

There was a regional failure to consider alternatives wholistically

Other transportation alternatives, such as transit expansion, were barely considered as part of the alternatives analysis process, due to transit not fixing the narrowly defined goals of improving safety or reducing congestion at the interchange itself.

The benefits will go to mostly white, suburban residents with access to vehicles

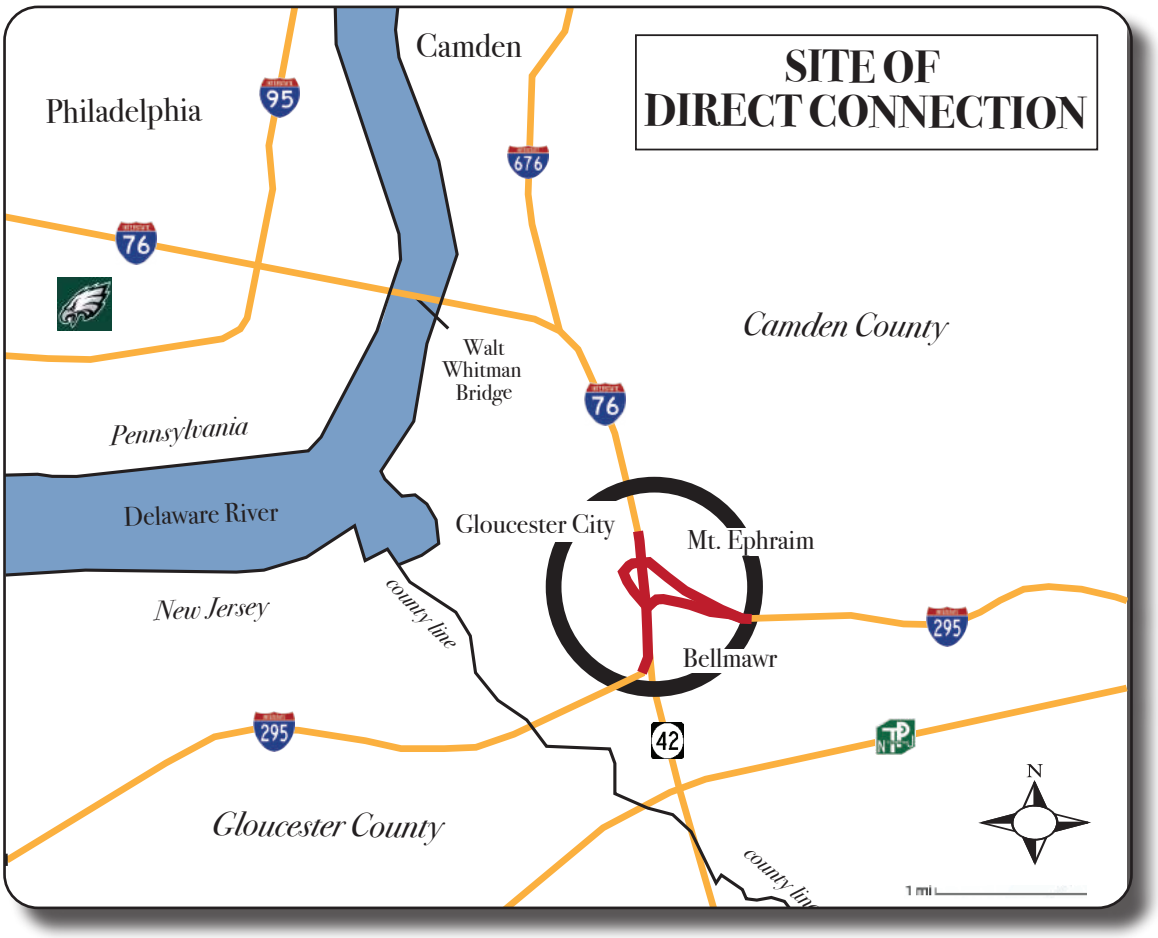
The users of the interchange are mostly suburban residents, and by failing to add new transit access in the area, the project will only further induce more auto-centric development in fast-growing counties like Gloucester. With three times as many people of color not having access to cars as white people in the Philadelphia region, the project only exacerbates current economic inequalities.

The project raises serious questions about transportation resource allocation

Improving safety and reducing congestion are important goals, but Direct Connection's incredibly expensive cost is just the latest example of a history of prioritizing automotive travel over transit in South Jersey. When considering that the average speeds in the interchange are only expected to increase to 32 MPH (AM/PM peak) from 25/26 MPH (AM/PM), and that most congestion benefits from capacity expansion disappear within a few years, there are questions about whether the money could have been spent more effectively in the interchange and on transit.

Direct Connection

Figure 70 Direct Connection Site Area



Direct Connection and the associated Missing Moves project are a massive $1.1 billion enhancement of the I-295, I-76, and Route 42 interchange, which project leaders have promised will improve safety and reduce congestion in South Jersey for years to come. While the project goals in themselves are not controversial, questions of equity arise when considering the tremendous cost, history of freeway building in the area, and seeing which groups are benefiting from the second largest roadway project in New Jersey's history.

Travel pattern, car ownership, and demographic data indicate that the project follows the area's historical trend of leaving poor and minority communities in the City of Camden out from the benefits created by large transportation investments, mainly because people in these communities are less likely to have access to vehicles and there are no transit improvements as part of the project. Despite the New Jersey Department of Transportation (NJDOT) and DVRPC following the correct environmental procedures and using best practices for community engagement, Direct Connection shows that they failed to evaluate their goals in the larger regional context. This decision has led to a project that will continue the area's history of distributing transportation benefits mainly to those who can afford a vehicle and failing to improve transit access for all people.

Over the last 35 years, NJDOT has studied how to provide a direct link for through traffic on I-295, which spans three municipalities in

Camden County including Bellmawr, Gloucester City, and Mt. Ephraim. As seen in Figure 70 on the previous page, this major interchange connects I-295 to I-76 and Route 42. With the interchange's current design, motorists traveling on I-295 must reduce their speed to 35mph and contend with traffic on I-76 and Route 42 to continue traveling on I-295. [194]

Twenty-five years since its first study, NJDOT broke ground in March of 2013 on the transportation project dubbed "Direct Connection". The stated goals of the project are to reduce congestion and increase safety via a direct link for through traffic for motorists traveling on I-295 at this interchange in Camden County. With an expected completion date of 2027, Direct Connection alone is anticipated to cost about $900 million and another $200-$300 million with the associated Missing Moves project, making it the second most expensive transportation project in the State of New Jersey's history.[195] [196]

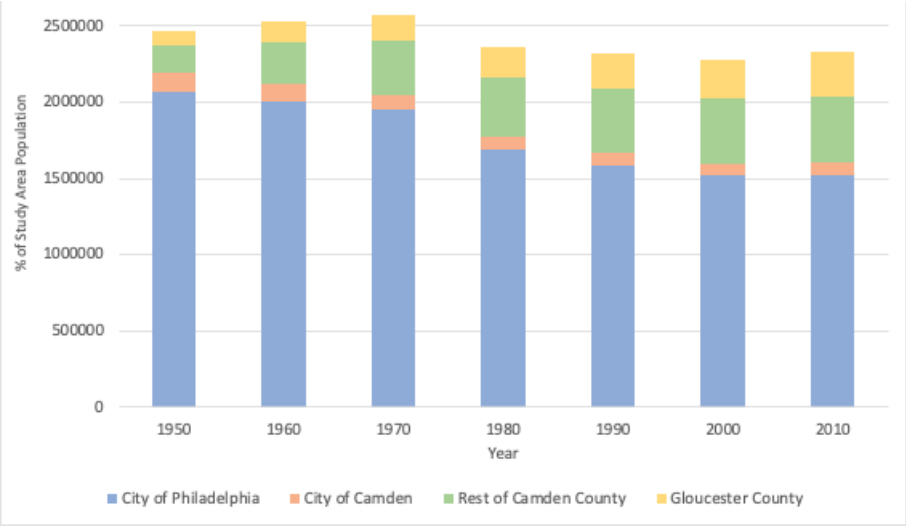
History

Suburbanization of South Jersey

In the middle of the 20th century, as Americans across the country began to migrate to suburban communities, fueled by a quest for more space, the rise of the private automobile, and funded by federal subsides, many suburban counties in New Jersey experienced immense population increases. Camden and Gloucester Counties in South Jersey experienced rapid population growth as former residents of the cities of Philadelphia and Camden left for nearby suburban communities.[197]

From 1950 to 2010, the City of Philadelphia's population declined from 2.1 million to 1.5 million while the City of Camden's population shrunk from 125,000 to 73,500. The new suburban residents were predominately white, since communities of color were often excluded from Federally funded housing programs. These residents sought to have direct access to the major economic centers of the Delaware Valley, which were Philadelphia and the City of Camden, without having to live there.[198]

Figure 71 Population Growth in Camden and Gloucester Counties, 1950-2010



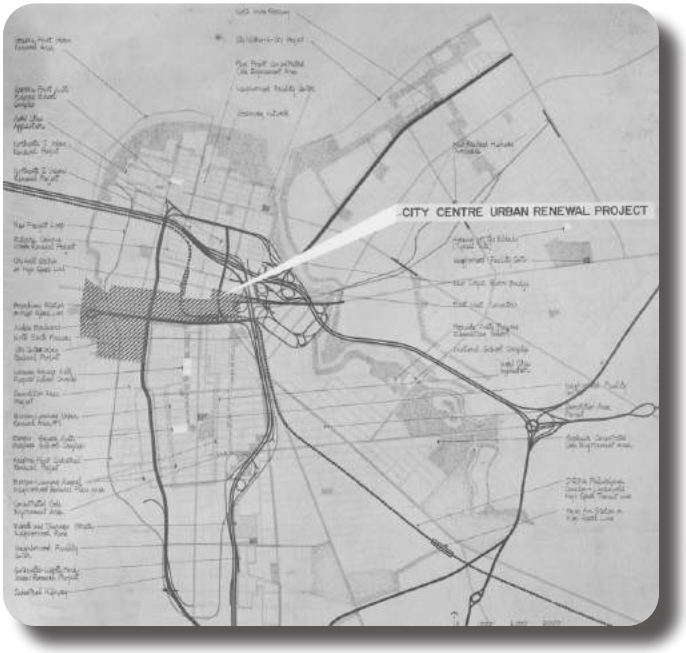
With the goal of ensuring access to the region's economic centers, New Jersey, Pennsylvania, and the federal government began a highway building spree funded mainly by the Federal Aid Highway Act of 1956. In the Delaware Valley, the construction leveled existing urban communities, especially communities of color and working-class white neighborhoods in Philadelphia and the City of Camden, to create highways and interstates to serve middle and upper-class white suburbanites.[199]

In the City of Camden, officials and planners bulldozed through the heart of the city to create a path for I-676. The construction displaced many residents, and those who remained were left with a starkly divided and environmentally compromised city. In addition, in Camden and Gloucester Counties, the State of New Jersey and federal government built I-295 and I-76 to serve new suburbanites and, in doing so, encouraged auto-centric land development in the counties, thus creating car-dependent residents.

Highway Construction

The Federal Aid Highway Act of 1956 catalyzed an exodus of predominately white Americans from urban centers to suburban areas across the United States, including in Camden and Gloucester Counties. The bill funded the construction of 41,000 miles of interstate highways across the country.[200] While South Jersey's interstate highway system allowed residents to move further out into the suburbs while continuing to have direct access to the economic job centers of Philadelphia and the City of Camden, the construction came at an immense cost to local residents. In working class and minority communities, residents were displaced, and neighborhoods were divided to make room for new interstate highways.

Figure 72 City of Camden Urban Renew Plans. Source: Temple Urban Archives



In an effort to save the city from declining, Camden's political leaders created a comprehensive plan in 1962 for urban renewal, which assumed economic growth would occur if only land were made available for industry and automobile access could be improved.[201] The original plan called for the displacement of almost 14,000 City of Camden residents, who were mostly minority and poor populations. When the City of Camden's planning director was asked about where the city's newly displaced poor were supposed to go, he responded "we can't plan for social conditions."[202] After a series of protests and intense public pressure in 1966, Jersey Joe Walcott, a former boxer turned Camden city official, stated that "the city's half-billion renaissance could be severely weakened by an uncooperative, militant, and rioting negro

population."[203] Community outrage surrounding the massive displacement was so great that the department of Housing and Urban Development (HUD) was brought in and reported that "citizen participation in a widely representative and viable sense does not exist in Camden today", directly contradicting the official statements made by City of Camden's elected politicians.[204]

I-676, which runs from I-76 in Philadelphia over the Ben Franklin Bridge and directly through the heart of the City of Camden, is a jarring example of the harmful consequences of urban interstate highway construction that took place through urban renewal. As it did in the City of Philadelphia, the construction of I-676 in the City of Camden split the local community in half, displaced many residents, and left permanent scars on the city. While bringing many negative consequences to urban communities, the construction of the interstate better connected motorists to and from to the Cities of Philadelphia and Camden with rapidly growing suburban areas in Camden and Gloucester Counties.

Figure 73 WWB Toll Plaza in Camden before (left) and after (right)I-676 Construction. Source: Temple Urban Archives

Population of Area

While Direct Connection is within the borders of Camden County, it is near the border with Gloucester County. Both Camden and Gloucester Counties are suburban counties of Philadelphia and are located directly across the Delaware River from the City of Philadelphia.

Camden County has a population of 513,000 residents with a land area of 228 square miles, but in recent decades has faced stagnant growth. Gloucester County with a land area of 337 square miles has a population of 288,000 and is one of the fastest growing counties in the State.[205]

The population by race for Bellmawr, Gloucester City, Mt. Ephraim, Camden County, Gloucester County, and the Delaware Valley can be seen in the Figure 74.

Major Takeaways:

- Predominately white suburbs: Bellmawr, Gloucester City, and Mt. Ephraim all have a much higher share of white residents at 83.7% and lower proportion of African American residents at 2.9% than Camden County and the Delaware Valley overall.[206]
- Homogenous Gloucester County: The racial breakdown of the three municipalities closely resembles that of Gloucester County compared to that of Camden County. In Gloucester County, white residents account for 81.4% of residents compared to just 63.6% of Camden County residents.[207]
- Asian Americans Community: In the Borough of Bellmawr, Asian Americans account for 11.4% of the population, well above Gloucester City at 5.8% and Mt. Ephraim at 0%. This number is higher than Camden County and the Delaware Valley at 5.7% and 6.5%, respectively.[208]

Figure 74 Population and Racial Breakdown in Direct Connection Area (2015-2019).

	Population	White Alone	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone	Two or More Races
Area of Direct Connect	27,228	83.7%	2.9%	0.2%	7.2%	0.0%	4.6%	1.4%
Bellmawr	11,398	79.9%	2.0%	0.0%	11.4%	0.0%	5.3%	1.5%
Gloucester City	11,248	82.4%	4.2%	0.2%	5.8%	0.0%	5.7%	1.8%
Mt. Ephraim	4,582	96.4%	2.3%	0.7%	0.0%	0.0%	0.2%	0.4%
Camden County	506,738	63.6%	19.3%	0.2%	5.7%	0.0%	8.0%	3.2%
Gloucester County	291,165	81.4%	10.2%	0.1%	3.1%	0.0%	2.0%	3.2%
DVRPC	5,725,345	66.1%	20.9%	0.2%	6.5%	0.0%	3.5%	2.8%
State of New Jersey	8,878,503	67.8%	13.5%	0.2%	9.5%	0.0%	6.3%	2.7%
USA	324,697,795	72.5%	12.7%	0.9%	5.5%	0.2%	4.9%	3.3%

Source: US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)

Educational Attainment

The educational attainment data for Bellmawr, Gloucester City, Mt. Ephraim, Camden County, Gloucester County, and the Delaware Valley can be seen in Figure 75.

Major Takeaways:

- Disparity in higher education: 19.3% of residents of the three municipalities within the have received a bachelor's degree or higher, well below the rate for Camden County and the Delaware Valley at 32.5% and 38.8%, respectively.[209]

Income

The median household income and poverty rates by race for Bellmawr, Gloucester City, Mt. Ephraim, Camden County, Gloucester County, and the Delaware Valley can be seen in Figure 76 and Figure 78.

Major Takeaways:

- Lower income: Bellmawr, Gloucester City, and Mt. Ephraim all have a smaller median household income than the rest of Camden County and the Delaware Valley overall.[210]
- Local racial disparities: White and Asian American households in the Direct Connection area earn $62,635 and $65,449, significantly higher than African American households which earn $30,386.[211]
- Regional racial disparities: In the Delaware Valley, white and Asian American households earn about $86,674 and $83,320, which is significantly higher than black households who earn $42,347.[212]
- Entrenched poverty: The three municipalities experience higher rates of poverty relative to Camden County and the Delaware Valley as a whole. The Borough of Bellmawr has a poverty rate among white and Asian American residents of 12.3% and 27.2%, well above the region's average of 7.6% and 12.1%, respectively.[213]

Figure 75 Educational Attainment in Direct Connection Area (2015-2019).

	Less than High School	High School	Some College	Bachelor's Degree	Master's Degree	Professional Degree	Doctorate Degree
Area of Direct Connect	11.7%	39.8%	29.2%	13.1%	4.6%	1.0%	0.6%
Bellmawr	14.9%	37.0%	28.3%	14.0%	5.0%	0.5%	0.3%
Gloucester City	10.6%	43.3%	28.8%	11.2%	3.4%	1.6%	1.1%
Mt. Ephraim	6.2%	39.1%	32.1%	15.2%	6.4%	1.1%	0.0%
Camden County	11.3%	29.5%	26.7%	20.3%	8.4%	2.6%	1.2%
Gloucester County	7.1%	32.0%	27.9%	21.5%	8.5%	1.7%	1.3%
DVRPC	9.5%	28.3%	23.4%	22.8%	11.1%	2.9%	2.0%
State of New Jersey	10.2%	27.2%	22.9%	24.2%	11.2%	2.6%	1.6%
USA	12.0%	27.0%	28.9%	19.8%	8.8%	2.1%	1.4%

Source: US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)

Figure 76 Median HH Income by Race in Direct Connection Area (2015-2019).

Geography	Median HH Income	White Alone	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone	Two or More Races	Hispanic or Latino	White Alone, Not Hispanic or Latino
Area of Direct Connect	$61,389	$62,635	$30,387	$112,500	$65,449		$41,543	$54,909	$58,394	$62,367
Bellmawr	$59,646	$61,539	$30,821	-	$48,958	-	$54,514	$50,729	$65,179	$60,447
Gloucester City	$59,394	$59,245	-	-	-	-	$27,670	-	$51,082	$59,778
Mt. Ephraim	$73,750	$75,625	-	-	-	-	-	-	-	$75,625
Camden County	$70,451	$81,575	$47,992	$32,961	$89,471	$23,654	$33,777	$61,324	$41,867	$84,167
Gloucester County	$87,283	$90,568	$57,615	-	$114,261	-	$52,515	$45,066	$70,154	$90,684
DVRPC	$72,564	$84,674	$42,347	$43,072	$86,320	$50,023	$34,628	$56,259	$44,632	$86,971
State of New Jersey	$82,545	$88,810	$53,247	$61,204	$121,111	$47,188	$49,881	$73,147	$57,068	$94,462
US	$62,843	$66,536	$41,935	$43,825	$88,204	$63,613	$49,221	$59,184	$51,811	$68,785

Source: US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)

Figure 77 Route 42 Widening at I-295 in 1965. Source: Temple Urban Archives

Figure 78 Poverty Rate in Direct Connection Area (2015-2019).

	White Alone	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone	Two or More Races	Hispanic or Latino	White Alone, Not Hispanic or Latino
Area of Direct Connect	10.2%	11.2%	61.8%	18.1%		41.0%	7.3%	25.6%	10.3%
Bellmawr	12.3%	13.0%	-	27.2%	-	32.6%	16.8%	26.7%	11.7%
Gloucester City	8.9%	12.0%	0.0%	0.0%	-	49.6%	0.0%	24.6%	9.6%
Mt. Ephraim	8.7%	3.8%	100.0%	-	-	0.0%	0.0%	26.1%	8.9%
Camden County	7.3%	18.2%	45.4%	11.9%	21.5%	36.4%	13.2%	27.5%	6.2%
Gloucester County	5.6%	13.6%	0.0%	5.7%	0.0%	23.1%	27.0%	17.9%	5.5%
DVRPC	7.6%	23.5%	24.2%	12.1%	25.5%	34.3%	17.0%	27.0%	6.4%
State of New Jersey	7.8%	17.3%	17.1%	6.7%	25.3%	21.4%	13.1%	17.9%	5.9%
US	11.2%	23.0%	24.9%	10.9%	17.5%	21.0%	16.7%	19.6%	9.6%

Source: US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)

Figure 79 I-295/I-76/Route 42 Before Construction. Source: Stokes Creative Group

Transportation

Many areas in Camden County, as well as in Gloucester County, were developed in the age of the private automobile. The time period in which they were created is reflected in the auto-centric land development patterns, which include residential developments with cul-de-sacs and looping roadways. The transportation infrastructure was built exclusively for the automobile, with finite access to active transportation, such as pedestrian and cycling amenities, and very limited public transportation infrastructure.

While Camden County is served by numerous NJ Transit bus routes, it only has three rail transit lines, including the PATCO High Speed Line, NJ Transit Atlantic City Line, and NJ Transit River Line. The rail transit lines predominately serve the City of Camden and the suburban communities to the east and they do not provide any service into Gloucester County or in towns along its border with Camden County, such as to Bellmawr, Gloucester City, and Mt. Ephraim.

With the land use development pattern and lack of transit services, residents around Direct Connection are heavily reliant on the private automobile. The most recent 5-Year U.S. Census American Community Survey found that 91% of residents in the project area use an automobile to get to work, which is above the Camden County and Delaware Valley rates of 86% and 79%, respectively. [214]

Even with the area's proximity to the region's economic center of Philadelphia, only 3.3% of residents report using public transportation to get to work, which is notably lower than the rest of Camden County and Delaware Valley at 7.6% and 10.4%, respectively. [215]

Project Selection

Although the highways that make up the Direct Connection project were all constructed before DVRPC's inception in 1965, the regional planning commission played a major role in the subsequent studies, advocacy, and funding that led to Direct Connection. I-76 was completed in 1957, Route 42 in 1958, and the I-295 interchange in 1961.[216]

While designing improvements for Route 42 in 1985, NJDOT determined that the I-295/I-76/ Route 42 interchange required significant changes not even twenty years after the construction of these three highways.[217] For the next fourteen years, NJDOT ordered a series of studies to determine how the interchange could be improved. In 1987 the engineering firm McCormick Taylor conducted a Preliminary Alternatives Report, which evaluated eleven alternatives and narrowed them down to four. In 1990, McCormick Taylor then produced the Final Alternative Reports, which settled on one recommended alternative.[218] In 1997 and 1998,

Figure 80 Direct Connection Selected Alternative. Source: EIS

the engineering firm Buchart Horn, Inc. produced an I295, I76, Route 42 Interchange Study and a follow up report, which recommended the further study of alternatives.[219]

In 1999, DVRPC and NJDOT performed a Congestion Management Study (CMS) and a Transportation Improvement Study (TIS), which together identified the interchange's major issues and evaluated a range of potential solutions. The TIS indicated that the major problem with the interchange was that there was no direct through movement on I-295, which forced drivers to use ramp-type roadways to make this movement.[220] The TIS cited the lack of a through movement, along with substandard roadway geometries, poor sight distances and inadequate bridge clearances, as the reasons for increased levels of congestion on both the freeways and adjacent local streets. The report also cited crash rates that were higher than the statewide average.[221] To determine the best way to remedy the problem, the TIS evaluated nine conceptual alternatives, which are as follows:

- No Build
- High-Occupancy Vehicle Lanes
- Supporting Strategies (Intelligent Transportation Systems (ITS), car/van pool)
- Express Bus/Park and Ride
- Glassboro-Camden Rail Line
- New Jersey Turnpike Widening
- New Jersey Turnpike Interchange Addition
- Partial Build of "Missing Moves" Ramps
    - I-295 NB to Rt. 42 SB and Rt. 42 NB to I-295 SB ramps that didn't exist
- Full Build of a grade separated interchange (Direct Connection)

Although the TIS found that some alternatives provided regional benefits, such as building the Glassboro-Camden rail line or implementing Intelligent Transportation Systems (ITS), it determined that those alternatives did not directly address the safety or congestion issues in the interchange. Instead, the TIS concluded that only the Full Build alternative, along with creating a separate project to build the Missing Moves ramps, would correct the identified deficiencies.[222]

Once DVRPC and NJDOT determined that the Direct Connection alternative was needed, they produced a Purpose and Need document and began to engage government and area stakeholders to determine what Direct Connection would look like. From 2003 through 2006, NJDOT held meetings with stakeholders to create twenty-six different Direct Connection alternatives that varied the location and grade of the ramps.[223] Public and agency stakeholders provided input on how each alternative would meet the project criteria, as well as how to minimize the effects of the alternatives on adjacent properties, the environment, and health of area residents.[224] After compiling the stakeholder feedback, NJDOT conducted detailed analyses of the five best alternatives, and eventually settled on one alternative to construct, which is shown in Figure 80.[225] Over the next few years following the alternative selection, NJDOT compiled and received comments on the Environmental Impact Statement (EIS), which was approved by the Federal Highway Administration (FHWA) on March 20, 2009.[226]

Project Funding and Justification

At the time of groundbreaking, Direct Connection was projected to cost $900 million, making it the second-largest road construction project ever in the state of New Jersey.[227] It is related but being constructed separately from the "Missing Moves" project, which is expected to cost around $230 million.[228] Direct Connection was funded by the Federal government via DVRPC and the New Jersey Transportation Improvement Program (TIP), and throughout both the alternative selection process and in justifying the cost of the project, DVRPC and NJDOT cited that the two major benefits were reduced congestion and improved safety. NJDOT stated that the Direct Connection interchange carries slightly under 250,000 vehicles per day, making it the busiest interchange in South Jersey, and these motorists often face significant delays and safety risks.[229] The EIS indicated that parts of the interchange configuration have crash rates that are seven-times the statewide average, and that some mainline and ramp sections have so much traffic congestion that they have a failing Level of Service (LOS).[230] The EIS claimed that the proposed alternative would reduce crashes by 70%, increase average speeds from 26MPH to 32MPH, and relieve congestion from local arterials by removing vehicles attempting to avoid the interchange. Similar arguments were made at the project's groundbreaking in 2013 by Lt. Governor Kim Guadagno, saying:

> *What can only be called a weird factoid in New Jersey is the existence of the interruption of Route 295. Today, we're announcing a nearly billion-dollar investment in ending that weird factoid. It can only be described as an effort to make the roads safe, an effort to improve quality of life, an effort to bring businesses and keep businesses in New Jersey, and I suspect that it will be successful.*[231]

The NJDOT commissioner Simpson made a similar statement about the project benefits, stating "investments in our transportation network are guided by a handful of key metrics, including the safety, operational performance, and quality-of-life benefits this project will produce."[232]

Construction

Due to its large size, Direct Connection was split into multiple smaller contracts, with an advanced ITS contract starting in July 2012 followed by four subsequent construction contracts.[233] When finished, the interchange will have ten new bridges, twenty-two retaining walls, and 15,000 feet of new and reconstructed noise barrier.[234] Groundbreaking for the ramp construction took place in March 2013, with initial estimates that the project would be completed in Fall 2021. However, project delays have been significant, and pushed the completion date back to 2027.[235] From a motorist perspective, the construction impacts are designed to be minimal, with ramp closures only occurring during nights and weekends, and mainline lanes remaining open the entire duration of the project.[236]

Equity Analysis of Direct Connection

The following sections show the equity analysis for Direct Connection across the six equity themes. The analysis highlights that, while the Direct Connection project team conducted extensive community and agency outreach, the early decision-making process and funding choices were not equitable. In protected classes, the environment, and economics, Direct Connection provides some benefits to some populations, but these benefits were not evenly distributed across all people. For access, the focus on congestion mitigation instead of improving multimodal access to rapidly growing areas of South Jersey raises equity questions about the project, particularly for access to opportunities for carless households, and if there will even be long-term mobility benefits.

In process, public participation, and decision-making

While the process followed by NJDOT and DVRPC to create the Direct Connection project was much improved when compared to historic highway building projects in the region, such as I-676 through the City of Camden, there are still equity issues that remain impactful but less obvious. One of the main areas of improvement from past highway building projects has been NJDOT's extensive communication and involvement of important stakeholders, local residents, and municipal government officials during the planning of Direct Connection. The EIS describes NJDOT's extensive outreach over seven years: forty-three total stakeholder meetings, six informational newsletters distributed to homes surrounding the project area, briefings of local elected officials, and the creation of periodically held Public Information Center meetings for the project[237] NJDOT also held Agency Coordination Meetings (ACM), which brought together major public agencies such as USEPA, FHWA, NJDEP, DVRPC, DRWC,

Figure 82 Direct Connection Under Construction. Source: 42 Freeway

Figure 81 Typical Direct Connect Public Information Session Meeting. Source: EIS

and others whose regulatory jurisdiction would affect progress of the project.[238] The government stakeholders were involved early on in alternatives development, which allowed them to comment on potential issues well before designs were created, and helped to ensure the agencies would approve the project's final design in a timely fashion once submitted by NJDOT.

NJDOT also prioritized the involvement of local community organizations at all stages of the alternatives analysis process through the creation of the Community Advisory Committee (CAC). This committee consisted of over 30 representatives from the communities surrounding Direct Connection, and included varied organizations such as the Bellmawr Baseball League, Mount Ephraim Girls Softball Association, Gloucester Senior Citizens Association, Hispanic Family Center of South Jersey, Rotary International South Jersey, Diocese of Camden, Gloucester County NAACP, and the South Jersey Chamber of Commerce, among many others.[239] While not a decision-making body in itself, the CAC provided a forum to voice community concerns, plan outreach activities, and set priorities of the alternatives development. It was through meetings with the CAC, ACM, local elected officials, and the public at large that NJDOT narrowed twenty-six possible Direct Connection alternatives down to five, and then to a final selected preferred alternative. This community and stakeholder involvement process stands in stark contrast to the building of I-676 and urban renewal in the City of Camden in the 1960s, when HUD reported that "citizen participation in a widely representative and viable sense does not exist in Camden today". The process that NJDOT was required to follow in order to comply with Federal regulations such as NEPA, Title VI, and the EJ Executive Order helped to ensure the community was involved and well-informed about the project.

Despite the positive stakeholder involvement conducted as part of Direct Connection, there were still equity issues with the process of its creation, especially with the project selection process itself. As described earlier, NJDOT and DVRPC conducted a series of reports that studied the possibility of a Direct Connection project for almost two decades. However, despite the long timeframe and the multiple studies conducted, there were few times in which NJDOT and DVRPC legitimately considered creating a more equitable transportation system by investing in other modes, such as public transportation. The only time when public transit was considered was in the joint 1999 TIS by DVRPC and NJDOT, in which a new rail line to Glassboro was evaluated as part of the alternatives analysis.[240] This public transportation option was quickly dismissed, even though the report acknowledged it would provide regional benefits. The reason for the dismissal was that the TIS had a very narrow definition of project needs, which were to improve congestion, operations, and safety at the interchange only, without considering what equivalent funds could do when redirected towards other projects.[241]

With Direct Connection, NJDOT and DVRPC effectively relegated equity to only be a consideration later in the project process, where public feedback made real but relatively minor changes to the project. Without conducting a true alternatives analysis where government agencies could gather public feedback while considering the tradeoffs between mobility, accessibility, safety, equity, and funding at the regional scale, the project leaders made similar mistakes to the leaders in the 1960s. This failure to study tradeoffs is especially striking when considering the massive cost of the project, and how benefits mainly accrue to white, suburban residents instead of the historically marginalized communities, as the following sections will discuss.

Across demographic groups that are geographically distinct and geographically diverse

Direct Connection is being built to provide benefits to motorists in the region, and project advocates state that it will increase efficiency, improve safety, and reduce congestion. There are potential significant detrimental consequences including environmental impacts, loss of public land, and an increased reliance on the private automobile for residents. While these potential consequences are significant, they do not disproportionately impact any demographic group that could be considered a protected class.

As the previous demographic analysis showed, the three municipalities within the project area, Bellmawr, Gloucester City, and Mt. Ephraim, are predominately white (84%). These three municipalities are more likely to be working class than Camden County and the Delaware Valley overall, with an only 19.3% of residents having attained a bachelor's degree or higher, which is much lower than the county and region's averages of 32.5% and 38.8%, respectively. While educational attainment is not considered a protected class category under Title VI or the Environmental Justice Executive Order, there is a significant undercurrent of classism in where interstates and highways were constructed in predominately white areas.[242]

In the EIS, NJDOT analyzed the potential impacts to protected classes adjacent to the project area and found no inequitable impacts to protected classes.[243] However, although the project itself does not directly impact protected classes, the project selection process, lack of increase in access, and funding allocation decisions all do have broader inequitable impacts on protected classes. The broader Direct Connection impacts to protected classes are discussed in detail in the preceding and following sections in this report.

Figure 83 Comparison between Proximate Zone and Catchment Zone, Direct Connection

	Population Affected vs Population Benefiting in Area of Direct Connection (2015-2019)								
	Disabled	Low Income	Older Adults	Racial Minority	Youth	Female	Ethnic Minority	Foreign Born	Low English Proficiency
Proximate Zone	15%	37%	16%	17%	22%	52%	11%	12%	9%
Catchment Zone	14%	28%	15%	36%	21%	52%	12%	11%	7%
Regional Average	13%	28%	16%	34%	22%	52%	9%	11%	6%

Source: American Community Survey (ACS) 2015-2019 (5-Year Estimates)[439]

Select Link Analysis

To gain a more detailed picture of which populations benefit from using the Direct Connection, DVRPC provided simulated traffic flow data to the analysis team. This data included only simulated vehicle counts along roadways in the region. Trip generation by zone may have been available but was not provided for this project. As a workaround to try and understand the discrepancy between impacted populations and the population using the project, the Natural Breaks algorithm was used to identify routes with a non-negligible number of trips (>100). Census tracts containing these routes were identified as the primary catchment zone for the project. Census tracts containing the project under analysis were identified as the proximate zone.

The proximate zone's population was compared that of the catchment zone and the region to identify differences in potential disadvantage, based on ACS 2019 5-year estimates. This analysis shows that the area in which Direct Connection is located is less racially diverse than the region at large but is of a lower income than the region at large. (See Figures 83 & 84)

Figure 84 Select Link Analysis for Direct Connection

In mobility and accessibility

When complete, the Direct Connection project will not have overtly harmed mobility or accessibility in South Jersey, including for protected classes. NJDOT is not removing any interchange movements and is improving the ease in which motorists can move from one freeway to another. While the project does improve mobility for vehicles by reducing congestion, it does little to improve access to jobs and services, which is a critical component in creating an equitable transportation system. Instead of building a transportation project that helped to repair previous harms committed against communities in the City of Camden, a record-breaking amount of money was spent to marginally improve mobility for suburban communities.

In the Purpose and Need, the second main reason behind improving safety that NJDOT provided for the Direct Connection was reducing traffic congestion.[244] In the EIS, NJDOT stated that 250,000 vehicles use the interchange per day, with 80% of them staying on the same roadway that they entered the interchange.[245] NJDOT argued that current congestion was untenable on both the mainline and local roadways, where some ramps were receiving a failing LOS grade, and local streets were facing high levels of congestion.[246] The selected alternative was projected to improve LOS, and increase speeds to 32 MPH (AM/PM) versus 25/26 MPH (AM/PM) under the No Build alternative. Although the Missing Moves project will improve access for freeway motorists by adding connections from Route 42 to I-295 SB and I-295 NB to Route 42, there are no other access benefits. Direct Connection is a project that is focused on improving mobility through congestion reduction.

