STATE ROUTE 885/SECOND AVENUE MULTIMODAL CORRIDOR STUDY

Final Report

12.23.2019

Southwestern Pennsylvania Commission

2019

Officers

Chairman: Larry Maggi
Vice Chairman: Rich Fitzgerald
Secretary-Treasurer: Tony Amadio

Executive Director: James R. Hassinger

Allegheny County
Rich Fitzgerald
Lynn Heckman
Clifford Levine
Robert J. Macey
David Miller

Armstrong County
Darin Alviano
Pat Fabian
Richard Palilla
Jason L. Renshaw
George J. Skamai

Beaver County
Tony Amadio
Daniel Camp
Sandie Egley
Kelly Gray
Charles Jones

Butler County
Kevin Boozel
Kim Geyer
Mark Gordon
Richard Hadley
Leslie A. Osche

Fayette County
Joe Grata
Fred Junko
Dave Lohr
Vincent A. Vicites
Angela Zimmerlink

Greene County
Dave Coder
Jeff Marshall
Robbie Matesic
Archie Trader
Blair Zimmerman

Indiana County
Michael Baker
Sherene Hess
Mark Hilliard
Rodney D. Ruddock
Byron G. Stauffer, Jr.

Lawrence County
Steve Craig
Robert Del Signore
James Gagliano
Amy McKinney
Daniel J. Vogler

Washington County
Larry Maggi
Scott Putnam
Harlan Shober
Diana Irey-Vaughan
Christopher Wheat

Westmoreland County
Charles W. Anderson
Robert J. Brooks
Tom Ceraso
Gina Cerilli
Ted Kopas

City of Pittsburgh
Scott Bricker
Rev. Ricky Burgess
William Peduto
Mavis Rainey
Aurora Sharrard

Pennsylvania Department of Transportation (2 Votes)
Joseph Dubovi
Kevin McCullough
Cheryl Moon-Sirianni
Larry Shifflet
Joe Szczur

Governor's Office
Jessica Walls-Lavelle

Pennsylvania Department of Community & Economic Development
Johnna Pro

Port Authority of Allegheny County (1 Vote)
Katharine Kelleman
Ed Typanski

Transit Operators Committee
Sheila Gombita

Federal Highway Administration*
Alicia Nolan

Federal Transit Administration*
Theresa Garcia-Crews

U.S. Environmental Protection Agency*
Laura Mohollen

Federal Aviation Administration*

U. S. Economic Development Administration*

*Nonvoting Members

The preparation of this publication was financed in part through grants from the United States Department of Transportation's Federal Highway Administration and Federal Transit Administration; the U.S. Department of Commerce; the Appalachian Regional Commission; the Commonwealth of Pennsylvania; the Department of Transportation of the Commonwealth of Pennsylvania; and, the counties of Allegheny, Armstrong, Beaver, Butler, Fayette, Greene, Indiana, Lawrence, Washington, Westmoreland, and the City of Pittsburgh. The views and opinions of the authors or agency expressed herein do not necessarily state or reflect those of these agencies.

State Route 885/Second Avenue Multimodal Corridor Study

Final Report

12.23.2019

Prepared for:

Southwestern Pennsylvania Commission
Two Chatham Center, Suite 500
112 Washington Place
Pittsburgh, PA 15219

In Association with the Project Steering Committee:
The Pennsylvania Department of Transportation
The City of Pittsburgh
Allegheny County
The Port Authority of Allegheny County
Hazelwood Initiative

Prepared by:

Whitman, Requardt and Associates, LLP
2009 Mackenzie Way, Suite 240
Cranberry Township, PA 16066

In Association with:
Renaissance Planning Group, Inc.
Moore Design Associates
The Markosky Engineering Group, Inc.

Credit/Disclaimer

This report was funded in part through grant(s) from the Federal Highway Administration and U.S. Department of Transportation. The views and opinions of the authors (or agencies) expressed herein do not necessarily state or reflect those of the U.S. Department of Transportation.

Special thanks to the members of the Steering Committee and stakeholders who guided the development of this plan:

Steering Committee

Pennsylvania Department of Transportation
Cheryl Moon-Sirianni, District Executive
Todd Kravits, District Traffic Engineer
Frank Cippel, Assistant District Traffic Engineer

Allegheny County Department of Economic Development
Ann Ogoreuc, Assistant Director of Mobility and Transportation Initiatives

Port Authority of Allegheny County
Amy Silbermann, Director of Planning

City of Pittsburgh Department of Mobility and Infrastructure
Karina Ricks, Director
Angela Martinez, Transportation Planner
Mike Panzitta, Transportation Planner

City of Pittsburgh Department of City Planning
Andrea Lavin Kossis, Riverfront Planning & Development Coordinator
Ose Akinlotan, Community Planner

Hazelwood Initiative
Sonya Tilghman, Executive Director

Additional Stakeholders

- Allegheny Conference on Community Development
- Allegheny Trail Alliance
- Bike PGH
- Bike SWPA
- Carload Express
- Carnegie Mellon University
- Carnegie Museums
- Center of Life Hazelwood
- City of Pittsburgh District 3 Councilman Bruce Krauss
- City of Pittsburgh District 5 Councilman Corey O'Connor
- Community Kitchen Pittsburgh
- Council of Three Rivers American Indian Center
- Dylamato's Market
- Friends of the Riverfront
- Furnace2Furnace
- Greater Hazelwood Community Collaborative
- Greenfield Community Association
- Hazelwood Carnegie Library
- Hazelwood Green
- Hazelwood Towers
- Hazelwood Youth Mentorship
- Healthy Ride
- Heinz Foundation
- Homestead Borough
- Innovate Pittsburgh
- Jewish Federation of Greater Pittsburgh
- Oakland Business Improvement District
- Oakland Planning and Development Corporation
- Oakland Transportation Management Association
- PA District 19 State Representative Jake Wheatley
- PA District 43 State Senator Jay Costa
- PA Department of Conservation & Natural Resources
- Peoples Oakland
- Pittsburgh Community Reinvestment Group
- Pittsburgh Parking Authority
- Pittsburgh Parks Conservancy
- Pittsburgh Urban Redevelopment Authority
- Pittsburghers for Public Transit
- Propel Schools
- Shadyside Complete Streets
- Sierra Club
- SouthSide Works
- Squirrel Hill Urban Coalition
- Steel Dynamics, Inc.
- St. Stephen Parish
- Trying Together
- University of Pittsburgh
- Uptown Partners

TABLE OF CONTENTS

LIST OF EXHIBITS

LIST OF APPENDICES

This page intentionally left blank

State Route 885/Second Avenue Multimodal Corridor Study

SECTION 1. Executive Summary

This page intentionally left blank

SECTION 1. Executive Summary

INTRODUCTION

OVERVIEW AND STUDY AREA

The Southwestern Pennsylvania Commission (SPC) initiated this planning study to explore existing multimodal transportation needs, future trends, and potential improvement strategies along the State Route (SR) 885 and Second Avenue corridor in the City of Pittsburgh, Allegheny County. Specifically, the study corridor spans Second Avenue from the 10th Street Bridge in the Bluff neighborhood, south through South Oakland, Greenfield, and Hazelwood, to a southern terminus at its intersection with SR 837 in Hays (*Exhibit 1-1*). The overall study corridor spans approximately five miles and includes connections to Oakland via SR 885/Bates Street between Second Avenue and the Boulevard of the Allies.

Exhibit 1-1: Study Area Location Map

PROJECT STEERING COMMITTEE AND VISION

SPC conducted this study effort in partnership with a broader project Steering Committee comprised of key staff from SPC, the Pennsylvania Department of Transportation (PennDOT), the Hazelwood Initiative, Allegheny County, the Port Authority of Allegheny County (PAAC), and the City of Pittsburgh. The Steering Committee recognized that the SR 885/Second Avenue corridor is one of both local and regional significance. Locally, it serves as the key transportation link for residents, community activities, businesses, services, and industry sites directly along the corridor and throughout the adjacent neighborhoods. Regionally, it has been identified as a corridor of significance for the City and the County connecting the communities of the Lower Monongahela River Valley and the South Hills with major job centers in Oakland, South Side, and Downtown.

Additionally, the study corridor is expected to experience a significant amount of growth through development sites that include the Hazelwood Green (Almono) development, the Carrie Furnace site in Rankin, continued growth at the Homestead Waterfront, Pittsburgh Technology Center, SouthSide Works, and within the Hazelwood commercial district. It is, therefore, critical from an economic development and community/quality of life standpoint that the impacts of these developments are considered when planning for the overall vision of this corridor. Within this context, the following Vision Statement was developed by the Steering Committee for the SR 885/Second Avenue Multimodal Corridor Study:

"The study should make recommendations that will improve safety and mobility for all travel modes and are supportive of existing neighborhoods and planned land use context along the corridor."

PROJECT GOALS AND STRATEGIES

The Vision Statement for this study echoes the regional vision provided in SPC's recently completed Long Range Plan, SmartMoves for a Changing Region. SmartMoves includes the regional goal of having a "world class, safe, and well maintained integrated transportation system that provides mobility for all." This plan also emphasizes that the region must continue to focus on a Vision Zero safety goal for all transportation users.

In support of the regional and project visions, and based on Steering Committee guidance, study goals included the exploration of long-term improvements to manage congestion and delays through multimodal strategies that:

- Focus on decreasing the prevalence of single-occupancy vehicle trips.
- Provide the mobility services and facilities necessary to enable growth and development in neighborhoods along the corridor including rapid, reliable, sustainable and resilient travel choices to Downtown Pittsburgh and other regional destinations.
- Encourage bicycle travel along the corridor (although not necessarily on SR 885/Second Avenue) on a complete trail network.
- Increase the use of transit, carpool, and other modes throughout the corridor.
- Preserve and enhance local quality of life and economic prosperity along the corridor.
- Promote compact land development patterns and infill development in developed areas, as per local land use plans.
- Promote solutions that are contextual to the changing character of adjacent land uses along the state route.

Stakeholder and public outreach was integrated throughout the planning process to confirm, expand, and refine the perspectives articulated by the draft project vision, goals, and strategies.

TRANSPORTATION NEEDS

The Existing Conditions section of this report (Section 2) details the existing motorized and non-motorized transportation network along the corridor, current travel patterns, mode share, and crash analysis, along with previous and ongoing studies and relevant projects. Data and maps from the Existing Conditions Report were presented to invited stakeholders and the public in February 2019, with the opportunity to indicate locations in need of improvements and communicate their thoughts on transportation needs in the corridor. An online survey and interactive Wikimap were available after the meeting to allow additional public input on transportation needs along the corridor.

Public input is summarized in the Alternatives Analysis Report (Section 3), and covers a range of topics, including missing bicycle and pedestrian connections, vehicle congestion, signal timing concerns, transit route and service limitations, safety concerns, and lack of access for local residents. Not all respondents agreed in their assessment of transportation needs. Some respondents, for example, advocated for widening the roadway through the Hazelwood Business District in order to alleviate south-bound congestion in the afternoon rush hour. Others strongly supported no changes to the sidewalks and on-street parking in the business district, so as not to impact the viability of local businesses. Some respondents specifically requested adding bike lanes to SR 885/Second Avenue, while others strongly opposed such a change.

In analyzing transportation in the SR 885/Second Avenue corridor, it is important to consider the geographic constraints that limit connections to the corridor, much like a limited-access interstate. Steep hillsides, limited bridges across the Monongahela River, multiple railroads, and Interstate 376 combine to create a relatively closed system that limits travel for all modes into and out of the corridor. Many of the recommended transportation improvements focus on improving those pinch points or creating new connections to improve access for all modes.

A Technical Charrette was held in April 2019 where a group of 21 planners, engineers and community members with experience in transit, Complete Streets, bicycle/pedestrian, and traffic operations met to brainstorm solutions to the transportation needs of the SR 885/Second Avenue corridor. The group focused on analyzing the regional transportation network to create new connections and improve transit services to meet travelers' needs while improving congestion, as well as smaller-scale improvements with big impacts, such as bicycle/pedestrian connections and intersection improvements. The resulting proposed transportation improvements were presented to the public at a meeting in May 2019, with opportunities for public comment during the meeting and after the meeting using an online survey.

FINAL PLAN

Following additional refinement in response to public input, the final transportation improvements were presented to stakeholders and the public in July 2019. The Final Plan (Section 4) details these recommendations, which are summarized as: Bicycle and Pedestrian Improvements (*Exhibit 1-2*), Transit Improvements (*Exhibit 1-3*), Roadway Improvements (*Exhibit 1-4*), and Improvement Summary Table (*Exhibit 1-5*).

Exhibit 1-2: Final Plan – Bicycle and Pedestrian Improvements

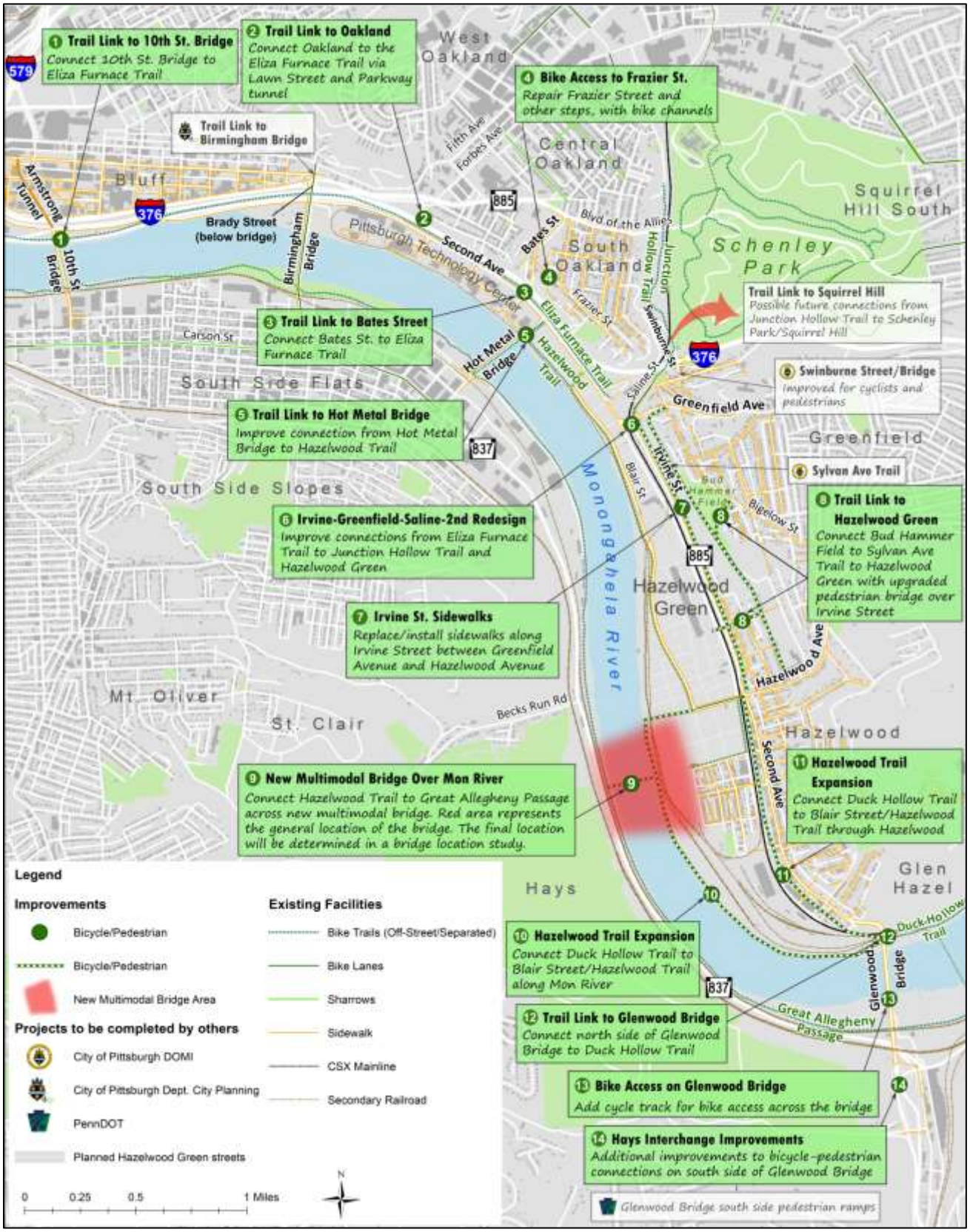


Exhibit 1-3: Final Plan – Transit Improvements

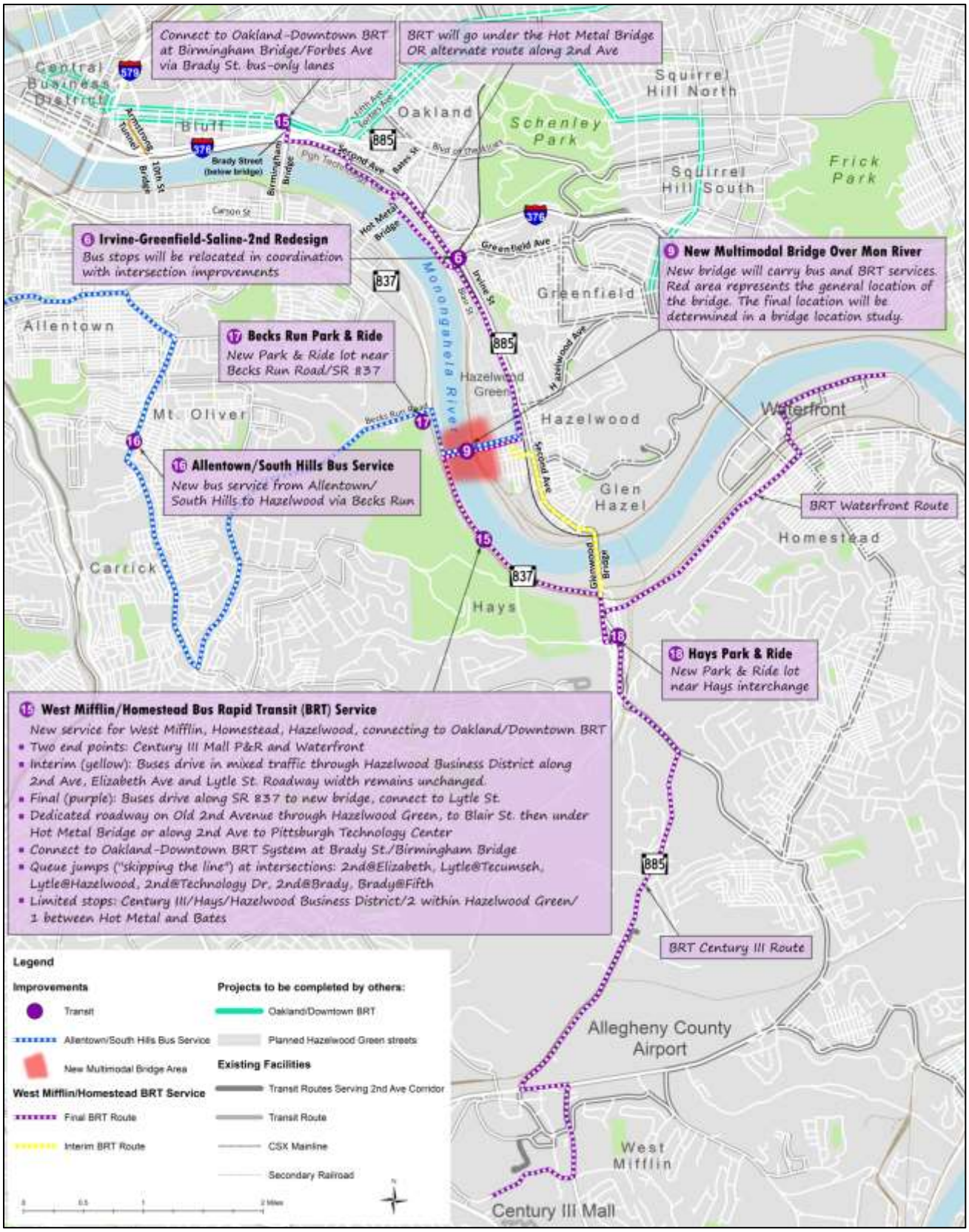


Exhibit 1-4: Final Plan – Roadway Improvements

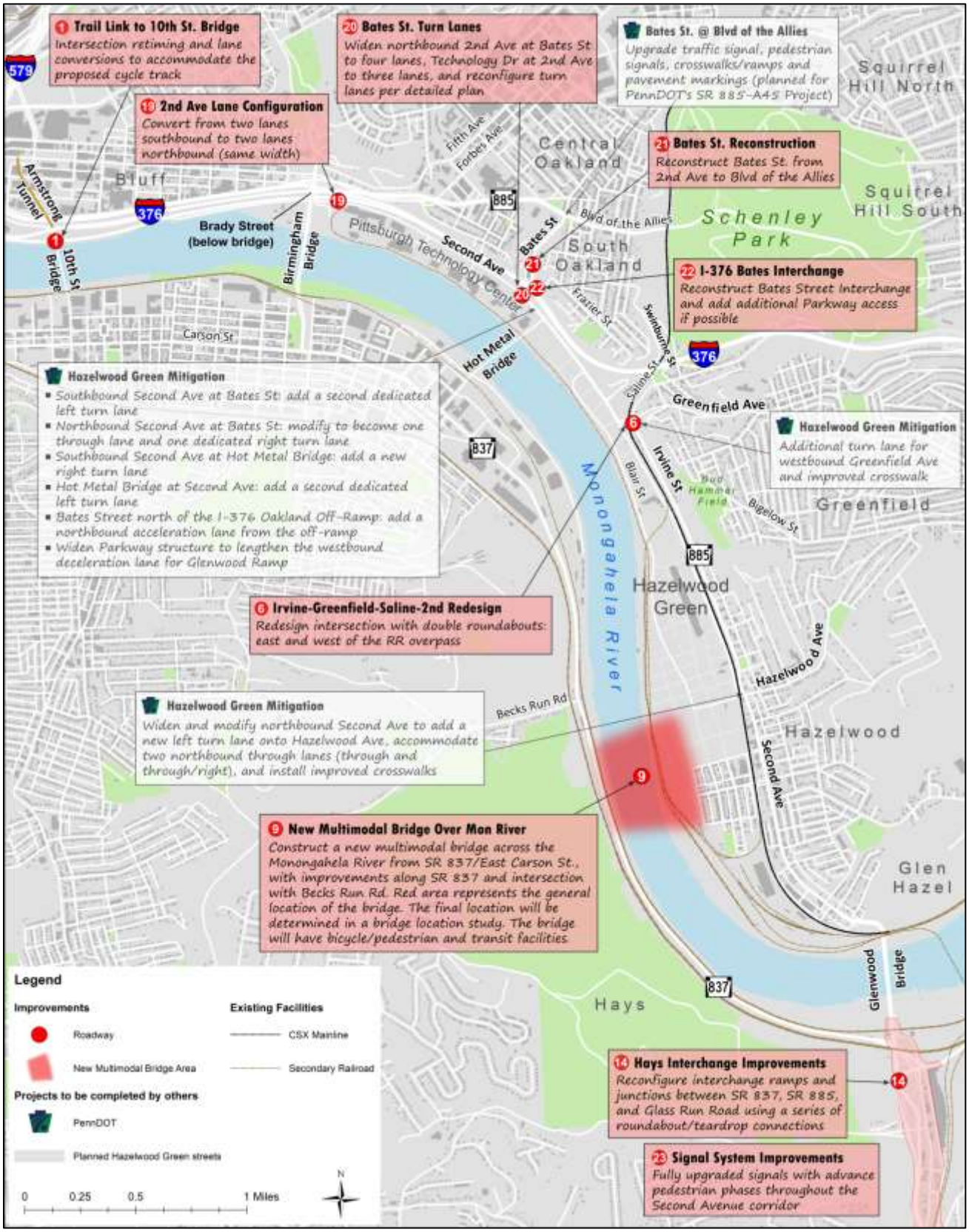


Exhibit 1-5: Final Plan – Improvement Summary Table

Project	Page 4-2	Page 4-3	Page 4-4	Name	Detail Page	Timeframe [a]	Cost Range [b] ($ Millions)
1				Trail Link to 10th St. Bridge	4-9	Short	$0.5M - 0.6M
2				Trail Link to Oakland [c]	-	Medium	$11.5M - 13M
3				Trail Link to Bates Street	4-11	Medium	*Included in #20*
4				Bike Access to Frazier St.	-	Short	$2M - 2.5M
5				Trail Link to Hot Metal Bridge	4-11	Medium	*Included in #20*
6				Irvine-Greenfield-Saline-2nd Redesign	4-13	Medium/Long	$12M - 14M
7				Irvine St. Sidewalks	-	Short/Medium	$1.8M - 2.3M
8				Trail Link to Hazelwood Green	-	Medium	$12M - 13.5M
9				New Multimodal Bridge Over Monongahela River	4-15	Long	$85M - 115M
10				Hazelwood Trail Expansion - Monongahela River	4-17	Long	$17M - 20M
11				Hazelwood Trail Expansion - Hazelwood	4-17	Medium	$2.5M - 3M
12				Trail Link to Glenwood Bridge [c]	-	Long	$7.5M - 9M
13				Bike Access on Glenwood Bridge	4-18	Long	*Included in #14*
14				Hays Interchange Improvements	4-18	Long	$19M - 22M
15				West Mifflin/Homestead BRT Service [d] [e]	4-6, 4-11	Medium	$23M - 27M *(+ $9M - 11M per yr)*
16				Allentown/South Hills Bus Service [d] [e]	-	Medium	$12.5M - 15M *(+ $6M - 8M per yr)*
17				Becks Run Park-and-Ride	-	Medium	$6.5M - 8M
18				Hays Park-and-Ride	4-18	Medium	$10M - 12M
19				2nd Ave Lane Configuration [f]	-	Short	$0.6M - 0.7M
20				Bates St. Turn Lanes	4-11	Medium	$9.5M - 11M
21				Bates St. Reconstruction	4-11	Long	$32M - 35M
22				I-376 Bates Interchange [c] [g]	-	Long	$10.7M (*PennDOT*) $2.3M (*Study*)
23				Signal System Improvements [h]	-	Short/Medium	$4M - 5M *(Upgrade)* $9.5M - 11M *(Replace)*

Table Notes:

(a) Timeframes were estimated as Short-Term ≈ 1-6 years; Medium-Term ≈ 6-12 years; and Long-Term > 12 years.

(b) Funds are not programmed; costs reflect rough order-of-magnitude estimates only, pending future feasibility studies (by others).

(c) Costs for Projects 2, 12, and 22 are partially derived from Phase 2 of the Parkway East Corridor study (PennDOT, 2018).

(d) Costs for Projects 15-16 summarize initial capital/implementation costs plus estimated annual transit operating expenses.

(e) Costs for Projects 15-16 exclude relevant components that may be captured by other project estimates (e.g. #9, #17-18, #20).

(f) Costs for Project 19 assume mill & overlay of the existing roadway; upgrades to markings only may be an option at < $50k.

(g) Costs for Project 22 assume $10.7M from (c), plus $2.3M for additional interchange alternatives analysis/feasibility studies only.

(h) Costs for Project 23 include separate ranges for minor/major equipment upgrades versus broader equipment/pole replacements.

These improvements will operate as an integrated multimodal system that will improve mobility and access for people and freight traveling to, from, and through the study area. These improvements address the study's goals by:

- Reducing single-occupant-vehicle traffic along SR 885/Second Avenue by offering Bus Rapid Transit (BRT) with convenient, fast service as an option connecting the study area with Downtown and Oakland as well as commuters from the South Hills passing through the corridor.
- Adding an additional connection to the SR 885/Second Avenue corridor with a new multimodal bridge, which would improve transit operations, improve the quality of life for Hazelwood by reducing traffic along SR 885/Second Avenue and allowing full time parking on both sides of the street, and providing a direct connection to the Greater Allegheny Passage trail from Hazelwood.
- Improving mobility for all modes of travel at major intersections that act as critical pinch points for both non-motorized and motorized traffic along the corridor: Irvine Street/ Greenfield Avenue/Saline Street/Second Avenue, Second Avenue/Bates Street/ Pittsburgh Technology Center, and Glenwood Bridge/Hays Interchange.
- Improving bicycle and pedestrian connections and safety by providing a set of additional links to allow for continuous off-street/separated trail access and various safety improvements.

This set of recommended improvements, when compared to a situation where no improvements have been made, **improves performance** of the SR 885/Second Avenue corridor (Section 4: How the Plan Meets the Study Goals) in the following ways:

- Improves bicycle mobility and safety, as seen by the improved **Bicycle Level of Traffic Stress**
- Increasing walking access to key destinations from Hazelwood using sidewalks and trails, as seen by significant improvements by improvements to **Walk Accessibility**
- Increasing the ability to access jobs within a 20-minute trip by walking, biking, transit, and car as seen by the **Access to Jobs by Mode**
- Improving the competitiveness of transit, walking, and biking from and through the study area when compared to driving as seen in the **Travel Time by Mode**
- Reduces peak hour demand by over 4,300 car trips, equivalent to a congested 4-lane signalized city street, as seen in the **Increase in Total Biking, Walking, and Transit Trips**
- Improves Hazelwood's vitality by reducing commuting traffic along Second Avenue and Irvine Street as seen in the **Neighborhood Livability for Second Avenue**
- Accommodates the future development which is expected to produce an additional 8,300 trips during the afternoon rush hour while only increasing cars crossing the Monongahela River by less than 40 trips during the peak hour due to changes in mode choice and Park-and-Ride lot locations as seen in the **Automobile Volumes Crossing the Monongahela River**
- Demonstrates an additional 14% reduction in car traffic due to policy changes as outlined in **Change in Increase in Total Biking, Walking, and Transit Trips with Transportation Demand Management**

State Route 885/Second Avenue Multimodal Corridor Study

SECTION 2. Existing Conditions

This page intentionally left blank

SECTION 2. Existing Conditions

INTRODUCTION

OVERVIEW AND STUDY AREA

The Southwestern Pennsylvania Commission (SPC) initiated this planning study to explore existing multimodal transportation needs, future trends, and potential improvement strategies along the State Route (SR) 885 and Second Avenue corridor in the City of Pittsburgh, Allegheny County. Specifically, the study corridor spans Second Avenue from the 10th Street Bridge in the Bluff neighborhood, south through South Oakland, Greenfield, and Hazelwood, to a southern terminus at its intersection with SR 837 in Hays (*Exhibit 2-1*). The overall study corridor spans approximately five linear miles and includes side-segments connecting to Oakland via SR 885/Bates Street between Second Avenue and Boulevard of the Allies.

Exhibit 2-1: Study Area Location Map

PROJECT STEERING COMMITTEE AND VISION

SPC conducted this study effort in partnership with a broader project Steering Committee comprised of key staff from SPC, the Pennsylvania Department of Transportation (PennDOT), Allegheny County, the Port Authority of Allegheny County (PAAC), the City of Pittsburgh, and the Hazelwood Initiative. The Steering Committee recognized that the SR 885/Second Avenue corridor is one of both local and regional significance. Locally, it serves as the key transportation link for residents, community activities, businesses, services, and industry sites directly along the corridor and throughout the adjacent neighborhoods. Regionally, it has been identified as a corridor of significance for the City and the County as it serves as one of the primary means of connecting the communities of the Lower Monongahela River Valley and the South Hills with major job centers in Oakland, South Side, and Downtown.

Additionally, the study corridor is expected to experience a significant amount of growth through development sites that include the Hazelwood Green (Almono) development, the Carrie Furnace site in Rankin, continued growth at the Homestead Waterfront, Pittsburgh Technology Center, SouthSide Works, and within the Hazelwood local neighborhood commercial district. It is, therefore, critical from an economic development and community/quality of life standpoint that the impacts of these developments are considered when planning for the overall vision of this corridor. Within this context, the following Draft Vision Statement was developed by the Steering Committee for the SR 885/Second Avenue Multimodal Corridor Study:

"The study should make recommendations that will improve safety and mobility for all travel modes and are supportive of existing neighborhoods and planned land use context along the corridor."

PROJECT GOALS AND STRATEGIES

The Vision Statement for this study echoes the regional vision provided in SPC's recently completed Long Range Plan, SmartMoves for a Changing Region. SmartMoves includes the regional goal of having a "world class, safe, and well maintained integrated transportation system that provides mobility for all." This plan also emphasizes that the region must continue to focus on a Vision Zero safety goal for all transportation users.

In support of the project and regional visions, and based on Steering Committee guidance, study goals included the exploration of long-term improvements to manage congestion and delays through multimodal strategies that:

- Focus on decreasing the prevalence of single-occupancy vehicle trips.
- Provide the mobility services and facilities necessary to enable growth and development in neighborhoods along the corridor including rapid, reliable, sustainable and resilient travel choices to Downtown Pittsburgh and other regional destinations.
- Encourage bicycle travel along the corridor (although not necessarily on SR 885/Second Avenue) on a complete trail network.
- Increase the use of transit, carpool, and other modes throughout the corridor.
- Preserve and enhance local quality of life and economic prosperity along the corridor.
- Promote compact land development patterns and infill development in developed areas, as per local land use plans.
- Promote solutions that are contextual to the changing character of adjacent land uses along the state route.

Stakeholder and public outreach was integrated throughout the planning process to confirm, expand, or refine the perspectives articulated by the draft project vision, goals, and strategies.