Reducing traffic congestion is currently the third most important criteria for DVRPC when evaluating projects for the TIP[247], but there are decades of research that definitively show that attempting to reduce congestion by increasing capacity not only fails to actually reduce congestion in the long run, but also produces other negative externalities that have equity implications. While Direct Connection does not add lanes throughout the interchange, it is attempting to solve its congestion issues by increasing capacity through a redesign of the ramps. Building more freeway capacity creates

Figure 85 *Car Ownership for People of Color in Philadelphia MSA (2017). Source: IPUMS/Equity Atlas*

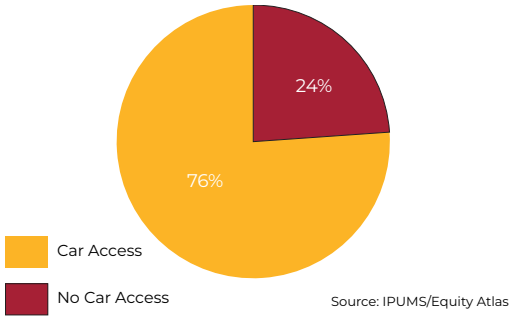
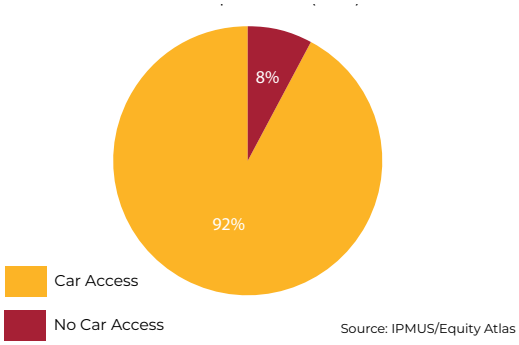


Figure 86 *Car Ownership for White People in Philadelphia MSA (2017). Source: IPUMS/Equity Atlas*



induced demand, in which making it easier for drivers to travel somewhere will mean they will travel to that place more often and create congestion.[248]

Studies show that within five years of new freeway capacity being added, vehicle travel will increase to use almost 90% of the new capacity, which is due to drivers changing their route and additional suburban development being created.[249] Induced demand is such a common and accepted phenomenon that it has been referred to as the *Fundamental Law of Road Congestion* for over 60 years.[250] However, the concept of induced demand has not stopped state and local governments, including in South Jersey and the Philadelphia region as a whole, from trying to build more and wider freeways to reduce congestion; from 1993-2017, the 100 largest urbanized areas in the U.S. spent more than $500 billion on highway capital investments.[251] The result: overall congestion grew by 139%.[252] The results were no different in the Philadelphia region, where although the area population only grew by 20%, freeway lane miles grew by 54%, and congestion grew by 139%.[253] Based on accepted theory and historical data, the congestion reduction and mobility benefits created by Direct Connection will most likely not last long.

Not only does it appear that mobility, one of the main goals of Direct Connection, will not provide long-term benefits, but also that any mobility and safety benefits for the project mostly go towards white, suburban drivers. To illustrate this fact, Figure 84 shows DVRPC vehicle travel patterns data (select link) at Direct Connection for the 6 AM-10 AM morning peak. The size of the green line indicates the number of travelers on any given road who will go through or have just gone through the Direct Connection interchange as part of their trip. The figure clearly shows that most drivers who enter the interchange are either going northbound/southbound in New Jersey or traveling between Philadelphia and its suburbs and suburban New Jersey. These patterns indicate that most of the motorists using interchange are from whiter suburbs, instead of places with higher numbers of protected classes, such as the City of Camden. In addition, many of the travelers use I-676 through the City of Camden, which as discussed earlier, is a roadway with a long history of causing negative effects on protected classes.

Another reason that motorists of Direct Connection will likely be whiter than the region as a whole is that people of color are much more likely to not have access to a vehicle than white populations. This fact is true both nationally and in the Philadelphia region, as shown in Figure 85 and Figure 86. In 2017, while only 6% of white households nationally and 8% regionally didn't have access to a vehicle, 19% of Black households nationally and 29% regionally didn't have access to a car.[254] For all people of color, the rate of households without a car is about 14% nationally and 24% regionally.[255] These statistics show just how stark the disparities of car ownership are between races, especially in the Philadelphia region where Black households are almost four times less likely to own a car when compared to their white counterparts. The statistics also show how auto-centric projects like Direct Connection do not help bridge these transportation racial divides, and benefit certain populations more than others.

Direct Connection appears to not only be failing to improve mobility or accessibility for protected classes, but also to have been chosen over new public transit projects that would benefit households without a car. As described earlier, NJDOT and DVRPC failed to adequately consider

investing in more equitable public transit as an alternative to Direct Connect. Given all the historical transportation inequities that the City of Camden has experienced in order to benefit suburban commuters, and how their residents are less likely to own cars, money could have been spent to improve regional access to jobs and services via rail or even drastically improved bus service.

Instead, various agencies decided to spend 15 years and over a billion dollars to increase average peak hour travel speeds by a projected 6 mph for mainly white suburban residents. While the Direct Connection project may achieve narrowly defined mobility goals over a short timeframe, it falls short from an equitable access standpoint.

In environmental impacts

Unlike the interstate highway system projects of the 1960s, NJDOT is not constructing Direct Connection through previously undisturbed environmental areas or existing urban neighborhoods. Instead, Direct Connection is mostly using the existing interchange footprint, with NJDOT needing to acquire some private properties and to conduct environmental mitigation efforts to benefit the health and well-being of both residents and the surrounding environment. Additionally, there have been some noticeable impacts to surrounding residents during construction.

Due to the new configuration of the ramps, Direct Connection required the taking of land, which included 13 residences, one business, and a historic building named the Huggs-Harrison house.[256] NJDOT's taking of the Huggs-Harrison house caused controversy, since the house was from 1764 and played a role in the Battle of Gloucester, which helped to jump start the career of Marquis de Lafayette.[257] The house had been used for years as an

Figure 87 Huggs-Harrison House Before Demolition. Source: Preservation NJ

office building by St. Mary's Cemetery, and once local preservationists learned that NJDOT intended to demolish the building, they started an impassioned campaign to save it.[258] It was estimated to that it would only cost $500,000 to move the house, with the Borough of Bellmawr donating a new site for the house and Camden County offering to contribute $50,000 towards moving costs.[259] Despite these efforts and in a direct contradiction to its own initial evaluation, NJDOT deemed the house to not be historically significant and demolished it in 2017.[260] The demolition has led to a lawsuit by the Camden County Historical Society, which contends that the house was historically important and the demolition was unnecessary.[261]

From an ecological standpoint, there are some piers, abutments, and fill materials that impacted floodplains and wetlands, but NJDOT worked with environmental regulators to enact some mitigation projects, including the elimination of culverts, which can harm aquatic life.[262] In addition, due to the removal of certain ramps as part of the project, land that was used by the old ramps will now be converted into open space.

Figure 88 Bellmawr Baseball League field before (top) and after (bottom) construction. Source: EIS

Neighboring residents of working-class Bellmawr are facing visual and noise impacts, both during and after construction. While the selected Direct Connection alternative does not take any recreational fields, which was the case in some other initial alternatives, the freeway will now directly abut the Bellmawr Baseball fields, harming aesthetics and adding noise pollution, as shown in Figure 88. In addition, some adjacent residents are experiencing noticeable impacts during construction, including increased traffic, noise, and dust. One resident in Bellmawr stated that during daily construction, "the whole house shakes- the dishes, the porch we are sitting on- and pictures are falling off the mantle and wall."[263] Another resident compared the noises during construction to "a 20-ton steel weight dropped into steel bed truck."[264] The mayor of Bellmawr has heard many complaints from his constituents, saying, "I feel sorry for everyone because of the noise, traffic and dust and dirt. People's homes can be seen from I-295 now, it's just a big mess."[265] In addition, while NJDOT is constructing noise walls to mitigate the effects of new levels of noise post-construction, 155 residential units will still have higher levels of noise than before the project.[266] Two nearby schools will have noise levels high enough that additional mitigation efforts will be needed.

Figure 89 Residential impacts during Direct Connection Construction. Source: 42 Freeway

In economic impacts

Direct Connection's $1.1 billion price tag could be worthwhile for South Jersey communities if it produced economic activity, which was an argument made by Lt. Governor Kim Guadagno as a reason for Direct Connection at its groundbreaking. However, neither she nor NJDOT provided evidence to back up the statement, and most research has in fact found no net increase in employment or other economic activity due to freeway capacity increases.[267] Importantly though, capacity expansions do influence where development in a region occurs, even if it does not cause the growth itself.[268] That influence is extremely important in a place like South Jersey, where Gloucester County is one of the fast-growing areas in the entire Delaware Valley. Future growth locations also raise important equity questions about Direct Connection in terms of who really benefits from economic growth that is helped by a freeway enhancement project.

Gloucester County is rapidly growing in both its population and the number of jobs it has, due to cheaply available land and successful educational institutions such as Rowan University. Figure 90 shows the projected population change for Gloucester County compared to the other counties in the DVRPC region. This figure shows that Gloucester County will have the fourth highest absolute population growth and the highest population growth rate compared to all other counties in the DVRPC region. In addition, Gloucester County will have the fifth highest absolute employment growth out of any DVRPC county.

As Figure 84 in the Access section (page 106) showed, Gloucester County has a lot of travelers who would take advantage of the enhanced mobility benefits of Direct Connection, since it already has a large number of motorists

Figure 90 Projected Population Change by DVRPC County (2015-2045). Source: DVRPC Connections 2045

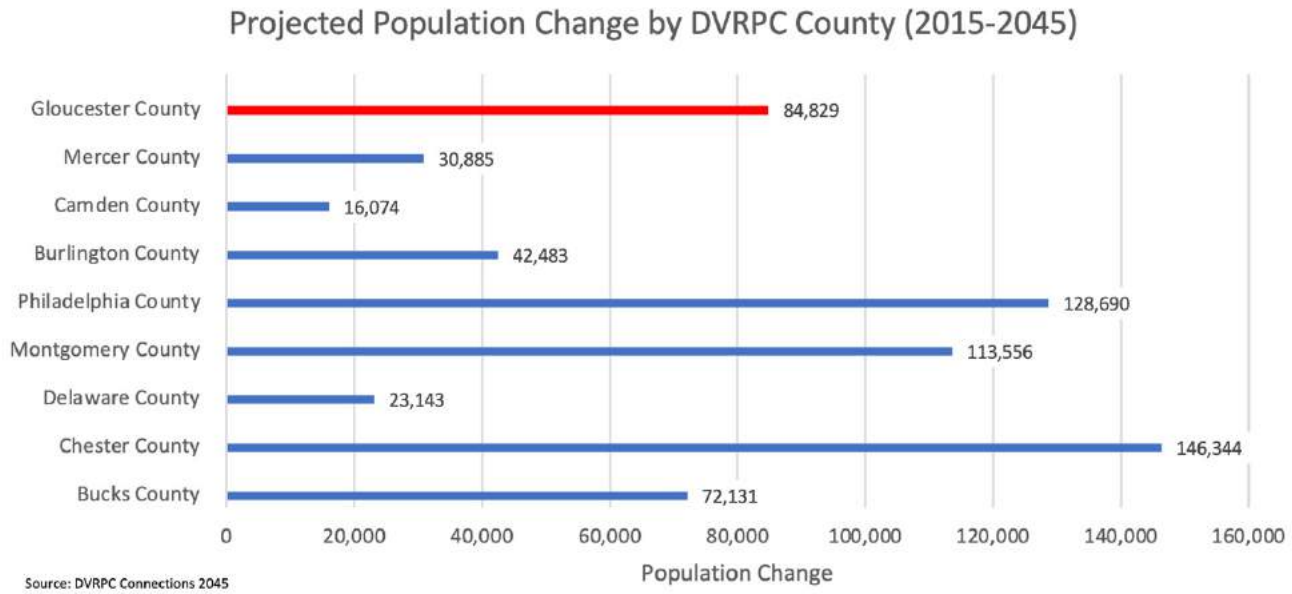
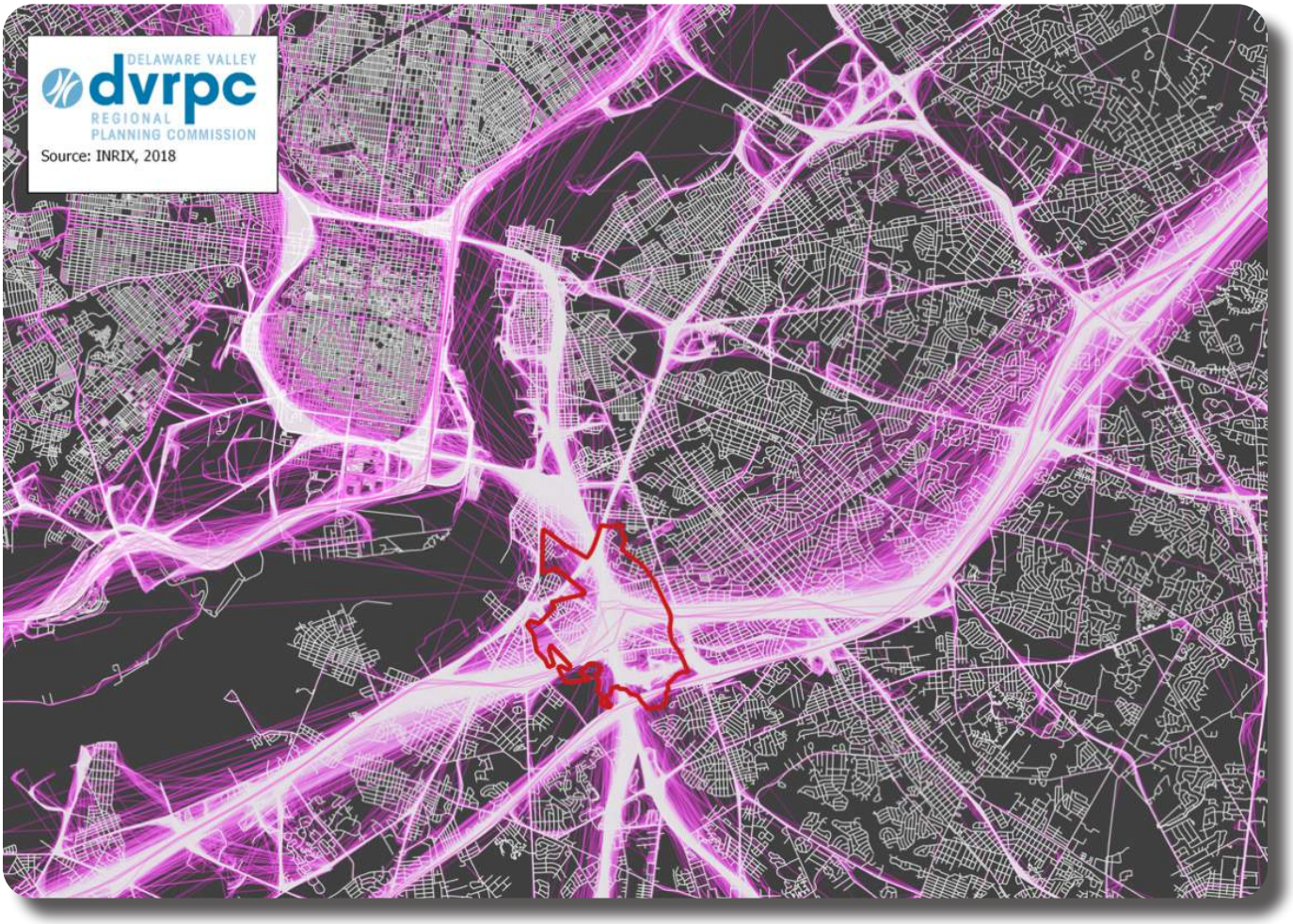


Figure 91 Heavy Truck Movement around Direct Connection. Source: INRIX & DVRPC



who currently use the interchange. With Direct Connection improving mobility, it will likely incentivize and continue the trend of directing growth in Gloucester County. However, because transit investments in buses and rail have not been made, there will be little transit access in Gloucester County, meaning the growth will be auto-oriented and leaving protected classes out of the benefits spurred along by the transportation money spent in Direct Connection. Especially since Gloucester County already has higher rates of residents who are white and have access to cars than the other counties in South Jersey and the Delaware Valley as a whole, Direct Connection only serves to exacerbate the existing economic and racial inequality trends.

One important economic consideration is Direct Connection's effect on truck traffic, since trucks are responsible for about 75% of the goods movement in the Philadelphia region.[269] In DVRPC's Long-Range Vision for Freight, I-295 falls within the "north-south inter-urban distribution corridor" and Direct Connection itself is at the intersection of that corridor and the "east-west global gateway corridor".[270] The report explicitly calls out Direct Connection and Missing Moves as projects that will help to relieve congestion and

therefore improve freight movement.[271] Figure 91 shows INRIX data from DVRPC for Heavy Truck movements that use Direct Connection, in which the Direct Connection area is outlined in red, and pink lines indicate the journeys of the Heavy Trucks before and after they pass Direct Connection. The figure shows that many trucks continue north/south along I-295, or travel to Philadelphia and other Pennsylvania destinations.

Although I-295 and Direct Connection are important to freight traffic, the long-term economic benefits of Direct Connection for freight are dubious. As discussed previously, the congestion benefits of Direct Connection will most likely dissipate after a few years, negating any travel time savings from Direct Connection for truck traffic. Also mentioned previously is that highway capacity increases do not spur economic development, which means there will likely not be new freight-based businesses in the area due to the project. Additionally, Direct Connection is not providing any significant new access improvements for trucks, meaning that trucks will be traveling along the same route if the Direct Connection project did not exist at all. While the Direct Connection project will most likely improve mobility for freight for a few years, it's unlikely that it will induce any meaningful long-term new economic activity in an area that already has an abundance of freeways.

Figure 93 Direct Connection under construction, Source: 42 Freeway

In allocation of project funds

As a standalone project, Direct Connection provides some safety and mobility benefits, and the interchange will have been improved once the project is finished. However, when the cost of the project is considered relative to the improvements, major concerns about inequitable resource allocation become apparent. The federal government is providing the funds for Direct Connection, which means that the money was allocated through DVRPC. According to recent DVRPC TIP documents, the Direction Connection project will cost around $900 million, with the related Missing Moves project costing about an additional $230 million, creating a combined total exceeding $1.1 billion over the project lifetime from 2012-2027.[272] These costs make Direct Connection/Missing Moves the second largest road project in the state's history.[273]

To provide more perspective on this massive number, consider all the money that DVRPC has directed through the TIP process toward the Southern New Jersey counties that are part of its

Figure 92 Direct Connection Cost Relative to DVRPC NJ TIP (FY 2012-2021). Source: DVRPC Tip Documents

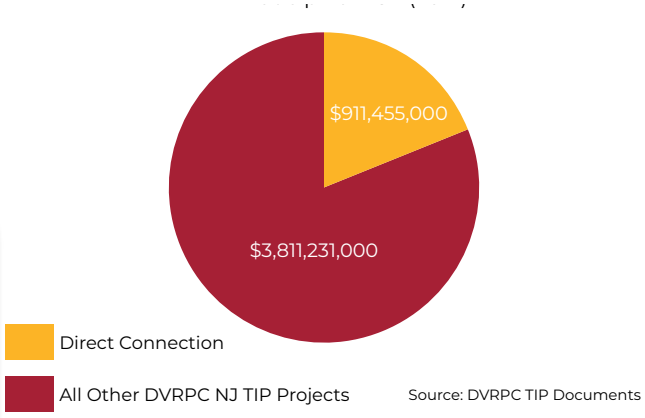
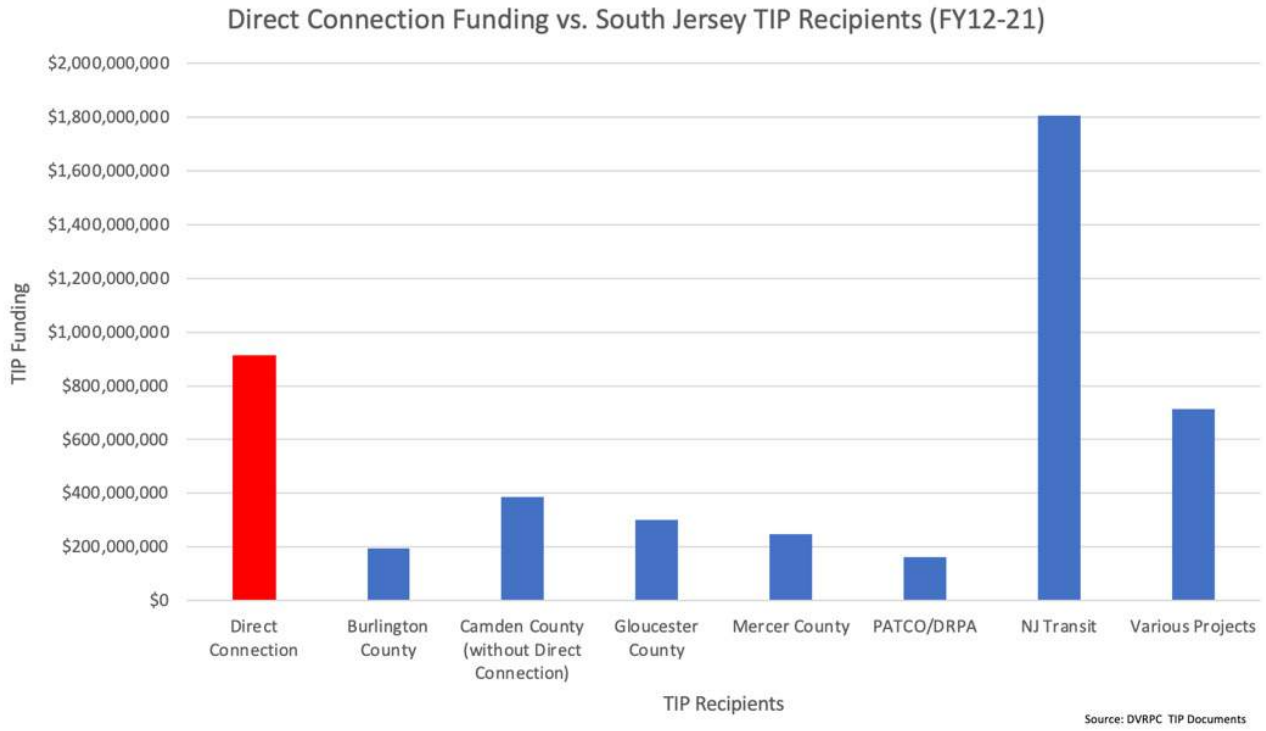


Figure 94 Direct Connection Funding Compared to South Jersey TIP Recipients. Source: DVRPC TIP Documents



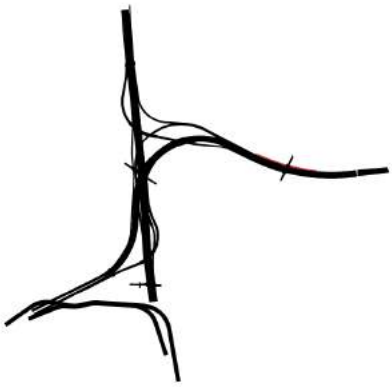
jurisdiction from 2012-2021, which is duration the Direct Connection/Missing Moves projects. Since 2012, Direct Connection/Missing Moves has used about 20% of the more than $4.7 billion South Jersey TIP budget from DVRPC, including all highways and transit expenditures, as shown in Figure 94.[274] While allocations listed on the TIP are only for programming and are not equal to the exact amount of money spent for the project, TIP allocations provide intended spending estimates, including relative to other projects.

Further breakdown of the FY2012-2021 data shows that the Direct Connection project is larger than the money going towards every individual county's highway budget, which includes bicycle, pedestrian, congestion mitigation, and safety projects, as shown in Figure 94. For Camden County, Direct Connection alone is 73% of all highway money going to the county, meaning that only 23% of the budget is left over for all other non-transit-related improvements in a county of over 500,000 residents. The Direct Connection project is also equivalent to 48% of all the TIP money going to PATCO/DRPA/NJ Transit in South Jersey, which in FY12-21 has included funds for projects such as rebuilding the entire PATCO rail car fleet, bus purchasing, and track safety improvements, among many others[275]. Note that TIP money is not for roadway maintenance, so the roadways budgets for each of the counties shown in Figure 94 are much smaller than the actual money spent on the roadways in South Jersey each year.

Even though the money which federal government provided to NJDOT through the FHWA was only for Direct Connection and could not be used for other projects, the massive amount of money for a highway capacity increase indicates the region's priorities. If NJDOT and DVRPC decided to use the capital money from Direct Connection for other projects, there could be transformative changes made to South Jersey transit, thereby improving transportation equity tremendously. As an example, the money from Direct Connection could buy 2,222 diesel buses, which is almost

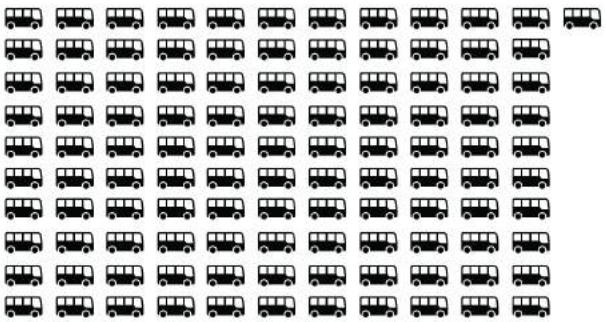
Figure 95 Direct Connection Cost Equivalents

Direct Connection + Missing Moves= $1.1 Billion



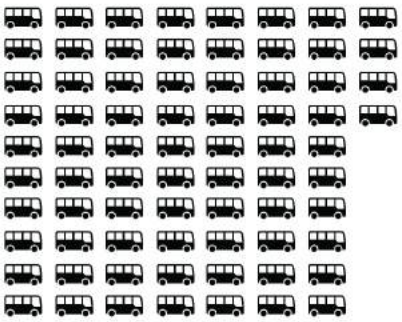
Is equal to:

New Diesel Buses:
2,222



or

New Electric Buses
1,481

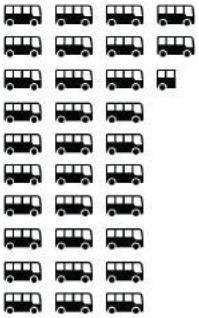


Compare this to:

Size of NJ Transit in South Jersey:
283 Buses

1 = 20

Size of Entire US Electric Bus Fleet:
650 Buses



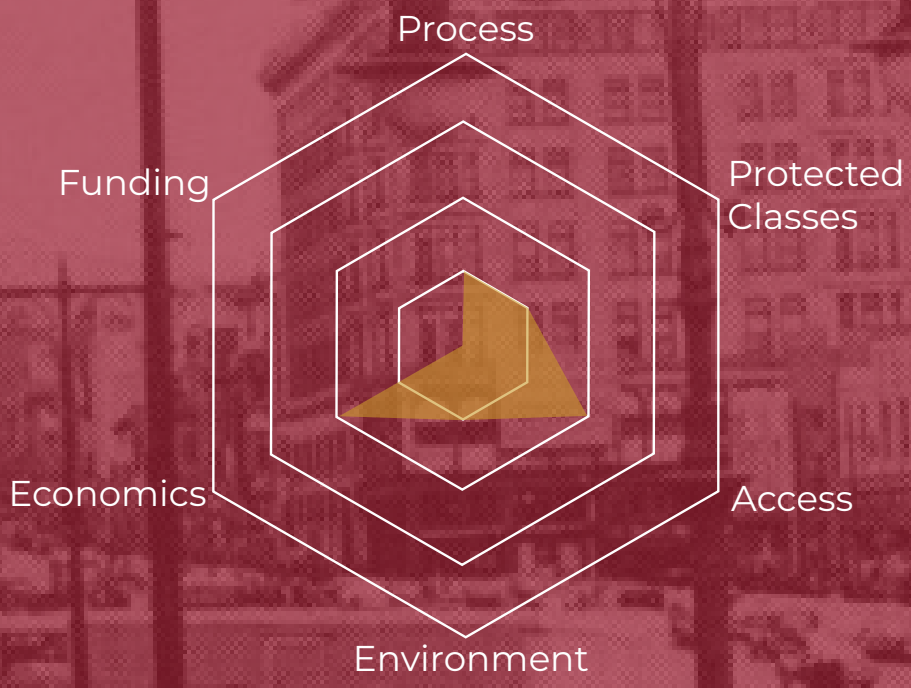
eight times the number of buses that currently serve the South Jersey region managed by DVRPC, as shown in Figure 95.[276] If NJDOT wanted a more environmentally friendly alternative, the money from Direct Connection could in purchase 1,481 electric buses, which is over 200% more electric buses than the 650 are currently in operation in the entire United States[277]. If the new Glassboro-Camden line was to be built using the money from Direct Connection, almost 70% of the funding for an entirely new 18-mile rapid transit line would be available.[278] These estimates do not take into account transit operating costs, which would require more granular information from NJ transit, but do provide a sense of the massive monetary scale of Direct Connection.

The cost comparison results show that the price of the Direct Connection project is not at all similar to road safety or congestion mitigation projects that NJDOT and local municipalities complete on a regular basis and should not be casually talked about as such. Direct Connection is a massive project that will cost over one billion dollars once completed, and mainly benefits white, suburban residents with vehicles, as the previous sections have illustrated. Direct Connection shows that for a project to be truly equitable, it not only must ensure that it is not harming the health, incomes, or livelihoods of protected classes, but it also should not casually spend funds that would otherwise help improve the lives of protected classes. The way that transportation funds are spent reflects the values of the agencies and communities that spend them. Although there are obviously complex rules about which types of funds can be spent on a given project, it has been clear for decades that easing congestion and improving safety of suburban drivers is much more valuable to South Jersey transportation decision-makers than improving access or economic outcomes of populations that have been harmed by past transportation projects.

Conclusion

The Direct Connection and Missing Moves projects together required decades of planning and will take over another decade to complete construction. Despite NJDOT and DVRPC following the correct environmental procedures and conducting extensive community outreach, in almost forty years the two lead agencies have never questioned their two main project goals: improving safety and decreasing congestion. While making roadways safer is undoubtedly important, any mobility benefits through increased capacity are likely to vanish within a few years. Additionally, the benefits of Direct Connection cannot be separated from the most striking aspect of the project: its enormous cost. With a total price of over $1.1 billion, there are serious questions of resource allocation, and who is benefiting from the second largest roadway project in the State of New Jersey's history. Travel pattern, car ownership, and demographic data all indicate that the main beneficiaries of Direct Connection are mostly white, suburban people with cars. While there's nothing wrong with benefits going towards these citizens, the lack of reliable transit access to suburban goods and services in South Jersey, and the history of freeway building through poor and minority communities in the City of Camden, indicate a pattern of prioritization of certain types of transportation, land uses, and populations over others. Direct Connection shows that even a current project that followed modern environmental procedures and best practices for outreach can still lead to inequitable outcomes. Improving safety and reducing congestion are fine goals, but Direct Connection never truly grappled with the questions of who benefits, and at what cost.

Highways often bring about suburbanization by creating accessibility to new areas that previously lacked sufficient transportation. In the case of US 422, politicians, business leaders, and most residents believed the Pottstown Expressway would bring about economic opportunity for the entire corridor. The lower land values would attract both commercial and residential development, which would create new communities and revitalize older, stagnating places like Pottstown and Phoenixville. Through this equity evaluation of US 422, it is apparent that the expressway has not equally, let alone equitably, impacted low-income residents in process, mobility and accessibility, the environment, economically, and in allocation of project funds.



Equity Dimension	Score	Reasoning
Process	1	The process was mainly led by the business community and other powerful people, not those mainly affected. Most public feedback that was heard was not implemented.
Protected Classes	1	The highway didn't cause a major burden to protected classes but did not benefit them either.
Access	2	The project improved access to the corridor for all, but not for carless populations, who are more likely to be protected classes.
Environment	1	No environmental benefits, but the project did not disproportionally harm one group or area over another.
Economics	2	The highway did produce economic growth in the corridor, but not for protected classes.
Funding	0	There has be almost no transit investment in the corridor, and any money that has going to studying transit has been for commuter rail, which is more expensive and less equitable.

Figure 96 US 422 equity spider chart and table
Figure 97 Image of Reading in the 1950s, Berksnostalgia.com

US 422 (Pottstown Expressway)
Chapter Summary

Theme: While bringing needed mobility and economic growth, the construction of US 422 led to a series of planning and transportation investment failures that have created an inequitable and inaccessible corridor.

US 422 422 extends from King of Prussia to Pottstown in DVRPC's jurisdiction, and it took about thirty years for PennDOT to finish construction for all the sections due to political, environmental, and funding issues. While US 422 spurred economic and population growth in the area's rural communities and industrial boroughs, the growth was poorly managed, which has led to incredible levels of congestion, rapid destruction of open space, and an economy that fails to include people without access to cars from sharing in the economic prosperity of the corridor.

Equity Analysis Key Takeaways:

The economic development created by US 422 has been inequitable

After the construction of US 422, new jobs in the area have been concentrated around interchanges without good transit service, most new housing has been sprawling, and communities with higher minority populations like Pottstown have not realized the economic benefits that their white counterparts have.

There is a severe lack of transit investment in the US 422 corridor

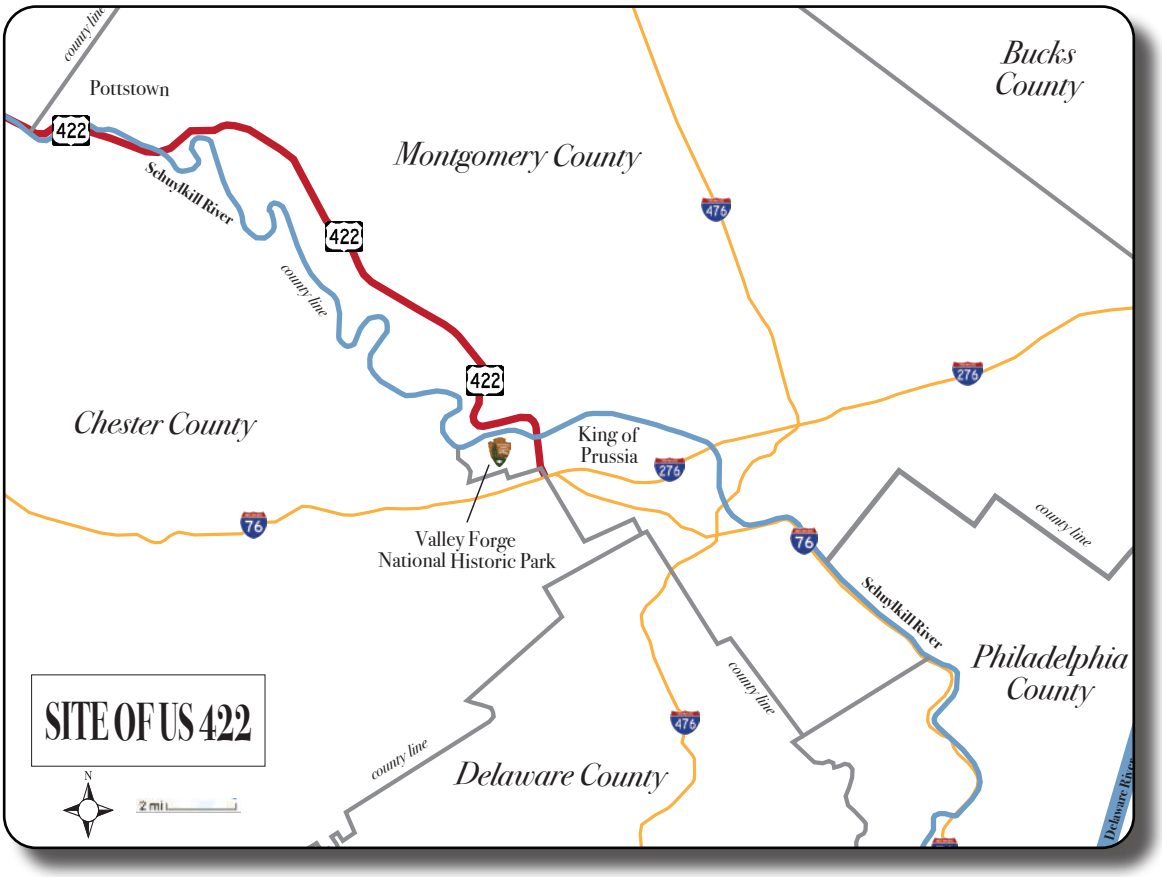
Besides a local bus system that services Pottstown, there is only one SEPTA bus line that travels in the US 422 corridor. While there have been many proposals for reintroducing rail service, the large cost and area travel patterns indicate that frequent, reliable bus service may be more useful. However, there have been few studies and little funding for improving such services, essentially making owning a car a requirement.

People with economic and political power influenced the creation and alignment of US 422

Business leaders along the proposed alignment of US 422 were huge advocates for the expressway, and powerful politicians even influenced the route of US 422. Average residents had a much smaller voice in the alignment or in how economic development would occur in the corridor.