PROJECT CONTEXT

LOCAL CONTEXT

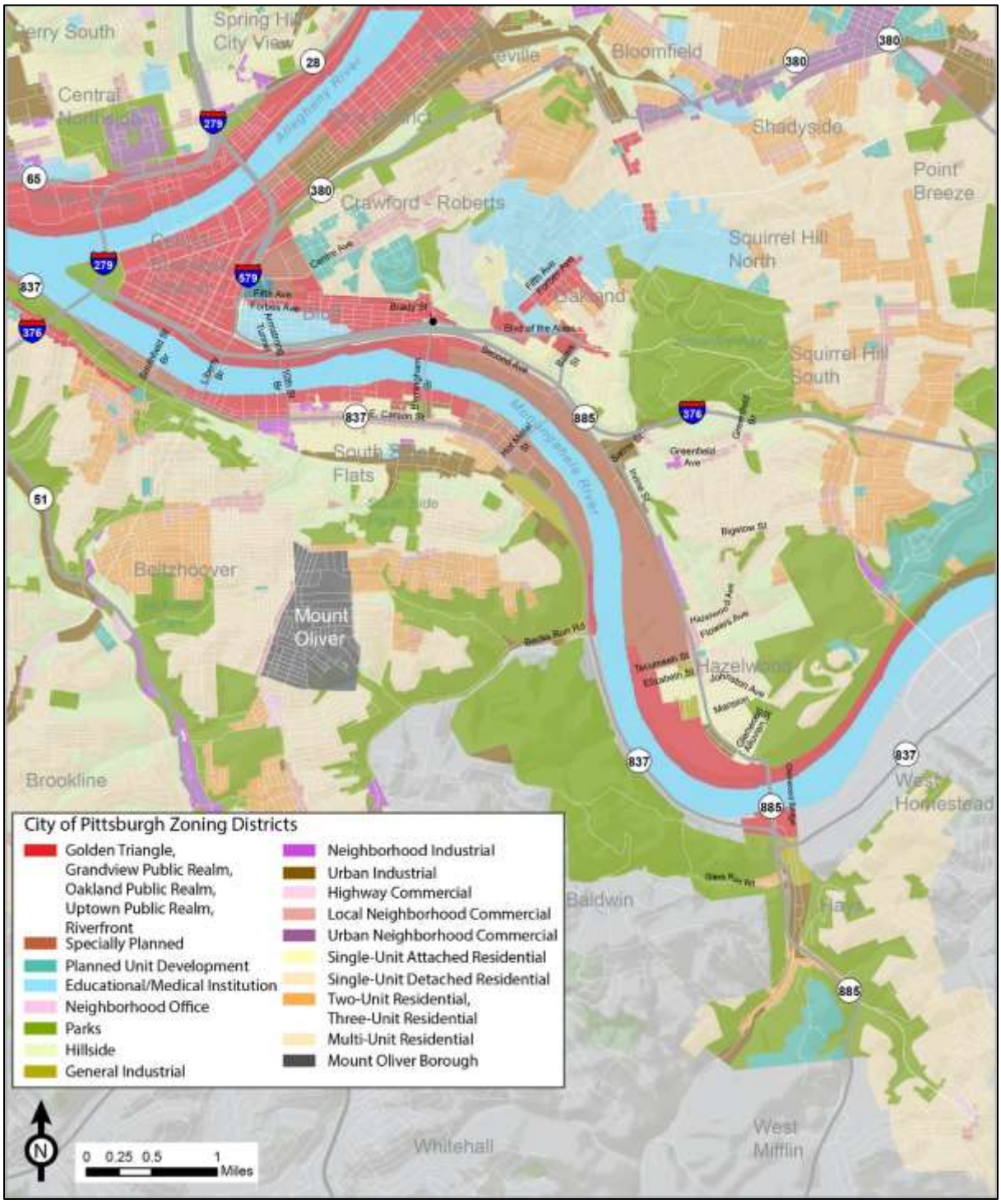
From a community perspective, particularly through the Hazelwood area, the study corridor plays an important role as an active, vibrant main street corridor – despite some aging infrastructure – with notable residential uses, local businesses, activity centers, and gathering places. Multimodal pedestrian, bicycle, transit, and vehicular access throughout the community is directly linked to local livability and safety interests, as well as local growth and redevelopment opportunities that support the area's economy.

The Hazelwood neighborhood, located in the southern third of the corridor, is home to approximately 2,000 people (American Community Survey 5-year estimates, 2016). Second Avenue is the primary route for these residents to access their homes and is also the front door for local businesses and institutions located on Second Avenue, such as the Hazelwood Library.

The City of Pittsburgh details zoning designations for the corridor and surrounding areas (*Exhibit 2-2*). The zoning designations generally reflect the current and desired future land uses for the corridor. The zoning and land use through the study area range widely and include urban industrial, neighborhood commercial, single and multi-unit residential, and planned and special districts.

At the northern end of the study area, there are no buildings directly adjacent to Second Avenue and the roadway is largely isolated from immediately adjacent development by I-376 and the Monongahela River. The County jail is located just outside of the corridor, northwest of the 10th Street Bridge. Parking lots, the river, and an industrial (cement) facility are located between 10th Street and the Birmingham Bridge. Further south and east, land uses along the corridor are predominantly office and commercial (adjacent to the river) with limited connectivity to neighborhoods and development north and east of I-376. Between Saline Street and Hazelwood Avenue, the land use is predominantly industrial with a transition to the Hazelwood neighborhood's residential and institutional uses beginning near Hazelwood Avenue. Further south, the corridor transitions to a mix of neighborhood uses, with mixed use buildings and commercial and institutional uses predominant directly on Second Avenue and residential uses predominant in surrounding blocks. The Hazelwood Green planned unit development zone is located between Second Avenue/Irvine Street and the river at the northern end of the Hazelwood neighborhood. Industrial uses are clustered along the river from points south of the Hazelwood Green development through the remainder of the study area.

Exhibit 2-2: Study Area Zoning Map

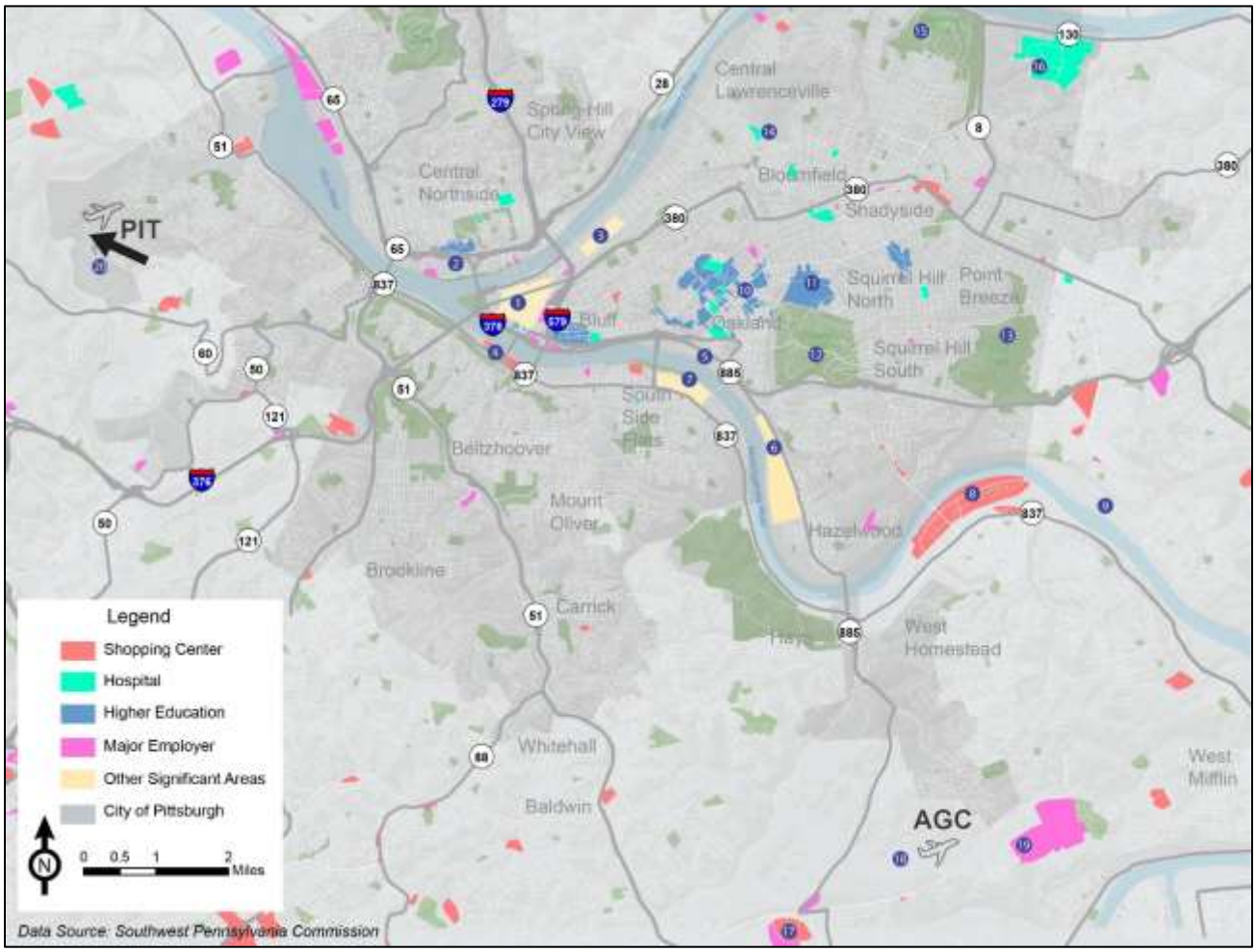


REGIONAL CONTEXT

Alongside its local community context, the SR 885/Second Avenue corridor also functions as a broader primary transportation link along the north side of the Monongahela River. In this capacity, it connects access between the Glenwood Bridge and areas south directly to downtown Pittsburgh. Key junctions include Greenfield Avenue; the Hot Metal Bridge and I-376/Bates Street area; the Brady Street intersection and access to Forbes Avenue, Fifth Avenue, and the Birmingham Bridge; and the 10th Street/Armstrong Tunnel intersection with direct access to downtown. The corridor supports a variety of major freight sites, existing technical business and industry centers, and significant future development opportunities. Balancing corridor usage and facilities to effectively serve all users across the local and regional transportation contexts is an important and challenging role that the corridor must play.

Spanning both the local and regional contexts, the study corridor provides key transportation connections to a wide variety of regionally significant destinations or activity hubs (*Exhibit 2-3*).

Exhibit 2-3: Regional Places

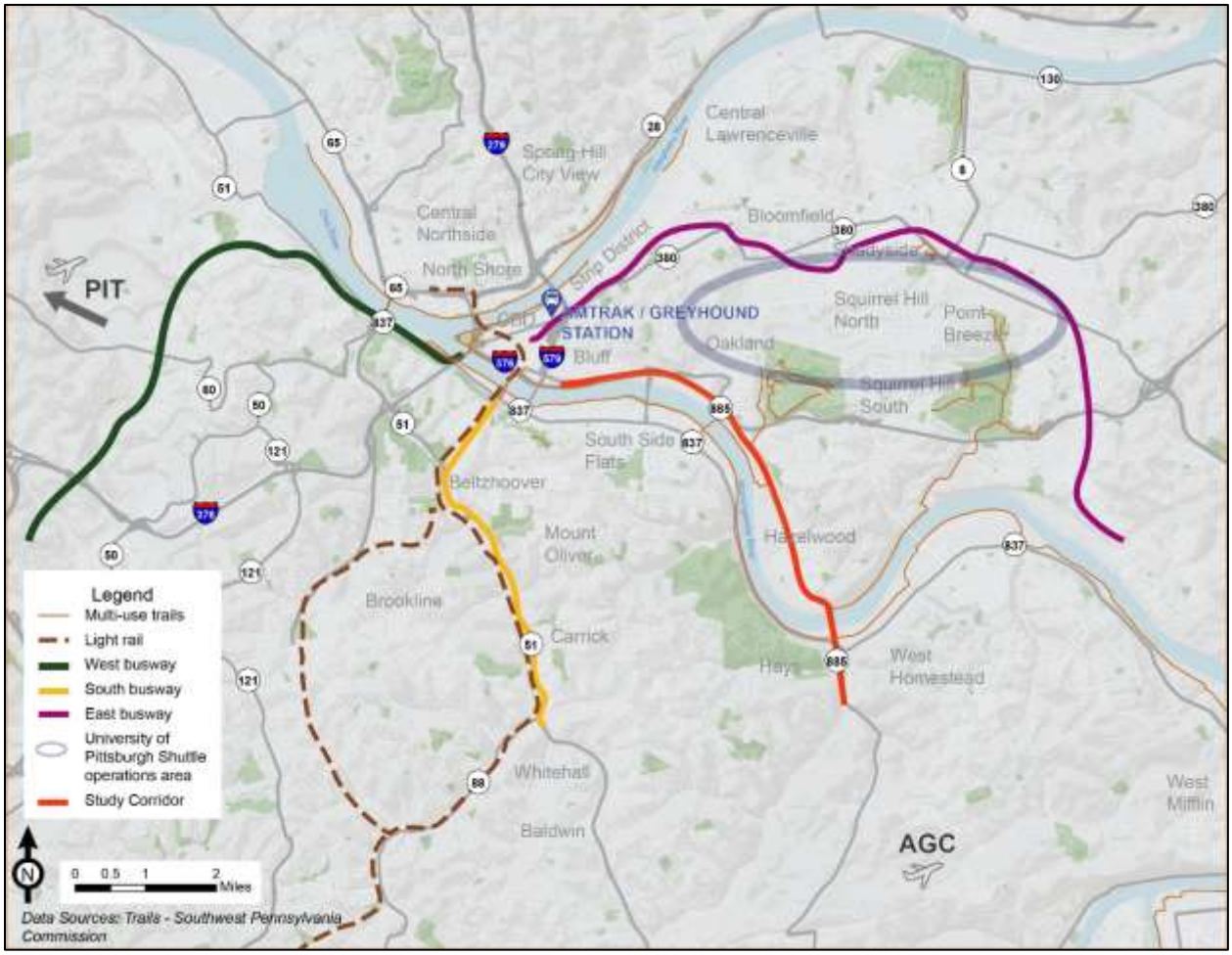


Regional Places Numbered Site Index:

1. Downtown Pittsburgh CBD
2. North Shore/Stadium Area
3. Strip District
4. Station Square
5. Pittsburgh Technology Center
6. Hazelwood Green Development Site
7. SouthSide Works
8. Homestead Waterfront
9. Carrie Furnace Development Site
10. University of Pittsburgh (Pitt)
11. Carnegie Mellon University (CMU)
12. Schenley Park
13. Frick Park
14. Children's Hospital of Pittsburgh
15. Pittsburgh Zoo & PPG Aquarium
16. Southwestern Veterans Center
17. Century III Mall Area
18. Allegheny County Airport (AGC)
19. Bettis Laboratory
20. Pittsburgh International Airport (PIT)

Beyond vehicular travel and the area's roadway network, the study corridor also provides access to or is surrounded by important regional multimodal travel options (*Exhibit 2-4*).

Exhibit 2-4: Regional Multimodal Connectivity



Via transit service in and around downtown Pittsburgh, for example, options include access to the Port Authority's 5-mile West Busway, 4.3-mile South Busway, and 9.1-mile Martin Luther King, Jr. East Busway, as well as the 26.2-mile light rail system (the T System), including Blue Line and Red Line services that link neighborhoods throughout the South Hills to the North Shore. Additional transit access on/near the corridor also links with the University of Pittsburgh's shuttle system. For broader travel, downtown transportation hubs near Liberty Avenue and 11th Street include access to interstate bus services via Greyhound and Megabus, as well as Amtrak's Capital Limited and Pennsylvanian routes from their Pittsburgh Station. The Pittsburgh International Airport (PIT) is located approximately 24 miles west of the study corridor, while the Allegheny County Airport (AGC) – a vital business and corporate travel hub for the area – is located just 7 miles to the south. The T system and its First Avenue Station are located just a block away from the study area.

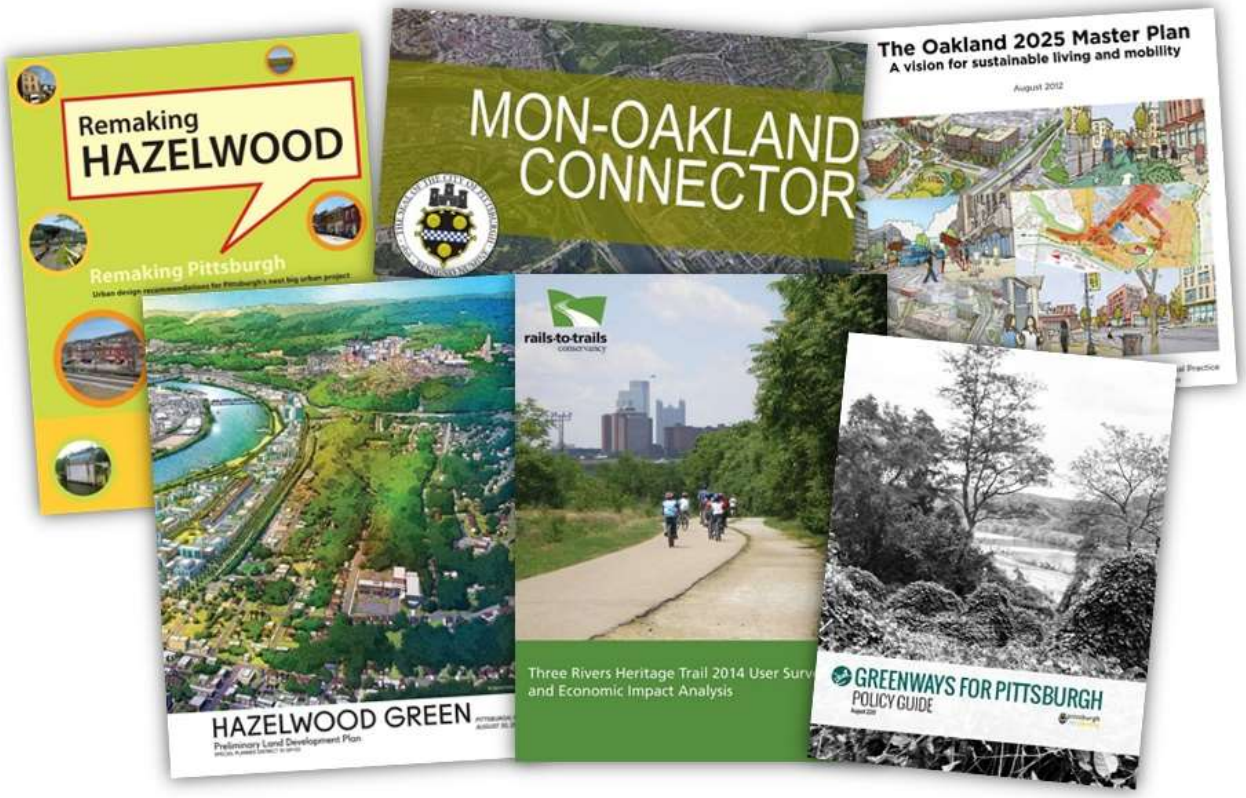
While not all regional travel options have a direct relationship or existing direct connection with the corridor, the overall system is interconnected, so change in one part of the system often impacts other areas. Understanding and accounting for these dynamics helped to support the development of a plan and strategies that effectively address both local and regional needs.

BACKGROUND PLANS/STUDIES

In addition to this multimodal study, numerous plans ranging from local to regional scales on a variety of topics exist or are in development for areas adjacent to or encompassing the SR 885/Second Avenue corridor. Examples include:

- Greater Hazelwood Neighborhood Plan
- Hazelwood Green Master Plan (Preliminary Land Development Plan)
- City of Pittsburgh Bicycle Plan
- Mon-Oakland Mobility Plan

A full list of plans/studies with potential relevance is provided in *Appendix A*. These plans have varying degrees of relevance to the SR 885/Second Avenue multimodal corridor planning process. At a minimum, all of the plans offer information on stakeholder perspectives and the planning context, and many of them suggest goals, recommendations, and implementation strategies that were important to consider in development of this corridor plan.



As the public and stakeholder engagement process, vision, and goal-setting phases of this corridor study got underway, it was worth noting that many of these plans have undergone extensive public engagement efforts. The ideas and input gathered through these other planning processes offer important foundational material for this corridor study. Most are composed of goals/principles made up of the following general themes:

- Mobility and Accessibility
- Economic Growth and Revitalization
- Environmental Sustainability
- Community Enhancement and Identity
- Equity and Health

Stakeholder and public engagement activities under this study honored the energies already put forth into development of other plans by using these themes and overlapping goals as the starting point for planning. At the same time this corridor planning process offered new opportunities to guide development of this multimodal corridor plan, which has its own unique scope and role for guiding future investment and actions.

Potential transportation projects and development activity in and around the study corridor was also considered for planning and development coordination. Potential project sources range from committed or planned expenditures in programming documents such as SPC's Transportation Improvement Program (TIP) or SPC's Long Range Transportation Plan (LRTP), to proposed or aspirational projects identified by the various background plans and studies noted previously. Summary project recommendations (by others) listed for areas in or near the SR 885/Second Avenue study are listed below (*Exhibit 2-5*); details are in *Appendix A*.

Beyond project specifics, general policies or policy recommendations that were important to development of this corridor plan were also reviewed throughout future planning, alternatives development, or prioritization efforts. Examples include the Transportation Demand Management Plan that was being developed by SPC during the course of this study. SPC's Long Range Plan, SmartMoves for a Changing Region, is a plan about creating and connecting people to opportunity. *SmartMoves* describes the overall strategic vision for the region's transportation system and describes the projects and investments that can be advanced with revenues that are reasonably expected to be available in the next 25 years.

(https://spcregion.org/smartmoves.asp)

Exhibit 2-5: Study Area Planned Projects (by Others)

Project	Source
Pedestrian/Bicycle Related	
Blair Street Bicycle Path (Hazelwood Green)	City of Pittsburgh/Almono LP
PA 837 Pedestrian Bridge	PennDOT/TIP
Transit Related	
Route Modification for PAAC Bus Route 57	PAAC
Bus Rapid Transit – East End/Oakland/Downtown	URA/PAAC
PAAC Oakland BRT Signal Improvements	PAAC/SPC TIP
Roadway/Traffic Related	
Hazelwood Green (Almono) Transportation Infrastructure Improvement Funding - Highway Construction	Almono LP/PennDOT/TIP
Parkway East Corridor Transportation Safety Improvements	PennDOT/TIP
Bates Street Reconstruction and Capacity Upgrades	SPC/LRTP
Boulevard of the Allies/Bates to Interchange Ramp Resurfacing	PennDOT/TIP
Smart Spines (ATCMTD) Project	SPC TIP
Bridge Related	
Glenwood Bridge Preservation (MA08)	Allegheny County/TIP
Swinburne Bridge Restoration	City of Pittsburgh/TIP
Charles Anderson Bridge Replacement	City of Pittsburgh/TIP
Boulevard of the Allies Ramps Bridge Preservation	PennDOT/TIP
Boulevard of the Allies Ramp U Bridge Preservation	PennDOT/TIP
Armstrong Tunnel Bridge Restoration (AR01)	Allegheny County/TIP
10th Street Bridge Rehabilitation	Allegheny County/SPC/LRTP
Glenwood Bridge Ramps Rehabilitation	PennDOT/SPC/LRTP

TRANSPORTATION NETWORK INVENTORIES

Moving beyond the local and regional contexts for the SR 885/Second Avenue corridor, a variety of baseline data collection efforts, walking tours, observations, field inventories, and related assessments were conducted to develop a better understanding of existing conditions and potential corridor/community transportation needs. These insights, in turn, also enhanced the community/stakeholder outreach discussions and helped to inform the development of future improvement alternatives. Inventory details are included in *Appendix B* and collectively focus on the existing non-motorized and motorized transportation networks, with emphasis on:

- Sidewalk connectivity and accessibility – including a review of the existing sidewalk network and conditions, and existing curb ramp installations
- Bicycle connectivity and accessibility – including a review of the existing bicycle and trail networks
- Transit – including a review of transit stop locations and connectivity, Port Authority transit routes, and boarding/alighting data
- Automobile – including a review of existing daily and peak period intersection turning movement volumes, vehicle occupancy, on-street and off-street parking.
- Traffic Operations – including a review of traffic infrastructure (e.g. signals, signing), corridor travel times and speeds, and site-specific queuing.
- Freight – including a review of major freight/industry sites on or near the corridor, truck volumes, and truck distribution by class.

Highlights from these inventories and assessments may be generalized as follows:

Sidewalk and Bicycle Networks:

- Sidewalk and curb ramp types, designs, and conditions vary dramatically throughout the corridor. Sidewalk segment conditions range from newer ADA-standard pathways to damaged sections with trip hazards or significant drainage impacts, to major states of disrepair or entire missing sections.
- On-street bicycle facilities are generally limited or not present within the study corridor; however, there is a fairly robust bicycle and trail network throughout the broader area that connects with existing elements of the Three Rivers Heritage Trail System.

Transit Stops and Service:

- Transit stops along the corridor varied in location and localized amenities (e.g. shelters, sidewalk/waiting area, and signage), and walking or crossing access to some stops was not ideal due to lack of adequate or ADA-accessible pathways and waiting areas.
- Various sections of the study corridor or nearby areas are serviced by Port Authority Transit including Routes 56 (Lincoln Place), 57 (Hazelwood), 58 (Greenfield), 52L (Homeville Limited), 53L (Homestead Park Limited), and 93 (Lawrenceville-Hazelwood).

Roadway and Automobile Inventories:

- Roadway, sidewalk, and on-street parking configurations vary to include a mixture of 2-, 3-, and 4-lane typical sections (*Exhibit 2-6* and *Exhibit 2-7*).
- On-street parking is permitted within the Hazelwood neighborhood between Glenwood Avenue and Hazelwood Avenue on both sides of the roadway, excluding weekday restrictions in the northbound direction from 7 AM to 9 AM to accommodate an additional peak period travel lane.
- In many areas where existing on-street parking is permitted, vehicles do not fully utilize the on-street lane; rather they encroach onto the adjacent curb and sidewalk, often constraining the available walkway width and likely contributing to sidewalk damage.
- The study corridor generally has significant daily traffic volumes ranging from approximately 15,000 to 20,000 vehicles per day depending on segment, with the highest volume segments occurring south of Hazelwood Avenue or north of Bates Street.
- Peak hour volumes vary throughout the corridor with approximately 1,300 to 1,500 vehicles per hour in the peak direction (northbound in the AM; southbound in the PM).

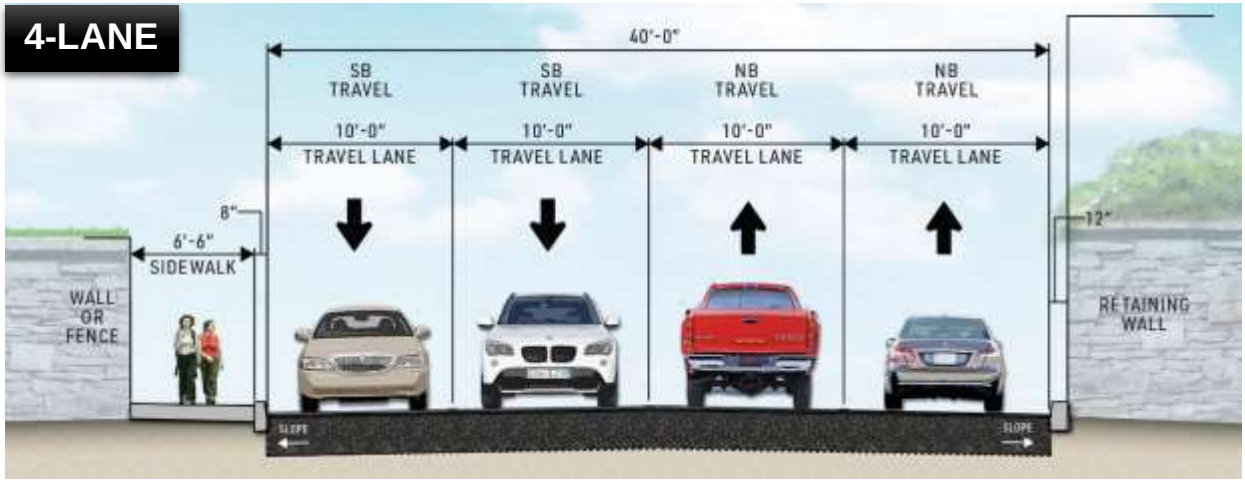
Traffic Operations:

- Over 80% of vehicles traveling the corridor were observed to have single occupants.
- Notable peak period traffic congestion and queuing were observed at multiple locations in the corridor, particularly at major junctions such as the Hot Metal Bridge and I-376/Bates Street area.
- Traffic signing throughout the corridor included potential issues with sign consistency, sign placement, non-standard installations, sign conditions, and sign clutter, particularly within the Hazelwood community.
- Travel time and delay information noted the highest levels of congestion occur during the weekday PM peak period with 61% of the southbound total delay occurring in the one-mile segment from Greenfield Avenue to Johnston Avenue, and 36% of the northbound delay occurring between the Hot Metal and Bates Street intersections.

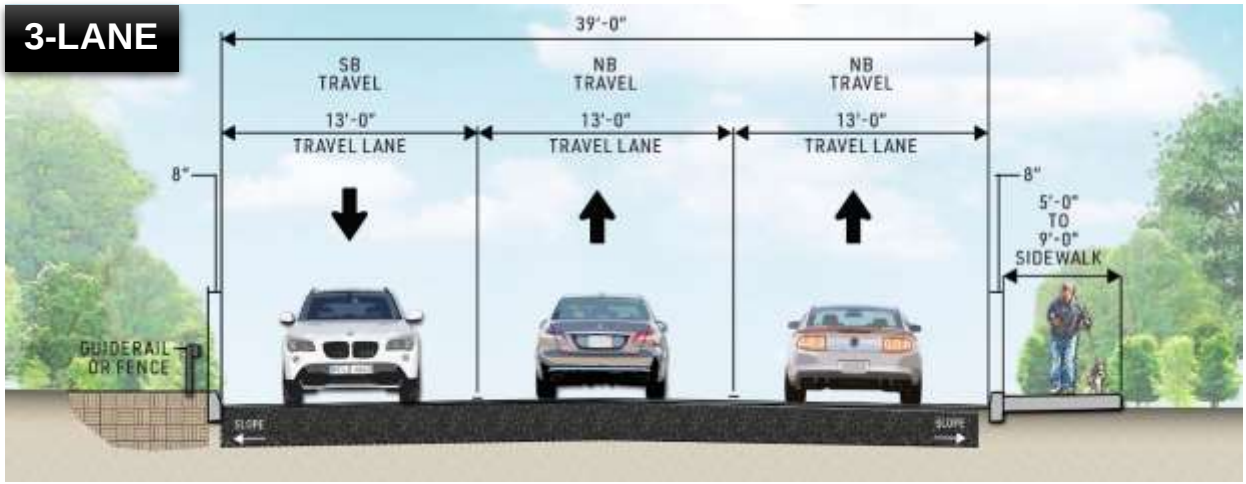
Freight Activities:

- A variety of local and pass-through freight uses are evident throughout the corridor, ranging from curbside box-truck deliveries to local maintenance or public works uses, tractor-trailer traffic, and local rail yard access. Truck volumes along the study corridor generally ranged up to 800 trucks per day (bi-directional), with 65% of those as two to four-axle single-unit trucks and the remaining 35% as single trailer or multi-trailer trucks.
- In addition to several freight generators located directly along the study corridor, SR 885/Second Avenue also provides access to/from key freight focus areas identified by the *Southwestern Pennsylvania Regional Freight Plan* with respect to existing freight clusters and future redevelopment in Downtown Pittsburgh, Homestead-Rankin, and West Mifflin.