US 422

Figure 98 Site Map of US 422 Corridor



History

Before US 422

Up until the first half of the Twentieth Century, much of northwestern Montgomery County was rural farmland. The area had a significant amount of agricultural and undeveloped land outside of Pottstown and Phoenixville, which had both served as significant hubs for metal manufacturing along the Schuylkill River, and later the Reading Railroad, up until the end of World War II. What existed prior to the construction of US 422 were local roads that ran from Pottstown all the way to Philadelphia. As Philadelphia grew westward with suburbanization and King of Prussia developed into an employment center, local politicians, business leaders, and some residents along the 422 Corridor advocated for a major highway that would connect northwestern Montgomery County with Philadelphia to both reduce traffic and foster economic growth in the entire region.

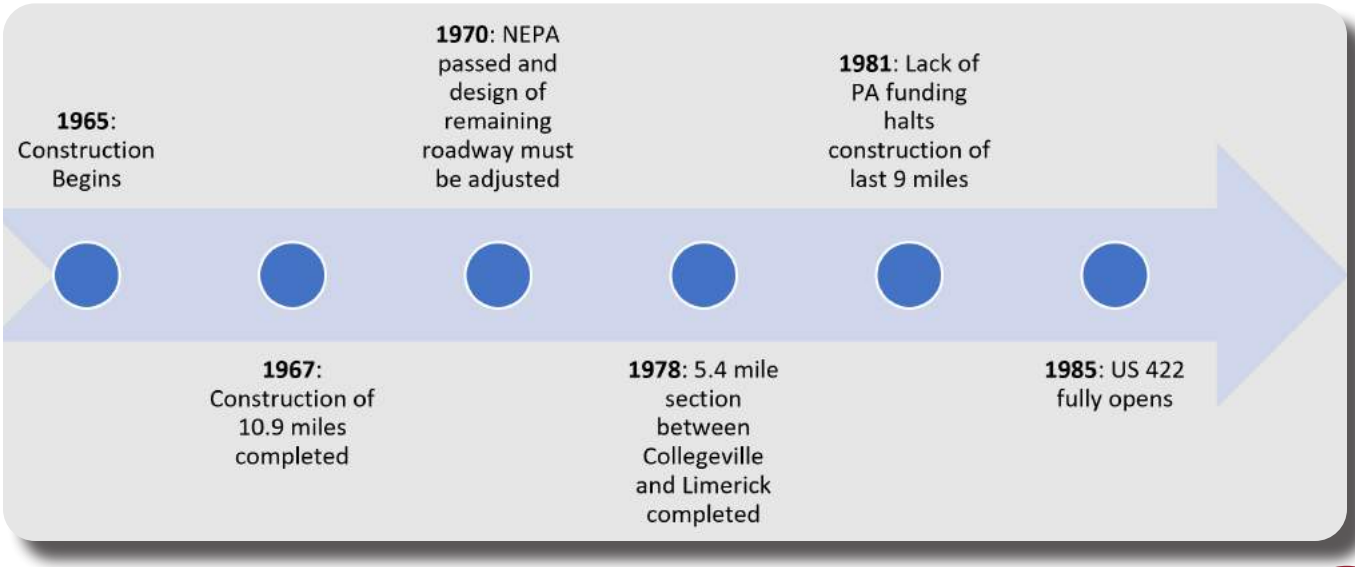
US 422, colloquially known as the Pottstown Expressway or Pottstown Bypass, took a long time to move from an idea to a plan and, ultimately, to a completed project. In 1932, the Regional Planning Federation of the Tri-State District, which was a regional planning authority that predated DVRPC, proposed a four-lane controlled access parkway between Valley Forge and Reading via Pottstown. Intended to line the Schuylkill River and only service automobiles, it was planned to be an extension of the Valley Forge Parkway, which later became the Schuylkill Expressway that connects King of Prussia with Center City Philadelphia. While inspired by New York City's parkway system designed by Robert Moses, this initial plan was never constructed.[279]

A little over thirty years later in 1964, the Pennsylvania Department of Transportation (PennDOT) proposed the "Relocated US 422" expressway to connect Reading and Pottstown with the Schuylkill Expressway and Philadelphia. Due to the congestion experienced on local two-lane roads between Philadelphia and Pottstown such as Ridge Pike and Germantown Pike, DVRPC supported the Pottstown Expressway's construction as a high-priority route for the region.[280] The plan for construction of the 25 miles of roadway was split into seven separate sections that span 24 municipalities at full build-out.

Construction of US 422

Construction of US 422 commenced in 1965 and would take 20 years to fully complete due to a series of delays in meeting environmental requirements and having the necessary funding. US 422 was designed with four 12-foot-wide lanes, in addition to shoulders and a median. The first 2.5-mile section between the Schuylkill Expressway and US 202 Expressway in King of Prussia and PA 363 in Betzwood crossed over the Schuylkill River and was completed in 1967, along with an 8.4-mile section between Douglassville in Berks County and Evergreen Road in Sanatoga, Montgomery County.[281] The remaining 14 miles of roadway would take 18 years to fully complete, frustrating motorists and businesses with the gap in connectivity and unfulfilled promise of economic growth and development. The design for connecting the northern and southern sections of US 422 was completed in 1968, only to have to be redesigned to meet federal environmental requirements. Construction had to start from Pottstown due to National Environmental Policy Act (NEPA) of 1970, and in the mid-1970s construction began on the 5.4 mile section between Collegeville and Limerick, which opened in 1978. Work began on the last two parts of the roadway, the 6.4 mile section between Betzwood and Collegeville and the 2.6 mile section between Limerick and Sanatoga, in 1981, but was halted. While the majority of funding came from federal sources, Pennsylvania was unable to afford its share at this stage in the construction. When the state's Department of Transportation ultimately allocated funding, a U.S. District Court judge

Figure 99 Timeline of Construction for each Section and Delays



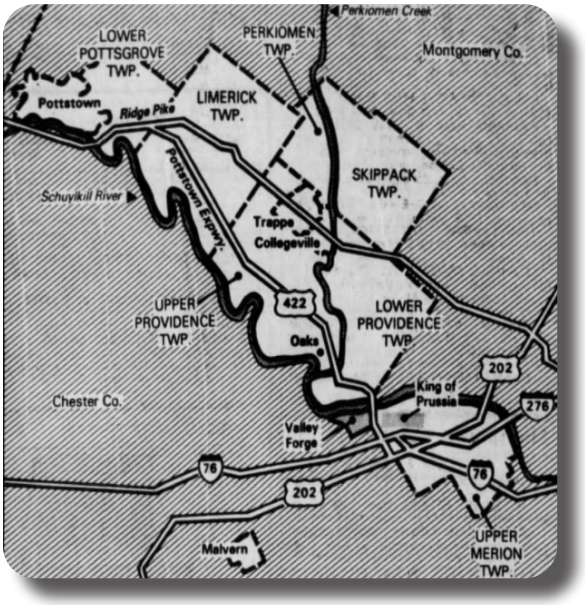
halted federal funding due to Pennsylvania not having an auto emission inspection program.[282] Construction resumed in 1983 and the expressway fully opened in April 1985 to much anticipation across the corridor's municipalities, which expected economic growth to follow.

What followed was the suburbanization of the corridor. New office parks and residential developments sprouted at each of the interchanges. Limited economic development or growth occurred in Pottstown as promised by politicians and business leaders. Ultimately, US 422 altered development patterns, and encouraged wealthy corporations and middle-class suburbanites to move their headquarters and homes to the more affordable land in northwestern Montgomery County that was now easily accessible to the employment centers of King of Prussia and Philadelphia. Little consideration was made pertaining to equitable accessibility for more vulnerable and low-income populations in Pottstown, and Pottstown continues to lag behind the rest of the region economically to this day. This roadway primarily benefited corporations and white, middle class residents, generating economic and population growth for those two stakeholders.

Public Transportation

Suburban sprawl-style development not only occurred because the building of US 422, but also the decline in transit service in the area. Despite the lack of modern access, rail transit in the US 422 corridor has a very long history, dating back to 1839 when the Reading Company began service between Philadelphia and Reading.[283] In 1933, the route was electrified between Philadelphia and Norristown, (now the Manayunk/Norristown line), but diesel service still continued from Reading to Norristown through Pottstown, Phoenixville, and other current US 422 municipalities. The Reading Company continued to run commuter rail services until 1966, at which point the

Figure 100 Map of US 422 Corridor. Source: Philadelphia Inquirer, June 7, 1985[440]



newly formed SEPTA took over operations of the commuter rail line. The route had seven daily roundtrips, and travel times between Philadelphia and Reading were about 80-90 minutes.[284] Conrail then bought the line from Reading in 1976, and in 1981 SEPTA stopped commuter rail services beyond Norristown due to declining ridership and in preparation for the opening of the Center City Connection tunnel, which required all-electric trains.[285]

Ever since the elimination of passenger rail service in the corridor, residents and politicians have supported and extensively studied a reintroduction of rail transit through major towns along US 422, as shown in Figure 102, despite some expensive cost estimates.

In the late 1990s and early 2000s, Berks Area Reading Transportation Authority (BARTA), SEPTA, and PennDOT conducted a series of feasibility studies for a project named the Schuylkill Valley Metro (SVM), which would have reinstated rail service from Wyomissing/Reading through Pottstown and Phoenixville to Center City Philadelphia.[286] The 1998 original feasibility study determined that passenger rail service

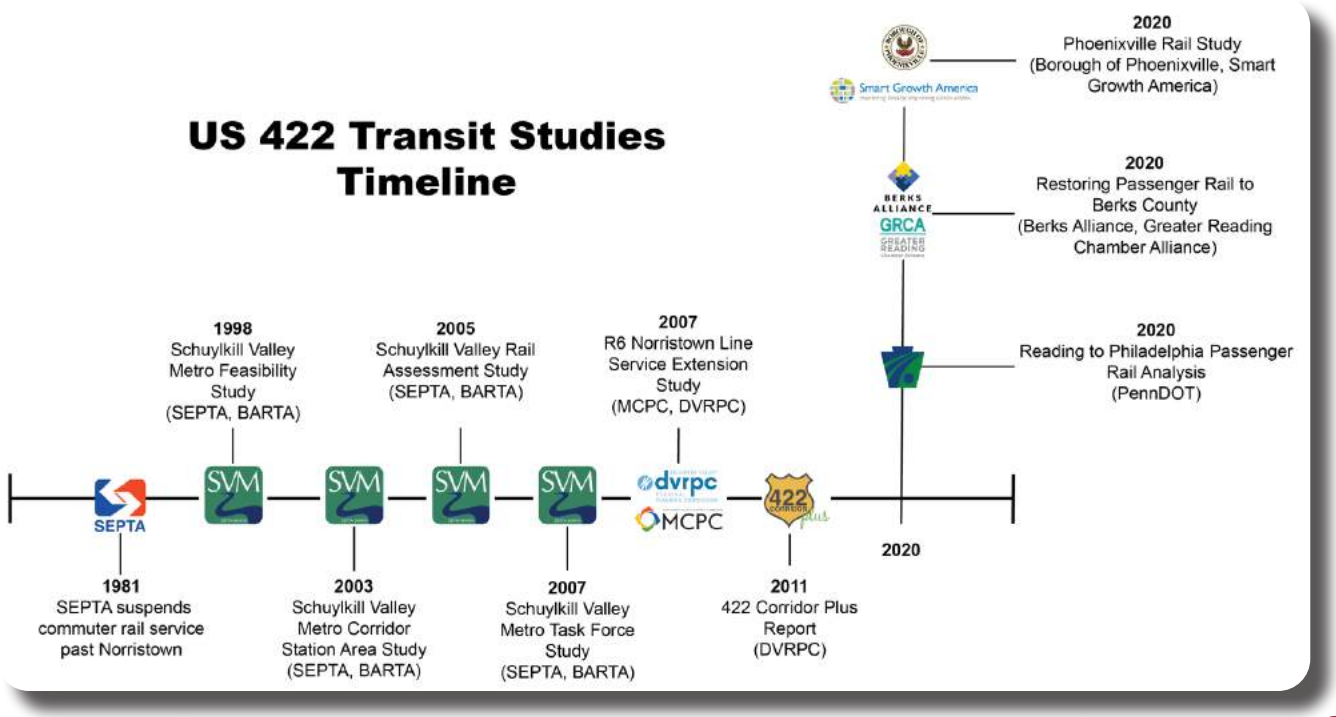
could be possible, since there was existing ROW, and the ridership/costs matched up with other new rail lines around the country.[287] However, the FTA decided that since there was no local funding match, and a high project cost of over $2.6 billion (2003 dollars), it would not provide funding to SVM. In 2007, a task force looked at various rail options in order to reduce the high costs of SVM, including using dual-power locomotives, with capital costs for the various alternatives ranging from $330-$815 million, and annual operating costs from $24-37 million (2005 dollars).[288] Notably, in the alternatives analysis, an express bus option was considered a baseline and only projected to cost $38 million in capital costs and $19.6 million in annual operating costs.[289] The rail alternatives ridership estimates ranged from 11,700-14,410 daily passengers, while the bus ridership estimate was 8,670 daily passengers. After the task force report, the SVM project was mothballed. In 2008, DVRPC and the Montgomery County Planning Commission (MCPC) conducted a study of a more modest extension of the Norristown Line to Reading/Wyomissing funded through

Figure 101 1929 Opening of Reading Railroad's new Pottstown station. Source: Temple Urban Archives

new tolls along US 422, but the project was never advanced.[290]

In 2010 as part of the "422 Corridor Plus" report studying tolling of US 422, DVRPC conducted analysis of a Manayunk-Norristown Line extension to Wyomissing/Reading, which also would have been funded by a potential new toll.[291] Capital costs for alternatives ranged from $350-$630 million, operating costs from $22-29 million, and daily ridership would have been around 5,200 by 2035.[292] However, the toll proved to be deeply unpopular to area residents,

Figure 102 Timeline of US 422 Area Transit Studies



and therefore the project was scrapped.[293] More recently, in 2020 Phoenixville worked with the nonprofit Smart Growth America on a study to reinstating rail service to the borough, and the report found that there would be $350 million in economic benefits over thirty years for a cost of $130 million.[294] While the borough is now submitting a grant application to the FTA for further planning and land purchase, there are still major issues to be resolved, such as coordinating with Norfolk-Southern about sharing their heavily-used rail line and determining if dual-power locomotives would even be safe to use in SEPTA's tunnels.[295] Also in 2020, the Berks Alliance and the Greater Reading Chamber Alliance commissioned a report about restoring passenger rail service to Berks County, which found economic benefits to the line if it connected with other major nodes.[296] Finally, PennDOT also recently completed a passenger rail analysis in December 2020 for reintroducing rail from Reading to Philadelphia, including stops in Royersford, Pottstown, and Phoenixville. The report had similar findings to the other studies, with alternatives having capital costs ranging from $616-818 million, and annual operating and maintenance costs $18-25 million (2020 dollars).[297] The daily ridership estimates ranged from 2,200-6,400, with significant differences depending on if a transfer was required at Norristown.[298] The study noted some similar challenges to the other reports as well, including how the rail corridor is not electrified, Norfolk-Southern's track ownership before Norristown, and technology compatibility with SEPTA. The report stated that once all project stakeholders agreed on a plan and funding was secured, that the design, engineering, and construction would take about four more years.[299]

Equity Analysis of US 422

The ensuing sections provide the equity analysis for US 422 across the six different equity themes. The analysis displays how US 422 spurred economic growth, but not in the most equitable ways, especially for minority communities. In process, the voices of power businesspeople and politicians were heard more than ordinary citizens during the construction of US 422. In protected classes, access, the environment, and economics, a severe lack of transit investment over the decades has led to a development pattern in which having a car is a necessity to reach adequate housing, jobs, goods, and services, which leaves carless households out of the economic benefits. The funding section illustrates how enhancing the highway or studying rail service have been the only projects funded, while the cheaper and more equitable option, bus service, has rarely been seriously considered. While proving needed economic and mobility benefits, the transportation and land use decisions in the US 422 corridor have led to significant congestion, much less open space, and inequitable economic outcomes for protected classes.

In process, public participation, and decision-making

While there were plans for decades to build an expressway from King of Prussia to Reading, the process of building and funding what became US 422 was not linear, and the ensuing land use decisions that came after had long-term equity implications. There were numerous stoppages in building US 422 due to lack of funding, design changes because of environmental regulations, and some modifications that incorporated community input. PennDOT changed the much of the roadway's alignment due to new Federal environmental regulations, and even made modifications to the expressway based on feedback from concerned residents of Phoenixville who wanted to preserve a neighborhood community park.[300]

Whenever funding, regulatory, or political issues arose throughout the process of building US 422, it was a group of business leaders lead by the Pottstown Chamber of Commerce that were the expressway's biggest advocates. They loudly filled MCPC Board meetings[301], gave presentations to high-ranking PennDOT officials, and started letter writing campaigns in order to advocate for US 422 to be built.[302] They viewed the expressway as a key to the area's economic future, and therefore worked tirelessly to have it built. The Chamber of Commerce was not a representative sample of the whole population though, and while their perspective was valuable, there needed to be better community engagement about what most residents really wanted.

Although the creation US 422 did in fact improve the economic conditions of the area, there were significant missed opportunities by PennDOT, DVRPC, and all of the local municipalities to create a process to manage land use and future growth that would be beneficial for all. In 1993, eight years after the expressway was built, MCPC planners advocated for denser development in order to have orderly growth that didn't induce more congestion.[303] They wanted to create "transit activity centers" throughout the corridor, which would have consisted of three centers of 4,000 residents and eight smaller centers, all of which would have walkable mixed-use development.[304] Described as modern-style Ardmore-like areas, these centers would curb suburban sprawl and allow for better walking and public transit due to the density of people and services. However, the area municipalities did not follow MCPC's recommendations, and since the municipalities have "home rule" over zoning laws, they could choose whatever pattern of development they wanted. Instead, the municipalities' zoning laws and development philosophies ended up being mostly driven by developers, even to the point they started to self-fund wastewater treatment plants.[305] In the decades since, any attempts to do forward-thinking planning work, such as tolling US 422 to pay for rail, buses, and roadway improvements, were shot down politically.

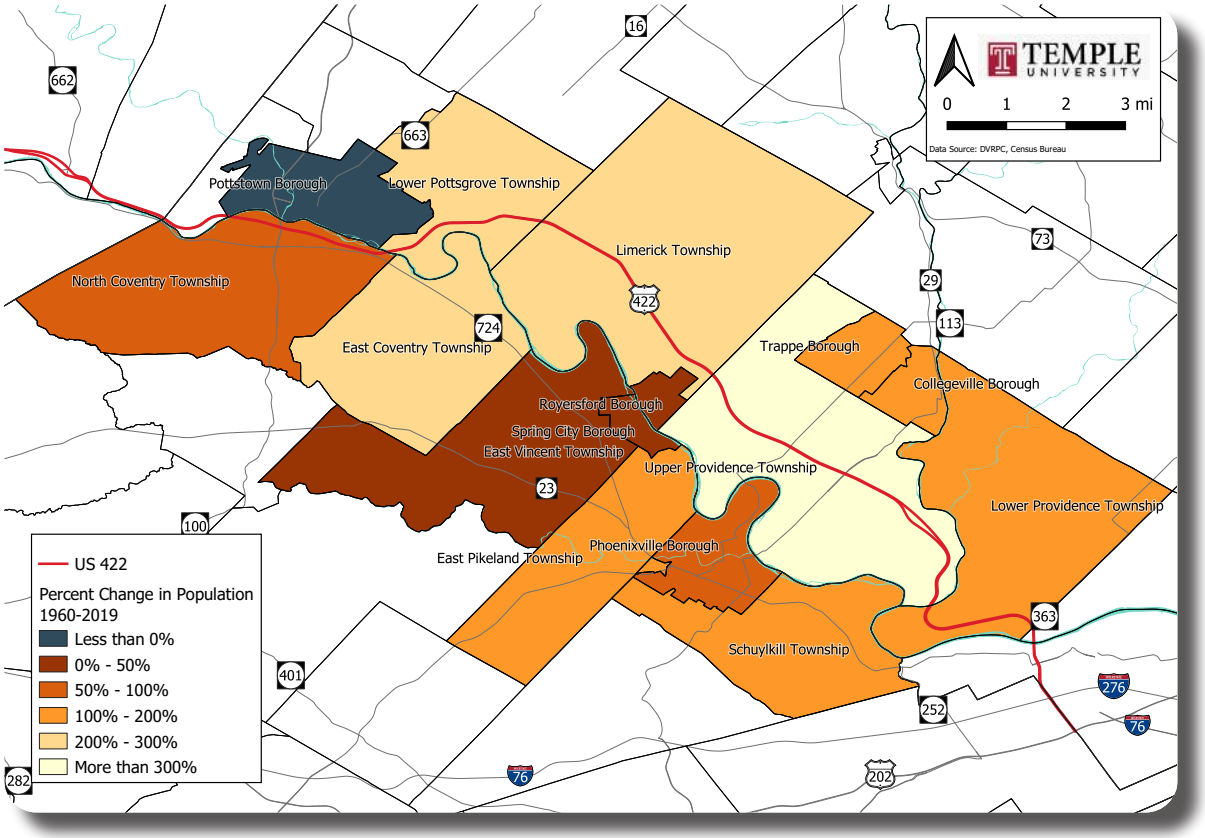
The process by which US 422 was developed, and land use choices made, was one of a few powerful citizens having the most influence over area decisions, sacrificing long-range planning and inclusive growth. While PennDOT did listen to some communities, and MCPC attempted to direct growth into more environmentally friendly and equitable places, these efforts were often overpowered by more influential voices. While US 422 may have introduced benefits to the area, the way in which it was planned was neither forward-thinking nor equitable.

Across demographic groups that are geographically distinct and geographically diverse

The construction of the Pottstown Expressway brought new people, jobs, and opportunities to area, but the way in which the prosperity has occurred has been inequitable. Before PennDOT constructed US 422, the townships along the future route were mostly rural farming communities such as Limerick or East Vincent, or small manufacturing boroughs such as Phoenixville or Pottstown. After the building of US 422 though, the population grew rapidly. From 1960-2019, the population in the US 422 corridor grew 95%, with some municipalities such as Limerick and Upper Providence growing by over 200% in just under 60 years, as shown in Figure 103.[306] The populations of all municipalities along US 422 grew from 1960 to 2019 with the notable exception of Pottstown, whose population declined about 13% in that same timeframe.

Throughout the decades for almost all municipalities along the current US 422 corridor, the population is almost exclusively comprised of white residents. Of the fifteen area townships in 1960, Pottstown had the largest minority population at 6%, with some townships having an entirely white population (U.S. Census, 1960). The completion of US 422 in 1984 brought significant new residential, office, and commercial development in the ensuing decades, and the US 422 area minority population did increase from 3% in 1960 to 20% in 2019, with Pottstown's minority population

Figure 103 US 422 Corridor Percent Population Change (1960-2019)



growing to 37% of the total population. Despite the increases, the whole US 422 corridor still has only about half the average minority population of the Philadelphia region, as shown in Figure 104 and Figure 105 (U.S. Census, 2019).

Figure 106 shows the percentage of the population that is a racial minority in the individual US 422 corridor municipalities. While there is variation between the municipalities, they all have higher percentages of white residents than the Philadelphia regional

Figure 104 US 422 Corridor by Race (2019).

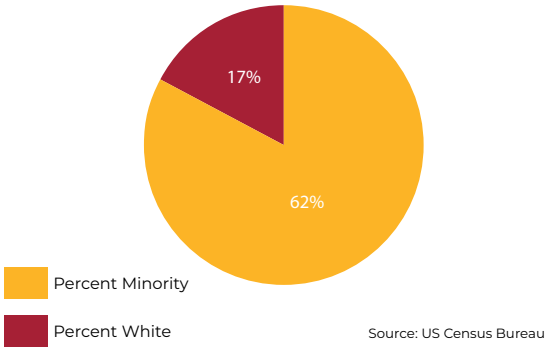


Figure 105 Philadelphia MSA by Race (2019).

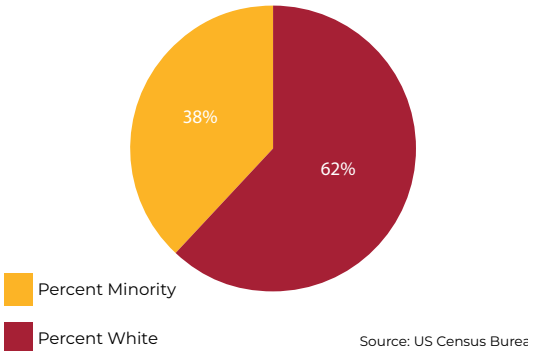


Figure 106 Percent of Population that is a Racial Minority US 422 Municipalities (2019)

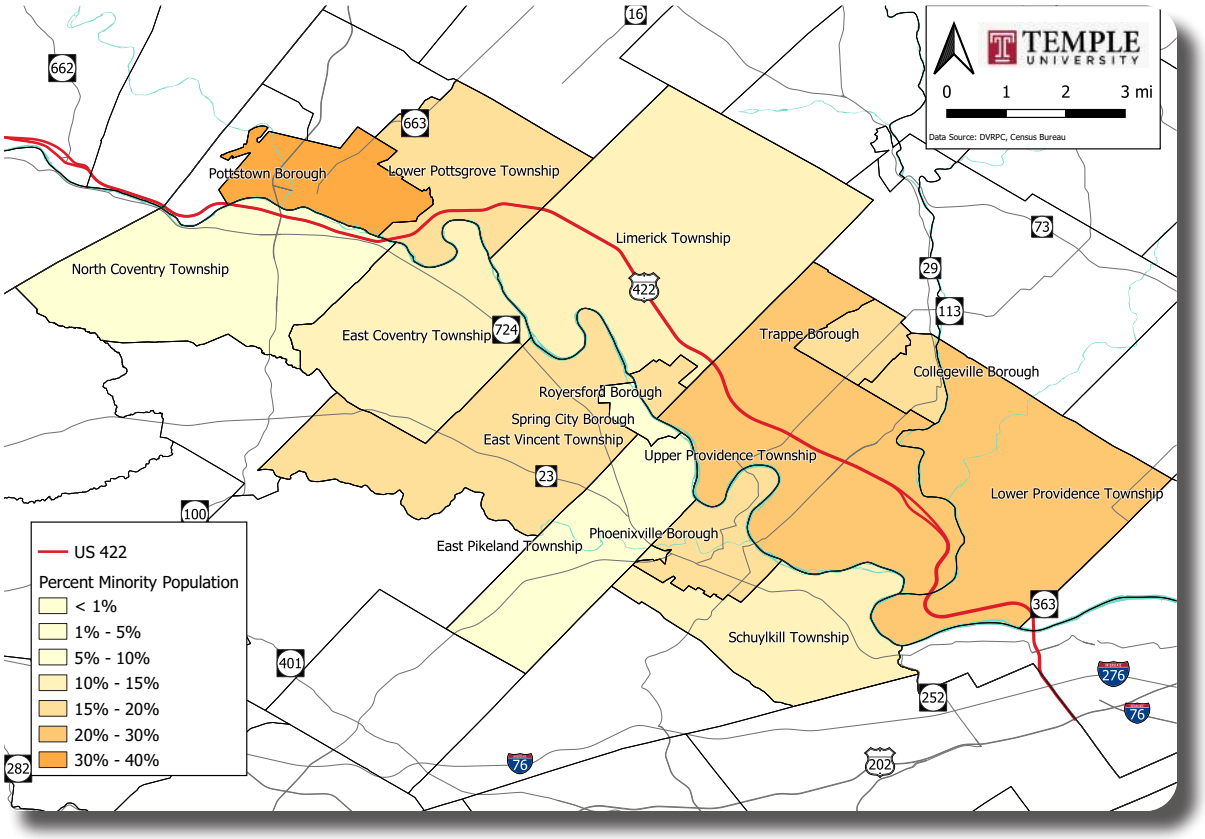
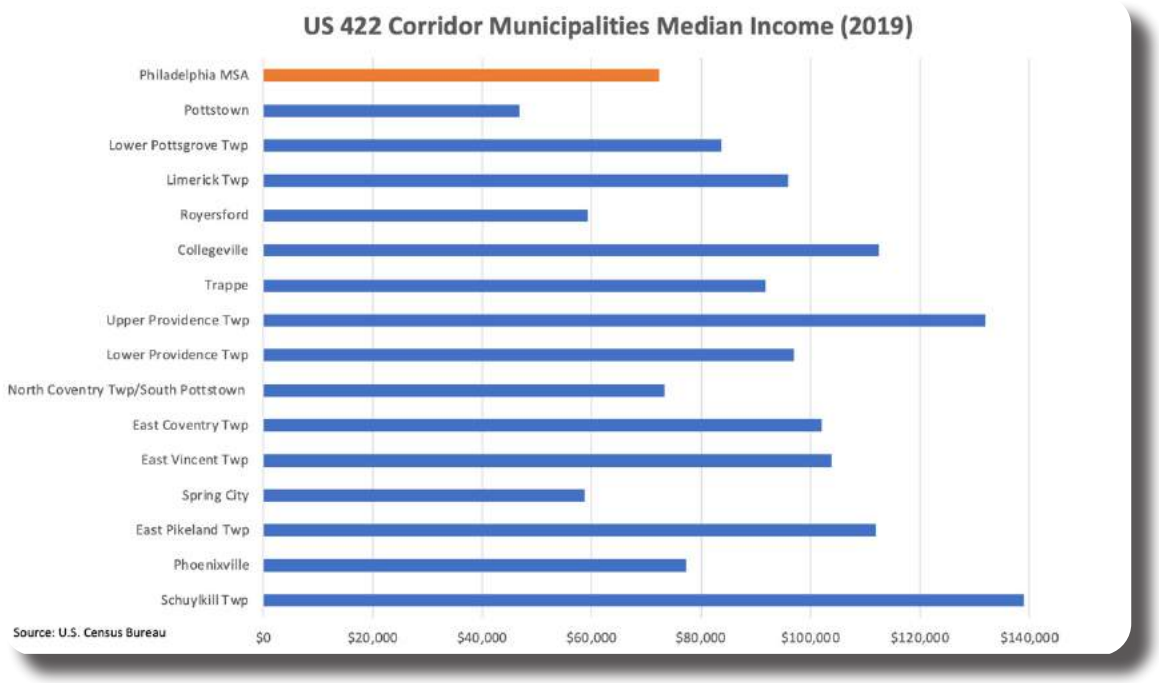


Figure 107 US 422 Municipalities by Median Income (2019). Source: US Census Bureau



average, including Pottstown. Spring City stands out with a very high proportional white population, with about 94% of its residents being white, while Pottstown has the largest percentage of the population that is a racial minority at 37%.

While the population of the US 422 corridor does not have large percentages of minority populations relative to the Philadelphia area, minority populations still face similar levels of poverty as compared to the region, even despite higher median incomes among all people in the US 422 corridor. While only 6% of white residents in the US 422 corridor live below the poverty line, 23% of Black residents are impoverished (U.S. Census, 2019). These US 422 corridor poverty levels are similar to those of the Philadelphia region as a whole, in which 8% of white residents and 23% of Black residents are below the poverty line (U.S. Census, 2019). While US 422 corridor poverty levels are similar to that of the region, median incomes in most US 422 municipalities are higher than the regional median income, as shown in Figure 107.

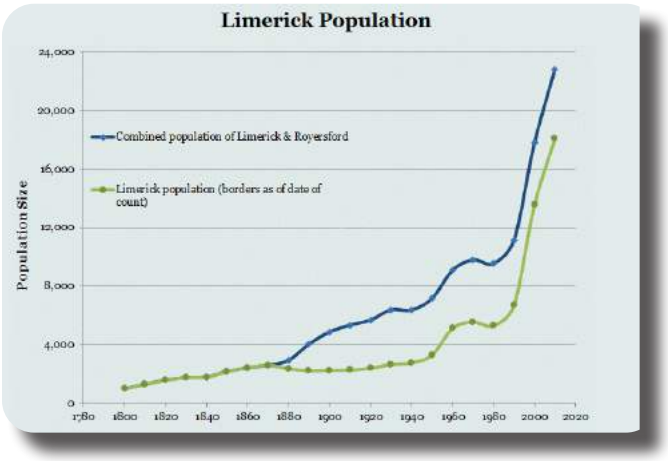
The census data results show that minority communities along the US 422 Corridor are not sharing in the economic prosperity brought on by US 422 in the same way that white residents are. One reason for this disparity was municipal-level planning decisions to build a mainly suburban development pattern where vehicles are required to go to most jobs and services, and that the fastest growing housing markets are also most likely out of reach for minority residents. For instance, Limerick has been one of the fastest growing townships in the area, growing from about 5,000 people in 1960 to almost 19,000 residents in 2019, an over 270% increase, as shown in Figure 109 (U.S. Census). The population is 87% white, the median house is worth about $315,000 and was built in 1995, and the median gross rent is $1,431 (U.S. Census, 2019).

The demographics and housing information of Limerick stands in stark contrast to Pottstown, where the population is 63% white, a median house is worth about $122,850 and was built in 1948, and the median gross rent is $981 (U.S. Census, 2019). Pottstown was built long before US 422, and has lower prices, a higher minority population and denser development, while Limerick was built after US 422 and a smaller minority population with more sprawling development.

In 1980, Pottstown and Phoenixville both had lower median household incomes than the rest of the corridor, but today Phoenixville has made gains benefiting from US 422 and its proximity to King of Prussia. Meanwhile Central Pottstown's median household income was below the median income of all but one sparsely populated census tract in the corridor in 1980 and continues to be the lowest earning census tract today, which is shown in Figures 108 and 110.[307]

Pottstown's population decreased by 2,978 residents, 11.7 percent of its residents, between 1980 and 2010. Contrast that to Phoenixville

Figure 109 Population growth of Limerick. Source: Limerick Township Historical Society[442]



which has increased in population by almost 11% in the same timeframe.[308] While most of Phoenixville's growth has occurred from 2000-2010 due to its renaissance in dinning, specialty retail, and personal/professional services businesses, one can see that the economic expansion and population growth experienced elsewhere in the corridor after the construction of US 422 has not translated to Pottstown.[309]

Figure 108 1980 Median Household Income (with 2019 buying power). Source: U.S. Census, Social Explorer[441]

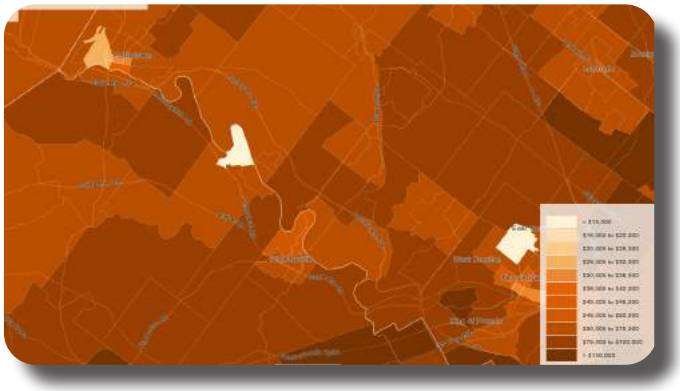


Figure 110 2019 Median Household Income. Source: U.S. Census, Social Explorer[443]

Figure 111 Comparison between Proximate Zone and Catchment Zone, US 422

Population Affected vs Population Benefiting in Area of US 422 (2015-2019)

	Disabled	Low Income	Older Adults	Racial Minority	Youth	Female	Ethnic Minority	Foreign Born	Low English Proficiency
Proximate Zone	10%	18%	14%	17%	23%	50%	5%	8%	3%
Catchment Zone	12%	24%	15%	32%	22%	52%	8%	11%	6%
Regional Average	13%	28%	16%	34%	22%	52%	9%	11%[444]	6%

Source: American Community Survey (ACS) 2015-2019 (5-Year Estimates)

Select Link Analysis

To gain a more detailed picture of which populations benefit from using US 422, DVRPC provided simulated traffic flow data to the analysis team. This data included only simulated vehicle counts along roadways in the region. Trip generation by zone may have been available but was not provided for this project. As a workaround to try and understand the discrepancy between impacted populations and the population using the project, the Natural Breaks algorithm was used to identify routes with a non-negligible number of trips (>100). Census tracts containing these routes were identified as the primary catchment zone for the project. Census tracts containing the project under analysis were identified as the proximate zone.