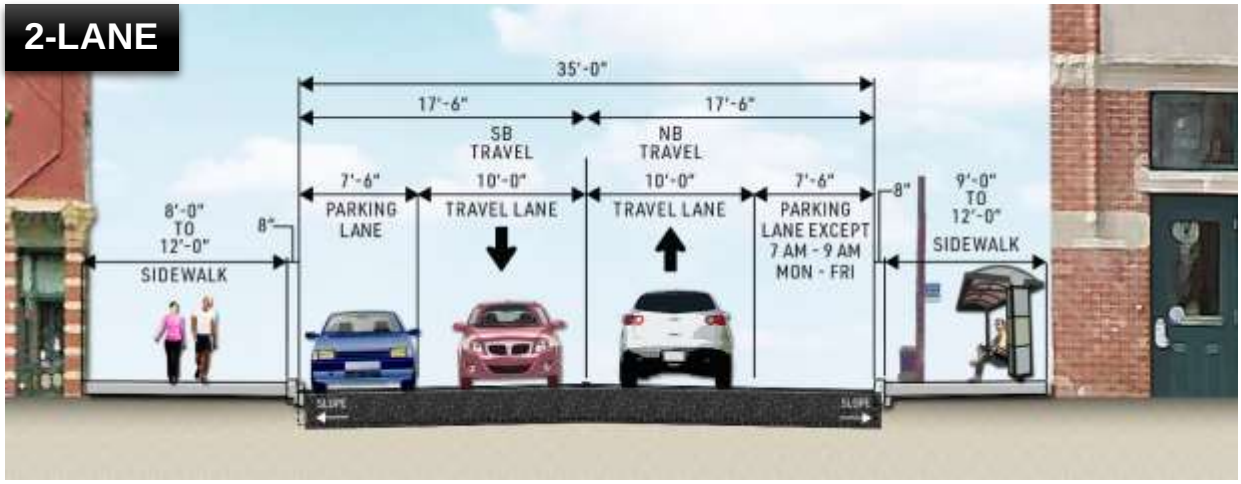
Exhibit 2-6: Sample Typical Sections



4-Lane Reference Location: *SR 885/Second Avenue, north of Swinburne Street*

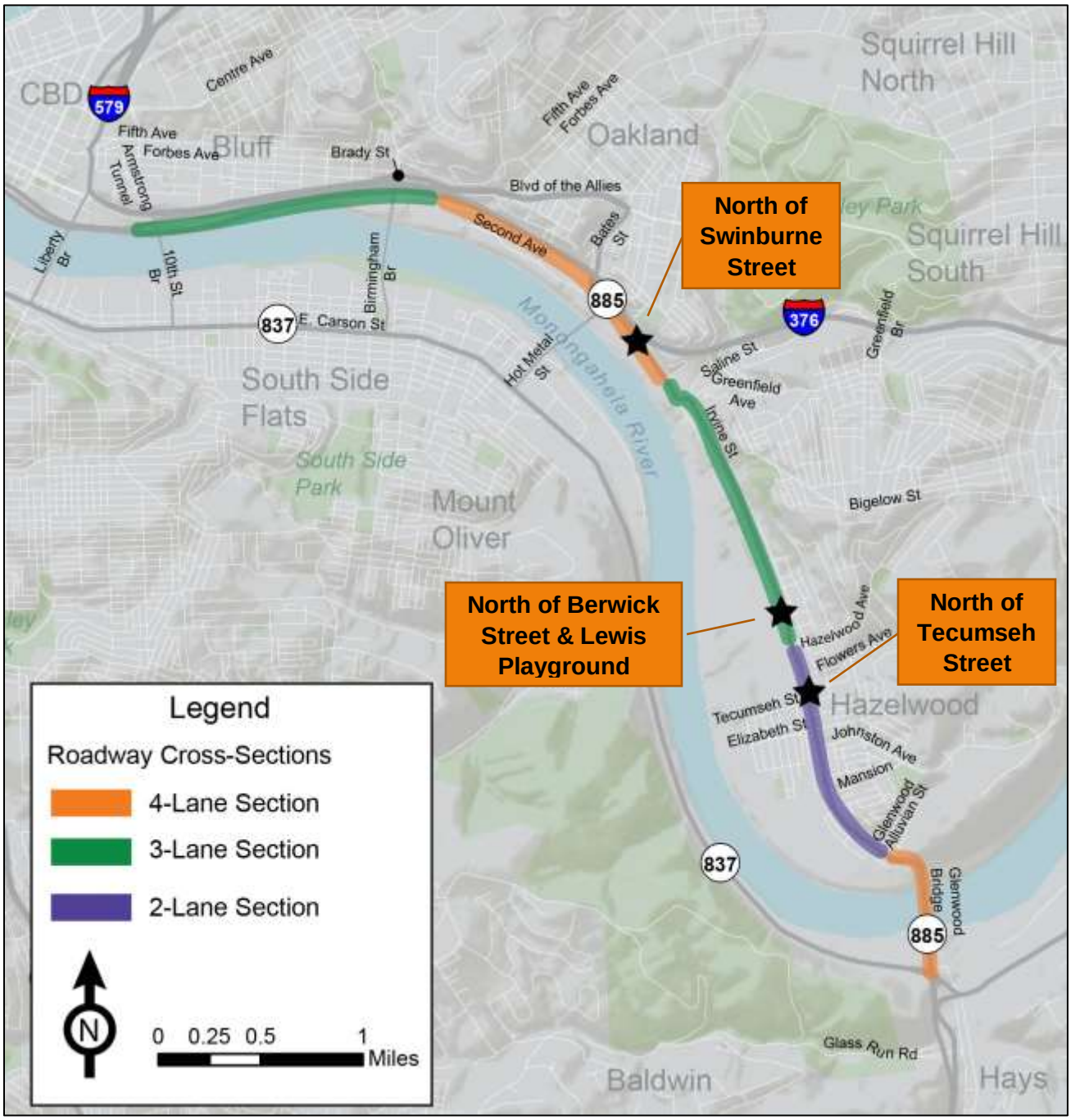


3-Lane Reference Location: *SR 885/Irvine Street, north of Berwick Street and Lewis Playground*



2-Lane Reference Location: *SR 885/Second Avenue, north of Tecumseh Street*

Exhibit 2-7: Corridor-Wide Typical Section Transitions



TRANSPORTATION SAFETY

The SR 885/Second Avenue corridor was analyzed to assess potential crash trends and overall safety performance based on historic crash data and existing roadway characteristics. The study encompassed five years of crash data (January 1, 2013 – December 31, 2017) provided by SPC via PennDOT's Crash Data Access and Retrieval Tool (CDART) database. Study limits included Second Avenue from Tenth Street Bridge/Armstrong Tunnels to Glenwood Bridge, and Bates Street between Second Avenue and Boulevard of the Allies. Within this area during the five-year timeframe, a total of 243 crashes were reported – or the equivalent of approximately one crash every week throughout the study area.

Crash patterns were reviewed to summarize activity based on crashes by severity (*Exhibit 2-8*) and by type (*Exhibit 2-9*). Related trends along the SR 885/Second Avenue corridor were also compared to comparable statewide proportions as reported in PennDOT's compilation of 2017 Pennsylvania Crash Facts and Statistics. Based on this, findings include the following:

- By severity, approximately half (49%) of all crashes resulted in property damage only, slightly less (44%) resulted in some degree of injury, and very few (less than 2%) were fatal. All trends by severity are generally on par with statewide average conditions.
- By type, most crashes were classified as Rear End (29%), Hit Fixed Object (27%), or Angle (25%) crash types, all of which are generally on par with statewide average conditions and typical of an urban arterial environment like that along SR 885/Second Avenue.
- A closer review of the data also revealed 19 pedestrian crashes (8%) within the study corridor. Proportionally, this result is higher than the statewide average (approximately 3%), but also likely reflects a higher-degree of pedestrian activity along the study corridor as compared to the net total of corridors tracked in the statewide average (i.e. the statewide average would also include rural corridors and other locations with limited pedestrian background activity).

Exhibit 2-8: Crash Summary by Severity

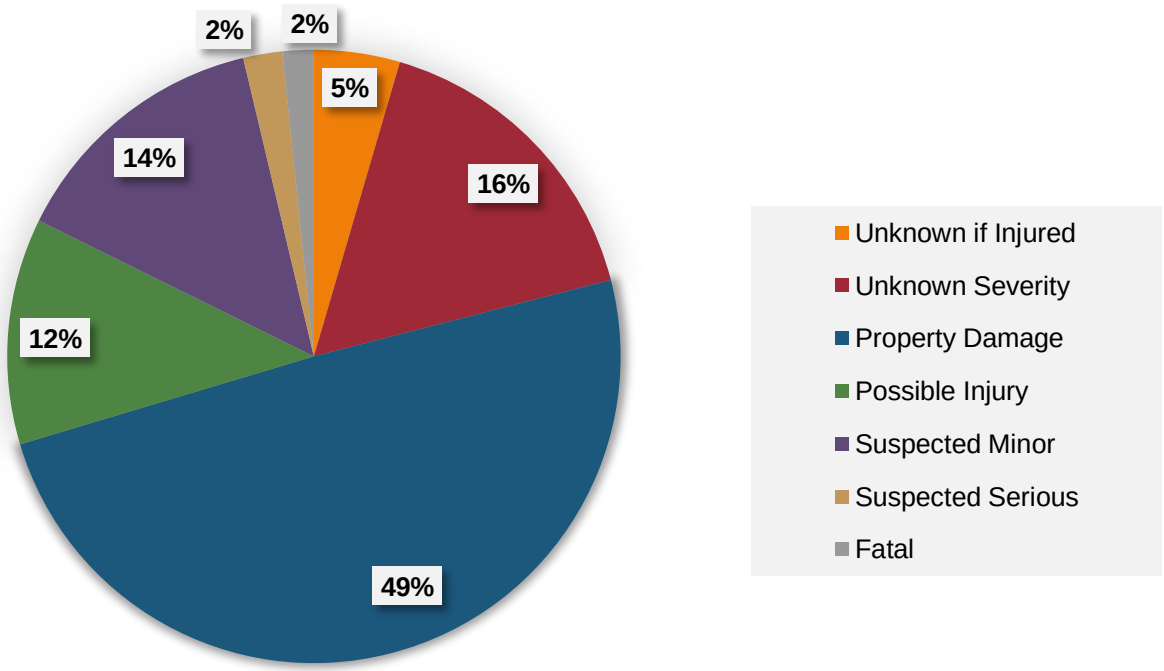
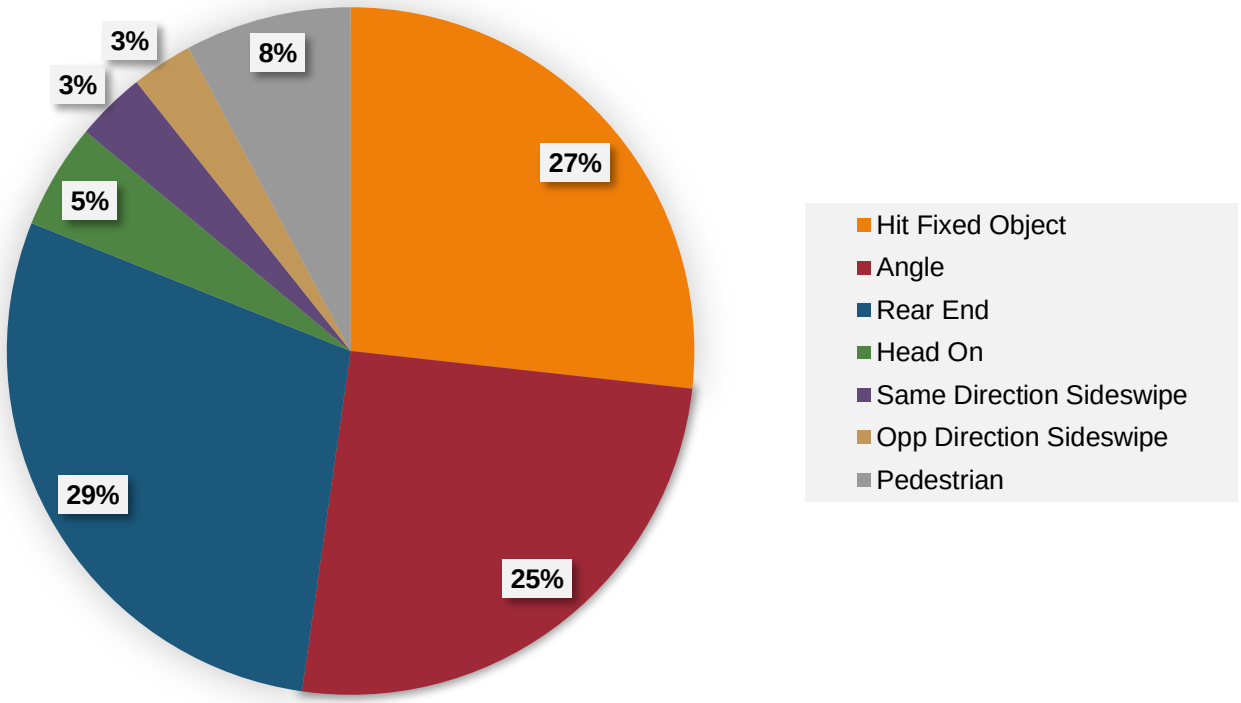


Exhibit 2-9: Crash Summary by Type



The study corridor was further analyzed to assess its safety performance based on methodologies outlined by AASHTO's *Highway Safety Manual* (HSM), including HSM Part C (Predictive Method) coupled with PennDOT's *HSM Analysis Tool* spreadsheet. These methods assess safety performance in terms of average annual crash frequencies, or crashes per year, based on (1) predicted averages derived from similar facilities, (2) expected averages that account for corridor-specific crash observations, and (3) a comparison of expected versus predicted averages to identify areas for potential safety improvement (i.e. areas where the expected values exceed the predicted values). Detailed HSM analyses and input assumptions are compiled in *Appendix C*; summary results are presented below.

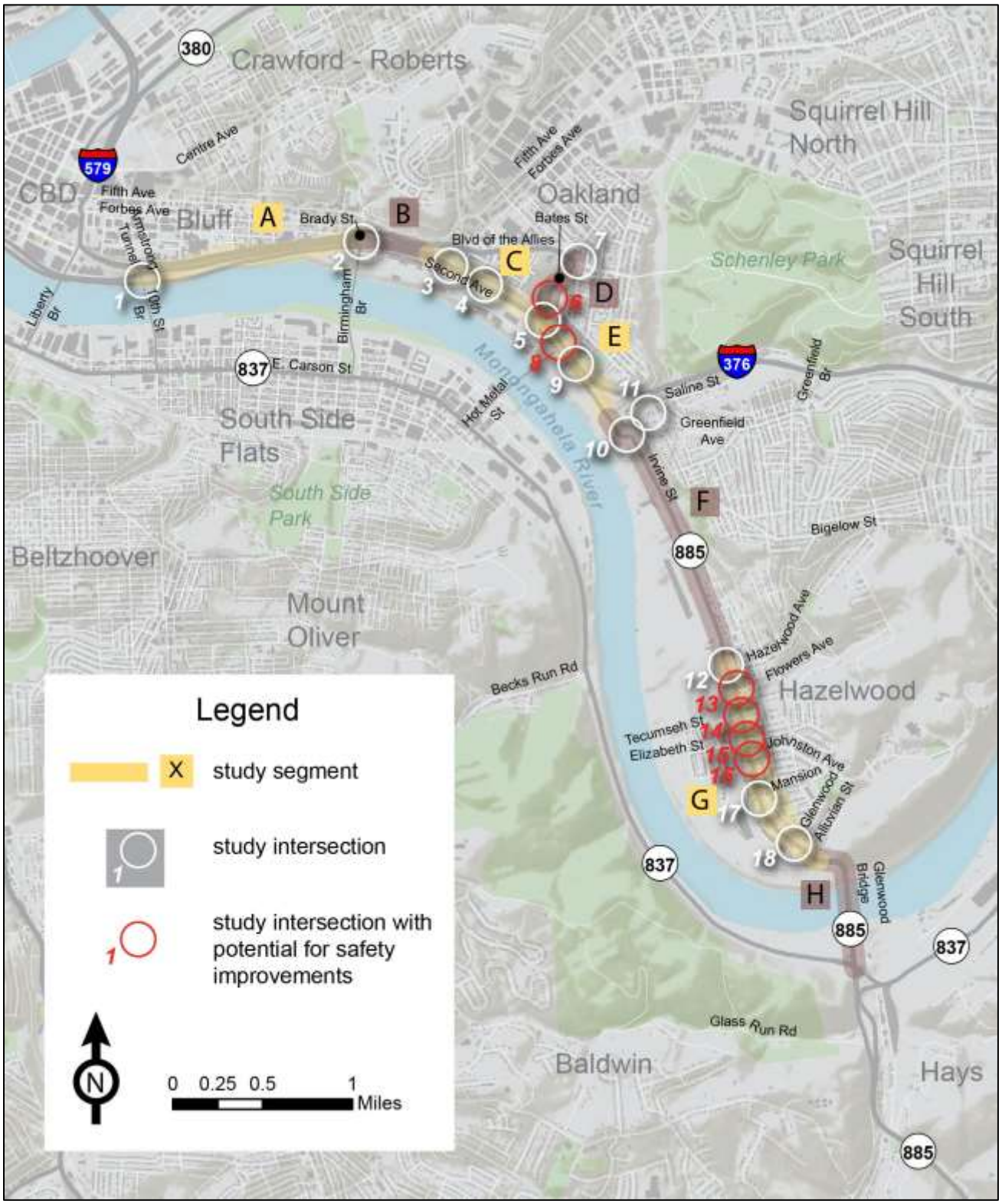
For the HSM analyses, the corridor was sub-divided to review 8 roadway segments (A-H) and 18 intersections (1-18) (*Exhibit 2-10*). Based on expected versus predicted crash frequencies, all eight roadway segments were reported as performing similar to or better than comparable facilities. However, six intersections (highlighted in *Exhibit 2-10*) were flagged as having positive potential for safety improvements and include the following:

- *Intersection 6 – Bates Street at the I-376 Interchange Ramps:* This location is a stop-controlled, high-volume, and often congested junction for travel between I-376 to/from the east, the Oakland area to/from the north, and the SR 885/Second Avenue corridor to/from the south. During peak periods, it can be impacted by queue spillback from downstream congestion affecting the I-376 eastbound on-ramps, plus congestion at the nearby Bates Street intersection with Second Avenue, less than 250' to the south. Rear End and Angle crash types were common, and two pedestrian crashes were noted at this location.

- *Intersection 8 – Second Avenue at Hot Metal Bridge:* This location is a signalized, high-volume, T-intersection that serves as an important access point not just along the SR 885/Second Avenue corridor, but also between the South Side, Oakland area, and I-376 via nearby connections along Bates Street, less than 500' to the north. Congestion, queue spillback, and periodic intersection blockages along Second Avenue between the Hot Metal Bridge and Bates Street can be significant. The area also provides an important pedestrian/bicycle linkage to the surrounding trail network via ramp connections to the Hot Metal Bridge and the related trail overpass above Second Avenue. Rear End and Angle crash types were common.

- *Intersections 13-16 – Second Avenue through Hazelwood at Flowers Avenue, Tecumseh Street, Elizabeth Street, and Johnston Avenue:* This cluster of closely-spaced intersections is located at the center of Hazelwood's downtown business stretch. Multimodal usage through this area involves vehicular traffic along Second Avenue; Hazelwood residential, commercial, and community activities (e.g. The Hazelwood Center and library); heavily-used on-street parking; active transit stops; and multiple signalized and unsignalized pedestrian crossings. Within this 4-6 block area, 11 pedestrian crashes were noted, which accounts for almost 60% of the total pedestrian crash count for the corridor.

Exhibit 2-10: Crash Analysis Segments and Intersections



** NOTE: "Potential for Safety Improvements" as based on HSM analyses and PennDOT's HSM Analysis Tool.*

TRAVEL BEHAVIOR

TRAVEL ORIGINS AND DESTINATIONS

The existing travel origins and destinations of SR 885/Second Avenue were determined using Streetlight Data. Streetlight Data is an online tool that processes real-time location data from mobile devices and interpolates it into traveler statistics, including travel origins and destinations. All travel origin and destination analyses have been summarized visually using maps from the Streetlight Data platform.