The proximate zone's population was compared that of the catchment zone and the region to identify differences in potential disadvantage, based on ACS 2019 5-year estimates. This analysis shows that by percentage of disadvantaged population, US 422 is in an area that is today less disadvantaged than much of the region, particularly in terms of race and income. The area that US 422 serves is on par with regional averages, if not slightly lower. This analysis does not include statistics for who beyond the region is served.

In mobility and accessibility

Before PennDOT built US 422, vehicle travel to boroughs such as Phoenixville and Pottstown required driving down local roadways through farmland, which limited mobility and accessibility in the area. One of the major reasons why businessowners and residents were clamoring for the construction of US 422 was that it promised to improve mobility and spur economic growth, with members of the Greater Pottstown Chamber of Commerce claiming that it would reduce travel times by over twenty minutes and provide trucks easy access to other highways.[310] The years following the completion of US 422 in 1985 have shown some of the accessibility and mobility promises to be true, with residential and commercial development booming in the US 422 corridor in the ensuing decades. However, the new development of US 422 has had some negative effects, especially from an equity standpoint. The type of growth in the area has largely been suburban sprawl-style development, which not only has brought traffic congestion to unforeseen levels that constantly infuriate motorists, but also essentially prohibits anyone who doesn't have access to an automobile from living or working in the area. The issue for people without access to cars, who are much more likely to be people of color, is

exacerbated by the complete lack of frequent or reliable transit investment in the area in the past decades, ensuring that the barriers to entry to the US 422 corridor's prosperity stay up for another generation.

Although the area around US 422 was more rural than before the creation of the expressway, not everyone drove a car before the roadway was constructed. In fact, US 422 heralded a substantive change in travel patterns, where

Figure 112 U.S. 422 Area Means of Transportation to Work (1960). Source: US Census Bureau.

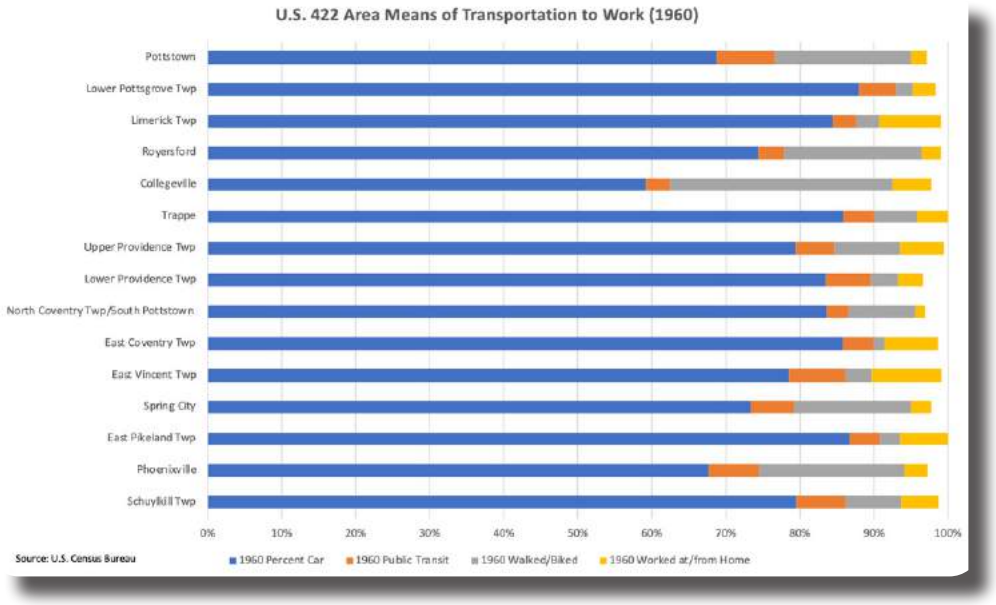


Figure 113 US 422 Area Means of Transportation to Work (2019). Source: US Census Bureau

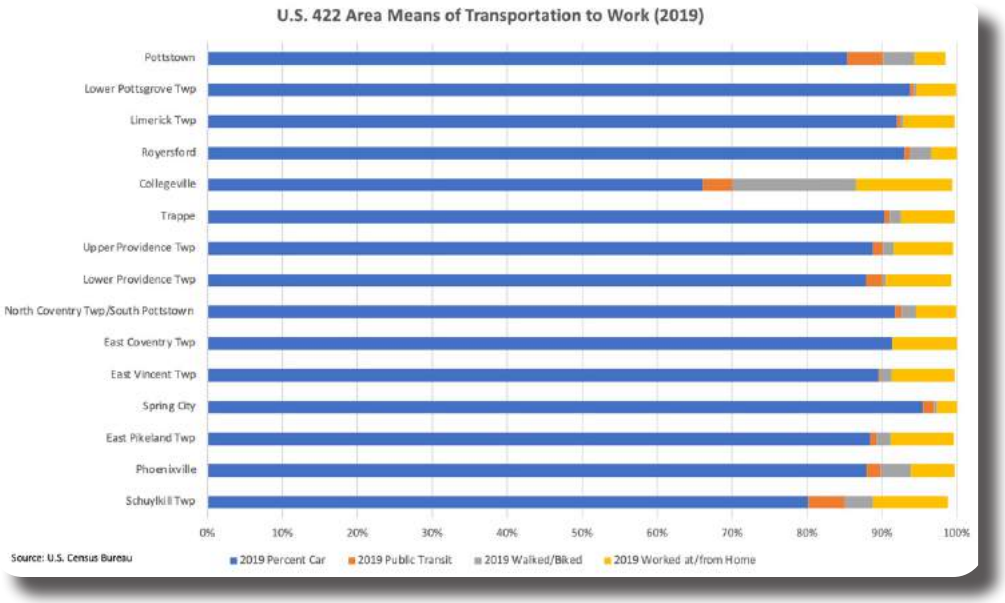


Figure 114 US 422 Commuting Rate for Public Transit (1960).

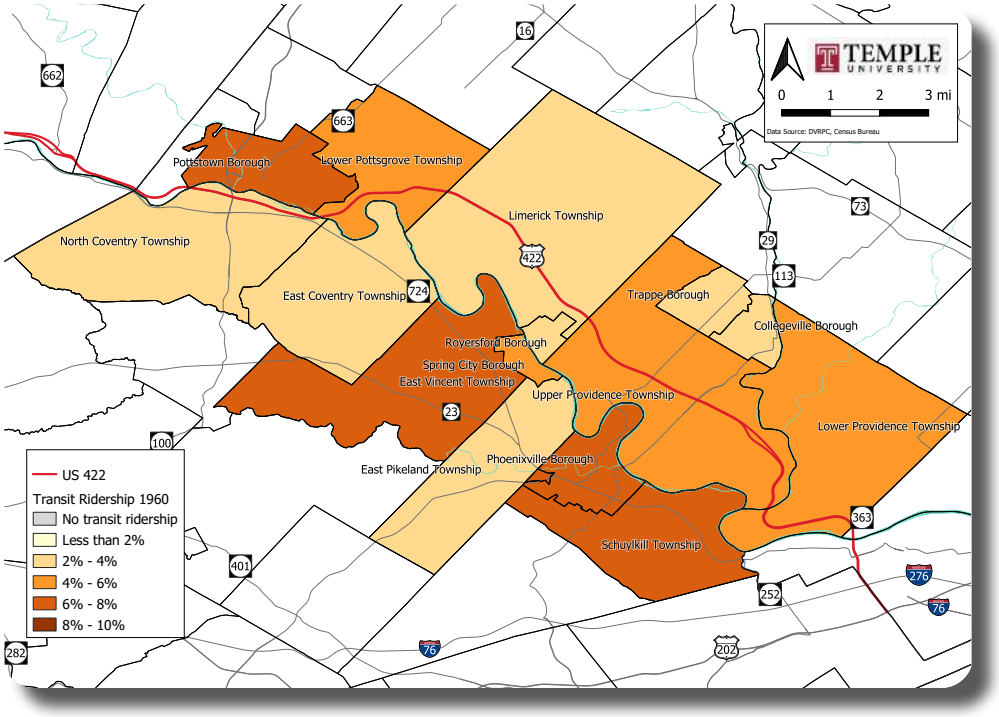
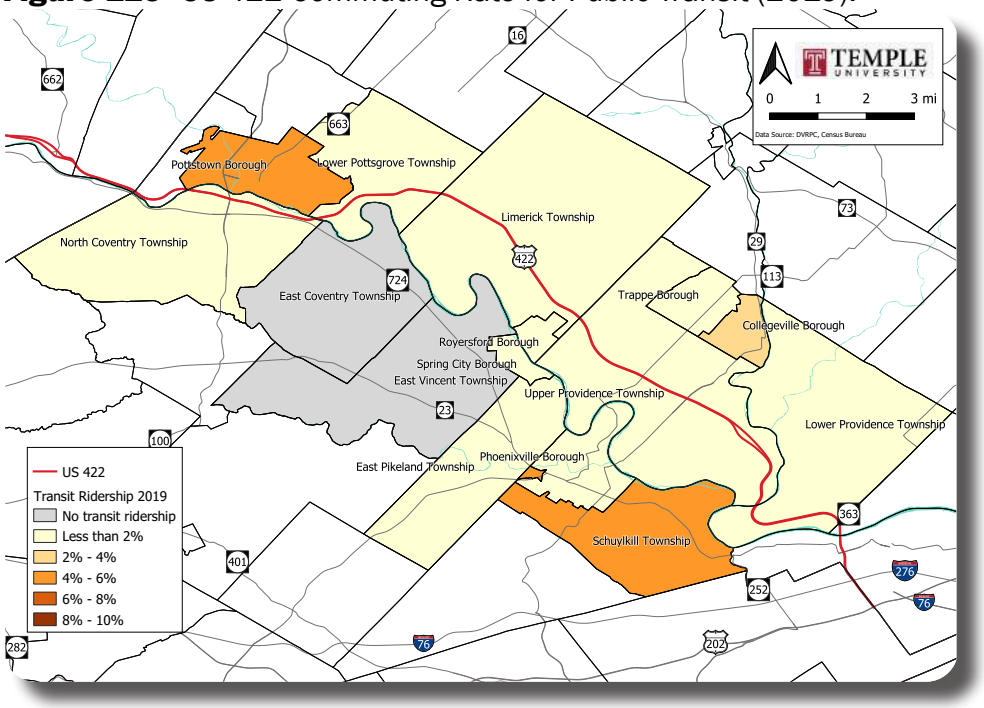


Figure 115 US 422 Commuting Rate for Public Transit (2019).



having a vehicle now is more important than ever. Figure 114 and Figure 115 illustrate this travel pattern change, showing means of transportation to work for 1960 and 2019, respectively. Collegeville stands out among the other municipalities in the percentage of commuters who take public transit, bicycle, or walk to work, but it is an outlier due to the presence of Ursinus College, and the many faculty, staff, and students who live nearby and do not need a car to go to campus.

While the figures show data that are not a perfect measure of how all residents travel around the area, since the data are only for work trips, the figures do display major increases in commuting by automobile and working from home, coupled with steep declines in commuters using public transit, walking and biking. To show the drastic falloff in other forms of transportation even more clearly, Figure 115 and 116 display public transit commuters in 1960 and 2019 in the US 422 area, respectively.

Figure 114 and 115 show a precipitous drop in commuters who use public transit to commute to work. In East Vincent Township, the public transit commuter percentage went from almost 8% in 1960 to 0% in 2019. Every municipality along US 422, apart from public transit commuters in Collegeville, saw major or complete declines in commuters taking public transit to travel to their workplace. Even Pottstown, which has its own separate public transit authority called Pottstown Area Rapid Transit (PART), experienced a 3% decline in the number of commuters who take public transportation to work.

This decline in non-automotive transportation modes is an indication of the suburban development pattern that requires a car to access everyday services, a development pattern that is common along US 422. Over 53% of all housing in the area is single-family detached, compared to 44% in the overall Philadelphia region.[311] In some communities along US 422 such as Schuylkill, East Vincent, and North Coventry Townships, the percentage of single-family detached houses is over 80%. In addition, most new residential and commercial development is auto-oriented.[312] Although there are many reasons for why development has occurred the way it did, it is clear that the area surrounding US 422 is now much more car-dependent than it was before US 422's construction.

Taken together, a growing population and an auto-oriented development pattern is a recipe for major congestion, which is why the levels of traffic along US 422 have greatly surpassed traffic predictions made by the builders of the expressway, which decreases mobility and leaves area residents sitting in traffic. Before PennDOT built US 422, some communities were worried that the expressway would bring major congestion and ruin their quality of life, with one Lower Pottsgrove commissioner saying, "one of the reasons I love living out here is the open space and the freedom of movement. I would hate to see traffic jams like in the eastern part of Montgomery County."[313] Unfortunately, the commissioner's fears came to pass.

Figure 116 Logo of Facebook group, "422 SUCKS."

At the opening of the final section of US 422 in 1985, the four-lane expressway was expected to carry about 30,000 vehicles per day.[314] In

1989 it was carrying about 35,000 vehicles per day, and almost 65,000 per day near its terminus at King of Prussia, leading the MCPC to request $80,0000 to study upgrades not even four years after construction was completed.[315] Traffic increased 25% in 1987 alone, which was 10% more than expected and made the township manager of Upper Providence say, "I look out my bedroom window I see a steady stream of traffic and it looks like California."[316] In 1993, a senior analyst at DVRPC commented that, "The road system is not set up to handle the kind of traffic we anticipate. Even building new roads won't help."[317] By 2010, DVRPC found that congestion added 25 minutes of travel time between Pottstown and King of Prussia[318], meaning that the twenty-minute travel time improvement promised by the Pottstown Chamber of Commerce back in 1977 had been completely negated by traffic jams. These congestion levels are not the peak either, with DVRPC projecting travel times to further increase 44% over the next 25 years.[319] Now, average daily traffic on US 422 is over 110,000 vehicles per day near King of Prussia, almost 79,000 per day near Royersford, and over 53,000 per day near Pottstown, as shown in Figure 117.[320] Traffic congestion has become so severe that frustrated residents even started a Facebook group called "422 SUCKS" in 2013.[321] The page has over 56,000 followers, and has a description that says, "Eastbound or Westbound, AM or PM 422 SUCKS! Get traffic updates, construction news, text alerts & so much more about RT 422! See you at 'The Lounge'".[322]

Although the poor traffic congestion along US 422 reduces the ease of mobility in the area and upsets drivers, congestion and the auto-oriented development pattern are indicators of serious systematic equity issues for transportation access. Namely, while PennDOT spent money building US 422, maintained it for decades, and is currently improving the roadway through

Figure 117 US 422 ADT by Year

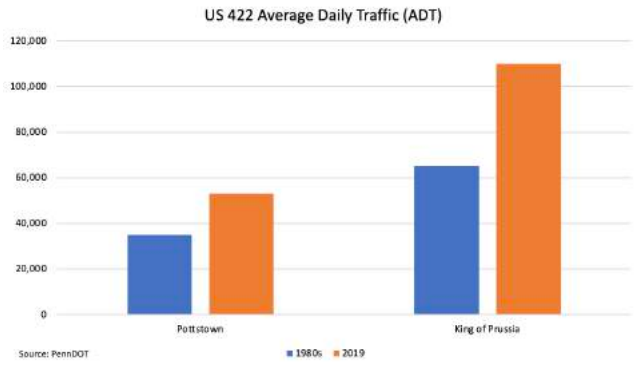


Figure 118 Car Ownership for People of Color in Philadelphia MSA (2017).

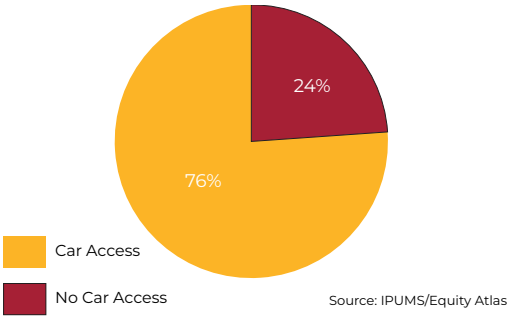
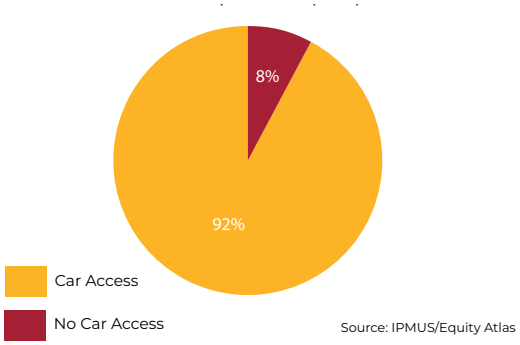


Figure 119 Car Ownership for White People in Philadelphia MSA (2017).

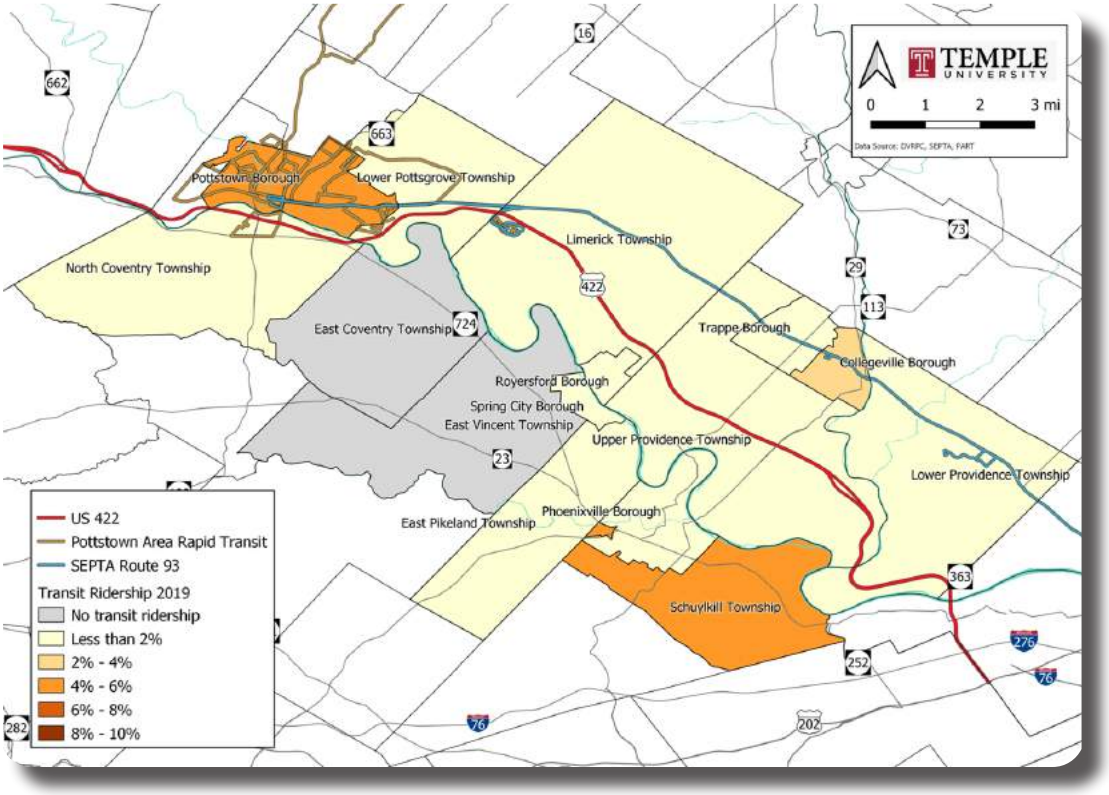


an eight-year, $450 million program[323], there has been an utter lack of transit investment in the corridor, further inducing sprawling development. Transit investment is a major equity issue, since minority populations are less likely to have access to a vehicle than white populations. Figure 118 and Figure 119 display the stark racial disparity in car access, nationally and in the Philadelphia region, respectively. The figures show that people of color are three times more likely nationally and almost four times more likely regionally to not have access to a car as white people.

In addition to racial inequities caused by disparate car access, not having access to a vehicle severely limits access to jobs and services due to the minimal amount of public transit and surrounding land use patterns in the US 422 corridor. Currently throughout the US 422 area there are only two public transit options: PART, which services the area immediately surrounding Pottstown and connects to local destinations such as the Philadelphia Premium outlets[324], and the SEPTA Route 93 line that goes from Norristown Transportation Center to Pottstown via Main Street/Ridge Pike/High Street.[325] The bus routes, along with the transit commute to work percentages of the US 422 corridor townships, are shown in Figure 120. The figure clearly shows that PART service has had an impact in transit commuting percentages in Pottstown, even with Pottstown not being close to a rail stop, unlike commuters in Schuylkill Township who are in fairly close driving distance to regional rail stop .

Despite PART helping Pottstown to have more transit commuters than the other townships,

Figure 120 US 422 Public Transit Routes with Transit Commuting Percentages by Township.



the best headways for PART are only every 30 minutes, with headways for most times of day every hour, and service ending at 10:30 PM.[326] Although there are five lines for PART, total ridership was only roughly 800 total passengers per day in 2016.[327] For the SEPTA Route 93, headways are also about every 30 minutes at best, service finishes around midnight, and pre-COVID ridership was only about 1,300 passengers every weekday.[328] The levels of bus service and ridership indicate that bus transit has not been a viewed as particularly important in the US 422 corridor.

Buses have not been a major priority along US 422, but as the previous discussion on the various studies for area passenger rail showed, the reinstallation of rail transit through major towns along US 422 has long been of interest to residents. While more public transit is positive, rail transit may not substantively reduce congestion or increase access to goods and services for protected class, especially considering the funding that would be required. To illustrate why, consider the commuting origin-destination data from the recent PennDOT rail study, shown in Figure 121. The patterns are interesting in that they indicate that there is significant travel in between suburbs, and not all morning traffic is necessarily going to Center City Philadelphia. These data show that, while there is a need for transit to Philadelphia itself, there is also a transit need to other destinations, meaning that new rail service would still not fill most accessibility gaps, especially because

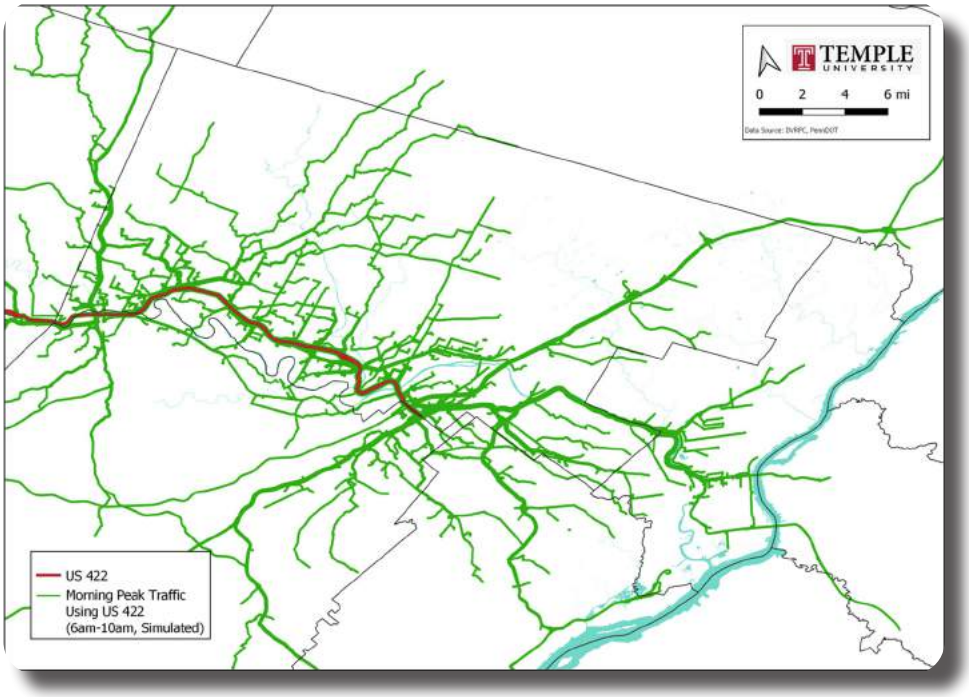
Figure 121 US 422 Area Commuting Origins and Destinations. Sources: US Census Bureau, LEHD LODES, 2017

US-422 Area Commuting Origins and Destinations

	Destination Area								
Origin Area	Philadelphia	Conshohocken	Norristown TC	Valley Forge	Phoenixville	Royersford	Pottstown	Birdsboro	Reading
Philadelphia	173,401	12,917	3,555	6,517	1,278	459	444	138	929
Conshohocken	18,623	14,088	3,888	5,723	1,139	353	285	47	315
Norristown TC	6,798	7,079	11,033	6,528	2,020	830	351	70	417
Valley Forge	3,966	3,980	2,159	6,959	1,423	448	250	66	459
Phoenixville	2,432	2,962	2,639	5,700	4,790	1,720	1,003	156	565
Royersford	1,553	2,130	2,564	3,837	3,077	3,530	1,708	188	578
Pottstown	2,463	2,265	2,623	4,232	3,544	3,741	10,909	1,245	2,421
Birdsboro	322	322	407	732	594	679	2,188	2,338	7,428
Reading	1,598	827	783	1,229	579	597	2,413	3,581	59,690

Source: US Census Bureau LEHD Lodes, 2017

Figure 122 US 422 AM Travel Patterns. Sources: DVRPC Select Link Data



the train would provide the greatest benefit to wealthier working professionals, on average.

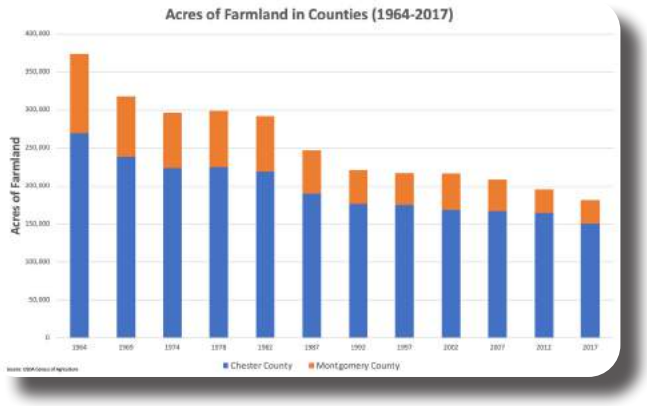
The commuting origins and destination data are not the only evidence that there are a significant number of trips between suburban communities, which are trips that rail transit alone wouldn't service. Figure 122 shows vehicle travel pattern data for the 6 AM-10 AM morning peak, with the size of the green line indicating the number of travelers on a given road who will go through or have gone through one of US 422 on/off ramps as part of their trip. The figure shows that, while there are a large number or people going towards and from Philadelphia, they are not all of the trips. Motorists are going to many other destinations within the US 422 Corridor and Montgomery county, to neighboring counties such as Chester, Delaware, and Bucks, and to locations beyond. The results also display how the sprawling development pattern of the US 422 corridor has left few centers for activity in the suburbs where rail transit would be effective at linking.

To improve equitable transportation that increases access to everyday goods and services in the US 422 corridor, area leaders should focus less on cars, and even rail transit, and instead consider better bus service or new bus rapid transit (BRT), along with the development of more dense centers. Less than 10 years after the completion of US 422 in 1993, planners at DVRPC warned that without denser, mixed-used clusters of people and businesses, there will continue to be major traffic problems.[329] Bus rapid transit has also proven to be a much cheaper, and more equitable, alternative to rail transit around the world, and if it could be implemented with the introduction of dense mixed-use clusters, the US 422 corridor could finally steer away from its past trends to become a more equitable place.

In environmental impacts

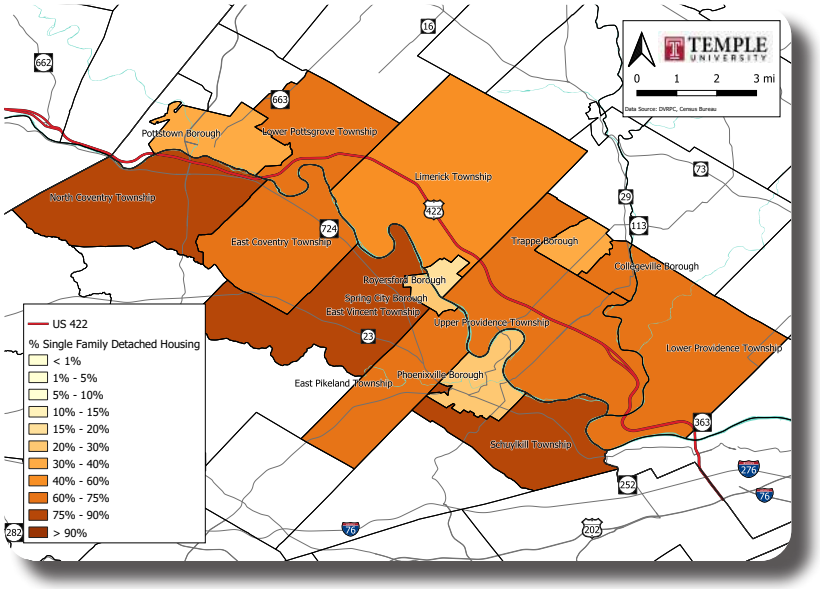
The suburbanization induced by US 422 not only failed to improve access for those without cars, but also caused environmental harm through the loss of hundreds of acres of farmland and greenspace, despite PennDOT following some of the proper environmental procedures. Before US 422 and the highway building spree of the 1960s, both Chester and Montgomery counties had large numbers of farms, which provided a variety of produce and goods for the local economy. After the expressways were constructed, builders began to locate commercial and residential development along the expressways, which significantly reduced the amount of farmland in both counties, as Figure 124 illustrates. Since 1964, which was before most of the expressways and sprawl in the counties were created, the number of all farms in Chester and Montgomery counties fell by 30% and 58%, respectively.[330] The acres of farmland have shrunk even more rapidly, with acreage falling by 44% and 70% in Chester and Montgomery Counties, respectively.[331]

Figure 124 Acres of Farmland in Chester & Montgomery Counties (1964-2017).



Research in Chester County has shown that protected open space generates economic activity, improves the health of neighboring residents, and even costs governments less tax money to maintain.[332] However, PennDOT and developers mostly bought farmland and other open spaces to build US 422 and subsequent development projects, significantly reducing the

Figure 123 US 422 Single Family Detached Housing Percentages. Source: Temple Urban Archives



amount green space in the US 422 corridor. Since the building of the Pottstown Expressway, there has been an increase in suburban sprawl residential housing and commercial development, and between 1995 and 2005 alone there was a 29% decrease in farmland, and 14% decrease in woodlands, while a corresponding 18% increase in residential and 11% increase in commercial development.[333] This residential development has been

Figure 125 US 422 under construction near Royersford. Source: Temple Urban Archives

suburban, with 53% of all housing units along the corridor being single-family detached units, compared to 44% in the Delaware Valley as a whole, with the prevalence of single-family detached units shown clearly in Figure 123.[334]

There have been some farmland preservation efforts in the area, with about 1,600 acres of preserved farmland in the Chester County townships[335] and 875 acres of preserved farmland in the Montgomery County townships along US 422 corridor.[336] Although these efforts are positive, much more farmland has been developed than preserved, and most of the preserved farmland in both Chester and Montgomery counties is not close to US 422.

Not all sections of US 422 had the same environmental effects, which was mainly due to the length of time that the expressway was built. When construction on US 422 began in 1964, there were few Federal environmental regulations that state DOTs were required to follow. The passage of the NEPA in 1969 meant that any project that used federal money needed to follow much stricter environmental guidelines, including prohibiting highways to go through parkland, recreational areas, or wildlife sanctuaries unless there was no other feasible alternative.[337] The western sections of US 422 were less affected by the new regulations, since they were wholly funded by PennDOT, but the new regulations caused issues for two eastern expressway sections in particular, requiring redesigns or elimination completely.[338]

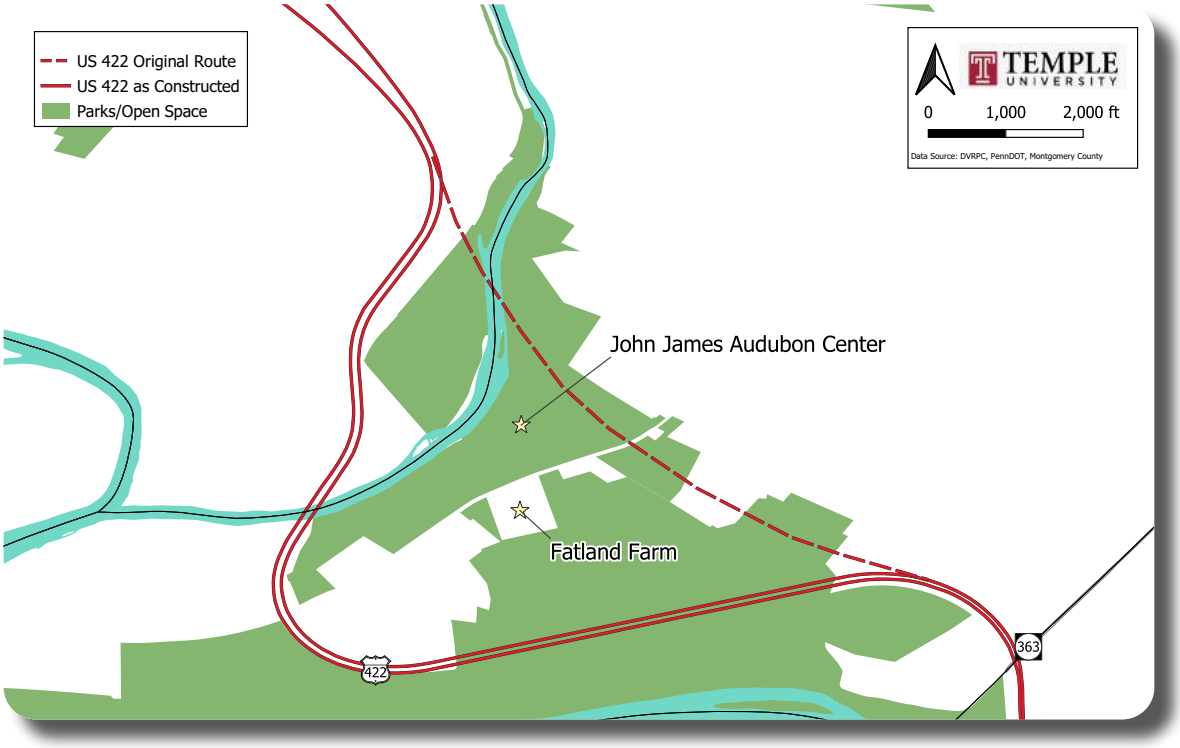
The first affected section was the Phoenixville Spur, which was an offshoot of the highway intended to create economic activity in the then-struggling borough. PennDOT planned a spur going through the northern edge of Phoenixville and multiple parks, including Reservoir Park and Oaks Reach Park, before terminating at the intersection of Routes 23 & 724 in East Pikeland Township.[339] PennDOT had already modified

Figure 126 US 422 under construction at Valley Forge and Betzwood Bridge. Source: Temple Urban Archives

this route once before because it originally went through a community baseball field, along with placing an exit at Franklin St.[340] However, both elected officials and citizens opposed the route, since they feared it would direct heavy vehicle traffic into downtown and kill the business section, citing a similar situation that harmed businesses in West Conshohocken after the construction of I-76.[341] While PennDOT rerouted the section directly next to Phoenixville, they were more hesitant in move the segment that cut through Oak Reaches park, arguing that the park "stretches for 15 miles up and down the river. How can you find your way around that?"[342] Eventually, due to the environmental concerns, the Phoenixville spur was never built.

The other section of US 422 that required a major redesign due to environmental concerns, and has equity implications, is the area now colloquially known as "St. Gabe's Curve" or the "Camiel Loop" between Oaks and King of Prussia. PennDOT's original design went through the Audubon Wildlife Sanctuary, but with federal funds paying for 70% of the project and new environmental regulations prohibiting building through parkland, PennDOT needed to modify the route into an extended loop around the Sanctuary, as shown in Figure 127.[343] Further complicating the situation was that the influential former State Senator and former Philadelphia Democratic Chairman, Peter J. Camiel, had his historic farm, named "Fatland", also in the path of the expressway.[344] The rerouting led to increased design and construction delays, and the price of the expressway in this section rose from $5 million to $8-$10 million. The delays lead to the Executive Director of the Pottstown Chamber of Commerce to accuse people playing "political football", and that it was "about time we take action with these politicians and let them know we are not going to tolerate this kind of treatment."[345]

Figure 127 The "Camiel Loop" of US 422



Preserving environmental resources is important generally and for equity, but greater equity disparities in decision-making are obvious when comparing this situation to that of other area highways, such as I-676, that bulldozed through poor and minority populations in Philadelphia and Camden, while a powerful politician was able to help reroute the entirely of US 422 around his house.