Origin-destination analyses were conducted for two trip scenarios: (1) trips beginning/ending in the corridor, and (2) trips that start outside SR 885/Second Avenue, travel along the entire corridor, and end outside of the corridor. These analyses determined the most common origins and destinations over a 24-hour period. Scenario results are summarized below and mapped in *Exhibit 2-11* through *Exhibit 2-16*:

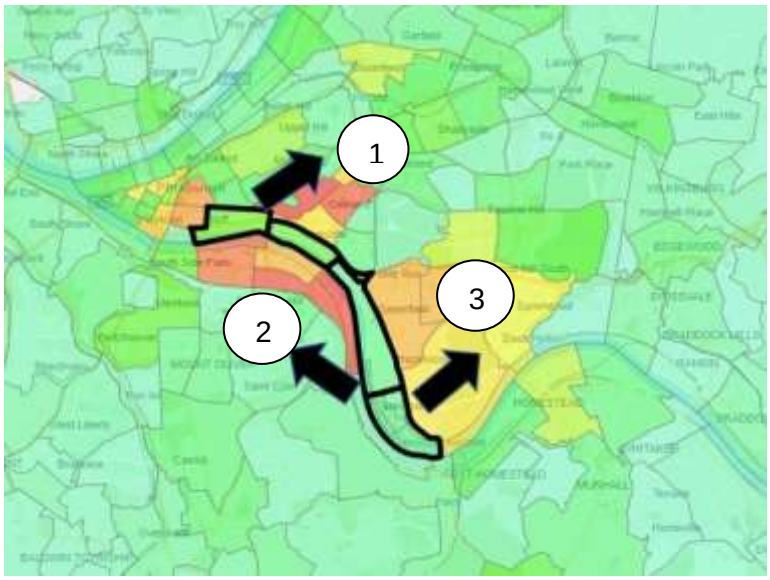
Outbound Travel (*Exhibit 2-11*): The most common destinations for outbound trips that begin in the study corridor are:

- Downtown Pittsburgh
- Oakland neighborhood
- South Side Flats neighborhood
- Borough of Homestead, specifically the Waterfront Shopping Center
- Greenfield neighborhood
- Boroughs of Pleasant Hills and Glassport, specifically to Century III Mall and adjacent shopping centers
- Technology Center near the Hot Metal Bridge

Inbound Travel (*Exhibit 2-12*): The most common origins of inbound trips that end in the study corridor are:

- Downtown Pittsburgh
- Oakland neighborhood
- South Side Flats neighborhood
- Borough of Homestead
- Greenfield neighborhood

Exhibit 2-11: Travel Patterns – Outbound (Study Corridor Origin to External Destination)



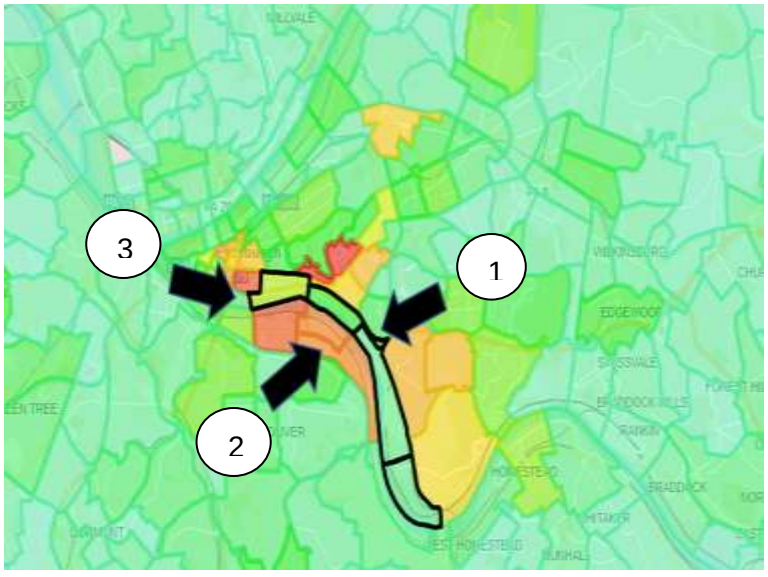
Estimated Total Trips: 12,700

Top Locations:
1. Oakland
2. South Side Flats
3. Greenfield

Percentage of Trips

0 -< 1 1 -<1.5 1.5 -<2 >2

Exhibit 2-12: Travel Patterns – Inbound (External Origin to Study Corridor Destination)



Estimated Total Trips: 12,900

Top Locations:
1. Oakland
2. South Side Flats
3. Downtown

Percentage of Trips

0 -< 1 1 -<1.5 1.5 -<2 >2

Through-Traffic Destinations (Northbound) (*Exhibit 2-13*): The most common destinations of trips that use the entirety of SR 885/Second Avenue northbound from Glenwood Bridge to 10th Street as a through route are:

- Downtown Pittsburgh
- South Side Flats neighborhood
- North Shore neighborhood/Borough of Bellevue

Through-Traffic Origins (Northbound) (*Exhibit 2-14*): The most common origins of trips that use the entirety of SR 885/Second Avenue northbound from 10th Street to Glenwood Bridge as a through route are:

- Allegheny County Airport and surrounding shopping centers
- Borough of Pleasant Hills and surrounding area
- Borough of Homestead and surrounding area
- Boroughs of McKeesport, Glassport, West Mifflin, Versailles, Forward Township, and surrounding areas
- Borough of Chalfant and surrounding area

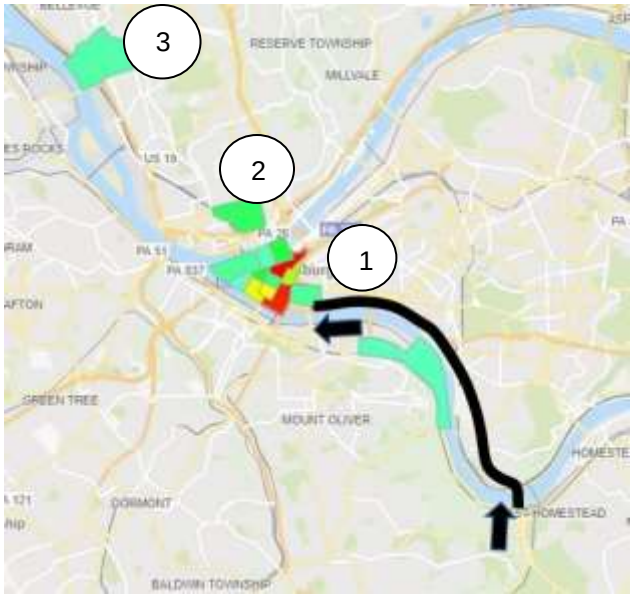
Through-Traffic Destinations (Southbound) (*Exhibit 2-15*): The most common destinations of trips that use the entirety of SR 885/Second Avenue southbound from 10th Street to Glenwood Bridge as a through route are:

- Allegheny County Airport and surrounding shopping centers
- Borough of Pleasant Hills and surrounding area
- Borough of Homestead and surrounding area
- Boroughs of McKeesport, Glassport, West Mifflin, Versailles, Forward Township, and surrounding areas
- Borough of Chalfant and surrounding area

Through-Traffic Origins (Southbound) (*Exhibit 2-16*): The most common origins of trips that use the entirety of SR 885/Second Avenue southbound from 10th Street to Glenwood Bridge as a through route are:

- Downtown Pittsburgh
- South Side Flats neighborhood
- North Shore neighborhood/Borough of Bellevue
- Pittsburgh International Airport

Exhibit 2-13: Travel Patterns – Northbound Through-Traffic (Destinations)



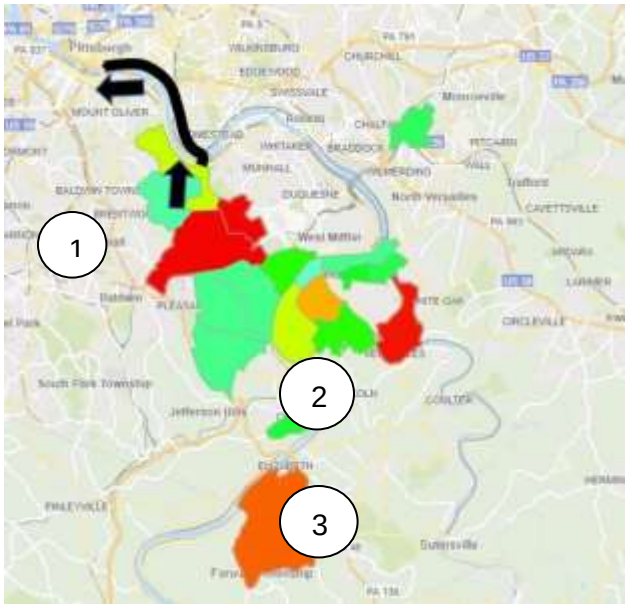
Estimated Total Trips: 600

Top Locations:
1. Downtown
2. North Shore
3. Borough of Bellevue

Percentage of Trips

0 -<0.5 | 0.5 -<3.5 | 3.5 -<6 | 6 -<8 | >8

Exhibit 2-14: Travel Patterns – Northbound Through-Traffic (Origins)



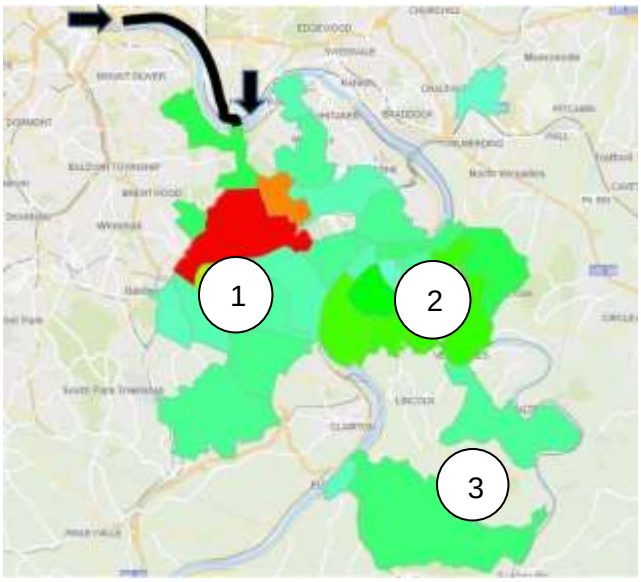
Estimated Total Trips: 600

Top Locations:
1. Allegheny County Airport/ Borough of Pleasant Hills
2. Boroughs of Versailles/ McKeesport
3. Forward Township

Percentage of Trips

0 -<0.5 | 0.5 -<3.5 | 3.5 -<6 | 6 -<8 | 3 >8

Exhibit 2-15: Travel Patterns – Southbound Through-Traffic (Destinations)



Estimated Total Trips: 1100

Top Locations:
1. Allegheny County Airport/ Borough of Pleasant Hills
2. Boroughs of Versailles/ McKeesport
3. Borough of Elizabeth

Percentage of Trips

0 -<0.5 0.5 -<3.5 3.5 -<6 6 -<8 3 >8

Exhibit 2-16: Travel Patterns – Southbound Through-Traffic (Origins)

Estimated Total Trips: 1100

Top Locations:
1. Downtown
2. North Shore
3. Pittsburgh International Airport

Percentage of Trips

0 -<0.5 0.5 -<3.5 3.5 -<6 6 -<8 3 >8

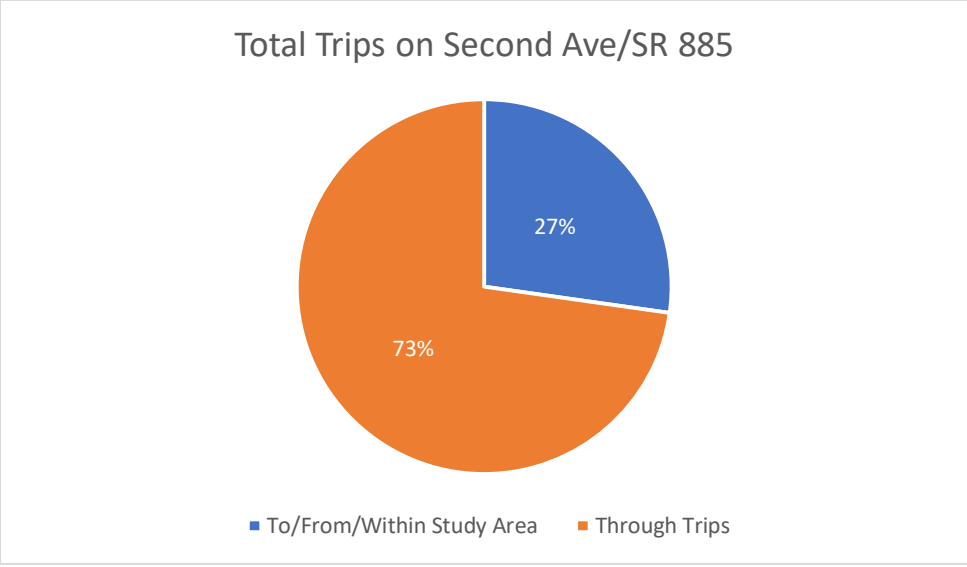
Additionally, Streetlight Data was used to determine the overall number of trips in the corridor and break those trips down into through trips and non-through trips on the corridor. Non-through trips are trips that either begin or end on SR 885/Second Avenue. Through trips are trips that did not begin or end on SR 885/Second Avenue, but traveled on it at some point in the trip.

This data is useful for estimating the number of trips that would occur in the study area if an improvement is made to an adjacent roadway. Through trips can potentially divert to an alternate route if that alternate route is improved. Non-through trips will not shift to an improved route. This information helps create a more precise estimate of potential future travel patterns and can be used to measure potential effectiveness of proposed transportation improvements in the region.

The comparison of through traffic and non-through traffic from Streetlight Data is summarized below and in *Exhibit 2-17*.

- Estimated 93,792 total trips take place at some point along the study corridor per day
- 27% of the total trips are non-through trips
    - Estimated 26,600 trips
        - 12,700 of these trips estimated to originate in the corridor study area
        - 12,900 of these trips estimated to end in the corridor study area
- 73% of the total trips are through trips
    - Estimated 68,200 trips
        - 66,500 of these trips estimated to use only a portion of the corridor
        - 1,700 of these trips estimated to use the entire corridor

Exhibit 2-17: Travel Patterns – Study Area Traffic versus Through-Traffic (by Percentage)



TRAVEL MODE SPLIT

The SR 885/Second Avenue corridor has infrastructure for multiple modes of motorized and non-motorized transportation to travel from point A to point B such as by vehicle (riding alone or ridesharing), bus, bicycle, or walking. However, as previously discussed, there are gaps in the existing infrastructure related to accessibility and connectivity, particularly when traveling via bus, bicycle, or walking.

The SR 885/Second Avenue corridor is also a vital commuter and freight route, serving single occupant vehicles (SOV), non-SOV, and trucks. *Exhibit 2-18* and *Exhibit 2-19* illustrate person-throughput by mode at two representative locations, Hot Metal Street and Glenwood Avenue, during the weekday PM peak. Traveling as SOV is currently the dominant mode choice, carrying between 1,400 and 2,400 people along the corridor. Data reported for pedestrians and bicyclists reflect counts along the intersection crosswalks at each location, plus (for the Hot Metal Street site) counts along the adjacent section of the Great Allegheny Passage Trail as measured west of the Hot Metal Bridge.

Exhibit 2-18: Travel Throughput by Mode (at Hot Metal Street - PM Peak)

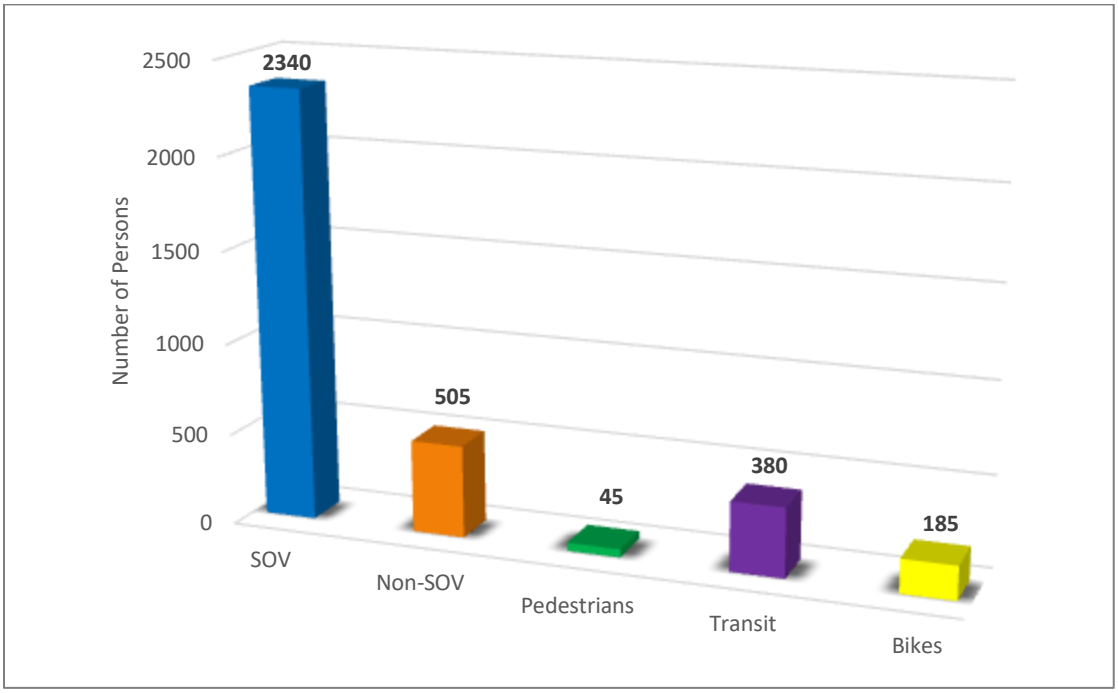
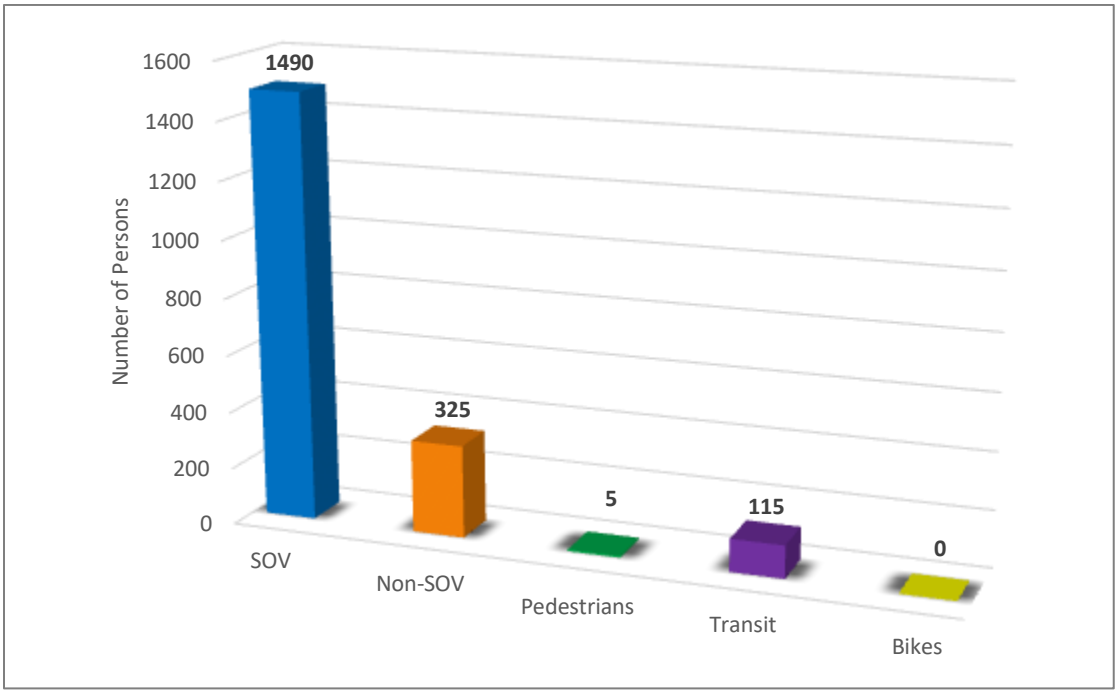


Exhibit 2-19: Travel Throughput by Mode (at Glenwood Avenue - PM Peak)



SUMMARY

This summary reviewed existing conditions along the SR 885/Second Avenue corridor between the Tenth Street Bridge/Armstrong Tunnel intersection in the north and the SR 837 interchange in the south. It identified important local and regional travel and multimodal transportation contexts relevant to the study corridor and surrounding areas. Important to this context are the findings of several previous or ongoing study efforts (independent of this plan) that have encompassed general themes such as:

- Mobility and Accessibility
- Economic Growth and Revitalization
- Environmental Sustainability
- Community Enhancement and Identity
- Equity and Health

Updated study efforts herein provide additional quantitative and qualitative detail to summarize the existing non-motorized transportation networks (i.e. pedestrian and bicycle relevant topics) alongside the existing motorized transportation networks (i.e. transit, automobile, traffic operations, and freight topics). These details provide the foundation for reviewing existing safety and travel behavior patterns, which subsequently was an important base from which to gather additional input from the project's stakeholder and public outreach and engagement efforts.

Collectively, these findings continue to support the exploration of specific transportation needs, future trends, and potential improvement strategies along the SR 885/Second Avenue corridor as the plans moves forward into subsequent phases of the study.

State Route 885/Second Avenue Multimodal Corridor Study

SECTION 3. Alternatives Analysis

This page intentionally left blank

SECTION 3. Alternatives Analysis

TRANSPORTATION NEEDS

PUBLIC INPUT PROCESS

This study was initiated in November 2018, and the first phase was completed with the Existing Conditions Report in February 2019. The report can be accessed on the 'Study Results' tab of the project website (*http://www.spcsecondavenue.com*). The Existing Conditions Report details the existing motorized and non-motorized transportation network along the corridor, current travel patterns, mode share, and crash analysis, along with previous and ongoing studies and relevant projects.

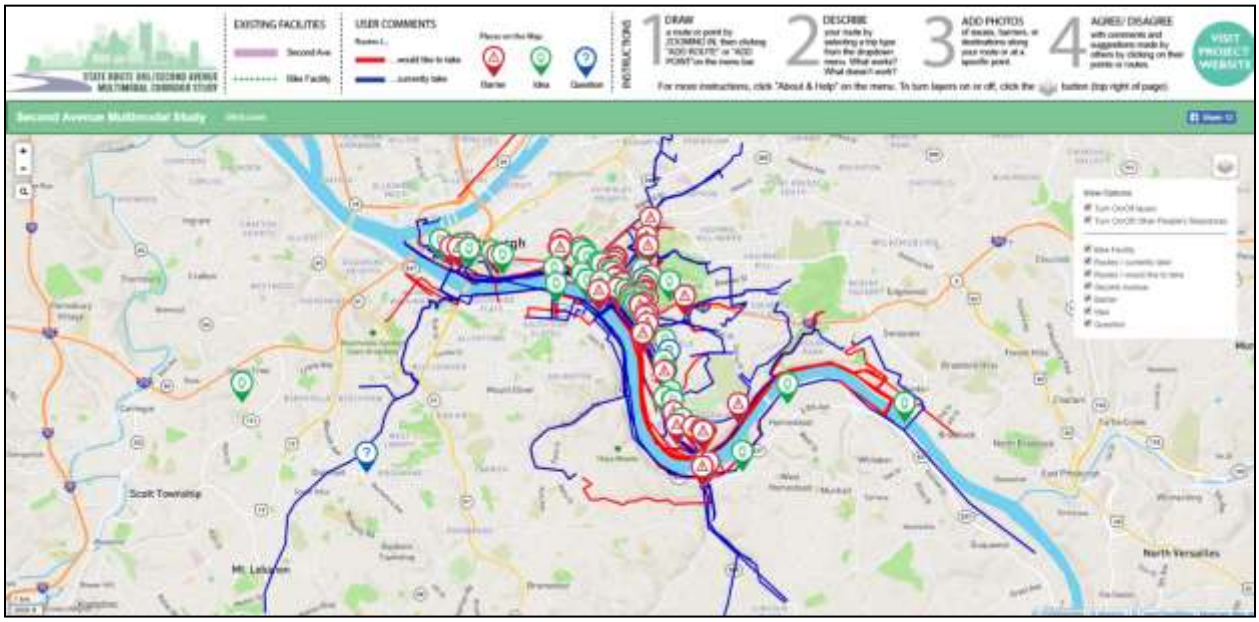
Data and maps from the Existing Conditions Report were presented to invited stakeholders and the public at separate meetings held on February 19, 2019 at the International Union of Operating Engineers located on Saline Street near Second Avenue. Meeting attendees had the opportunity to view the data and maps from the Report, speak with consultant and SPC staff, mark paper maps to indicate locations in need of improvements, and fill out surveys to communicate their thoughts on transportation needs in the corridor.




Following the February 19th meetings, an online survey was created using the same survey questions to enable more people to participate in the study. The online survey was open from February 21 through March 22, 2019 and was publicized at the Carnegie Library of Hazelwood near the public computers, as well as by email invitation to stakeholder groups. The displays from the February 19th meetings were also posted on the project website for anyone who could not attend the meetings.

In addition to the meetings and online survey, an interactive Wikimap was available for public input (*Exhibit 3-1*). The online map allowed users to add points representing barriers, ideas and questions, and to draw lines for routes that they currently take and routes that they would like to take. Users could also comment on and agree or disagree with input from other users.

Exhibit 3-1: Public Input – Wikimap Collected Results



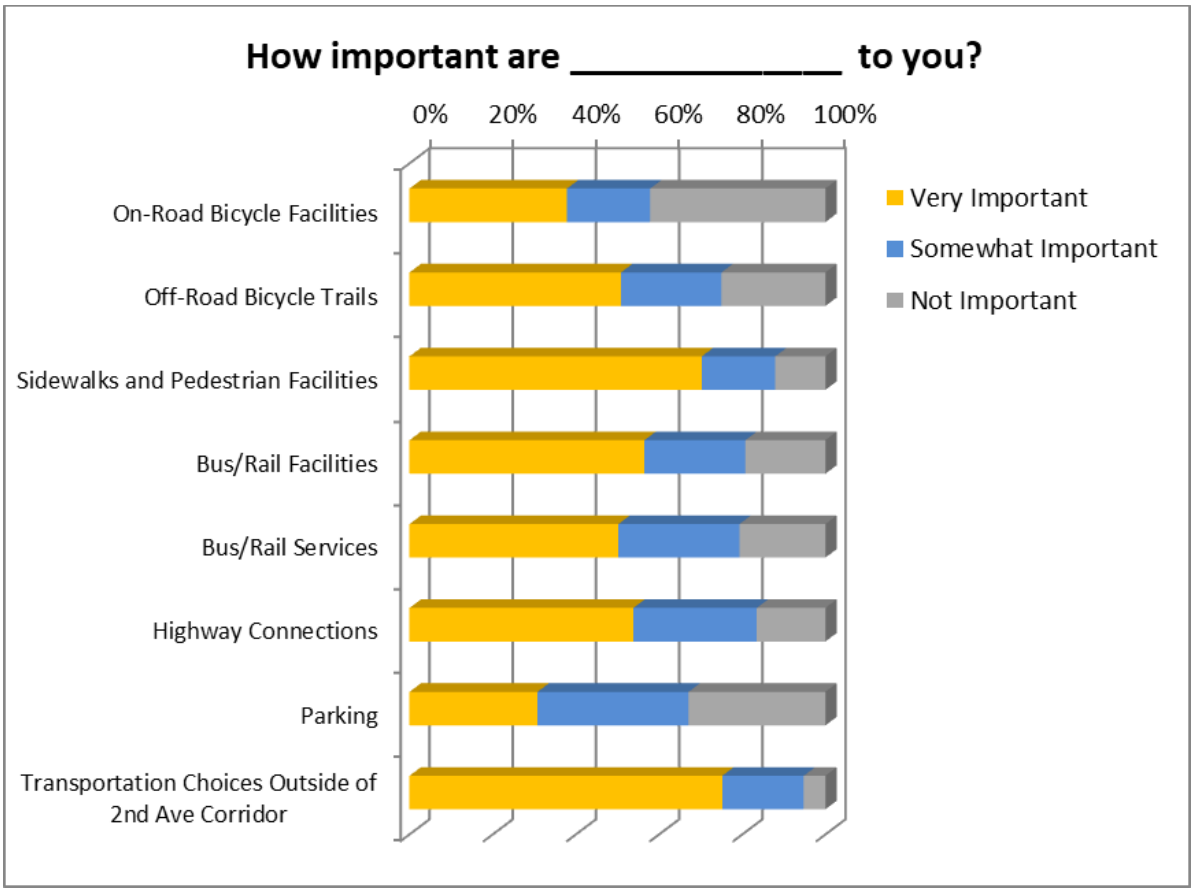
SUMMARY OF PUBLIC INPUT

By the numbers, the public input on transportation needs can be summarized as follows:

- Wikimap → 308 responses
- Online Survey → 240 responses
- February Stakeholders Meeting → 25 participants
- February Public Meeting → 57 participants
- Comments Sent to Project Email → 14 responses

Public input has been summarized in two ways: Survey-based responses combined from both the February meetings and the online survey are presented in graphs (*Exhibit 3-2* through *Exhibit 3-4*), with complete results in *Appendix D*. Open-ended comments and map-based input are summarized by focus area (Map in *Exhibit 3-5*, table in *Exhibit 3-6*).

Exhibit 3-2: Public Input – How important are transportation modes to you?



Sidewalks and Pedestrian Facilities and Transportation Choices outside the Second Avenue corridor were rated as both “Very Important” and “In Need of Major Improvements” by the greatest number of respondents. On-road Bicycle Facilities and Highway Connections were rated the next most in need of improvement. Ride-sharing and parking were rated the least in need of improvements.

Exhibit 3-3: Public Input – How well do the transportation modes work for you?

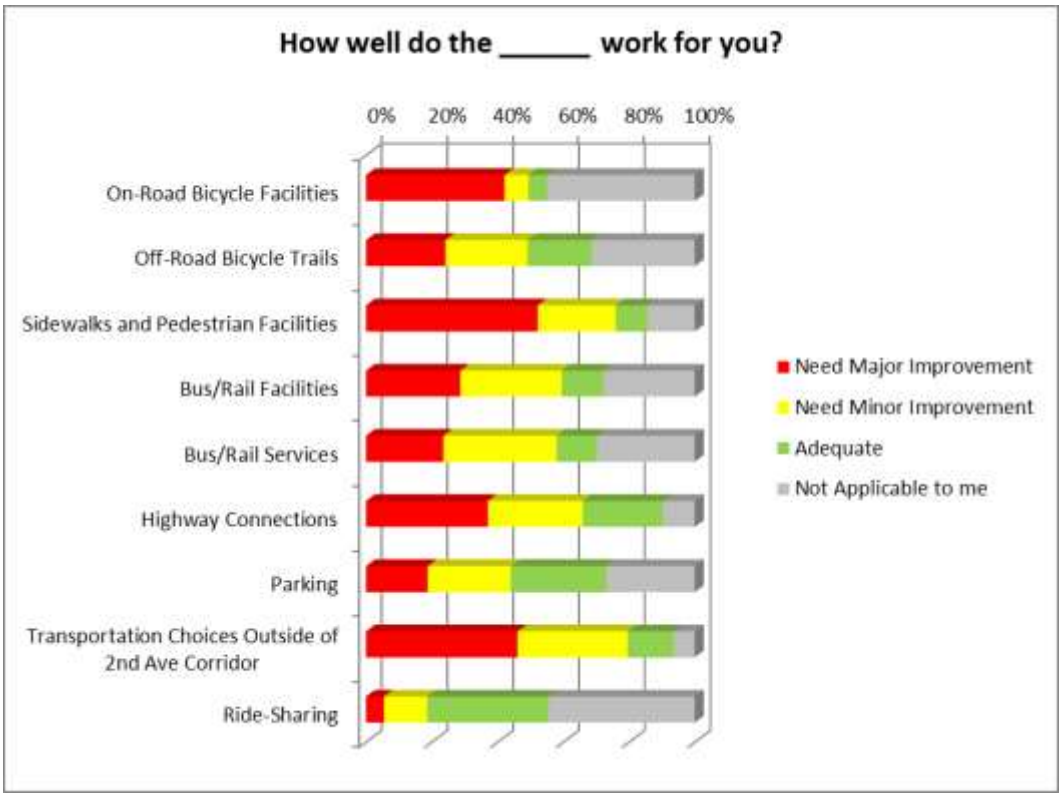
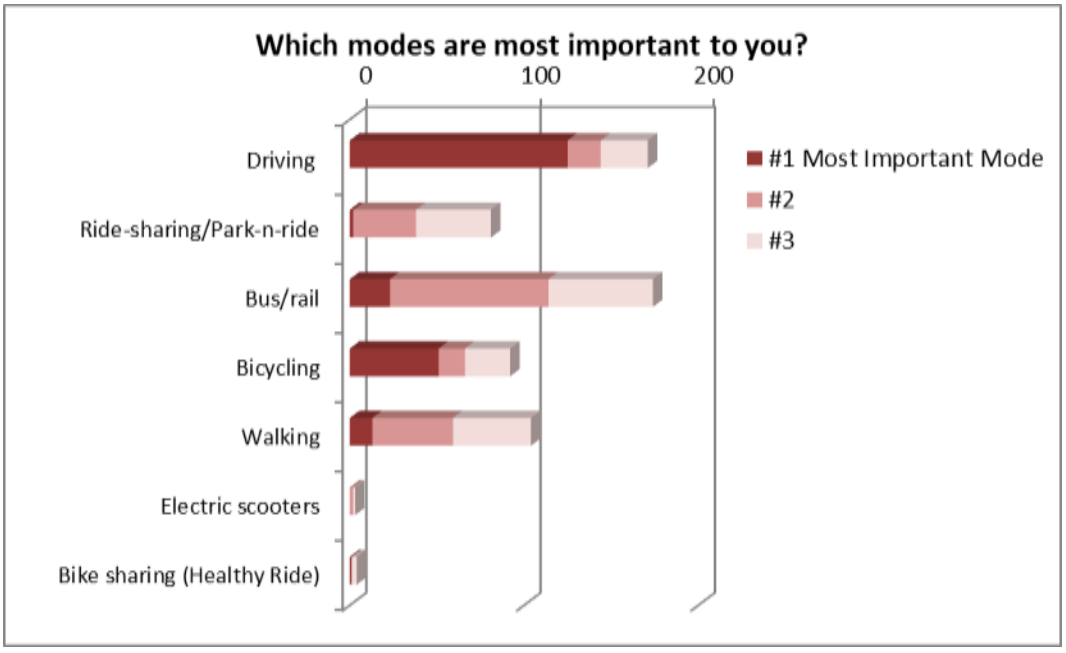


Exhibit 3-4: Public Input – Which modes are most important to you?