There was some local citizen pushback to the Pottstown expressway, but they were less successful than Peter Camiel. One Oaks resident, Admiral Ross P. Whitemarsh, was staunchly against the expressway and an interchange in Oaks in particular, on the basis that it would destroy the way of life for citizens who lived there. At one public meeting said, "it is the opinion of the countryside, and we have tremendous support for our position, that the interchange would destroy us."[346] At the time, Oaks only had about 1,000 residents, and Adm. Whitemarsh and his fellow citizens were worried that roadway and commercial development would significantly change Oaks without input from residents. He stated that, "you have to widen existing roads to accommodate industry that will come, which will change the character of our town" and "the whole plan to industrialize our area and the expressway interchange on the part of that plan, was made in industrial circles and without regard to people."[347] Some of the changes that Adm. Whitemarsh was concerned about did occur, as the population of the township that Oaks is located in, Upper Providence, grew 327% from 1960-2019, and the population density grew 755%.[348] Despite PennDOT following proper environmental procedures for the later section of US 422, there were still harmful environmental effects in the amount of land developed and in the routing of the expressway.

In economic impacts

Since US 422 was fully opened for operation in 1985, development and land use along the corridor have both changed dramatically. Prior to its construction, this section of Montgomery County and Chester County was largely agrarian in both its landscape and economy. The sole exceptions to the largely rural and unused land in the area were Pottstown and Phoenixville. Both towns of dense development grew in the industrial context of steel and iron manufacturing and were strategically located along the Schuylkill River and later the Reading Railroad. After World War II, the need for metal produced in the United States was greatly reduced and the major local employers of Bethlehem Steel in Pottstown and Phoenix Steel in Phoenixville closed in the mid-1970s, leaving thousands unemployed in each community. Both towns fell into decline, with additional manufacturers closing shortly thereafter and Firestone Tire & Rubber shuttering in 1980, putting 2,400 more people out of work in the Pottstown area.[349] It is in this context that politicians, local officials, and the business community of northwestern Montgomery County forecasted and advertised the Pottstown Expressway as a catalyst for growth that would create development all along the corridor.

Pottstown leaders were as confident as their counterparts elsewhere in the region about the positive effect that US 422 would have to revitalize the town and attract new businesses. In 1977, the Chairman of the Pottstown Chamber of Commerce enthusiastically stated that the expressway "...will be a lifeline to Pottstown". Just three months after the expressway opened, a Philadelphia Electric Company representative, Earl Watt, referred to Pottstown as in an "enviable position", and

Douglas Hickey Jr., the Executive Director of the Suburban Development Council affirmed that he believed Pottstown was well-positioned for development to begin there.[350] To attract business in advance of the Pottstown Expressway being operational, Pottstown opened a business park next to the local airport in August 1984 and had sold several lots prior to an apt "Pottstown gains from a highway" article published in the Philadelphia Inquirer on June 17, 1985.[351] Much of the optimism came from seeing the success that both King of Prussia and Route 202 to the south had in attracting companies.

Many business stakeholders viewed US 422 as the solution to growing and developing the more rural areas along the route, in addition to the old manufacturing towns, by providing connectivity and access to the adjacent communities. And for much of the corridor, their projections that there would be demand for the land was correct. Land values were relatively low in comparison with neighboring King of Prussia, and significantly lower than the more inner ring suburbs of Philadelphia. For example, land in the Route 202 corridor in 1985 was selling for $200,000 per acre, while a comparable property in Pottstown was about one-quarter of that price. Since 1970, median home values

Figure 128 1970 Median Home Values by Census Tract with 2019 buying power (Pre-US 422). Source: U.S. Census Bureau, Social Explorer[445]

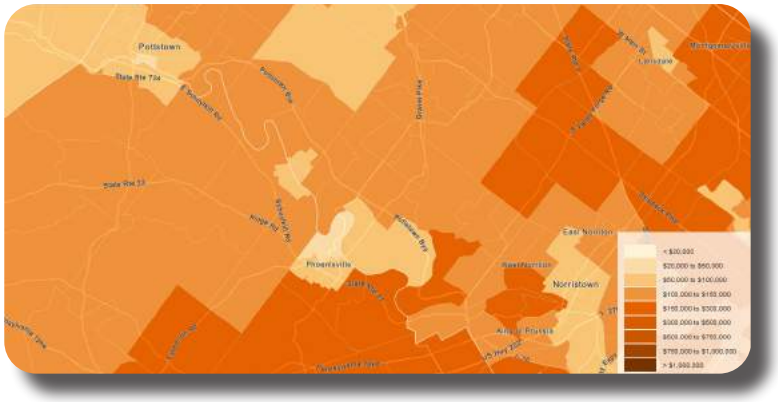
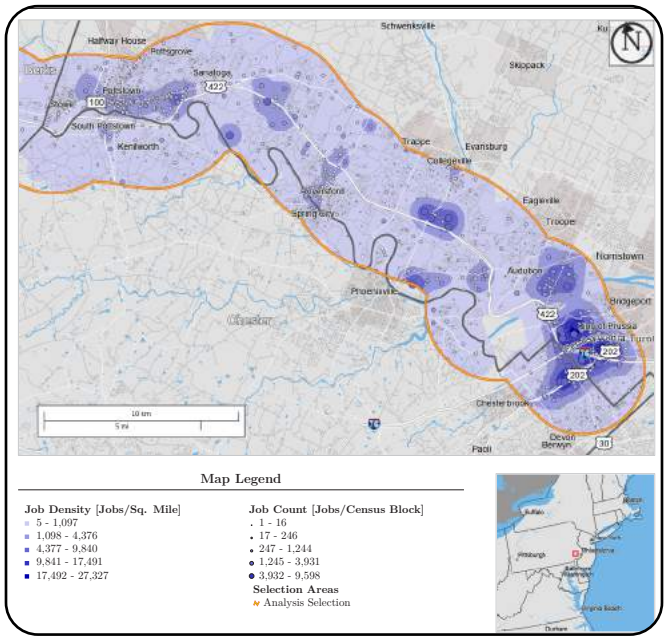


Figure 129 2019 Median Home Values by Census Tract (Post-US 422). Source: U.S. Census Bureau, Social Explorer[446]

have risen by between two and three times along most of the corridor's census tracts, while Pottstown's home values grew less. As of 2012, Pottstown's median home value was $112,200, less than half that of Montgomery County.[352] Pottstown ended up not being the beneficiary of much of the development that migrated along the US 422 corridor.

Once the Pottstown Expressway was built, both residential and commercial development have replaced a significant amount of farmland and wooded areas in the corridor. Each municipality in Montgomery County has the ability to shape their own zoning code to support changes to the land use and character of their respective areas. In 1988, Upper Providence, for instance, saw an opportunity to accelerate economic growth and attract corporate headquarters at the interchange with PA Route 29 located within its boundaries. The township changed their zoning code to accommodate commercial uses on land that was previously zoned for agricultural or residential uses.[353] Within the same year, two sizeable pharmaceutical companies, Sterling Drug Company from New York and Rhone-Poulenc Rorer Group from nearby Fort Washington, made formal plans to build research facilities at the PA Route 29 interchange with US 422. Per Sterling's spokesperson Tom Kelley, the Philadelphia area was attractive due to its pharmaceutical agglomeration economy, access to a skilled workforce from the local institutions of higher education, and the quality of life the region offered.[354] Each more than one-hundred-acre commercial property had the effect of attracting a skilled white-collar workforce to work there and spurring additional residential and commercial development nearby. Now the PA Route 29 interchange has over 13,000 jobs in the pharmaceutical and health sectors, between the large corporations of Pfizer, GlaxoSmithKline,

Figure 130 Number of Jobs in Montgomery County within 2 miles of US-422 Corridor in 2021, Source: U.S. Census, On the Map[447]



and Quest Diagnostics[355]. There are currently corporate centers and shopping centers at the majority of US 422 interchanges between King of Prussia and Pottstown. This has resulted in a shift in the corridor from a more agricultural economy to a service economy since the opening of the Pottstown Expressway. However, in Figure 130 one can see that the higher total number of clustered jobs are located at the suburban interchanges of PA Route 29 in Upper Providence and the Limerick exit. Large corporate offices and malls did not move to Pottstown to replace the manufacturing jobs lost in the 1970s and 1980s, but instead provided jobs in the suburbs accessible by automobile and closer to middle and upper-class neighborhoods.

With the change in employer demand for employees possessing skills in the service economy, median family income in the US 422

Figure 131 US 422 and PA Route 29, Image Source: Google Earth

Corridor has grown immensely. The creation of US 422 brought new businesses and residents to the region which contributed to the increases in incomes in the area. However, what happened to existing residents that this highway was intended to bring economic prosperity to? Particularly in Pottstown, which has the highest percentage of Black residents of any municipality in the corridor, there has not been the level of growth projected, and the disparity in incomes has become greater as other parts of the corridor have seen wealth gains. Furthermore, unlike Pottstown's surrounding areas, housing construction occurred there at a slower rate than the rest of Montgomery County, Berks County and Chester County.[356]

Pottstown was left out of the economic revitalization of the corridor through the construction of US 422. The corridor attracted significant new development, businesses and residents, but contributed to reinforcing and expanding the existing inequities of lower income blue-collar workers, particularly those working on farms, without a car, and protected classes residing in Pottstown. US 422 has not benefited Pottstown, and this may have played a role in the almost 17 percent decrease in Pottstown's white population between 1980-2010.[357]

Overall, the number of jobs for white-collar workers requiring skilled labor have increased in the Corridor due to US 422. One 2010 projection estimated 28,000 new jobs would be created between 2000 and 2030, with an accompanying 21,000 new housing units forecast to be built between 2009 and 2030[358]. Given the commercial and residential real estate activity and growth in land values along the corridor since the opening of US 422, the roadway has been responsible for economic resurgence and prosperity in towns such as Limerick and Phoenixville. However, despite the promises of

mayors and other business leaders, US 422 has not had much, if any, of an economic impact on Pottstown. Pottstown's median income and home values lag behind the other municipalities in the corridor, impacting Black and Latino residents disproportionately, who represent about 23% and 7% of its population respectively. Given the lack of prosperity still experienced in Pottstown and the dearth in major corporations that have moved to Pottstown due to US 422, US 422 has not had an equitable impact on the economy across all demographics.

In allocation of project funds

The Pottstown Expressway was a necessary link between Reading and Philadelphia, and it has proven successful in increasing mobility and creating economic growth in an area which previously had rural farms and declining industrial clusters. However, it has only been successful in these goals for certain segments of the population, in which citizens with access to cars have benefited greatly, while populations without vehicle access have been left out. Two main culprits for the disparities are the types of transportation that the area's leaders have decided to fund over the past few decades, and the funding mechanisms they decided to not pursue that could have created a more equitable transportation system. Consistently, area leaders have decided to only spend money on building and maintaining expressways or

Figure 132 US 422 Transportation Alternative Cost Estimates.

Source: PennDOT

studying expensive passenger rail, with buses being an afterthought.

The history of the creation of US 422 showed a sustained push by local political and economic leaders over decades to convince PennDOT to build the expressway, and there have been numerous studies over the last 20 years on the possibilities to reinstate expensive rail service to Phoenixville and Reading, but very little attention has been paid to creating a better bus network, which would be much cheaper. While there have been at least eight detailed studies on reintroducing rail transportation along various points in the corridor in the past 20 years, better bus service has only been studied in conjunction with reintroducing rail, and when the two transit options have been compared, buses have always been cheaper.[359] To understand the vast differences in costs for each type of development, consider the following estimated capital costs for four alternatives which have been proposed or built over the past few decades:

- Rail to Reading (No Transfer): reinstating a one-seat ride from Reading to Center City Philadelphia and with dedicated track. *Total Estimated Cost: $818 million*[360]
- Rail to Reading (Transfer): introducing a two-seat ride from Reading to Center City Philadelphia with a transfer at Norristown and a shared track with Norfolk-Southern. *Total Estimated Cost: $616 million*[361]
- US 422 Upgrades Since 2013: Includes the many US 422 construction projects since 2013. *Total Estimated Cost: $452 million*[362]
- High-Capacity Bus: a Bus Rapid Transit (BRT) style line along all of US 422. *Total Estimated Cost: $45.8 Million*[363]

Figure 132 compares the costs of the four alternatives, and it is striking to visualize the massive difference between the rail and road upgrades relative to the improved bus option. Even if the bus alternative had costs that were ten times larger than these estimates, which could mean improved stations or even a dedicated lane along US 422, it would still be as much or less expensive than the other options.

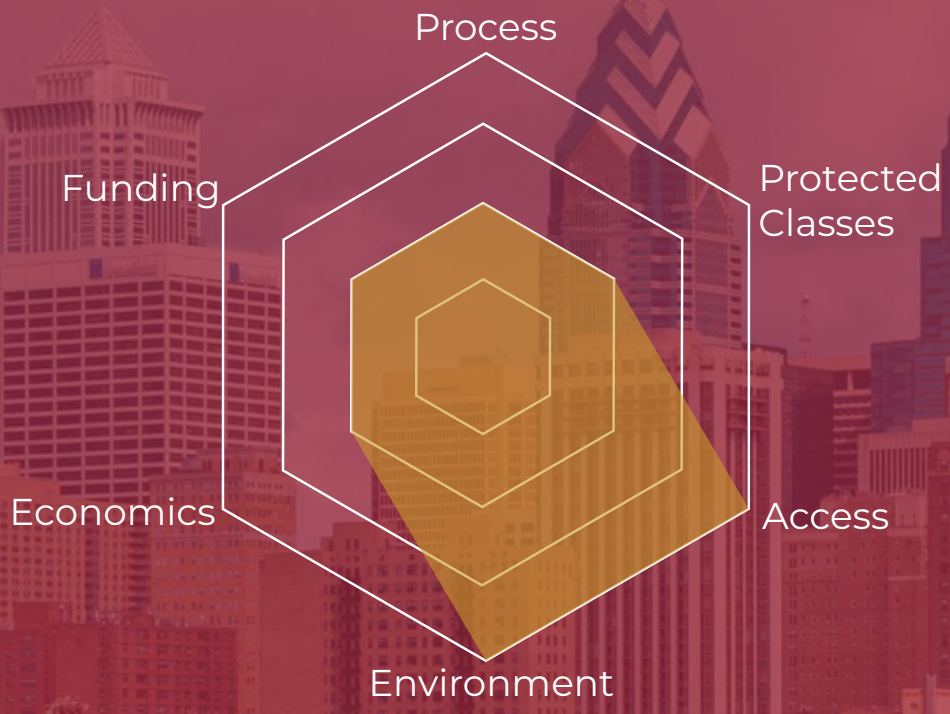
With the price of the High-Capacity Bus being so much cheaper, there could be multiple well-funded high-capacity bus lines in the corridor, making traveling not just easier to Center City but also to the other townships. These new connections throughout the corridor would help those without cars share in the economic growth that has occurred since the creation of US 422, especially in communities such as Pottstown that have not seen the promised economic benefits.

The funding disparity in transportation projects in the US 422 corridor is a major equity concern, since choosing a singular transportation mode inherently leaves out people who cannot afford or have access to that mode, such as with people of color not having access to a car or commuter rail lines. It is an important values statement made when a community decides to not fund inexpensive transit upgrades, since it is an active choice to leave certain populations out of the economic growth that the region has experienced. An example of when area citizens manifested their values and priorities for transportation was after the 422 Corridor Plus report was completed. The 2011 report stated that tolling US 422 would not only provide the money for much needed upgrades of the expressway, but also for reinstating passenger rail service from Reading to Philadelphia, while also reducing congestion.[364] Despite the major benefits, residents hated the idea, and were able to eventually kill the tolling plans. Instead, government leaders decided that after the 2013 passage of the large PA transportation infrastructure bill, Act 89, they should spend hundreds of millions of dollars to once again enhance US 422 without any substantive transit investment. The funding choices made by US 422 politicians, businesspeople, and citizens have cast aside inexpensive transit investment to create a corridor that is growing but snarled by traffic and has major transportation inequities for carless populations.

Conclusion

When measured against its initial goals of improving transportation and the economy in an area consisting of rural farming communities and small industrial boroughs, the Pottstown Expressway, in itself, was a success. US 422 increased access to the corridor, spurred economic growth, and lead to large population increase in the area. However, decades of poorly managed sprawling growth and a severe lack of transit investment have led to incredible levels of congestion, rapid destruction of open space, and an economy that leaves out people without access to cars from the economic prosperity of the corridor. The fact that there has been investment in the expressway, single-family communities, and auto-oriented services is not the problem; it is that these have been the *only* type of investment, leaving out those without cars and creating the present traffic and environmental problems.

For poor or minority communities, the equity legacy of the Pottstown Expressway is different than other American highway projects, in which thriving minority commercial districts were leveled in the name of suburban mobility. Rather, US 422 and the many political and planning decisions surrounding it, signal that the way to prosperity is along a narrow path that does not include them, leaving them behind. If a person cannot overcome the barriers to entry, such as owning a reliable car or buying a home, they will not share in the same prosperity that so many others in the area have.



Equity Dimension	Score	Reasoning
Process	2	There have been trail improvements and benefits along the entire corridor, but not a significant amount of engagement.
Protected Classes	2	The trail goes through many different communities, including many with protected classes. However, the trail is not as well-maintained in lower-income areas.
Access	4	It provided access for those without a car or who cannot afford transit, when historically only motorized mobility has been prioritized. The SRT replaced a freight train that cut off communities from the waterfront.
Environment	4	While the SRT does not provide the most benefits to marginalized groups specifically, it does address past wrongs of prioritizing transportation modes that are primary pollutants and cause adverse health effects.
Economics	2	Economic benefits have gone to a variety of neighborhoods along the trail, but not evenly.
Funding	2	While funding sections through many communities, the disjointed funding structure of the trail means that not all sections receive the same level of funding.

Figure 133 Schuylkill River Trail equity spider chart and table
Figure 134 Image of the trail, Image Source: Shutterstock

Schuylkill River Trail
Chapter Summary

Theme: In repairing past environmental damage and improving access for a variety of populations throughout the region, the Schuylkill River Trail is an example of how even a relatively cheap transportation project can improve equity for large numbers of people throughout the region.

Stretching 71 miles from Philadelphia to Pottstown and welcoming over 20,000 visitors per week, the Schuylkill River Trail (SRT) has grown significantly since its member organizations began converting old railroad tracks into trails in 1970s. The SRT replaced environmental hazards and now stretches through many areas with various demographic and economic characteristics, and so provides mobility, economic, and environmental benefits across many different populations. The success of the SRT has created some fears of "green gentrification", which will require active monitoring and policies to ensure protected classes aren't forced away from a standout example of equitable transportation.

Equity Analysis Key Takeaways:

The trail has created numerous positive environmental outcomes

From repurposing industrial rail lines, to capturing stormwater runoff, to contributing to reducing greenhouse gas emissions, the SRT has helped to repair numerous environmental issues in the region.

Populations in disparate geographies and demographic groups have seen mobility benefits

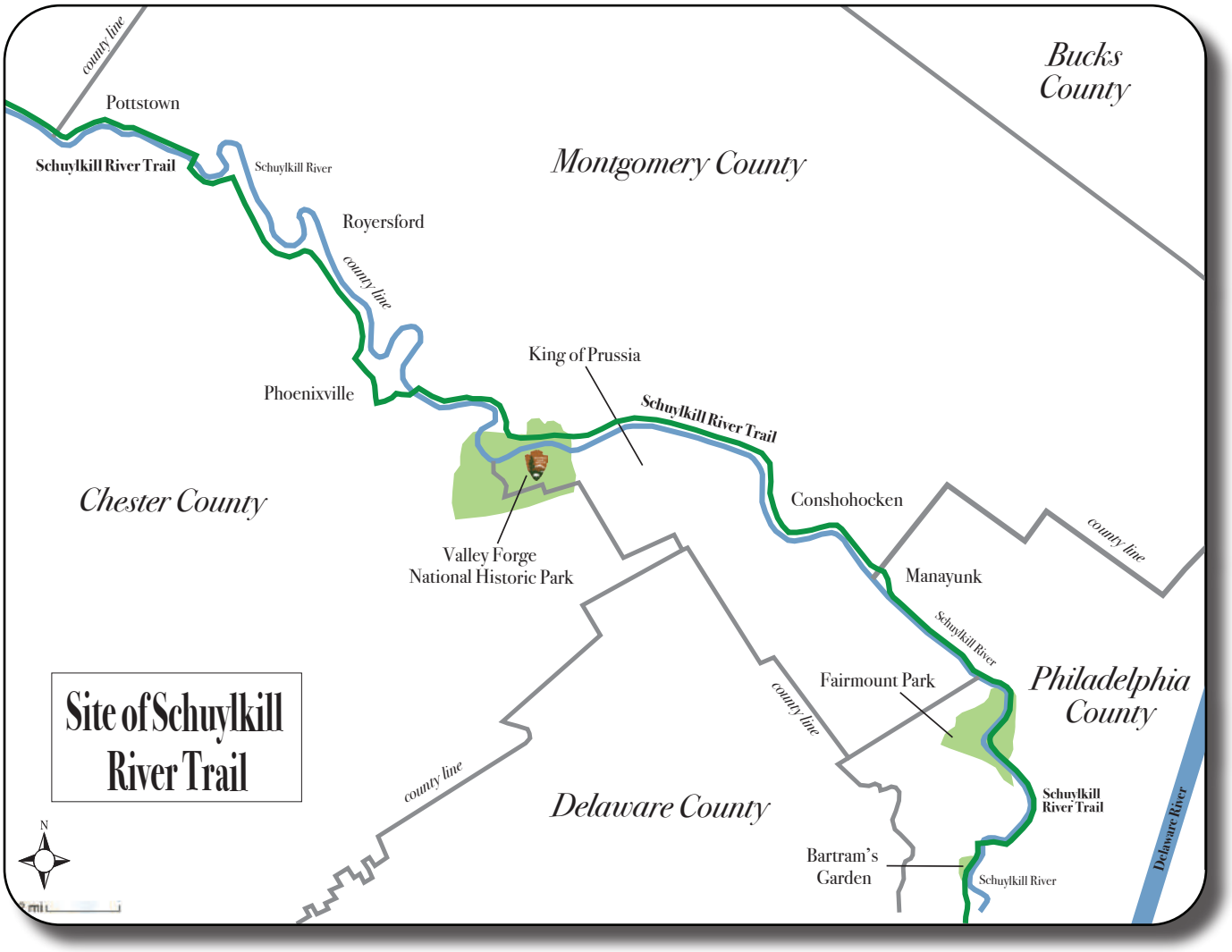
Due to the SRT's large geographic reach through various communities, the trail has helped to connect people to workplaces and important community assets without the need for a car.

"Green gentrification" and universal accessibility need to be considered as the trail expands

As the trail grows in popularity and length, there must be plans to ensure displacement does not occur due to the trail, and that all people regardless of ability are able to able to access all portions of the trail.

Schuylkill River Trail

Figure 135 Map of the Schuylkill River Trail Site



This section will review the Schuylkill River Trail (SRT), its history, context, and the concerns it poses for equity. This case study differs from the other project case studies in this report as it is the only nonmotorized transportation project in the report, and also represents the small percentage of nonmotorized projects from DVRPC, as most projects are centered around highway and transit systems. Being a nonmotorized project, the SRT stands out in the ways that its equity measures will be weighed against other automobile-oriented developments. The SRT has been called "the most transformational project that Philadelphia built in the last decade" by Inga Saffron of the Philadelphia Inquirer in 2010.[365] The trail continues to be a work in progress which still has many years left until it is completely finished, presenting an opportunity to address a myriad of unique equity concerns, such as "green gentrification," that can arise from trail development projects and also prevent future equity issues. Intentional planning that includes the public's input in trail project discussions can best serve the communities along the trails. This case study will focus on the sections of the SRT within DVRPC's county boundaries, but it is important to note that it extends into other Pennsylvania counties and exists as part of the larger East Coast Greenway that runs from Maine to Florida.

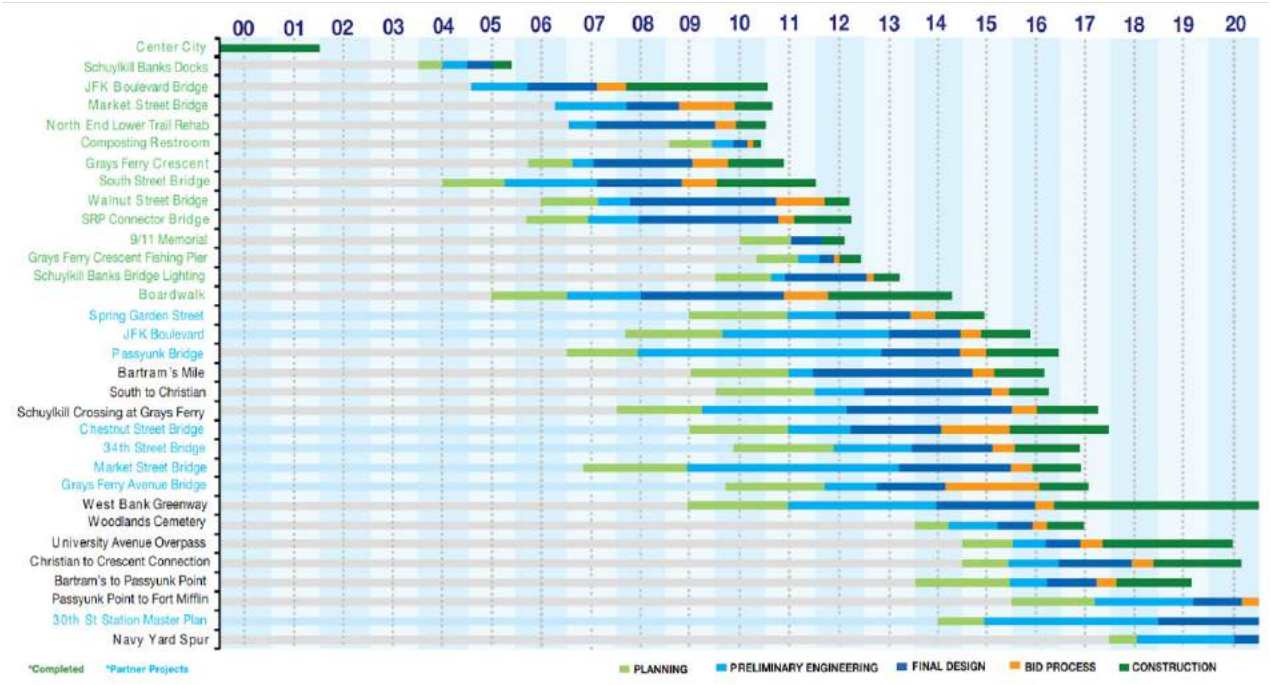
This study was performed and written during the COVID-19 pandemic, and trail use has significantly increased because of the COVID-19 pandemic as it allows for socially-distanced activities. The impacts of the global pandemic on open space trails has continued to illustrate just how crucial public parks and pedestrian trails are to the wellbeing of its communities. Much of the quantitative data surrounding this topic are still in its earliest stages, and will have to be examined more deeply in the months and years after the pandemic has subsided, outside of the scope of this report.

Introduction

The Schuylkill River Trail, first constructed in the 1970s, previously an abandoned railway along the Schuylkill River, is now one of Philadelphia's most popular walking and biking trails. The SRT has seen an immense amount of social and economic growth over the past several years which has given the trail national attention. In the past two decades alone, the Schuylkill River Trail has seen over 10,000 feet of trail built along the water, 37 acres of newly landscaped green space, and gained over $14 million in state tax revenues.[366] Figure 136 shows the timeline of all SRT projects to date. With the collaborative efforts of organizations such as the Schuylkill River Development Corporation (SRDC), the City of Philadelphia, the Delaware Valley Regional Planning Commission (DVRPC), and many more, the trail has succeeded in completing new projects that promote increased safety, mobility, and accessibility.

The SRT's complete circuit is currently 71 miles long and stretches from Pottsville, Pennsylvania in Schuylkill County down to the southwestern boundaries of Philadelphia County. The SRT reaches a number of different areas, crossing through many diverse urban, suburban, and rural landscapes. With the trail attracting as many as 20,000 visitors per week, the SRT is

Figure 136 Schuylkill Banks Capital Projects Timeline, 2000-2020[448]



expected to continue to expand and grow. The existence of the SRT has become an attractive asset for residents, tourists, and businesses alike: in recent years, property values adjacent to the trail have appreciated, new storefronts and housing developments have been built, and the overall economic growth has allowed cities like Philadelphia to expand their tax base. The resulting economic growth has allowed for more dollars to be funneled into other necessary areas such as better schools and improved municipal services. The trail also acts as an environmental amenity: the open green space preserves the local ecosystem along the Schuylkill River while also promoting the usage of non-automobile-oriented recreation, which reduces carbon emissions.

Multi-use trails are an essential recreational asset that improve the quality of life in local neighborhoods. The goal of the SRT project is to have a complete circuit of open protected space that individuals can use without ever needing to cross paths with a shared roadway space with cars. Successful open spaces like the SRT will especially benefit lower income neighborhoods located along the trail, as the local economic growth will bring increased investment to their communities. An increase in bicycle and pedestrian usage on the trail could become a catalyst for individuals to prioritize traveling without a car, which has a multitude of public health and traffic safety benefits. With these strategies in mind, the SRT can utilize its current and future resources to make the space more welcoming for individuals and leverage the trail's capacity as a more equitable space to work, play, and travel.

There continues to be many opportunities and challenges that exist within the development of the SRT. Trail safety, maintenance, and access have been brought to light as some key areas of improvement through local community outreach efforts. For example, there are still some sections of the trail that have not yet been developed as fully functional bicycle and pedestrian routes, which will require additional funding to complete in the coming years. It is also difficult for many trail users to access several of the entry points along the trail. A demand for more well-connected streets on and off the trail will likely need to be incorporated into a plan that is much larger in scale, as this will necessitate a thorough examination of the roadway infrastructure as it exists across the tri-state region. Lastly, despite the trail's massive increase in popularity, there continues to be significant gaps amongst those who are welcomed in using trail; some people may not feel comfortable using the trail for various reasons, are unaware of its existence, or face difficulties accessing the trail in general. Because the SRT is operated by a number of different organizations and stakeholders, it is clear tha t collaboration across public and private sectors will be needed in order to make the trail more safe, accessible, and welcoming for all.

History

Schuylkill River Trail & Pennsylvania Railroad

The Schuylkill River has been a valuable asset to southeastern Pennsylvania for hundreds of years. During the 1800s, the Schuylkill River became an important corridor for shipping and freight industries. Railroad companies were rapidly building lines on land adjacent to the river. The Philadelphia & Reading Railroad was the first company to provide service between Reading and Philadelphia with a line that was completed in 1842. It transported valuable anthracite coal from the fields to the city. As its empire expanded in Pennsylvania and New

Jersey, the company was reorganized and renamed as the Reading Company during the 1890's. The Pennsylvania Railroad, the largest railroad company of the time, was also quickly expanding at the same time. By the 1870s, it had grown into a massive transportation system connecting Philadelphia with Chicago and New York City. The Pennsylvania Railroad's construction in Pennsylvania expanded along the Schuylkill River from West Philadelphia northward to increase competition with other railroad companies and monopolize that land. In the late 1880s, the Pennsylvania Railroad continued to expand and created subsidiaries, including the Reading & Pottsville, Pennsylvania & Schuylkill Valley, and Pottsville & Mahanoy railroads. The Reading & Pottsville railroad purposely ran nearly parallel to the Reading Company's line creating a connection to Lehigh Valley's New Boston Junction.

The Pennsylvania Railroad's growth was interrupted as the demand for anthracite coal decreased significantly after World War II. Additionally, as the highway system rapidly expanded and trucking capabilities increased efficiencies in the late 1800s and early 1900s, the Schuylkill River and other waterways saw less and less use. The decreased usage of rivers resulted in a failed investment for the Pennsylvania Railroad, and the railroad was abandoned in 1931. The Pennsylvania Railroad then merged with the New York Central's Penn Central Transportation Company nearly 40 years later to continue commuter service up to Manayunk, but service ended and the entire track north of Manayunk was abandoned in 1976 when the Consolidated Rail Corporation took ownership. The remaining railroad was obtained by SEPTA in the early 1980s and still provides service up to Cynwyd.[367]

Rails to Trails

As rail use was rapidly declining, people began to consider converting the abandoned or underutilized railroad rights-of-way into public trails. Railroad corridors, with operating services or without, were seen as attractive sites for trails to be built as they often provide connections between desirable locations, including downtowns and residential neighborhoods. Prior to formal trail development on these tracks, people were naturally walking on and using them for recreational purposes. Some of the individuals who were using the railroad corridors in this way began calling them "rails-to-trails." In 1967, the Elroy-Sparta State Trail in Wisconsin became the first of the rail-trail movement, and it was quickly followed by the opening of the Illinois Prairie Path in 1968. The Rails-to-Trails Conservancy was created in 1986 to advocate for the rail-trail movement. A cofounder of the Rails-to-Trails Conservancy, Peter Harnik, said, "In 1965…Rails-to-Trails was still a highly localized movement; people said, 'We've got an abandoned railroad track, so let's use it.' Only gradually did there emerge a realization that America desperately needs a national trails system, and that unused rail corridors are the perfect backbone for that network."[368]

The US Congress passed the Staggers Rail Act in 1980. The act allowed for unprofitable railroad routes to be discontinued and led to the abandonment of 4,000-8,000 miles of rail lines every year in the early 1980s. Concerned with the risk of permanently losing thousands of miles of rail corridors, the US Congress amended the National Trails Systems Act in 1983 to establish "railbanking," which preserves inactive railroad corridors for future rail use if desired and allows the corridors to serve as interim trails. Today, the US has more than 21,000 miles of rail-trails.[369] Some

of the most famous rails-to-trails projects are Missouri's Katy Trail, Chicago's Bloomingdale Trail, Nebraska's Cowboy Trail, Ohio's Ohio to Erie Trail, and Georgia's Atlanta Beltline.

In Pennsylvania, the Rails-to-Trails Act of 1990 created the Pennsylvania Rail-to-Trails Program within the Pennsylvania Department of Environmental Resources, currently known as the PA DCNR. This program sought "to acquire, operate, maintain and develop available railroad rights-of-way for public recreational trail use" and gave the PA DCNR the abilities to:

"Acquire land for the development of the Rails-to-Trails Program; Participate in abandonment proceedings before the STB [Surface Transportation Board] and PUC [Public Utilities Commission]; accept title to properties for use in trail projects; Publish and distribute appropriate maps of recreational trails; Establish access routes and related public use facilities; Evaluate existing and potentially available railroad rights-of-way; and Update lists of available railroad rights-of-way on a quarterly basis."[370]

The act led to the establishment of the Rails-to-Trail Conservancy, a nonprofit organization dedicated to preserving and converting abandoned railroad rights-of-way into trails. In addition to the PA DCNR, the Pennsylvania Department of Transportation (PennDOT) promoted the discussion of rail infrastructure, active and abandoned, as components of the comprehensive transportation network in its 1995 Pennsylvania Transportation Policy Plan. The state allowed for the transfer of railroad easements to be used as roadways. The law included paved bike trails because they are considered a type of roadway, and bicycling is a form of non-motorized transportation. Thus, multi-use trails that bicyclists can ride on are included.

As a result of the Rails-to-Trails Act of 1990 in Pennsylvania and other states, many abandoned railroad rights-of-way have been converted to a variety of other uses. One of the most notable rail-trail reuse projects is the SRT. It was designated a National Recreation Trail in 1994 for being one of the first 500 rail-trails in the US.[371] In Philadelphia, Conrail's closure of service and abandonment of tracks north of Manayunk, called the Schuylkill Valley Branch, went through the process of becoming the city's first rail-trail. This 11.5 mile stretch of paved trail was the first section of the SRT in Philadelphia.[372] The 1997 DVRPC Abandoned Railroad Inventory and Policy Plan identified the Phoenixville Secondary as a railroad right-of-way to be converted into an extension of the SRT from Phoenixville to Pottstown.[373] Since then, the SRT has expanded in a piecemeal fashion. Outside of Philadelphia, the rails-to-trails process was used to develop many miles of trail segments on abandoned railroad rights-of-way along the Schuylkill River.

Figure 137 Pennsylvania Counties and Municipalities Crossed by SRT[450]

Pennsylvania Counties and Municipalities Crossed by SRT

Counties	Philadelphia	Montgomery	Chester	Berks	Schuylkill
Municipalities	Philadelphia	Norristown Conshohocken W. Conshohocken Upper Providence Pottstown Royersford	East Coventry Phoenixville Spring City	Birdsboro Amity Twp Robeson Twp Hamburg Leesport Reading Shoemakersville [449]	Auburn Landingville Port Clinton Pottsville

Source: SRGA, 2019

Equity Analysis of the Schuylkill River Trail

The following section provides a detailed assessment of how the SRT has upheld varying definitions of equity impacts throughout the communities that it runs through. The chapter evaluates how the trail has succeeded in maintaining equity during many different stages of development, including a review of the planning and decision-making process of creating the trail, the successes of local environmental efforts, economic impacts, and distribution of economic funding. The SRT is a uniquely instrumental project because of its clear, intentional efforts towards improving the social and economic conditions of the surrounding environment in which it exists. It has created a greater opportunity for non-automobile-oriented travel and recreation while also providing waterfront access for thousands of users where it was difficult to enter previously. The continued development of the SRT will have rippling effects that promote a new way of utilizing open space. As the trail advances in completing more of its long-term projects, the SRT will become more sustainable and accessible than ever before.

In process, public participation, and decision-making

The existing segments of the SRT currently span 71 miles in Southeast Pennsylvania through Philadelphia, Montgomery, Chester, Berks, and Schuylkill Counties. Once completed, the entire SRT is planned to be over 130 miles in length. Figure 137 shows the municipalities that the SRT runs through and their respective counties. Of the counties and municipalities listed in Figure 137, DVRPC serves Philadelphia, Montgomery, and Chester Counties. With how expansive the SRT is planned to be once completed, coordination and communication amongst all stakeholders, public agencies, private partners, and the community has been robust.

The portion of the Schuylkill River where the SRT has been built is called the Schuylkill River National and State Heritage Area (SRHA). It was designated as a State Heritage Area in 1995 by the Pennsylvania Department of Conservation and Natural Resources and as the Schuylkill River Heritage Corridor in 2000 by the US Congress. Because of these designations, the Schuylkill River Greenway Association (SRGA) was established as SRHA's coordinating entity.[374]

SRHA's overarching goal of building the SRT includes completing the development of the SRT system along with connections to tributary trails and enhancing existing and providing new outdoor recreational opportunities related to its natural and cultural heritage. Between 2001 and 2016, SRGA had invested almost 40% of total funding for planning, development, and maintenance projects for the SRT, which amounted to more than $6.1 million. SRGA has been involved in the development of 38.46 miles of the SRT, created 32 trailheads, and built 20 water landings. It has been responsible for approximately 50% of maintenance for the SRT. SRGA coordinated thousands of volunteer hours through its various programs: nearly 6,500 volunteer hours through the SRHA's Trails Keepers Program since 2002, over 5,900 volunteer hours through the SRHA's Trail Ambassador's Program between 2011-2014, and over 800 volunteer hours through the Adopt-A Trail program from 2010-2015. Perhaps one of the most significant contributions SRGA has made to the SRT and trails in general is the development of regional standards to promote trail safety as well as standardized trail design, development and management.[375]

In addition to SRGA, the SRT is owned, managed, developed, and maintained by numerous entities. SRGA acts as a connection and uniting organization for the various SRT stakeholders. The SRT Council was formed in 2005 to facilitate communication regarding trail development and to promote the SRT as a unified trail system. The Council includes SRHA, Schuylkill River Development Corporation (SRDC), East Falls Development Corporation, Fairmount Park Conservancy , Manayunk Development Corporation, Valley Forge National Historical Park, Montgomery County, Chester County, Berks County Planning Department, Borough of Hamburg, Schuylkill County, and PA DCNR. Figure 138 lists a few of the most prominent organizations that own and manage different sections of the SRT within DVRPC's boundaries. While there are other organizations responsible for certain aspects of the SRT, they are beyond the scope of this project.

Schuylkill River Development Corporation (SRDC)

In 1992, the nonprofit Schuylkill River Development Council was formed to advocate and fundraise for a riverfront park, the Schuylkill Banks. The council was restructured into the Schuylkill River Development Corporation (SRDC) in the early 2000's. Since the Schuylkill River Development Corporation's founding, over $86 million has been invested into the Schuylkill River, Schuylkill River Trail, and Schuylkill Banks by the Schuylkill River Development Corporation,

Figure 138 Organizations Responsible for the SRT within DVRPC Boundaries. Source: Rails-to-Trails Conservancy, 2009 [452]

Organizations Responsible for the SRT within DVRPC Boundaries	
Entity	Section of SRT
SRDC	Philadelphia: Fairmount Waterworks to [451]Locust Street (Schuylkill Banks)
Fairmount Park Conservancy	Philadelphia: Kelly Drive from Wissahickon Creek at Ridge Avenue to the Philadelphia Art Museum
Manayunk Development Corp	Philadelphia: Manayunk
Montgomery County	County line in Philadelphia to Mont Clare through Valley Forge National Historical Park, Pottstown to Berks County Line
Source:Rails-to-Trails Conservancy, 2009	

Figure 139 Center City Trail[453]

the City of Philadelphia, and their various partner stakeholders, including universities, businesses, and utilities.[376] The Schuylkill River Trail has become a connected greenway that provides recreational opportunities to all. The expansion of the Schuylkill River Trail has been influential on development for the past 20 years.

SRDC's earliest SRT project was the Center City Trail. Between 1996 and 2009, the project was completed in several phases. SRDC asserted that this trail segment is "a vital commuter corridor, a valued recreation amenity, and an oasis within the city" that attracts over 19,000 user trips on average per week.[377] During 1996-1998, the City of Philadelphia's Streets Department (Streets Department) was working on revitalizing the tidal Schuylkill River corridor by bulkheading a large section of this trail segment. The bulkheading was crucial in protecting the river's water quality by mitigating erosion and creating a space large enough for installing a greenway and riverfront trail. In 1999, the Philadelphia Streets Department paved a 1.2 mile trail segment with lighting along its entire length. The segment was constructed to be 11-12 feet wide to accommodate a variety of users, including walking, running, bicycling for recreation and commuting purposes. The Center City Trail, shown in Figure 139, opened to the public in 2000.

A few years later in 2005-2006, SRDC worked with the Army Corps of Engineers to landscape the trail segment between Locust Street and Race Street. Landscaping included the plantings of trees, flowers, shrubs, and grass in order to create distinct and vibrant "rooms" along

the trail. The next major project along this trail segment was landscaping the North End of the Schuylkill Banks, from Race Street up to Martin Luther King Jr. Drive, in 2009. SRDC collaborated with the Pennsylvania Horticultural Society, Fairmount Park Conservancy, and PennDOT. This project built a gateway plaza near MLK Jr. Drive, a river overlook to the west of the plaza, a formal fishing pier with custom benches near Vine Street, and a formal walking trail near the tidal beach bounded by Vine Street and MLK Drive. Other improvements including new trees, benches, and trash receptacles were added as well. This Center City Trail is just one of the many SRT projects of the SRDC; others include the Schuylkill Banks Boardwalk and Grays Ferry Crescent.

Figure 140 Manayunk Canal Towpath[454]

Fairmount Park Conservancy

Another significant entity that is responsible for sections of the SRT is Fairmount Park Conservancy. This nonprofit organization evolved out of the City of Philadelphia's Fairmount Park Commission, which was founded in 1867 to protect the city's water supply and ensure outdoor space for recreation. Today, Fairmount Park Conservancy helps to oversee the entire citywide park system in Philadelphia alongside Philadelphia Parks & Recreation. They work together to raise public awareness of the importance of parks in the Greater Philadelphia Region through programs, projects, and community outreach.[378]

Fairmount Park Conservancy manages and

maintains the portion of the SRT that runs through East Fairmount Park near Kelly Drive from Wissahickon Creek at Ridge Avenue to the Philadelphia Art Museum.[379] East Fairmount Park covers 650 acres of land that border the Schuylkill River. This park is filled with some of the most popular places to visit in Philadelphia, including Boathouse Row, the Philadelphia Art Museum[380] SRT users have direct access to these staples by simply following along the trail.

Manayunk Development Corporation

As the SRT runs north through Manayunk, the Manayunk Development Corporation (MDC), which was formed in 1992, becomes responsible for the trail. MDC sought to promote Manayunk's business district and also its community through community programming and physical improvement projects.[381] The SRT goes through Manayunk via the Manayunk Canal Towpath. The canal and towpath are maintained by the MDC and Philadelphia Parks & Recreation. Traveling through diverse landscapes, the two-mile Towpath runs parallel to the Manayunk business district and then follows along heavy industrial and rural settings where trail users can see old canal locks, rail lines, and the ruins of old textile mills as well as wildlife. Its surface varies between hard ground, gravel, and boardwalk, which makes the Towpath suitable for walking, running, bicycling, and other forms of nonmotorized transportation.[382]

Philadelphia Parks & Recreation and the MDC plan to fully restore the Manayunk Canal to allow small boats and canoes to sail through the canal and to the Schuylkill River. This development could impact the SRT by potentially increasing the number of trail users frequenting the SRT and Towpath, shown in Figure 140, to view the Manayunk Canal. The MDC, Philadelphia Parks & Recreation, and other stakeholders that get hired for the just will hopefully pursue a study of the implications of the effects the restoration could have on the SRT once the project begins.

Montgomery County

Going further north, the Manayunk Canal Towpath terminates in Shawmont and leads to the Montgomery County section of the SRT. From the county line in Philadelphia up to Mont Clare, Montgomery County built, owns, and maintains 18 miles of the SRT.[383] The county has its own park staff that sets standards and maintains the SRT. Paid park rangers enforce the rules and regulations that are posted at all trailheads and manage security. Since a portion of the SRT runs through the Valley Forge National Historical Park, the National Park Service manages mowing and tree pruning while Montgomery County maintains the SRT's surface.[384]

The section of the SRT in Montgomery County is entirely paved. As shown in Figure 141, the paved surface makes this portion of the SRT a popular destination for a wider variety of nonmotorized transportation, including walking, rollerblading, bicycling, skateboarding, and jogging. The US Department of Interior's National Trails System recognizes this stretch as a National Recreation Trail. In addition to the existing portions of the SRT, Montgomery County completed a segment from Pottstown to the Berks County Line. Montgomery County looks to continue to expand and connect Pottstown to the section of the SRT in Chester County.[385] Closing gaps in the trail is a high priority action item for all entities responsible for the SRT, so Montgomery County and others are slowly working towards a connected, complete network to serve the Greater Philadelphia Region.

Figure 141 SRT in Conshohocken[455]

Public Participation

For trails projects like the SRT, there is no requirement to conduct community outreach. Much of this is attributed to lack of funding. Excluding the public in trail development projects may further concerns of "green gentrification." Manayunk is one of the many communities in Philadelphia and in the US that represents the potential consequences of redevelopment that incorporates the parks, trails, and bodies of water as amenities, which is known as "green gentrification." The Pennsylvania Environmental Council (PEC) asserts that green gentrification "refers to the role of environmental discourse and urban sustainability, which includes the planning of parks and trails, in driving up property values and displacing low-income residents."[386] Manayunk, its Canal Towpath, and the SRT have a history of questions around green gentrification.

Manayunk was once a major textile center with a booming industrial economy in the 1800s. Due to a variety of environmental issues and competition from the Reading Railroad over the following 50 years, Manayunk's economy began to decline and lose jobs for the decades to come. In the 1970s, Philadelphia government officials focused on making Manayunk a tourist destination by taking advantage of its proximity to the river, the SRT, and downtown Main Street. The City of Philadelphia spent $2 million upfront on dredging and continued to invest in adding amenities, including new sidewalks, a park, and trees. The new amenities made Manayunk desirable to new residents and businesses.

From 1980 to present day, Manayunk's revitalization has led to a shift in neighborhood demographics. Housing prices have increased by almost 110% since 1990. The overall educational attainment level has increased by nearly 20% for residents with bachelor's degrees. Manayunk's planning strategy was not focused on the existing community but instead on attracting new residents and businesses with new amenities and development. The existing community was not involved in the planning process at all. The PEC stated, "While the 'greening of Manayunk' was positive for the economy and for the environment, the negative externality of displacement directly impacted the community. As affordability shifted, tensions grew between the working class in the neighborhood and the new residents moving in to enjoy the amenities. The new businesses on Main Street were not locally owned and did not hire residents of Manayunk, further divorcing the commercial area from long-time residents."[387] The example in Manayunk serves as an example of how the SRT is used as an amenity and is influential on development.

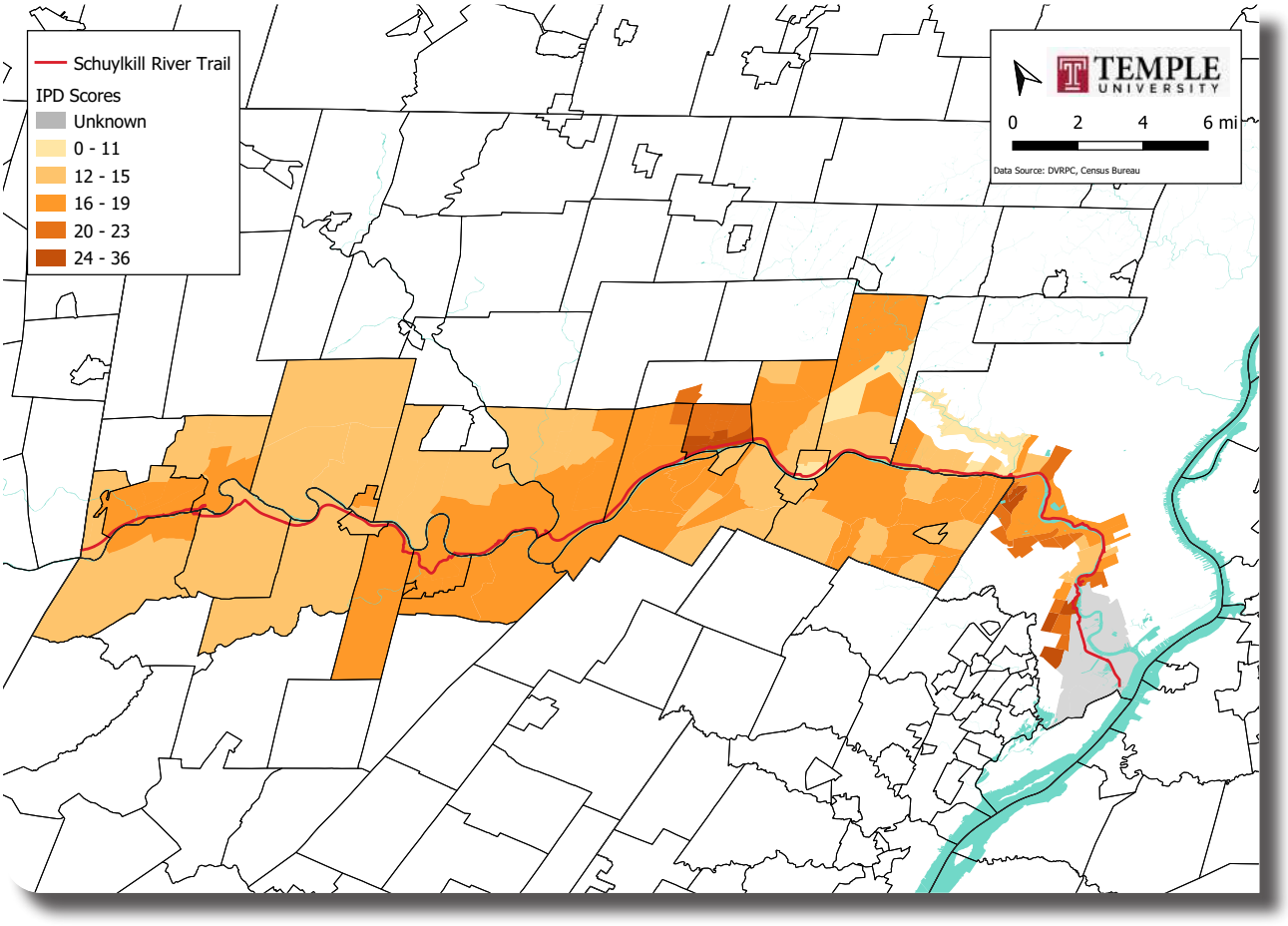
Across demographic groups that are geographically distinct and geographically diverse

The SRT is an environmental asset and is intended to provide benefits to the communities it serves. Those who reside in the municipalities along the SRT have the most direct access to the trail, and as a multi-use trail it accommodates pedestrians, bicyclists, and various other forms of nonmotorized transportation. Because the trail is so long, the neighborhoods and municipalities along the trail have distinct demographic characteristics, including going through various historically marginalized communities.

To better examine who has the most potential benefit and burden as a result of the trail, Figure 142 shows DVRPC's composite Indicators of Potential Disadvantage (IPD) score for the area around the SRT. The Composite IPD shows that the SRT runs through municipalities with a wide range of IPD scores. The scores are the highest in Southwest Philadelphia and Norristown, while they are lower on the western end of the trail in Montgomery and Chester Counties.

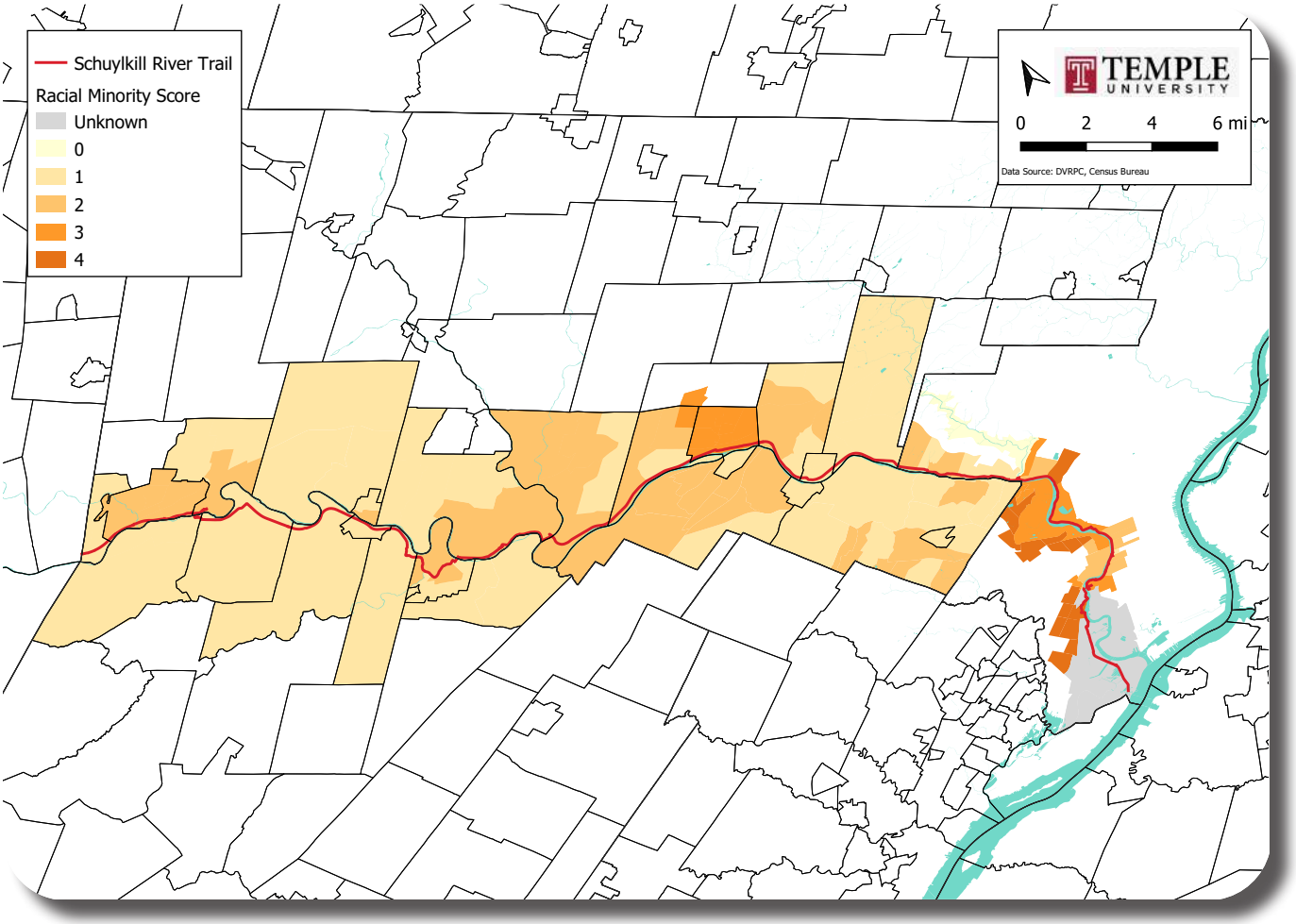
While useful, the composite IPD score is an aggregate look of many different potentially disadvantaged populations. To understand how the trail affects specific distinct populations, Figure 143 shows the Racial Minority score, in which a higher rating indicates an increased rate

Figure 142 DVRPC Composite IPD Score for Communities Along the SRT



of certain racial populations when compared to the average. Similar to the Composite IPD score, the highest Racial Minority Scores along the SRT are concentrated in Philadelphia, and Norristown, with the lowest rates in the western areas of Montgomery and Chester counties. The Racial Minority Score shows that the SRT is accessible to neighborhoods and municipalities with various racial makeups. A further breakdown of income by municipality is provided in Appendix A.

Figure 143 Racial Minority Score for Communities Along the SRT



The SRT also goes through neighborhoods and municipalities in which people have various incomes, as shown through the Low Income Score in Figure 144, in which a higher number means a higher concentration of low income populations. Again, similar to the previous indicators, the areas with the lowest incomes are in Philadelphia and Norristown. However, Figure 144 shows that Pottstown in western Montgomery County also has a high concentration of people with low incomes. A further breakdown of income by municipality is provided in Appendix A.

Figure 144 Low Income Score for Communities Along the SRT

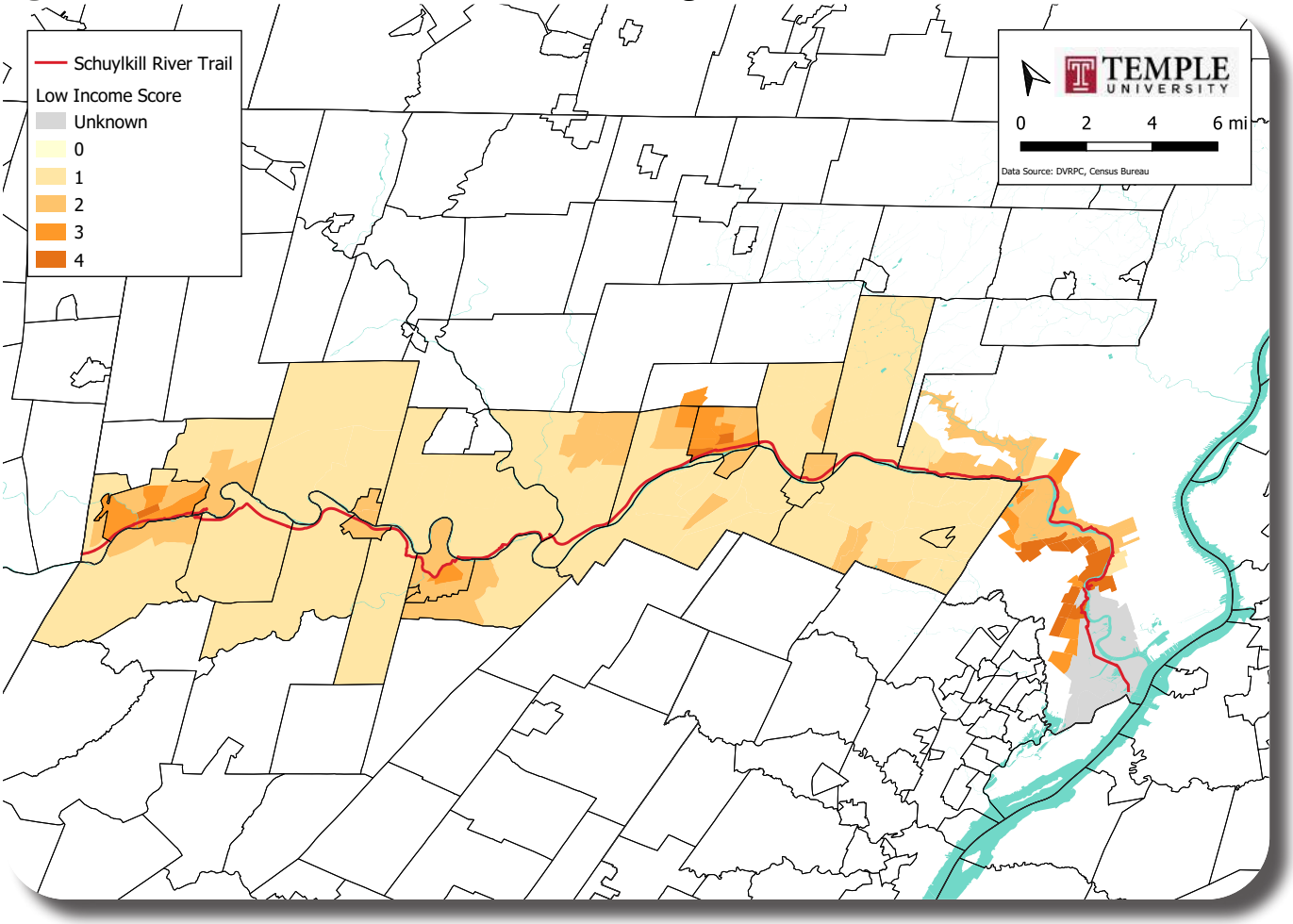
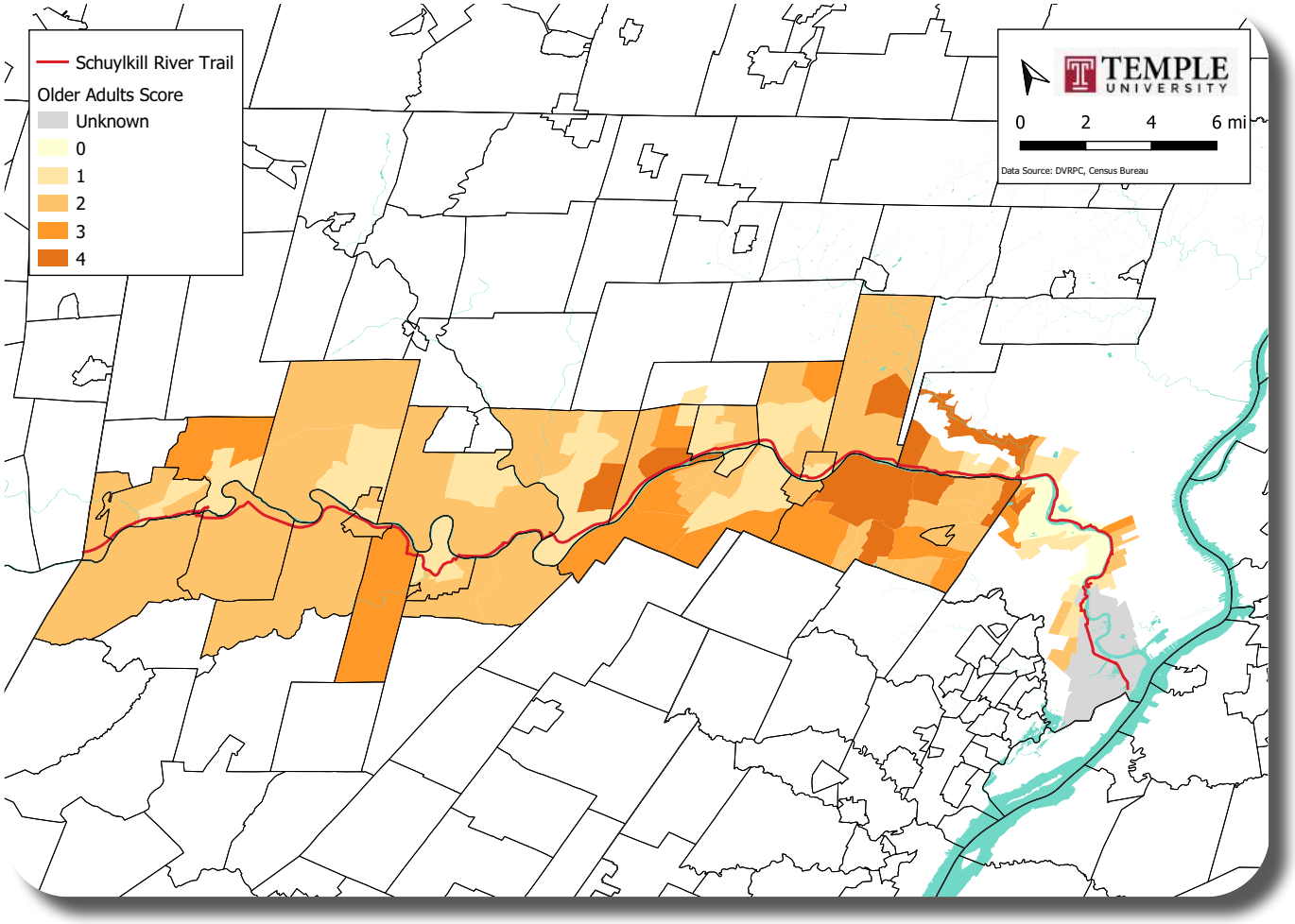


Figure 145 shows that the concentration of older adults in the municipalities and neighborhoods along the SRT. The locations of older adults are different than the locations of racial minority populations or those with low incomes, with older adults being less concentrated in Philadelphia and more concentrated in communities in Montgomery County. This concentration indicates that older populations may be less likely to have lower incomes or be racial minorities. However, all of these populations have relativity close access to the trail.

Since the trail goes through many distinct communities, the benefits and burdens can affect all of them, but not always in the same ways. The following sections will delve into how certain aspects of the trail can help or harm a given community, depending on the local context.

Figure 145 Older Adults Score for Communities Along the SRT



In environmental impacts

The Schuylkill River Trail, amongst many other trails across the region, has succeeded in becoming a community asset that provides a number of environmental benefits. Adding protected open space into an area creates an environmentally conscious space for both humans and natural wildlife to coexist while also increasing the local tree canopy, reducing carbon emissions, and promoting recreational activities. The carbon capture process from trees is a necessary way for cities to remove harmful pollutants from the air. Within the southeastern region of Pennsylvania, it is estimated that the existing biomass in protected open spaces store approximately $61 million worth of carbon.[388] Open space trails also help with flood mitigation efforts by preserving land that is necessary for collecting stormwater runoff and excess rainfall. The Federal Emergency Management Agency (FEMA) estimates that trails with flood ordinances prevent as much as $1.1 billion in flood damages annually by restoring protected waterways in their natural state.[389] The existence of these trails creates a vital ecosystem that provides protection for a variety of different species. For example, large areas protected by greenery allow for plants to filter out harmful air pollutants such as ozone, sulfur dioxide, carbon monoxide, and other airborne particles. Greenways also improve water quality by creating a natural buffer zone that protects streams, rivers, and lakes, preventing soil erosion and filtering pollution caused by agricultural and road runoff.[390] The environmental benefits of the SRT in connection to the East Coast Greenway account for a total of $39 billion in saved costs from preserving air quality, water supply, and wildlife habitat preservation.[391]

As a result, these environmental benefits also provide public health benefits for the communities surrounding the trail. Open spaces provide a low-cost, accessible location for people to engage in physical activity. The more individuals who utilize the trail for exercise and health purposes, the greater the health benefits in the area. Studies have shown both direct and indirect health benefits from local trail usage. It is estimated that cities avoid about $795 million in medical costs every year from lower incidences of individuals being diagnosed with cardiovascular diseases, diabetes, depression, certain cancers, and obesity.[392] This equates to about $142 in preventive health care savings per person.[393] Furthermore, individuals who opt to use the Schuylkill River Trail instead of an automobile for travel not only benefit from the aforementioned health advantages, but also have a reduced risk of becoming involved a traffic crash. Roadways that share space with bicyclists and pedestrians are inevitably prone to experiencing traffic crashes, and taking automobiles out of the equation entirely makes protected walking/biking trails like the SRT exponentially safer for all users of nonmotorized transportation.

All of these health impacts have been compounded during the past year which has been ravaged by the global COVID-19 pandemic. Early studies have shown that outdoor trail use is up by nearly 200% nationwide.[394] With stay-at-home orders requiring people to stay as isolated as possible, socially distanced outdoor activities have been more necessary for health and well-being than ever. Walking and biking trails have become an essential way for individuals to stay physically active while continuing to live safe and productive lives. Physically active employees who use the trail often have been shown take less time off for sick days, saving the SRT region approximately $485 million in potentially lost productivity costs.[395] The trail helps promote a healthier lifestyle amongst contiguous households, businesses, and communities who engage in recreational activities on the trail on a regular basis.

In mobility and accessibility

The Schuylkill River Trail has allowed for Philadelphia to become a national leader in bicycle and pedestrian networks. In tandem with efforts of the trail being conducted in the sections that pass through Pennsylvania, interconnectivity has become an overarching goal across the entirety of the trail. With 60 miles of completed trail out of the 130+ miles of planned development, the SRT aims to become one of the longest, continuous pedestrian and bicycle trails across the tri-state region. As the trail has seen increased investment over the past several years, bicycle usage has nearly tripled along the SRT compared to Philadelphia's citywide average.[396] Individuals who work in Center City but live along the trail are able to take their bicycle instead of their car to commute, strengthening the demand for non-motorized commuting paths. The Schuylkill River Trail also has connections to 51 passenger rail stations within 1 mile of the regional trail route, including 24 SEPTA stations, 5 AMTRAK stops, and 22 locations along NJ Transit routes.[397] By providing numerous entry points to and from public transit stops along the trail, the SRT succeeds in creating wider opportunities for users to access the trail without the need for an automobile.

There are also several plans in progress that aim to connect both sides of the Schuylkill River Trail so that users on both the east and west paths can access one cohesive, interconnected loop.[398] New projects such as the 30th Street Station Master Plan, the Woodlands Cemetery Trail, and the Southwest Philadelphia extension are set to make the SRT more accessible and mobility-friendly for a wider geography of trail users. The 30th Street Station plan will extend its riverside plaza to create a riverfront promenade on two levels, with connections to other parks along the way.[399] The SRT already provides user access to Penn Park, Paine's Park, Grey's Ferry skate park along the route that passes through Philadelphia. With the 30th Street plan, an additional "floating park" will be installed which will create a public overlook area for visitors and commuters to enjoy increased open space along the river. This new amenity would contribute to the SRT's overall vision of bringing more users to the water in a way that is more accessible and equitable for all.

Other proposals for connector bridges along the Schuylkill would link trail users to the other side of the river to improve pedestrian access. There are several bridge crossings located along the SRT; however, very few of them are pedestrian-oriented. Over the next few years, SRDC plans to open two major pedestrian crossings in Philadelphia: one located along Passayunk Avenue in Southwest Philadelphia and the other located just south of the Greys Ferry Bridge. Both of these bridges will expand access in areas that do not have as many connections to the trail as Center City or other more developed sections of the SRT. These connections will likely bring increased foot traffic to the adjacent neighborhoods, and have the potential to spur more development and investment in the region in the years to come.

In economic impacts

Open space trails are not only an immense benefit for the environment, they also bring substantial economic value to the region. A North Carolina study conducted in 2018 found that for every $1.00 invested in one-time open space trail construction, $1.72 is generated annually from local business revenue, sales tax revenue, and benefits related to health and transportation.[400] Portions of the Schuylkill River Trail have received as much as $414 million in capital funding investments over the past two decades, which in turn has produced more than $770 million in overall economic impact on the surrounding region.[401] The economic investments of the Schuylkill River Trail have induced both direct and indirect effects on the nearby areas. In 2016, 30th Street Station announced in its Master Plan the development of riverside multi-use recreational amenities close to the transit hub that would be built over the next several years and incur costs as high as $6 billion.[402] From 2000 to 2015, over $64 million was paid out to employees who worked on the construction of the SRT, and $155 million has been generated in construction expenditures.[403]

Property values, rates in homeownership, and housing stock are also bound to experience growth from increased open space development. Neighborhoods with close proximity to protected open spaces like the SRT are a premium amenity that increase property values. A five-year study in Southeastern Pennsylvania found that homes within a one-mile radius of protected open space had collectively increased the value of their housing stock by a margin of $16.3 billion.[404] Homes located near the Schuylkill River Trail in Philadelphia are forecasted to see significant gains in median household income of more than 10% over the next five years.[405]

New businesses, educational facilities, apartment complexes, and public parks have also begun developments along the riverfront. Riverside projects often come at a price that costs an additional several million dollars in order to feed the high demand for the riverfront. Developers pay an estimated $9400 per unit in extra fees for housing complexes being built by the water. These new construction projects have also spurred developments that have the potential to strengthen the local workforce, generating additional economic activity for the area. River trail developments have brought in more than 6,900 jobs, which were created on or as a result of protected open space in the five-county region across Pennsylvania. These statewide jobs compensated workers a total of $67 million during the construction period, allowing individuals to spend more on goods and services within the local economy. [406]

The economic activity brought about by the construction and revitalization of the SRT will undoubtedly have a ripple effect across the region. The remaining sections of the Schuylkill River Trail, as it connects to the remainder of the East Coast Greenway along Pennsylvania, New Jersey, and Delaware, are expected to cost more than $239 million in construction over the next several years.[407] As the trail continues to expand, new visitors will become regular users of the trail, tourism is likely to increase, and housing affordability rates will change. While the neighborhoods surrounding the Schuylkill River Trail mostly consist of higher income households, there continue to be areas of disinvestment that have proximity to the river. Because much of the SRT has been undergoing redevelopment on the east side of the river, where households are typically of higher incomes, local residents may experience shifts in their neighborhood landscapes that do not have far-reaching socioeconomic impacts.

However, it continues to remain unclear as to how low-income communities situated predominantly on the west side of the Schuylkill River (where trail development is less active) will be impacted by subsequent investment along the trail. While increased investment in historically low-income neighborhoods has the potential to positively transform the area, there is also the simultaneous threat of gentrification that constantly looms on the periphery. New trail projects should strive to remain cognizant of the needs of the residents in all regions touched by the Schuylkill River and should proactively address any potential negative impacts that may be incurred from increased development.

In allocation of project funding

Because the trail is maintained and operated by a variety of partner organizations, each section of the SRT acquires funding for capital projects through a wide variety of public and private investments. Some of the primary funding sources for the trail come from the William Penn Foundation, the United States Department of Transportation (USDOT), the Pennsylvania Department of Transportation (PennDOT), and a mixture of grants from local, state and federal governments. The Schuylkill River Heritage Association (SRHA) has also invested about $6.2 million in projects related to the planning, development and maintenance of the Schuylkill River Trail over the past two decades.[408] In 2019, over $10 million in federal grants were secured through the City of Philadelphia, many of which will be used towards the continued development of projects over the next several years.[409] Other local community-based organizations, such as the Friends of the Schuylkill River Park, the Schuylkill Action Network, East Falls Development Corporation, and many others have also helped contribute to the investments brought on for the Schuylkill River Trail.

Despite the SRT's impressive collective efforts to receive funding for many monumental trail developments, there are still questions regarding where the funding is being sourced versus where the money is going. Because no singular entity manages the Schuylkill River Trail from beginning to end, it is predictable that some sections of the trail are going to be more developed than others. However, it is clear that some neighborhoods, such as those in Southwest Philadelphia or Norristown,

Pennsylvania, show high indicators of potential disadvantage while also experiencing some of the lowest rates of trail investment overall.[410] There is limited public-facing data as to whether or not more dollars could be placed into lower-income communities that face a greater socioeconomic need for trail access. Some of the primary stakeholder groups leading the SRT development projects may have a greater capacity to fund developments than others, but this has clearly created both direct and indirect disparities along the trail. A more intentional plan to bring equitable financial investment to regions where the trail's access is needed most will have the greatest potential to help close these kinds of gaps in the future.

Conclusion

The SRT serves as an immensely valuable resource for the greater Philadelphia region. Since it has not been fully completed yet and continues to expand, the SRT has the potential to become a form of equitable infrastructure. The inherent relationship between transportation and land use are apparent in this nonmotorized transportation project. The SRT has clear impacts on the communities surrounding it, and therefore, further development needs to be deliberate and considerate of the possible benefits and negative effects it will have on the public, particularly vulnerable populations. The public should be involved and have a say in future SRT projects to ensure that the sections adequately meet the needs of the communities. The trail could use more dollars to increase the area's equitable mobility efforts by funding projects that incorporate universal design elements. This includes improvements to the trail such as adding ramps that make the SRT more wheelchair accessible, improving signage for individuals with sight or hearing differences, and providing relevant trail information in language formats other than English. Finally, more green stormwater infrastructure should be installed along the existing segments and also incorporated into the projects that are in the plan, design, and construction phases. Ensuring equity in transportation projects like the SRT is an on-going process that can be potentially be achieved through intentional planning and development.

Conclusion
Discussion and Recommendations

As each of the case studies showed, equity has been a concern for many different types of transportation projects the DVRPC region, whether it be new sections of a bicycle and pedestrian trail or a billion-dollar highway capacity increase. How the region's transportation leaders have performed in the various dimensions of equity has not stayed constant over time, and while the case studies show improvement over the decades, there are still gaping holes in decision-making that create inequitable transportation outcomes. The overarching issue throughout DVRPC's existence is not that funding auto-oriented transportation and development is inherently bad, or that funding reliable public transit is unquestionably good; it's that too often the balance of the region's transportation benefits have been skewed towards certain populations over others. Even today, the region tends to fund expensive projects that mainly benefit white suburban residents and contribute to sprawling development patterns, such as Direct Connection, while projects that benefit poor or minority residents are not given similar consideration, such as with increasing bus service over rail service with US 422, not creating TOD around PATCO stations, or failing to seriously consider public transit as an alternative for Direct Connection. The scales have been uneven for a long time, and although there has been progress in making them more even, there is a long way to go until balance is achieved.

Analysis and Discussion

In the early years of DVRPC in the 1960s, projects had more blatant equity issues. The creation of projects like I-676 in Camden and NJ-29 in Trenton are brutal examples of decision-makers believing that urban renewal highways were necessary for economic growth. While creating some benefits, the highways bulldozed minority neighborhoods, displaced thousands, and created places where quality of life was much lower due to the elimination of parks and introduction of noise and air pollution. In addition, most economic benefits accrued to white suburban car-owners, while transit had little investment, leaving those without access to cars left out of the economic growth. Even for highways projects that just went through mostly open spaces, such as US 422 and the roadways that make up the Direct Connection interchange (I-76, I-295, and Route 42), the elimination of environmental assets such as farms and wetlands is essentially permanent, harming the long-term health of the region's residents.

Historical public transit projects like PATCO are not immune from equity concerns. While PATCO is a frequent, reliable and crucial transit line for South Jersey, the lack of TOD around its stations, and inadequate public transit connections indicate that it was a line intended and continues to be mainly for suburban commuters. PATCO is a prime example of what the region leaders classify as useful public transit, while frequent and reliable bus service is too often an afterthought. This mindset is on display with US 422 as well, in which there have been many studies for the reintroduction of expensive rail service in the corridor, while little interest in greatly enhancing much cheaper bus service. In projects like NJ-29 and Direct Connection, improving any transit service was not seriously considered as an option.

In more recent years, transportation projects have been increasingly addressing equity concerns more than ever before. There are better, more equitable processes in place that ensure that the harmful effects of past transportation projects are not further perpetuated. The creation of regulations and policies like Title VI, EJ, NEPA, and ADA Compliance essentially forced change that may have not otherwise happened on its own. They all have the common thread of requiring nondiscrimination in transportation projects. As a result, public participation and community outreach are now requirements in project planning, construction, and evaluation. Assessing environmental impacts of transportation projects is now standard. Also, infrastructure is being built more equitably in terms of ensuring accessibility and usability for all individuals regardless of ability. The policy approach to reckoning with past missteps and attempting to prevent future inequities has been transformative for transportation projects, including the ones discussed in this report.

Motorized transportation has historically been viewed as superior and more of a priority over nonmotorized transportation. More modern approaches to transportation projects have been considering how pedestrians and bicyclists fit into the transportation context of larger highway networks and public transit systems. For example, while the NJ-29 project had many flaws, there have been significant efforts toward making Trenton's transportation network more comprehensive. Funding has been allocated to constructing bike facilities, pedestrian infrastructure, and trails, and a "Complete Streets" guide was created and will be published in 2021. Transportation projects specifically dedicated to bicycle and pedestrian planning are becoming increasingly popular. The SRT is one of the most well-known multi-use trails in the

region. It serves as an example of how valuable nonmotorized transportation is to the entire transportation network, as well as the economic, environmental, and social health of surrounding communities. It is important to note that investments in nonmotorized transportation are generally much less expensive in comparison to massive highway projects and intense public transit projects. Pursuing more projects like the SRT are not only less costly but also more equitable in its distribution of benefits to all populations, including those most vulnerable.

While steps are being taken to minimize direct harm, inequities still exist due to a variety of factors. Transportation and land use are intrinsically connected, which is showcased in many of the projects in this report. Proper management of one requires proper management of the other. Overall, transportation projects have such long-lasting effects on equity because of the heavy investment in creating these networks and the permanence of transportation infrastructure. Development has been made to cater to these systems, and altering land use is difficult. Low income and minority populations are still being impacted by the inequities created by past transportation and land use decisions. Such decisions have perpetuated cycles of poverty, isolation, segregation and uneven distribution of benefits and harms. The transportation decisions being made today are less obviously inequitable. Funding and resource allocation are used as tools that can either worsen inequities or rectify past mistakes with disadvantaged populations. The latter should be the priority.

No matter the time period or the project type, equity has been a difficult concept to incorporate into transportation initiatives, and the history of projects funded in the DVRPC region is evidence of this difficulty. However, it is incredibly necessary in order to create a region that works for all residents, not just the few. Evaluating equity in past DVRPC projects through the dimensions of process, protected classes, access, the environment, economics, and funding allows for a nuanced view of these projects to highlight both bad and good decisions.

The results of the analysis show a region improving in equity, but nowhere near where it should be. From the scars of urban renewal that have never been rectified, to the prioritization of the desires of suburban car-owners and commuters, to the investments in roadways over transit, to the creation of a sprawling development patter that harms access and the environment, the area's transportation leaders need to have an urgent paradigm shift in order to create a better region. In the same way that the passage of modern environmental regulations led to changes in DVRPC's improved process and environmental equity outcomes, progress does not just occur on its own. Intentional decisions that are not being made right now by DVRPC, PennDOT, NJDOT, DRPA and others need to start being made, today. Upcoming long-range plans need to integrate these ideas , TIPs should be changed, and new voices incorporated so that all Delaware Valley residents can share in the region's prosperity, and for there to not be repeat of this report again.

Recommendations and Next Steps

The results of the analysis show a region improving in equity, but nowhere near where it should be. From the scars of urban renewal that have never been rectified, to the prioritization of the desires of suburban car-owners and commuters, to the investments in roadways over transit, to the creation of a sprawling development pattern that harms access and the environment, the area's transportation leaders need to have an urgent paradigm shift in order to create a better region. In the same way that the passage of modern environmental regulations led to changes in DVRPC's improved process and environmental equity outcomes, progress does not just occur on its own. Intentional decisions that are not being made right now by DVRPC, PennDOT, NJDOT, DRPA and others need to start being made, today. Upcoming long-range plans need to integrate these ideas, TIPs should be changed, and new voices incorporated so that all Delaware Valley residents can share in the region's prosperity.

Below are some recommendations to help DVRPC create a more equitable transportation system. The recommendations will take different amounts of time, resources, and coordination to accomplish, but will provide some guidance in making a transportations system that works better for everyone.

DVRPC Leadership in Transportation Equity

Using the equity framework discussed in this report, DVRPC should take ownership in furthering transportation equity in the region at all stages of projects. From initial feasibility assessments, to project selection, to public engagement, to construction mitigation, to final completion, DVRPC is in the best position out of any other regional entity to incorporate equity into projects. DVRPC can leverage its skilled employees, and high-quality data, and relationships to create tools and procedures to ensure that current and future projects consider all aspects equity.

On projects such as Direct Connection, incorporating this equity framework would have highlighted the inequitable resource allocation and the lack of deep consideration of public transit, even though there was a quality public engagement process later in the project. In the case of NJ-29, integrating the presented equity framework could have increased public engagement, resulting in additional mitigation efforts in communities with protected classes, and more investments to benefit those without vehicles. While it is undoubtedly not easy politically or logistically to be the primary regional leader for transportation equity, doing so will allow DVRPC to finally begin correcting past mistakes that some people have had been living with for generations.

Public Participation Beyond Legal Requirements

DVRPC should continue its practice of meeting and going beyond the legal requirements for public participation in transportation planning. In recent years, DVRPC has improved its process for public outreach, and typically goes beyond the legal minimum requirements; however, continued improvement in this area would foster more equity.

Legally, DVRPC is required to listen to the public and provide many opportunities for feedback, but DVRPC is not formally required to integrate that feedback into decisions. While DVRPC does frequently integrate community feedback into projects, instances in which the community was

heard but ignored had strong negative impacts with regards to equity, such as in the case of NJ-29 when DVRPC's own citizen's task force called for a less auto-oriented TIP during the planning phases of the Lamberton Tunnel. DVRPC could formalize the role of its citizen task force through voting powers or other methods to ensure that citizen voices are both heard and incorporated into plans and projects.

Throughout these cases studies, it is clear that frequently, even in the best processes, the voices of those who already hold power, such as business leaders in the case of US 422 planning, have a louder voice than the average citizen. In conducting outreach, DVRPC should both be creative about how to make public comment easy for the average citizen, and it should also be sure that responses from those who hold less power are as influential--if not more influential--in final decision-making than those who traditionally have influence.

Require Construction Mitigation at the Beginning of Projects:

While it is best for projects to have as little negative impacts on neighbors during construction, it is inevitable that noise, pollution, and physical obstructions will, to some extent, be a burden for near neighbors during construction phases. In the construction of NJ-29, primarily Black Trenton residents not only dealt with noise and dust pollution, but also had to make costly home repairs, and in the construction of Direct Connection, working-class Bellmawr residents dealt with noise and visual impacts, many of which continued post-construction. Furthermore, in the case of the Lamberton tunnel, alignment decisions allowed this type of study to be skipped. Studying these impacts should be a requirement. By addressing these issues at the beginning of the planning process, including identifying dedicated funding for studying and mitigating construction impact, DVRPC can improve outcomes both during and after construction, especially for those who will be disproportionately impacted who are frequently Black or lower-income.

Transparent and Accessible Final Project Costs

DVRPC should prioritize increasing transparency in the funding sources and final costs for projects, to both themselves and the public. While DVRPC does a great job of clearly showing TIP allocations, the responsibility for the actual payments for projects lies with DOTs and public transportation agencies, and so information on final project costs is not always easily accessible. If DVRPC worked with its agency partners to routinely compile this information into one of its popular online toolkits, then both DVRPC and the public would be able to see how much money is being spent where and could call attention to any inequitable distributions. This compiled information would also highlight the opportunities and constraints of the current funding system and may even provide reasoning to increase the amount of local funding for transportation, which could be used to provide accessibility and economic growth to disadvantaged populations.

Focus on Improving Access and Deemphasize Traditional Congestion Mitigation

Since the advent of the automobile, reducing traffic congestion has been a major concern for transportation leaders across the country. However, decades of research on congestion has shown that increasing highway capacity does not lead to the long-term elimination of congestion, but in fact creates more of it. Instead of the futile prioritization of faster

vehicle movement, DVRPC should focus on projects that improve the fundamental purpose of transportation, which is increasing access to goods and services. While congestion mitigation should continue to play a role in decision-making—especially congestion mitigation which supports construction and improvements to transportation alternatives to private car travel—it should do so only in the context of improving equitable access rather than the narrowly defined goal of reducing highway travel times. This shifting focus to prioritizing access is occurring across the country, and there are great examples like Virginia DOT's SmartScale program that uses a data-driven processes to quantify the increase in access for proposed transportation projects.

Prioritizing access over congestion reduction would have affected projects like Direct Connection, NJ-29, or recent upgrades to US 422, since other alternatives like public transit, walking, or bicycling would be more likely to be considered. As described in the case studies, choosing those alternatives would improve transportation equity by increasing access to goods and services for those without vehicles.

Be a more Forceful Advocate for Integrating Land-Use Planning into Transportation Projects

As the region's Metropolitan Planning Organization, DVRPC understands and prioritizes the importance of integrating land-use and transportation planning. However, the history of the projects evaluated in this report shows that despite DVRPC long-range plans that call for making land-use decisions that would complement transportation projects, projects frequently fail to incorporate these solutions, siloing transportation planning from land-use planning, and not incorporating DVRPC recommendations. As a result, disadvantaged populations such as those without a car, Black and Brown populations, reverse commuters who are often low income, gain fewer benefits from the project. For example, large amounts of parking lots around PATCO stations meant that people without a car and reverse commuters had least access to this public transit system, and that Black and Brown residents of Camden faced adverse environmental effects. Similarly, DVRPC appropriately called for more dense, and mixed-use development around US 422 to mitigate traffic issues in light of that route contributing to further suburbanization of the area and car-dependency which hurt people of color, particularly Black people most. The Schuylkill River Trail case study shows the importance of developing land-use plans alongside the active transportation plan that would mitigate the potential for green gentrification. Because DVRPC is already a leader on integrating land-use and transportation projects, DVRPC can strengthen its advocacy in this area, particularly by strengthening regional partnerships and working with elected officials and government agencies to integrate complementary land-use planning

into transportation planning, decision-making, and funding. DVRPC can call for policy changes that would make it easier to ensure appropriate zoning around transportation projects; it can work with public transit agencies that own land to partner with developers to create transit-oriented development, and it can encourage transportation plans to include land-use planning. These suggestions are not exhaustive for how DVRPC can push for complementary work in land-use and transportation planning, but rather show how this advocacy can take place on many levels.

By taking the above suggested next steps, DVRPC will not only see better equity outcomes in future transportation planning, but also DVRPC will ensure that it does not repeat the problems that exacerbated the injustices reviewed in these five case studies. Implementing these recommendations will require DVRPC to develop specific strategies, strengthen and create regional partnerships, and dedicate resources to further these goals. While these recommendations cannot right all wrongs of the past, or ensure full equity for future generations, by working towards these goals, DVRPC can address the findings found throughout transportation projects in the greater Philadelphia region, across time and across transportation modes. In following these recommendations, DVRPC can set the gold standard for states, municipalities, transit agencies, and MPOs nationwide who are trying to do better for people, particularly for those who have been harmed, continue to be harmed, and reap fewer benefits from the regional transportation system.

Appendix A

(pollution data: BTS)	Grams per mile						
Light-duty vehicles	2002	2003	2004	2005	2006	2007	2008
Total HC	1.506	1.338	1.231	1.116	1.02	0.949	0.881
Exhaust CO	14.672	12.975	11.866	10.714	9.759	9.116	8.457
Exhaust NOx	1.6	1.448	1.342	1.202	1.079	1.034	0.947
Exhaust PM2.5	0.034	0.031	0.028	0.025	0.023	0.021	0.019
Brakewear PM2.5	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Tirewear PM2.5	0.001	0.001	0.001	0.001	0.001	0.001	0.001
C02 (data: EPA)	404	404	404	404	404	404	404
	2002	2003	2004	2005	2006	2007	2008
Ridership (BTS data)	9,288,445	8,863,911	9,150,048	9,361,289	9,376,952	9,406,473	10,337,870
Passenger miles traveled (PMT) (BTS data)	79,825,200	76,419,700	79,551,100	80,676,900	80,695,500	81,896,200	93,480,300
Average trip length (passenger miles/boardings)	8.59	8.62	8.69	8.62	8.61	8.71	9.04
PMT to VMT Conversion Factor (APTA)	33%	33%	33%	33%	33%	33%	33%
Estimated hypothetical VMT sans PATCO	26,342,316	25,218,501	26,251,863	26,623,377	26,629,515	27,025,746	30,848,499
	2002	2003	2004	2005	2006	2007	2008
Hydrocarbons	39,671,528	33,742,354	32,316,043	29,711,689	27,162,105	25,647,433	27,177,528
Exhaust CO	386,494,460	327,210,050	311,504,606	285,242,861	259,877,437	246,366,701	260,885,756
Exhaust NOx	42,147,706	36,516,389	35,230,000	32,001,299	28,733,247	27,944,621	29,213,529
Exhaust PM2.5	895,639	781,774	735,052	665,584	612,479	567,541	586,121
Brakewear PM2.5	79,027	75,656	78,756	79,870	79,889	81,077	92,545
Tirewear PM2.5	26,342	25,219	26,252	26,623	26,630	27,026	30,848
C02	10,642,295,664	10,188,274,404	10,605,752,652	10,755,844,308	10,758,324,060	10,918,401,384	12,462,793,596

Figure 146 PATCO emission reduction calculation 2002-2008

(pollution data: BTS)						
Light-duty vehicles	2009	2010	2011	2012	2013	2014
Total HC	0.862	0.827	0.786	0.77	0.686	0.624
Exhaust CO	7.954	7.48	7.121	6.839	6.228	5.775
Exhaust NOx	0.936	0.917	0.901	0.87	0.772	0.688
Exhaust PM2.5	0.019	0.018	0.017	0.017	0.015	0.014
Brakewear PM2.5	0.003	0.003	0.003	0.003	0.003	0.003
Tirewear PM2.5	0.001	0.001	0.001	0.001	0.001	0.001
CO2 (data: EPA)	404	404	404	404	404	404
	2009	2010	2011	2012	2013	2014
Ridership (BTS data)	10,022,056	10,108,981	10,506,369	10,612,897	10,542,383	10,007,256
Passenger miles traveled (PMT) (BTS data)	90,016,400	89,769,900	93,200,900	93,958,000	93,151,563	88,526,818
Average trip length (passenger miles/boardings)	8.98	8.88	8.87	8.85	8.84	8.85
PMT to VMT Conversion Factor (APTA)	33%	33%	33%	33%	33%	33%
Estimated hypothetical VMT sans PATCO	29,705,412	29,624,067	30,756,297	31,006,140	30,740,016	29,213,850
	2009	2010	2011	2012	2013	2014
Hydrocarbons	25,606,065	24,499,103	24,174,449	23,874,728	21,087,651	18,229,442
Exhaust CO	236,276,847	221,588,021	219,015,591	212,050,991	191,448,818	168,709,983
Exhaust NOx	27,804,266	27,165,269	27,711,424	26,975,342	23,731,292	20,099,129
Exhaust PM2.5	564,403	533,233	522,857	527,104	461,100	408,994
Brakewear PM2.5	89,116	88,872	92,269	93,018	92,220	87,642
Tirewear PM2.5	29,705	29,624	30,756	31,006	30,740	29,214
CO2	12,000,986,448	11,968,123,068	12,425,543,988	12,526,480,560	12,418,966,379	11,802,395,376

Figure 147 PATCO emission reduction calculation 2009-2014

(pollution data: BTS)				
Light-duty vehicles	2015	2016	2017	2018
Total HC	0.557	0.499	0.447	0.389
Exhaust CO	5.314	4.898	4.563	4.183
Exhaust NOx	0.597	0.518	0.448	0.337
Exhaust PM2.5	0.012	0.011	0.01	0.009
Brakewear PM2.5	0.003	0.003	0.003	0.003
Tirewear PM2.5	0.001	0.001	0.001	0.001
C02 (data: EPA)	404	404	404	404
	2015	2016	2017	2018
Ridership (BTS data)	10,169,487	10,653,390	10,839,059	10,789,374
Passenger miles traveled (PMT) (BTS data)	90,716,963	95,238,333	96,952,223	96,375,041
Average trip length (passenger miles/ boardings)	8.92	8.94	8.94	8.93
PMT to VMT Conversion Factor (APTA)	33%	33%	33%	33%
Estimated hypothetical VMT sans PATCO	29,936,598	31,428,650	31,994,234	31,803,764
	2015	2016	2017	2018
Hydrocarbons	16,674,685	15,682,896	14,301,422	12,371,664
Exhaust CO	159,083,081	153,937,527	145,989,688	133,035,143
Exhaust NOx	17,872,149	16,280,041	14,333,417	10,717,868
Exhaust PM2.5	359,239	345,715	319,942	286,234
Brakewear PM2.5	89,810	94,286	95,983	95,411
Tirewear PM2.5	29,937	31,429	31,994	31,804
C02	12,094,385,507	12,697,174,556	12,925,670,370	12,848,720,466

Figure 148 PATCO emission reduction calculation 2015-2018

Figure 149 SRT municpal household income by county, 2000-2019

Municipality	County	2019 Median household income	2015 Median household income	2010 Median household income	2000 Median household income
Amity	Berks	$102,547	$86,481	$79,424	$59,145
Birdsboro	Berks	$64,722	$61,078	$61,679	$52,889
Hamburg	Berks	$56,893	$47,687	$39,815	$37,622
Leesport	Berks	$67,669	$68,214	$53,092	$46,435
Reading	Berks	$32,176	$26,784	$28,197	$26,605
Robeson	Berks	$81,029	$79,766	$75,763	$53,346
Shoemakersville	Berks	$56,708	$47,500	$45,720	$38,190
East Coventry	Chester	$102,009	$79,630	$83,661	$55,819
Phoenixville	Chester	$73,004	$55,642	$61,153	$42,259
Spring City	Chester	$58,673	$45,844	$52,694	$40,445
Conshohocken	Montgomery	$87,241	$73,261	$63,839	$43,914
Norristown	Montgomery	$48,414	$41,856	$43,551	$35,618
Pottstown	Montgomery	$50,331	$43,075	$43,311	$35,543
Royersford	Montgomery	$59,258	$50,828	$49,924	$39,912
Upper Providence	Montgomery	$131,453	$114,397	$107,438	$74,717
West Conshohocken	Montgomery	$120,179	$102,279	$87,768	$55,588
Philadelphia	Philadelphia	$45,927	$38,253	$36,251	$30,431
Auburn	Schuylkill	$45,000	$45,000	$43,819	$36,908
Landingville	Schuylkill	$67,917	$51,750	$51,500	$45,417
Port Clinton	Schuylkill	$48,125	$44,643	$37,857	$30,536
Pottsville	Schuylkill	$42,083	$37,581	$31,772	$29,982

Endnotes

1 Jon Blackwell, "1911: 'Trenton Makes' history", The Trentonian, accessed March 20, 2021, http://www.capitalcentury.com/1911.html.
2 US Census, Decennial Census 1950.
3 Ibid.
4 Sanborn Fire Insurance Map (Map). 1955 Sanborn Fire Insurance Map
5 American Municipal News vol IX No 3 1955, Box 17/Highway Financing, Walter Massey Phillips Papers, SCRC 136, Special Collections Research Center, Temple University Libraries, Philadelphia, Pennsylvania.
6 Ibid.
7 Ibid.
8 Ibid.
9 Ibid.
10 "NJ29 Freeway Overview", Eastern Roads, accessed March 10, 2021, http://www.nycroads.com/roads/NJ-29/.
11 John Sullivan, "Road and Rail- a New Tunnel for Trucks- No Trucks Allowed" New York Times, March 10, 2002.
12 George Harms Construction Company, https://ghcci.com/projects/route-129-sections-10a-11a/
13 John Sullivan, "Road and Rail- a New Tunnel for Trucks- No Trucks Allowed" New York Times, March 10, 2002.
14 David Chen, "Will Finishing a Trenton Highway Finish Riverside Life?" New York Times, July 27, 1997.
15 Sullivan, "Road and Rail- a New Tunnel for Trucks- No Trucks Allowed" 2002.
16 Chen, "Will Finishing a Trenton Highway Finish Riverside Life?" 1997.
17 "Route 29 Waterfront Improvements," New Jersey Department of Transportation, accessed March 10, 2021, https://www.nj.gov/transportation/commuter/roads/route29/route29wi.shtm.
18 Chen, "Will Finishing a Trenton Highway Finish Riverside Life?" 1997.
19 Sullivan, "Road and Rail- a New Tunnel for Trucks- No Trucks Allowed" 2002.
20 Chen, "Will Finishing a Trenton Highway Finish Riverside Life?" 1997.
21 Sullivan, "Road and Rail- a New Tunnel for Trucks- No Trucks Allowed" 2002.
22 New Jersey Department of Transportation, Route 29 Tunnel to Open To Traffic Saturday, March 2 New Traffic Patterns In Area For Monday's Commute, 2002. https://www.state.nj.us/transportation/about/press/2002/022702.shtm.
23 "NJ29 Freeway Overview", Eastern Roads.
24 Ibid.
25 Sullivan, "Road and Rail- a New Tunnel for Trucks- No Trucks Allowed" 2002.
26 Chen, "Will Finishing a Trenton Highway Finish Riverside Life?" 1997.
27 Sullivan, "Road and Rail- a New Tunnel for Trucks- No Trucks Allowed" 2002.
28 ILSR, "Tractor-trailer Ban on Local Roads – New Jersey," Institute for Local Self-Reliance, accessed March 20, 2021, https://ilsr.org/rule/vehicle-limitations/2590-2/.
29 Ibid.
30 John P. McAlpin, "Judge throws out heavy truck ban for secondary roads; McGreevey promises appeal," The Record, March 25, 2004.
31 ILSR, "Tractor-trailer Ban on Local Roads – New Jersey".
32 Ibid.

33 New Jersey Department of Transportation, “Truck Routing.” Accessed April 14, 2021, https://www.state.nj.us/transportation/freight/trucking/routing.shtm.
34 New Jersey Department of Transportation, Route 29 Tunnel to Open To Traffic Saturday, March 2 New Traffic Patterns In Area For Monday’s Commute, 2002.
35 Sullivan, “Road and Rail- a New Tunnel for Trucks- No Trucks Allowed” 2002.
36 Ibid.
37 Ibid.
38 New Jersey Department of Transportation, Route 29 Tunnel to Open To Traffic Saturday, March 2 New Traffic Patterns In Area For Monday’s Commute, 2002.
39 Zillow, 2021
40 Sullivan, “Road and Rail- a New Tunnel for Trucks- No Trucks Allowed” 2002.
41 Chen, “Will Finishing a Trenton Highway Finish Riverside Life?” 1997.
42 Section 1 of P.L.2001, c.45 (C.39:4-197.16), New Jersey Legislature, 2017.
43 Sullivan, “Road and Rail- a New Tunnel for Trucks- No Trucks Allowed” 2002.
44 South Trenton Residents Against 29 v. State of New Jersey 29, No. 98-5226, (1999).
45 Michael Plunket, “In Trenton, a tough road to improvement is near an end”, Philadelphia Inquirer, July 31, 2001, B6.
46 “Morrisville complains it has no say on Trenton Rt. 29 plan”, The Times, 1998.
47 DVRPC, Transportation Improvement Program (TIP) 1996–2000, 2000–2005 (Philadelphia: DVRPC, 1995, 2000).
48 DVRPC, Transportation Improvement Program (TIP) 1996–2000, 2000–2005 (Philadelphia: DVRPC, 1995, 2000).
49 US Census, Decennial Census (1950 to 2010)
50 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
51 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
52 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
53 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
54 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
55 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
56 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
57 New Jersey Dept. of Health - 2014 Mercer County Asthma Profile
58 New Jersey Dept. of Health - 2014 Mercer County Asthma Profile
59 New Jersey Dept. of Health - 2014 Mercer County Asthma Profile
60 Virginia Commonwealth University - Mapping Life Expectancy: Trenton
61 Virginia Commonwealth University - Mapping Life Expectancy: Trenton
62 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
63 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
64 American Municipal News vol IX No 3, 1955.
65 U.S. Census Bureau. Race, 1990. Prepared by Social Explorer, accessed March 10, 2021.
66 Ibid.
67 Ibid.
68 U.S. Census Bureau. Workers 16 Years and Over Means of Transportation To Work, 1990. Prepared by Social Explorer, accessed March 10, 2021.
69 Ibid.
70 Morrisville complains it has no say on Trenton Rt. 29 plan, The Times, 1998.
71 New Jersey Department of Environmental Protection, “Public Access In New Jersey: The Public Trust Doctrine and Practical Steps to Enhance Public Access,” accessed March 10,

021, https://www.state.nj.us/dep/cmp/access/public_access_handbook.pdf.
72 Ibid.
73 Nj S.R. 1074, 218th Legislature (2018). Accessed https://www.njleg.state.nj.us/2018/Bills/S1500/1074_I1.HTM.
74 Ibid.
75 Abbot Marshlands Trails Map (Map), accessed March 10, 2021, https://www.mercercountyparks.org/assets/Abbott-Marshlands-All_Trails_sm.pdf.
76 Mercer County Park Commission, "John A. Roebling Memorial Park," accessed March 10, 2021, https://www.mercercountyparks.org/#!/parks/john-roebling-park-at-abbott-marshlands/.
77 Ibid.
78 Thomas L. Weck et al, "Making the Environmental Process Work: The Trenton Complex," Transportation Research Record 1033, 1985: 93-109.
79 Ibid.
80 Friends for the Marsh, "Cooperative Stewardship Plan," 2010, https://abbottmarshlands.org/wp-content/uploads/2015/11/Marsh_CSP_FINAL_MAR2010_II-reduced-4.pdf.
81 Thomas L. Weck et al, "Making the Environmental Process Work: The Trenton Complex," 1985.
82 Thomas L. Weck et al, "Making the Environmental Process Work: The Trenton Complex," 1985: 99.
83 Ibid.
84 Ibid.
85 W. Passchier-Vermeer and W. F. Passchier, "Noise exposure and public health," Environmental Health Perspectives 108, March 2000.
86 U.S. Bureau of Labor Statistics, "Labor Force Statistics from the Current Population Survey: Series ID LNU04000000," accessed March 10, 2021, https://data.bls.gov/timeseries/LNU04000000?periods=Annual+Data&periods_option=specific_periods&years_option=all_years
87 Ibid.
88 U.S. Bureau of Labor Statistics, "Local Area Unemployment Statistics Map: New Jersey, 2015," accessed March 10, 2021, https://data.bls.gov/lausmap/showMap.jsp.
89 U.S. Census Bureau, Employment, 2000. Prepared by Social Explorer, accessed March 10, 2021.
90 U.S. Bureau of Labor Statistics, "Labor Force Statistics from the Current Population Survey: Series ID LNU04000000."
91 U.S. Bureau of Labor Statistics, "Local Area Unemployment Statistics Map: New Jersey, 2015."
92 U.S. Census Bureau; American Community Survey; 2015 American Community Survey 5-Year Estimates, Unemployment; using data.census.gov.
93 DVRPC Journey-to-Work trends, 1990-2000. https://www.dvrpc.org/Reports/05001.pdf
94 U.S. Census Bureau; 1990 Census; Housing Census, Table 58, 1990.
95 Ibid.
96 DVRPC, Transportation Improvement Program (TIP) 1991–1995 (Philadelphia: DVRPC, 1990)
97 Ibid.
98 DVRPC, Transportation Improvement Program (TIP) 1996–2000, 2000–2005 (Philadelphia: DVRPC, 1995, 2000)

99 DVRPC, Transportation Improvement Program (TIP) 2003 (Philadelphia: DVRPC, 2003)
100 DVRPC, Trenton Area Reverse Commute Options, (Philadelphia: DVRPC, 1997)
101 Morrisville complains it has no say on Trenton Rt. 29 plan, The Times, 1998
102 NJDOT, A Master Plan for Transportation, 1968
103 Ibid.
104 Ibid.
105 Ibid.
106 Edward Collimer, "Trenton Is Getting A 'Complex,' Ending A Long Haul On I-295: Decades In The Making", Philadelphia Inquirer, February 15, 1993
107 DVRPC, Transportation Improvement Program (TIP) Line Item 4182A, 1991–1995
108 Collimer, "Trenton Is Getting A 'Complex,' Ending A Long Haul On I-295: Decades In The Making" 1993
109 Chen, "Will Finishing a Trenton Highway Finish Riverside Life?' July 27, 1997
110 "Making A Pitch: City Tries To Inject Life With New Ballpark", St. Louis Post, 1997
111 NJDOT, A Master Plan for Transportation, 1968
112 "Camden-Trenton: River Line Light Railway Gains Riders, Spurs Economic Development," Light Rail Now, accessed April 3, 2020, https://www.lightrailnow.org/news/n_nj002.htm
113 "FAQ- Getting to BRT: An Implementation Guide for U.S. Cities," ITDP , accessed April 3, 2020, https://www.itdp.org/2019/10/04/faq-getting-to-brt-for-u-s-cities/
114 Max A. Bushell, Bryan W. Poole, Charles V. Zegeer, and Daniel A. Rodriguez "Costs for Pedestrian and Bicyclist Infrastructure Improvements", (Chapel Hill: PBIC, 2013), 25
115 "Costs for Pedestrian and Bicyclist Infrastructure Improvements", 2013, 13
116 Kent Hymel, Kenneth Small, and Kurt Van Dender, "Induced demand and rebound effects in road transport" (Bethesda: TRB, 2010)
117 Collimer, "Trenton Is Getting A 'Complex,' Ending A Long Haul On I-295: Decades In The Making"
118 Large Truck Map (map), 2018, New Jersey Department of Transportation, accessed March 10, 2021, https://www.state.nj.us/transportation/freight/trucking/pdf/largetruckmap.pdf.
119 Federal Motor Carrier Safety Administration, "Large Truck and Bus Crash Facts 2015," accessed March 10, 2021, https://www.fmcsa.dot.gov/safety/data-and-statistics/large-truck-and-bus-crash-facts-2015#A1.
120 New Jersey Department of Transportation, Route 29 Tunnel to Open To Traffic Saturday, March 2 New Traffic Patterns In Area For Monday's Commute, 2002.
121 Sullivan, "Road and Rail- a New Tunnel for Trucks- No Trucks Allowed" 2002.
122 Nj S.R. 3000, 217th Legislature (2018). Accessed https://www.njleg.state.nj.us/2016/Bills/S3000/3000_I1.PDF.
123 Burks, Edward. "Camden: An Exodus of Whites". New York Times. June 25, 1972, 70. https://www.nytimes.com/1972/06/25/archives/camden-an-exodus-of-whites.html
124 J. William Vigrass, The Lindenwold Hi-Speed Line: The First Twenty Years of the Port Authority Transit Corporation, (Palmyra: West Jersey Chapter, National Railway Historical Society, 1990): 6-10.
125 "Delaware Bridge Signaling," Railway Signaling, 1937, accessed online March 22, 2021: https://www.jonroma.net/media/signaling/railway-signaling/1937/Delaware%20River%20Bridge%20Signaling.pdf
126 Vigrass, The Lindenwold Hi-Speed Line, 11.
127 Ibid
128 Ibid, 12-14.

129 Ibid, 20.
130 Ibid
131 Haddonfield Civic Association. “About The HCA.” Haddonfield Civic Association, n.d. https://haddonfieldcivic.com/about-the-hca/.
132 Historical Society of Haddonfield. “History of the Town of Haddonfield.” Historical Society of Haddonfield, n.d. https://haddonfieldhistory.org/about/history-of-the-town-of-haddonfield/.
133 Borough of Haddonfield. “Article VI Historic District.” Borough of Haddonfield, NJ Code, n.d. https://ecode360.com/10201490.
134 “Speed Line Depot Plans Opposed by Haddonfield.” Courier Post, February 21, 1964.
135 Ibid.
136 Vigrass, 1990
137 NBC 10 Philadelphia. “Woman Claims PATCO Problems Forced Her to Quit Her Job.” NBC10 Philadelphia. NBC 10 Philadelphia, December 17, 2013. https://www.nbcphiladelphia.com/local/woman-claims-patco-problems-forced-her-to-quit-her-job/2143806/.
138 Carol Comegno. “Escalator, Elevator Repairs among Complaints from PATCO Riders.” Courier. CHL, February 7, 2014. https://www.courierpostonline.com/story/news/local/south-jersey/2014/02/05/escalator-elevator-repairs-among-complaints-from-patco-riders/5214993/.
139 Ibid.
140 Vince Lattanzio. “Federal Transit Administration Cites PATCO for Broken Escalators, Elevators.” NBC10 Philadelphia. NBC 10 Philadelphia, January 16, 2014. https://www.nbcphiladelphia.com/news/local/federal-transit-administration-cites-patco-for-broken-escalators-elevators/98296/.
141 Ibid.
142 Sarah Glover. “PATCO Awards Maintenance Contract.” NBC10 Philadelphia. NBC 10 Philadelphia, September 19, 2013. https://www.nbcphiladelphia.com/news/local/patco-escalator-repairs/1970668/.
143 “Elevator Installations.” PATCO, n.d. http://www.ridepatco.org/projects/elevators.html.
144 Joseph A. Gambardello. “PATCO to Run Fewer Trains, Close Some Stations Overnig.” https://www.inquirer.com. The Philadelphia Inquirer, May 7, 2019. https://www.inquirer.com/transportation/patco-schedule-change-late-nights-stations-closed-20190507.html.
145 Joseph A. Gambardello. “After Backlash, PATCO Delays Overnight Schedule Changes to Consider Tweaks.” https://www.inquirer.com. The Philadelphia Inquirer, May 8, 2019. https://www.inquirer.com/transportation/patco-schedule-overnight-station-closings-20190508.html.
146 Jason Laughlin. “PATCO Cancels Planned Changes to Late Night Schedule.” https://www.inquirer.com. The Philadelphia Inquirer, May 13, 2019. https://www.inquirer.com/news/patco-train-drpa-late-night-service-20190513.html.
147 “South Jersey Mayors Ask PATCO to Reconsider Late-Night Station Closures.” PhillyVoice, May 7, 2019. https://www.phillyvoice.com/south-jersey-mayor-asks-patco-reconsider-late-night-station-closures/.
148 Ibid.
149 Laughlin, 2019
150 Delaware River Port Authority and Port Authority Transit Corporation, Title VI Program, DRPA/PATCO, March 2019, http://www.ridepatco.org/pdf/TitleVI_Program.pdf.
151 Ibid.
152 US Census, American Community Survey, 2019 (5-Year Estimates).

153 DRPA/PATCO, Title VI Program, 33-34.
154 Ibid., 36-37.
155 "Elevator Installations," PATCO, accessed March 20, 2021, http://www.ridepatco.org/projects/elevators.html.
156 Carol Comengo, "Elevators coming to more PATCO stations," The Courier-Post, May 3, 2017.
157 Vigrass, 1990
158 Ibid.
159 Ibid.
160 "Philadelphia's Poor", Pew Research Center, (Philadelphia, Pew Research Center, 2017), 16–17
161 "PATCO Elevator Installations," PATCO, accessed April 3, 2020, http://www.ridepatco.org/projects/elevators.html
162 National Academies of Sciences, Engineering, and Medicine 2021. An Update on Public Transportation's Impacts on Greenhouse Gas Emissions, (Washington, DC: NASCM, 2021) 1
163 "Greenhouse Gas Emissions from a Typical Passenger Vehicle," EPA , accessed April 3, 2020, https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle
164 "From the Field: Poor and vulnerable bear brunt of climate change," United Nations , accessed April 3, 2020, https://news.un.org/en/story/2021/02/1085272#:~:text=People%20living%20in%20low%2Dincome,the%20UN's%20humanitarian%20office%2C%20OCHA.
165 "An Equitable Water Future Camden", US Water Alliance, (Camden: US Water Alliance, 2019), 7
166 Ihab Mikati, Adam Benson, Thomas Luben et. al, "Disparities in Distribution of Particulate Matter Emission Sources by Race and Poverty Status", American Journal of Public Health, (Bethesda: American Journal of Public Health, 2018) 480–485
167 "Coal-Tar-Based Pavement Sealcoat, PAHs, and Environmental Health," USGS, accessed April 3, 2020, https://www.usgs.gov/mission-areas/water-resources/science/coal-tar-based-pavement-sealcoat-pahs-and-environmental-health?qt-science_center_objects=0#qt-science_center_objects
168 "An Equitable Water Future Camden", 2019, 6
169 "Calculate your stormwater runoff," City of Bothell, accessed April 3, 2020, http://www.ci.bothell.wa.us/1304/Calculate-Your-Stormwater-Runoff
170 "An Equitable Water Future Camden", 2019, 6
171 Casey, Richard. "Lindenwold High Speed Line Cultivates Friends – and Critics". Philadelphia Inquirer. September 6, 1970, 8 https://www.newspapers.com/image/180300282/?terms=Lindenwold%20High%20Speed%20Line%20Cultivates%20Friends&match=1
172 Dickson, Robert, et al. "PATCO Hi Speed Line – Study of Joint Development Opportunities" (Advanced Planning Studio Report, University of Pennsylvania, 1983), 46.
173 Dickson, et al. "PATCO Hi Speed Line – Study of Joint Development Opportunities", 47
174 "Mount Laurel Doctrine", Fair Share Housing Center, accessed March 7, 2021 https://fairsharehousing.org/mount-laurel-doctrine/
175 Boyce, David E., et al. Impact of Rapid Transit on Suburban Residential Property Values and Land Development: Analysis of the Philadelphia – Lindenwold Line (November 1972), 14.
176 An Evaluation of the Economic Impact of the Existing Lindenwold Line. Delaware River Port

Authority. Prepared by Development Research Associates in association with Gannett Fleming Corddry and Carpenter, Inc. and Bellante Clauss Miller and Nolan, Inc. 1972

177 Boyce, David, et al. Impact of Rapid Transit on Suburban Residential Property Values, 2.

178

179 Colimore, E. Near rail stops, transit villages begin to sprout: Collingswood, Haddonfield, and other PATCO towns are looking to capitalize. near rail stops, transit villages begin to sprout. Philadelphia Inquirer, June 21, 2006, ProQuest, http://libproxy.temple.edu/login?url=https://www-proquest-com.libproxy.temple.edu/newspapers/near-rail-stops-transit-villages-begin-sprout/docview/1909241764/se-2?accountid=14270

180 Chatman, Daniel G., et al. "Evaluating the Economic Impacts of Light Rail", 480

181 PATCO Transit-Oriented Development Master Plans Study. (Prepared by Wallace, Roberts & Todd for DRPA and PATCO, 2006), 4, http://www.drpa.org/pdfs/PATCO_TOD_Sum.pdf

182 J. Hayden Boyd, Norman J. Asher, and Elliot Wetzler, Rail Transit System Costs Versus Mid-Year of Construction, Evaluation of Rail Rapid Transit & Express Bus Service in the Urban Commuter Market (Washington, DC: US Department of Transportation), A-42, Google Books

183 Ibid, A-34

184 B. Bruce-Briggs, "Mass Transportation and Minority Transportation," The Public Interest, 40 (New York: National Affairs, Inc., 1975): 43-75.

185 Establishment of a Public Transportation Trust Fund Program with Funds Derived from the Crude Oil Excess Profits Tax: Hearings Before the Subcommittee on Surface Transportation of the Committee on Public Works and Transportation, 69th Cong. (1979) (statement of Robert W. Edgar, Representative in the House of Representatitves from Pennsylvania), 105.

186 Establishment of a Public Transportation Trust Fund Program, 151.

187 Boyd, Asher, and Wetzler, A-51

188 Ma'ayan Dembo, "Off the Rails, Alternatives to Policing on Transit", (Los Angeles: UCLA, 2019), 20

189 Francis Lordan, "Regional Planners Block $1.6 Billion In Transit Projects," Philadelphia Inquirer, December 21, 1973, 1-C – 3-C.

190 Delaware Valley Regional Planning Commission, 1985 Regional Transportation Plan (Philadelphia: DVRPC, 1969): 30.

191 Thomas Lipscomb, Letter to Walter K. Johnson, Executive Director Delaware Valley Regional Planning Commission, August 8, 1969, 1985 Supplemental Analysis No. 1: Estimated Increased Transit Ridership Lindenwold Line Extended to Berlin (Philadelphia, DVRPC, 1969).

192 Delaware River Port Authority, "DRPA Board Completes Approval of 2016 Budgets," DRPA, December 9, 2015, http://www.drpa.org/news/news.asp?param=2&num=6703&Archive=1

193 Peter Mucha, "No love for $5 bridge tolls," Philadelphia Inquirer, July 1, 2011, https://www.inquirer.com/philly/news/breaking/20110701_No_love_for__5_bridge_tolls.html

194 "Overview of Direct Connection", New Jersey Department of Transportation, accessed March 17, 2021, https://www.state.nj.us/transportation/commuter/roads/rt295/.

195 "Christie Administration breaks ground on $900 million Direct Connection project in southern new jersey", Targeted News Service, accessed March 17, 2021, http://libproxy.temple.edu/login?url= https://www-proquest-com.libproxy.temple.edu/newspapers/christie-administration-breaks-ground-on-900/docview/1315901377/se-2?accountid=14270

196 "I-295/I-76/Route 42 Direct Connection Final Environmental Impact Statement/Final Section 4(f) Evaluation", U.S. Department of Transportation, FHWA, NJDOT, December 2008.

197 US Census, Decennial Census (1950-2010)

198 US Census, Decennial Census (1950-2010)

199 The Role of Highways in American Poverty
200 Congress Approves the Federal-Aid Highway Act
201 Howard Gillette, Jr, Camden After the Fall: Decline and Renewal in a Post-Industrial City, (University of Pennsylvania, 2006), p. 69.
202 Gillette, Camden After the Fall: Decline and Renewal in a Post-Industrial City, p. 74.
203 Ibid
204 Gillette, Camden After the Fall: Decline and Renewal in a Post-Industrial City, p. 75.
205 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates
206 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
207 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
208 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
209 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
210 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
211 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
212 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
213 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
214 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
215 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
216 "Christie Administration Breaks Ground on $900 Million Direct Connection Project in Southern New Jersey", Targeted News Service.
217 "Christie Administration Breaks Ground on $900 Million Direct Connection Project in Southern New Jersey", Targeted News Service.
218 "I-295/I-76/Route 42 Direct Connection Project Purpose and Need", NJDOT, 2006.
219 Ibid
220 Ibid
221 Ibid
222 "I-295/I-76/Route 42 Direct Connection Final Environmental Impact Statement/Final Section 4(f) Evaluation", U.S. Department of Transportation, FHWA, NJDOT.
223 Ibid
224 Ibid
225 Ibid
226 "Christie Administration Breaks Ground on $900 Million Direct Connection Project in Southern New Jersey", Targeted News Service.
227 Carol Comegno, "Direct Headache", Courier-Post, September 23, 2014.
228 DVRPC TIP Documents, DVRPC, Various.
229 "I-295/I-76/Route 42 Direct Connection Final Environmental Impact Statement/Final Section 4(f) Evaluation", U.S. Department of Transportation, FHWA, NJDOT.
230 Ibid
231 Dari Kotzker, "Construction Project Will Help Drivers at Interchange of I-295, Route 42 and I-76", NJ Spotlight News, March 11, 2013, https://www.njspotlight.com/ video/construction-project-will-help-drivers-at-interchange-of-i-295-route-42-and-i-76/.
232 "Christie Administration Breaks Ground on $900 Million Direct Connection Project in Southern New Jersey", Targeted News Service.
233 "Overview of Direct Connection", New Jersey Department of Transportation.
234 Kotzker, "Construction Project."
235 "Overview of Direct Connection", New Jersey Department of Transportation.
236 Kotzker, "Construction Project."
237 "I-295/I-76/Route 42 Direct Connection Final Environmental Impact Statement/Final

Section 4(f) Evaluation", U.S. Department of Transportation, FHWA, NJDOT.
238 Ibid
239 Ibid
240 Ibid
241 Ibid
242 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
243 "I-295/I-76/Route 42 Direct Connection Final Environmental Impact Statement/Final Section 4(f) Evaluation", U.S. Department of Transportation, FHWA, NJDOT.
244 "I-295/I-76/Route 42 Direct Connection Project Purpose and Need", NJDOT.
245 "I-295/I-76/Route 42 Direct Connection Final Environmental Impact Statement/Final Section 4(f) Evaluation", U.S. Department of Transportation, FHWA, NJDOT.
246 Ibid
247 "DVRPC TIP Project Benefit Criteria", DVRPC, 2019.
248 Susan Handy, "Increasing Highway Capacity Unlikely to Relieve Traffic Congestion", UC Davis National Center for Sustainable Transportation, 1.
249 Kent Hymel, "If you build it, they will drive: Measuring induced demand for vehicle travel in urban areas", Transport Policy, Volume 76, (2019): 57-66.
250 Anthony Downs, "The Law of Peak-Hour Expressway Congestion", Traffic Quarterly (1962): 393-409.
251 "The Congestion Con", Transportation for America, 2020.
252 Ibid
253 Ibid
254 "Car Access Indicator Tool", National Equity Atlas, 2017, accessed March 17, 2021, https://nationalequityatlas.org/indicators/Car_access#/?breakdown=2&geo=01000000000000000
255 Ibid
256 "I-295/I-76/Route 42 Direct Connection Final Environmental Impact Statement/Final Section 4(f) Evaluation", U.S. Department of Transportation, FHWA, NJDOT.
257 Kevin Riordan, "Saving a Revolutionary Marker", Philadelphia Inquirer, July 5, 2016, https://www.newspapers.com/image/227707489
258 Kevin Riordan, "History, Plowed Through", Philadelphia Inquirer, July 21, 2017, https://www.newspapers.com/image/322849771
259 Ibid
260 Ibid
261 Ibid
262 "I-295/I-76/Route 42 Direct Connection Final Environmental Impact Statement/Final Section 4(f) Evaluation", U.S. Department of Transportation, FHWA, NJDOT.
263 Comegno, "Direct Headache."
264 Ibid
265 Ibid
266 "I-295/I-76/Route 42 Direct Connection Final Environmental Impact Statement/Final Section 4(f) Evaluation", U.S. Department of Transportation, FHWA, NJDOT.
267 Handy, "Highway Capacity", 1.
268 Handy, "Highway Capacity", 1.
269 "DVRPC Long-Range Vision for Freight", DVRPC, 2010.
270 Ibid
271 Ibid

272 "DVRPC TIP Handbook", DVRPC, July 2017.
273 Comegno, "Direct Headache."
274 DVRPC TIP, DVRPC, Various.
275 "FY2018 NJ TIP", DVRPC, 2018.
276 "DVRPC FY2018-2021 TIP for New Jersey", DVRPC, 2018.
277 "North America Electric Bus Market - Growth, Trends, and Forecast (2020 - 2025)", Mordor Intelligence, accessed March 17, 2021, https://www.reportlinker.com/p05986874/North-America-Electric-Bus-Market-Growth-Trends-and-Forecast.html?utm_source=GNW.
278 Carol Comegno, "Glassboro-Camden light rail line proposal may pick up speed", Courier-Post, accessed February 26, 2021, https://www.courierpostonline.com/story/news/2021/02/26/south-jersey-agency-fund-next-phase-glassboro-camden-rail-plan/6749435002/.
279 "422 Pottstown Expressway: Historic Overview". Eastern Roads, accessed 3/12/21. http://www.phillyroads.com/roads/US-422_PA/
280 Ibid
281 "Addressing US 422 Needs: The Highway Component Report". (White Paper, Michael Baker Jr., et al., September 2011), Appendix B 1-4.
282 Wolf, Ron "Pottstown Gains from a Highway", Philadelphia Inquirer, June 17, 1985, https://www.newspapers.com/image/173698266.
283 "Reading to Philadelphia Passenger Rail Analysis", PennDOT, December 2020.
284 Ibid
285 Ibid
286 "Schuylkill Valley Metro Task Force Summary Report", SEPTA & BARTA, November 2007.
287 Ibid
288 Ibid
289 Ibid
290 "R6 Norristown Line Service Extension Study", MCPC & DVRPC, 2008.
291 "US 422 Plus", DVRPC, 2011.
292 Ibid
293 Jim Saksa, "A Long-Shot Plan to Extend Regional Rail to Phoenixville Could Revolutionize How Infrastructure is built", Plan Philly, August 24, 2018, https://whyy.org/articles/a-long-shot-plan-to-extend-regional-rail-to-phoenixville-could-revolutionize-how-infrastructure-is-built/.
294 Evan Brandt, "Phoenixville rail study shows $350M in economic benefits", Pottstown Mercury, July 12, 2020, https://www.pottsmerc.com/news/phoenixville-rail-study-shows-350m-in-economic-benefits/article_ef6bb6b6-c2ec-11ea-9adc-97f38d21091b.html
295 Ibid
296 "Restoring Passenger Rail Service to Berks County", PA, Berks Alliance & GRCA, 2020.
297 "Reading to Philadelphia Passenger Rail Analysis", PennDOT.
298 Ibid
299 Ibid
300 Joseph E. Dougherty, "Pottstown Highway May Be Delayed Again...,"Pottstown Mercury, June 27, 1969, https://www.newspapers.com/image/52527959.
301 Lesley Ciarula, "Area Officials Fight to keep expressway in county plans", Pottstown Mercury, April 2, 1977, https://www.newspapers.com/image/82043860.
302 "Letter writing campaign sought for expressway", Pottstown Mercury, June 9, 1977, https://www.newspapers.com/image/42938519.
303 Making plans for Rte. 422 growth, Henson, R., Philadelphia Inquirer, 1993

304 Ibid
305 Wolf, Ron. “Pottstown gains from a highway – Progress stalled for other areas”. Philadelphia Inquirer, June 17, 1985, https://www.newspapers.com/image/173698266.
306 2019 ACS 5-Year Estimates and 1960 Census, US Census Bureau.
307 United States Census. 2019 ACS 5-Year Estimates.
308 Pottstown Borough Comprehensive Plan. (September 19, 2019).
309 Phoenixville Region Comprehensive Plan. (May 2014 Update), 25
310 “Letter writing campaign sought for expressway”, Pottstown Mercury, June 9, 1977, https://www.newspapers.com/image/42938519.
311 “2019 ACS 5-Year Estimates”, U.S. Census Bureau, 2019.
312 “US 422 Master Plan Summary Report”, DVRPC, 2010.
313 “Board balks at endorsing Pottstown Expressway”, Pottstown Mercury, June 22, 1977, https://www.newspapers.com/image/42944378.
314 Pottstown Expressway opened after 20 years, Hekking, J., Pottstown Mercury, 1985
315 Rte. 422’s land-office business, Shaw, D., Philadelphia Inquirer, 1989
316 Rte. 422 bypass leads to an uncertain future, Naedele, W., Philadelphia Inquirer, 1988
317 Making plans for Rte. 422 growth, Henson, R., Philadelphia Inquirer, 1993
318 “US 422 Plus”, DVRPC, 2011.
319 “US 422 Plus”, DVRPC, 2011.
320 “Traffic Information Repository (TIRe)”, PennDOT, accessed March 1, 2021, https://gis.penndot.gov/tire.
321 “422 Sucks”, Facebook, 2021, https://www.facebook.com/422suck/.
322 Ibid
323 “US 422 Improvements”, PennDOT, 2021, accessed March 5, 2021 https://www.422improvements.com/.
324 “Route Schedules”, PART, 2021, accessed March 18, 2021, http://pottstownarearapidtransit.com/schedules/.
325 “Route 93 Schedule”, SEPTA, 2021, https://www.septa.org/schedules/bus/pdf/093.pdf
326 “Route Schedules”, PART.
327 “PART System Performance Review”, PART, July 18, 2018.
328 “Route Statistics,” SEPTA, 2019.
329 Making plans for Rte. 422 growth, Henson, R., Philadelphia Inquirer, 1993
330 “Census of Agriculture”, USDA, 1964-2017.
331 Ibid
332 “Return on Environment”, DVRPC, 2019.
333 “US 422 Master Plan Summary Report”, DVRPC.
334 “2019 ACS 5-Year Estimates”, U.S. Census Bureau, 2019.
335 Agricultural Conservation Easements- Chester County ALPB”, Chester County, January 15, 2020.
336 “Farmland Preservation Program Annual Summary”, Montgomery County, 2019.
337 “Preservation of Environment Causes New Expressway Delay”, Pottstown Mercury, July 20, 1971, https://www.newspapers.com/image/81530958.
338 Robert Fowler, “Pottstown Highway in Trouble Over Restriction on Park Land”, Philadelphia Inquirer, July 18, 1971, https://www.newspapers.com/image/180072541.
339 “Preservation of Environment”, Pottstown Mercury.
340 Joseph E. Dougherty, “Pottstown Highway”
341 Ibid

342 "Preservation of Environment", Pottstown Mercury.
343 Robert Fowler, "Hearing Set on 3 Oaks Area Road Alternatives", Philadelphia Inquirer, December 3, 1972, p. 3-E, https://www.newspapers.com/image/180320196.
344 William G. Reinecke, "Pottstown Expressway Link Blocked", Pottstown Mercury, September 23, 1976, p. 1 & p. 12, https://www.newspapers.com/image/42407062
345 Ibid
346 Fowler, "Hearing Set".
347 Ibid
348 "2019 ACS 5-Year", U.S. Census, 2019.
349 Wolf, Ron. "Pottstown gains from a highway – Progress stalled for other areas", 8-E
350 Ibid
351 Ibid
352 Pottstown Borough Comprehensive Plan. (Pottstown, May 2014 Update), 90 https://www.pottstown.org/DocumentCenter/View/470/Pottstown-2014--Comprehensive-Plan-?bidId=
353 Hernan, Michael. "NORTHEAST NOTEBOOK: Pottstown, Pa; Highway Spurs 4 Big Projects". The New York Times, Section 10 (August 1989), 16 https://www.nytimes.com/1989/08/20/realestate/northeast-notebook-pottstown-pa-highway-spurs-4-big-projects.html
354 Diamond, Jonathan. "Pottstown Expressway spurs developer activity." Philadelphia Business Journal, vol. 10, no. 10, (May 13, 1991), 8B, Gale General OneFile, link.gale.com/apps/doc/A10938319/ITOF?u=temple_main&sid=ITOF&xid=3dcac903
355 McCormick and Taylor. US 422 Corridor Master Plan. (Prepared by McCormick and Taylor on behalf of DVRPC, 2010) https://www.dvrpc.org/Reports/09035.pdf.
356 Pottstown Borough Comprehensive Plan. (May 2014 Update), 32
357 Pottstown Borough Comprehensive Plan. (May 2014 Update), 27
358 McCormick and Taylor, US 422 Corridor Master Plan, 8
359 "Reading to Philadelphia Passenger Rail Analysis", PennDOT, December 2020.
360 Ibid
361 Ibid
362 "US 422 Improvements", PennDOT.
363 "Schuylkill Valley Metro Task Force Summary Report", SEPTA & BARTA, November 2007.
364 "US 422 Plus", DVRPC, 2011.
365 SRDC, "Revitalizing the Tidal Schuylkill Strategic Plan 2016-2020" (SRDC, 2017), https://www.schuylkillbanks.org/sites/default/files/attachments/SRDC%20Strategic%20Plan%202016-2020.pdf.
366 Ibid.
367 "Rail-Trail History," TrailLink (Rails-to-Trails Conservancy, n.d.), https://www.traillink.com/trail-history/schuylkill-river-trail/#:~:text=The%20trail%20occupies%20a%20former,from%20Philadelphia%20to%20Wilkes%2DBarre.
368 "History of RTC and the Rail-Trail Movement: Rails-to-Trails Conservancy," Rails-to-Trails (Rails-to-Trails Conservancy, n.d.), https://www.railstotrails.org/about/history/.
369 Ibid.
370 "Abandoned Railroad Inventory and Policy Plan" (DVRPC, September 1997), "Rail-Trail History," TrailLink (Rails-to-Trails Conservancy, n.d.), https://www.traillink.com/trail-history/schuylkill-river-trail/#:~:text=The%20trail%20occupies%20a%20former,from%20Philadelphia%20to%20Wilkes%2DBarre, 88.
371 Ibid, 29.
372 Ibid, 31.

373 Ibid, 33.
374 Tina Marshall, Mary Anne Myers, and Monique Thornton, "The Schuylkill River National and State Heritage Area Evaluation Findings," August 2016, https://www.nps.gov/subjects/heritageareas/upload/47144_2016_NHA_ReportsSchuylkill-V7a-082516-PRINT.pdf, 4.
375 Ibid, 6.
376 "History: A Brief History of the Lower Schuylkill," Schuylkill Banks (SRDC, August 26, 2020), https://www.schuylkillbanks.org/history.
377 SRDC, 2017.
378 "History of Fairmount Park Conservancy," Fairmount Park Conservancy, March 5, 2020, https://myphillypark.org/who-we-are/history/.
379 Tomes and Knoch, "Schuylkill River Trail 2009 User Survey and Economic Impact Analysis", 5.
380 "History of Fairmount Park Conservancy," Fairmount Park Conservancy, 2020
381 "MDC/MSSD," Manayunk (Manayunk Development Corporation, n.d.), http://manayunk.com/about/mdc-mssd.html.
382 Ibid.
383 "Trail Partners," Schuylkill River Greenways (SRGA, April 5, 2020), https://schuylkillriver.org/schuylkill-river-trail/trail-partners/.
384 Tomes and Knoch, "Schuylkill River Trail 2009 User Survey and Economic Impact Analysis", 5.
385 "Trail Partners," Schuylkill River Greenways, 2020.
386 "Inclusionary Trail Planning Toolkit: A Guide to Planning and Programming Equitable Trail Networks" (Pennsylvania Environmental Council, 2018), https://pecpa.org/wp-content/uploads/Inclusive-Trail-Report.pdf , 5.
387 Ibid.
388 DVRPC. Return on Environment: The Economic Value of Protected Open Space in Southeastern Pennsylvania. 2011, 13.
389 Federal Emergency Management Agency, Building Community Resilience with Nature-Based Solutions. 2019. https://www.fema.gov/sites/default/files/2020-08/fema_riskmap_nature-based-solutions-guide_2020.pdf
390 "Benefits of Greenways," Greenways, Inc., n.d., http://www.greenways.com/benefits-of-greenways#:~:text=The%20protection%20of%20open%20spaces,billion%20in%20flood%20damages%20annually.
391 "Investing in Our Future: Quantifying the Impact of Completing the East Coast Greenway in the Delaware River Watershed" (East Coast Greenway Alliance, 2017), https://www.greenway.org/uploads/attachments/cjtonj33o1zqb23qijb3fza0l-ecg-in-the-delaware-valley-report-final-reduced.pdf.
392 "Return on Environment: The Economic Value of Protected Open Space in Southeastern Pennsylvania" (DVRPC, January 2011), https://www.dvrpc.org/reports/11033A.pdf, 4.
393 East Coast Greenway Alliance, 2017.
394 "Create Safe Places to Walk and Bike During COVID-19: Rails-to-Trails Conservancy" (Rails-to-Trails Conservancy), accessed April 5, 2021, https://www.railstotrails.org/take-action/createsafeplaces/.
395 DVRPC, Return on Environment, 2011.
396 "The Potential Economic Impacts of the Completed Expansion of Schuylkill Banks." (Econsult, Schuylkill River Development Corporation, 2017). https://www.schuylkillbanks.org/sites/default/files/attachments/Economic%20Impact%20of%20Schuylkill%20

Banks%202017.pdf
397 "2019 Annual Report." (East Coast Greenway, 2019) https://www.greenway.org/uploads/attachments/ckbuuf5z0id20svqiv0xhpvww-2019-annual-report.pdf, 8.
398 SRDC, 2017.
399 "30th Street Station Master Plan" (District 30, 2016) https://static1.squarespace.com/static/539b050fe4b077b40b221f4f/t/57694caaff7c5085d0a3de31/1466518722881/District+Plan+Final+Report_June2016_8.5x11_web.pdf, 9.
400 "Evaluating the Economic Contribution of Shared Use Paths in NC" (North Carolina State, 2016) https://itre.ncsu.edu/focus/bike-ped/sup-economic-impacts/.
401 SRDC, 2017.
402 30th Street Station, 2016.
403 SRDC, 2017.
404 DVRPC, 2011.
405 SRDC, 2017.
406 SRDC, 2017.
407 East Coast Greenway, 2019, 3.
408 "(Re)Turn to the River." (SRHA, 2016) https://www.yymz.net/wp-content/uploads/2018/02/SRHA-Return-to-the-River-Strategic-Plan-FINAL.pdf.
409 "Philadelphia Trail Plan: 2020 Update" (City of Philadelphia, 2020) https://www.phila.gov/media/20201230212117/2020_TrailPlan_Update-12-30-20.pdf.
410 DVRPC IPD, 2021.
411 Philadelphia Tribune Ad, 1996.
412 US Census, Decennial Census 1950-2010
413 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
414 New Jersey Dept. of Health - 2014 Mercer County Asthma Profile
415 New Jersey Dept. of Health - 2014 Mercer County Asthma Profile
416 Virginia Commonwealth University - Mapping Life Expectancy: Trenton
417 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
418 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
419 Catalina Jaramillo, "Franklin Square Station to reopen," Philadelphia Tribune, November 13, 2015, ProQuest.
420 "Franklin Square Station Reopening," PATCO, accessed March 19, 2021, http://www.ridepatco.org/projects/franklin-square-station.html
421 Harry Kyriakodis, Underground Philadelphia: From Caves and Canals to Tunnels and Transit (Charleston: History Press, 2019), 186
422 Steve Metraux, "Digging Up Vine Street in Search of Old Skid Row," Hidden City, April 26, 2017, https://hiddencityphila.org/2017/04/digging-up-vine-street-in-search-of-old-skid-row/
423 Ibid.
424 "Station at Franklin Square," Philadelphia Inquirer, May 19, 1939.
425 Francis Lordan, "Franklin Sq. Station Will Become Stop on N.J. High-Speed Line," Philadelphia Inquirer, May 13, 1969, Metropolitan Page.
426 Paul Nussbaum, "$18.5M cost to reopen PATCO stop, study finds: The Franklin Square station closed in 1979," Philadelphia Inquirer, March 17, 2015, ProQuest.
427 Kyriakodis, Underground Philadelphia, 185.
428 Kevin Riordan, "PATCO's Franklin Square station reboot could be right on time," Philadelphia Inquirer, September 28, 2018, Gale General OneFile.
429 US Census, American Community Survey, 2019 (5-Year Estimates).

430 Ibid.
431 Bureau of Transportation Statistics, Emissions and Ridership Data, 2002-2018
432 "Greenhouse Gas Emissions from a Typical Passenger Vehicle," EPA
433 Chatman, Daniel G., et al. "Evaluating the Economic Impacts of Light Rail by Measuring Home Appreciation: A First Look at New Jersey's River Line," Urban Studies 49(3) (February 2012), 477. Sage 434 Boyd, Asher, and Wetzler, 37
435 Mango Downing, "Tel-A-Tran, Moving by Summer?" Philadelphia Tribune, April 15, 1975
436 Ibid
437 Ibid.
438 Ibid.
439 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
440 ibid
441 U.S. Census, Median Income, 1980. Prepared by Social Explorer, accessed March 20, 2021
442 "Limerick Population", Limerick Township Historical Society, last modified September 11, 2016, http://www.limerickpahistory.org/population.html
443 U.S. Census, Median Income, 2019. Prepared by Social Explorer, accessed March 20, 2021
444 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
445 U.S. Census Bureau, Median Home Values, 1970. Prepared by Social Explorer, accessed March 14, 2021
446 U.S. Census Bureau, Median Home Values, 2019. Prepared by Social Explorer, accessed March 14, 2021
447 U.S. Census, Jobs, Prepared by On the Map, accessed March 22, 2021
448 Ibid, 32-33.
449 US Census, American Community Survey (ACS) 2015-2019 (5-Year Estimates)
450 "Trail Towns," Schuylkill River Greenways, January 15, 2019, https://schuylkillriver.org/schuylkill-river-trail/trailtowns/.
451 "Trail Towns," Schuylkill River Greenways, January 15, 2019, https://schuylkillriver.org/schuylkill-river-trail/trailtowns/.
452 Patricia Tomes and Carl Knoch, "Schuylkill River Trail 2009 User Survey and Economic Impact Analysis" (Rails-to-Trails Conservancy, November 2009), https://www.railstotrails.org/resourcehandler.ashx?name=schuylkill-river-trail-2009-user-survey-and-economic-impacts&id=3520&fileName=Schuylkill%20River%20Trail%20Users%20Survey_Final_low%20res.pdf, 5.

453 "Center City Trail," Schuylkill Banks (SRDC, June 3, 2020), https://www.schuylkillbanks.org/projects/center-city-trail.
454 "Weekend Trip on the 'Completed' Schuylkill River Trail," Schuylkill Banks (SRDC, March 12, 2020), https://www.schuylkillbanks.org/blog/weekend-trip-completed-schuylkill-river-trail.
455 Ibid.
459 "SmartScale Technical Guide". Virginia Department of Transportation, 2018.