When asked to rank transportation modes by importance, driving was clearly the most important (*Exhibit 3-4*), with bus/rail not far behind but as a secondary form of transportation. Bicycling and walking were also ranked highly.

By location (*Exhibit 3-5* and *Exhibit 3-6*), the issue most often mentioned by respondents was 'The Chute.' The respondents characterized this area as a dangerous connection from the Eliza Furnace Trail to the Saline Street bike route (pictured below). The connection is narrow, protected from heavy traffic by only jersey barriers, has blind corners at both ends, a steep hill, and shares sidewalk space with a busy bus stop. Cyclists, pedestrians and bus riders all commented on perilous current conditions.

Trail connections, or lack thereof, and pedestrian facilities were frequently mentioned in the collected comments, particularly junctions between routes coming into or leaving the SR 885/Second Avenue corridor (shown as red arrows in *Exhibit 3-5*).

Not all the respondents agreed in their assessment of transportation needs. Some respondents, for example, advocated for widening the roadway through the Hazelwood Business District in order to alleviate south-bound congestion in the afternoon rush hour. Others strongly supported no changes to the sidewalks and on-street parking in the business district, so as not to impact the viability of local businesses. Some respondents specifically requested adding bike lanes to Second Avenue, while others strongly opposed such a change.

Exhibit 3-5: Public Input – Comment Focus Areas (Map)

Exhibit 3-6: Public Input – Comment Focus Areas (Table)

Focus Area (see Exhibit 3-5 for numbered locations)	
1. 10TH ST. BRIDGE/ARMSTRONG TUNNEL • Eliza Furnace Trail does not connect to bridge • Intersection design is confusing for drivers	**2. BIRMINGHAM BRIDGE** • Eliza Furnace Trail does not connect to bridge • Sidewalk at south end of the bridge has stairs
3. BATES STREET/HOT METAL BRIDGE • Traffic is often congested along Bates and Second Ave between Bates and Hot Metal Bridge • Buses currently cannot travel up Bates • Ramp to I-376 from Bates is eastbound only and cars stop at the top • Eliza Furnace Trail does not connect to Bates • Repair Frazier Street steps and add bike rail • Cyclists need better access up the hillside to Oakland • Cyclists need connection from Hot Metal Bridge to Hazelwood Trail without going through intersection	**4. IRVINE-GREENFIELD-SALINE-SECOND AVE INTERSECTION** • Intersection is confusing for drivers • Tractor trailers have difficulty negotiating tight corners at intersection • Bike 'chute' connection between Eliza Furnace and Junction Hollow Trails is difficult and unsafe • Waiting bus passengers share sidewalk space with pedestrians and cyclists • Pedestrians crossing Greenfield Ave lack pedestrian signals and crosswalk • Significant bike traffic on Greenfield Ave with no dedicated bike facility • No connection between Eliza Furnace Trail and new Blair Street Bike trail • Sidewalk along Irvine St from Greenfield Ave to Hazelwood Ave is incomplete, poor condition, and frequently blocked by vehicles • Cars speed along Irvine St from Greenfield Ave to Hazelwood Ave • Swinburne St is often closed by landslides
5. HAZELWOOD BUSINESS DISTRICT • Confusing lane configuration (partially restricted parking, treated as two lanes NB) • Southbound afternoon rush hour backups • Need to support local businesses by maintaining on-street parking and not expanding roadway width • Hazelwood residents do not have access to the river for fishing or recreation • Traffic signals need to be updated/improved (retime, add detection, etc.) • Lack of off-street parking along corridor • Widen road to alleviate congestion • Make reversible middle lane • Add bike lanes • Do not add bike lanes	**6. GLENWOOD BRIDGE** • Duck Hollow Trail does not connect to Hazelwood Trail/Blair Street • Duck Hollow Trail does not connect to Great Allegheny Passage (South side of bridge) • Cars speed across Glenwood Bridge • Pedestrian access at the south end of bridge has stairs • Opportunity for Park & Ride at south end of bridge
TRANSIT COMMENTS • Need better bus connections to Oakland and Downtown from Hazelwood. Bus options exist but frequency (particularly off-peak) and weekend access are problematic	**ADDITIONAL BIKE/PEDESTRIAN COMMENTS** • Junction Hollow Trail does not connect to Schenley Park trails, blocked by railroad • Need a connection from Junction Hollow Trail east to Squirrel Hill

- Hazelwood needs more stops and better access to existing bus stops (complete/safe sidewalks, crosswalks, bus shelters)
- ADA access to the VA from Hazelwood requires multiple routes and walking connections
- Need better access to groceries via bus - not easy to get to Greenfield Giant Eagle or Waterfront
- Possible to add a cooperative shuttle between universities and hospitals?
- Add bike share stations at each end of Hot Metal Bridge to connect bus routes on either side of the river
- Don't relocate the 57 bus
- Add BRT or LRT on Second Ave
- Add Park-and-Ride near Second Ave/ Greenfield
- Need a connection from Oakland to Eliza Furnace Trail via Lawn Street
- Ramps from Eliza Furnace Trail to Pittsburgh Technology Center need to be repaired/made permanent
- Trails need adequate bathroom facilities and safe parking areas

ACCESS LIMITATIONS

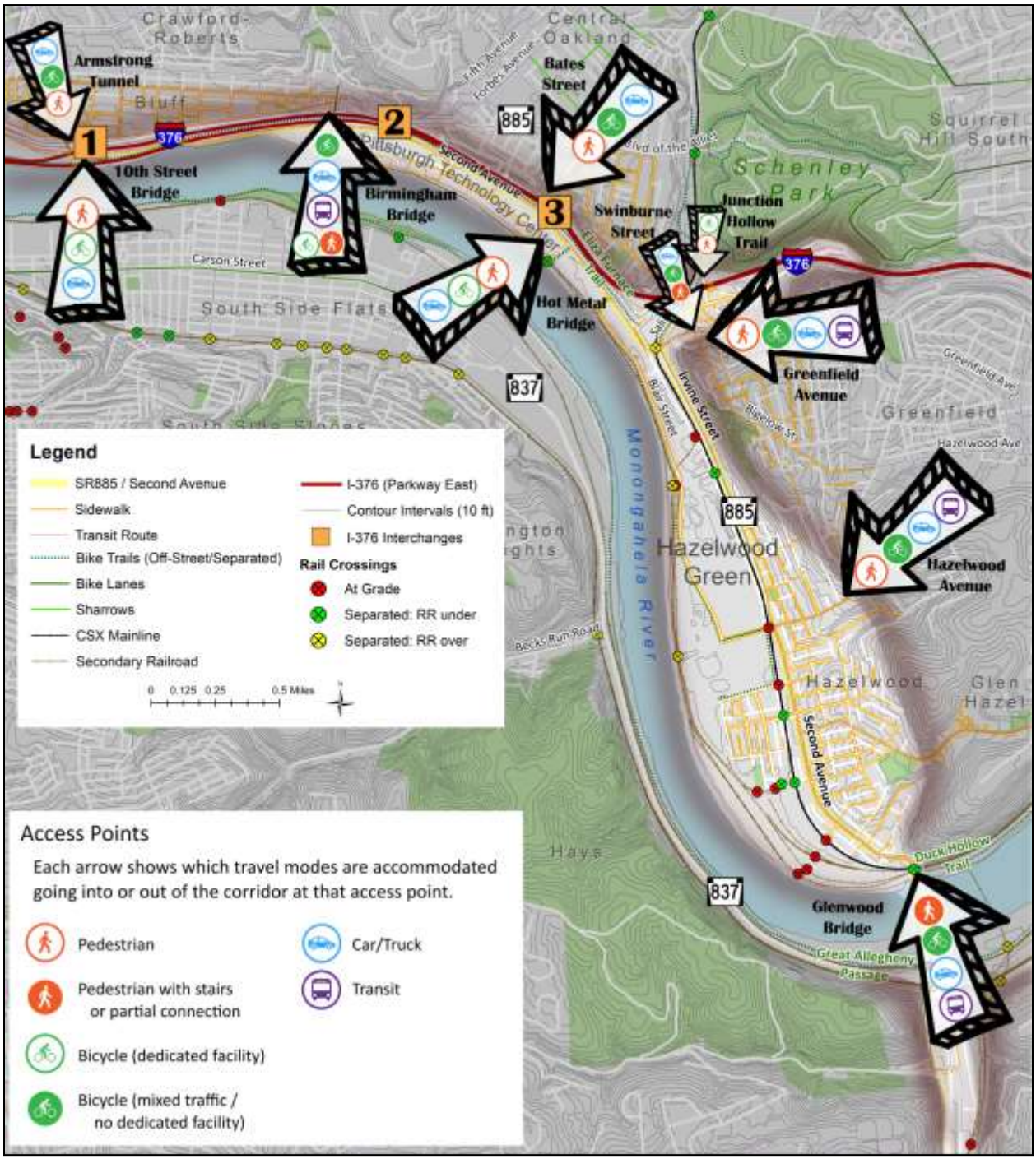
An additional factor in analyzing the transportation needs of the SR 885/Second Avenue corridor is to think of the corridor as a closed system with limited connections, much like a limited-access interstate. The combination of steep hillsides, the Monongahela River, multiple railroads, and Interstate 376 combine to create a relatively closed system (*Exhibit 3-7*) that limits the traffic flow into and out of the corridor. Focusing on improving those pinch points or creating new connections could result in major improvements in traffic flow for relatively low cost.

The physical barriers depicted are as follows:

- Four bridges cross the Monongahela River to the south/west:
  - 10th Street Bridge
  - Birmingham Bridge
  - Hot Metal Bridge
  - Glenwood Bridge
- Four major connections up the steep hillsides to the north/east:
  - Armstrong Tunnel
  - Bates Street
  - Greenfield Avenue
  - Hazelwood Avenue
- Three I-376 interchanges offer limited connections. The interstate itself is also a physical barrier:
  1. Second Avenue westbound off only (near Allegheny County jail)
  2. Forbes Avenue eastbound off/westbound on only (no connection to SR 885/Second Avenue corridor)
  3. Bates Street westbound off/eastbound on only

- Allegheny Valley Railroad mainline and several secondary railroads cut through the SR 885/Second Avenue corridor and limit east-west access in the southern part of the corridor

Exhibit 3-7: Physical Barriers and Access Points



Each major access point is depicted on the map as a large arrow with icons for the modes that can travel on it, with different color icons for access that is available but less safe (such as

separate bike lanes vs. cyclists riding in the lane with traffic) or limited (such as pedestrian access that includes stairs).

For example, the symbol at left indicates that Glenwood Bridge is an access point that accommodates cars, trucks and transit buses. Pedestrians have a sidewalk, but the sidewalk ends in stairs on the south side of the bridge. Cyclists must ride in the lane with traffic as there is no bike lane or trail.

Together, the sources of public input – surveys, Wikimap and additional comments – combined with the access limitation analysis and the data from the Existing Conditions Report to provide a basis for understanding the problems that need to be solved in the SR 885/Second Avenue corridor. Those problems were then addressed during the Technical Charrette in the next phase of the project, described below.

TECHNICAL CHARRETTE

On April 3 and 4, 2019, a group of 21 planners, engineers and community members with experience in transit, Complete Streets, bicycle/pedestrian, and traffic operations met to brainstorm solutions to the transportation needs of the SR 885/Second Avenue corridor (*Exhibit 3-8*). The participants were divided into two groups to brainstorm separately, then met together to decide on the best solutions to move forward.

Using data on travelers' origins and destinations, the groups focused on analyzing the regional transportation network to create new connections and improve transit services to meet travelers' needs while improving congestion along the SR 885/Second Avenue corridor. Then the groups focused on smaller-scale improvements with big impacts, such as bicycle-pedestrian connections, and intersection improvements. The resulting set of potential solutions is presented in the following section.

Exhibit 3-8: Technical Charrette

POTENTIAL SOLUTIONS

Based on the public input process and the technical charrette, proposed improvements were developed and divided into three approaches. The three approaches are detailed in the following section. These groups were created to make it easier to measure how well the projects would address the projected future growth. They simply represent different groups of elements that could address the current and projected traffic in the SR 885/Second Avenue corridor. The final plan incorporates parts of all three approaches.

FILL IN THE GAPS APPROACH

The Fill in the Gaps Approach (*Exhibit 3-9* through *Exhibit 3-13*) is a group of projects intended to address existing gaps in the transportation network that have little to do with future growth. Many of these projects were ideas submitted by stakeholders and the public earlier in the study. Although many of these projects are relatively low-cost and could be addressed in the short term, that is not true of all of the projects. Some of these projects would be mid-term and long-term projects.

Projects in the Fill in the Gaps Approach are presented in two parts: Bicycle and Pedestrian improvements (*Exhibit 3-9*) and Transit and Roadway improvements (*Exhibit 3-10*). The maps note that several projects shown are already underway or are committed to be completed by other agencies, such as PennDOT, the City of Pittsburgh Department of City Planning, and the City of Pittsburgh Department of Mobility and Infrastructure (DOMI). Since these projects are relevant to the SR 885/Second Avenue corridor they are shown on the maps for informational purposes, but they are being completed separately from this study.

Exhibit 3-9: Fill in the Gaps Approach: Bicycle and Pedestrian

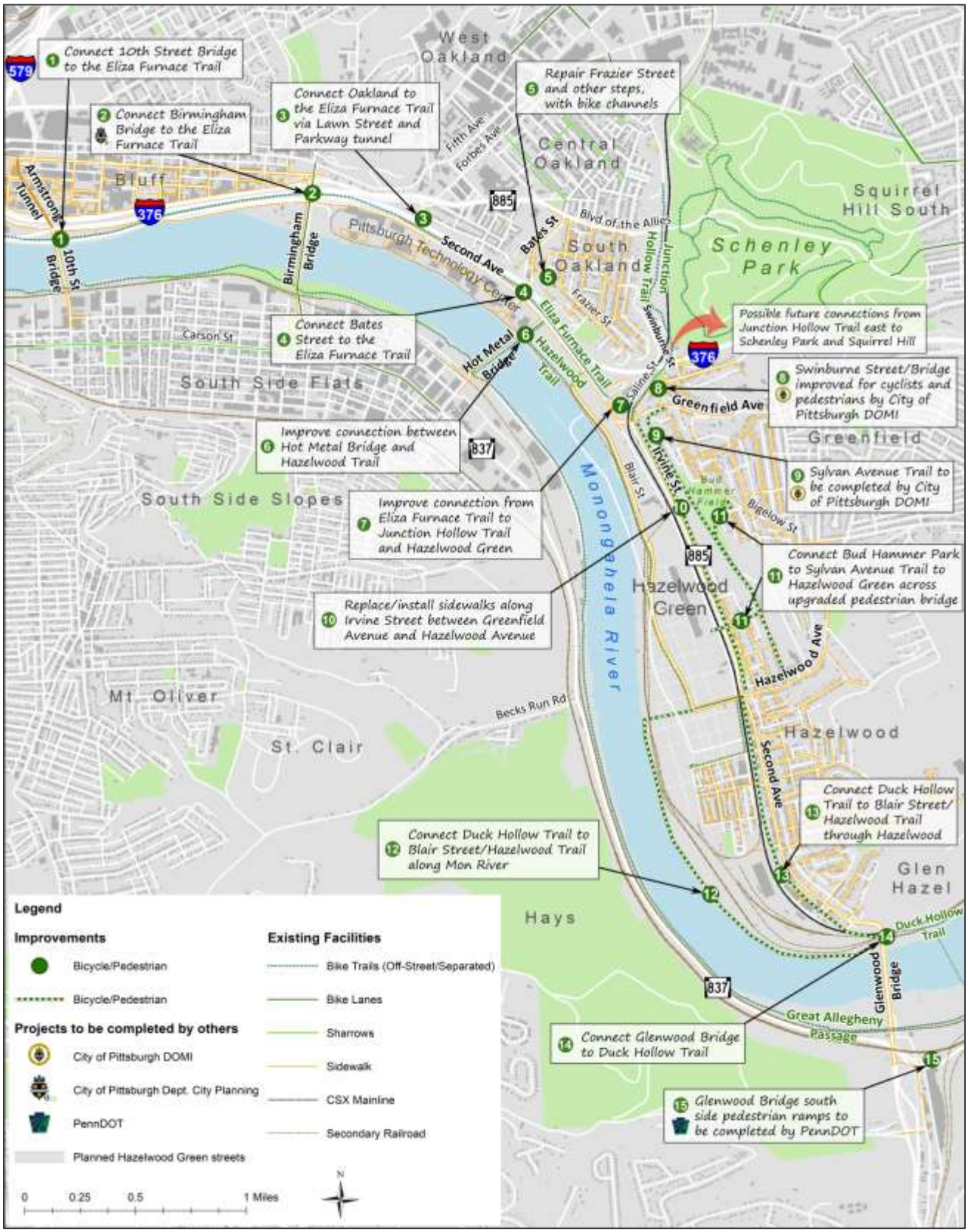
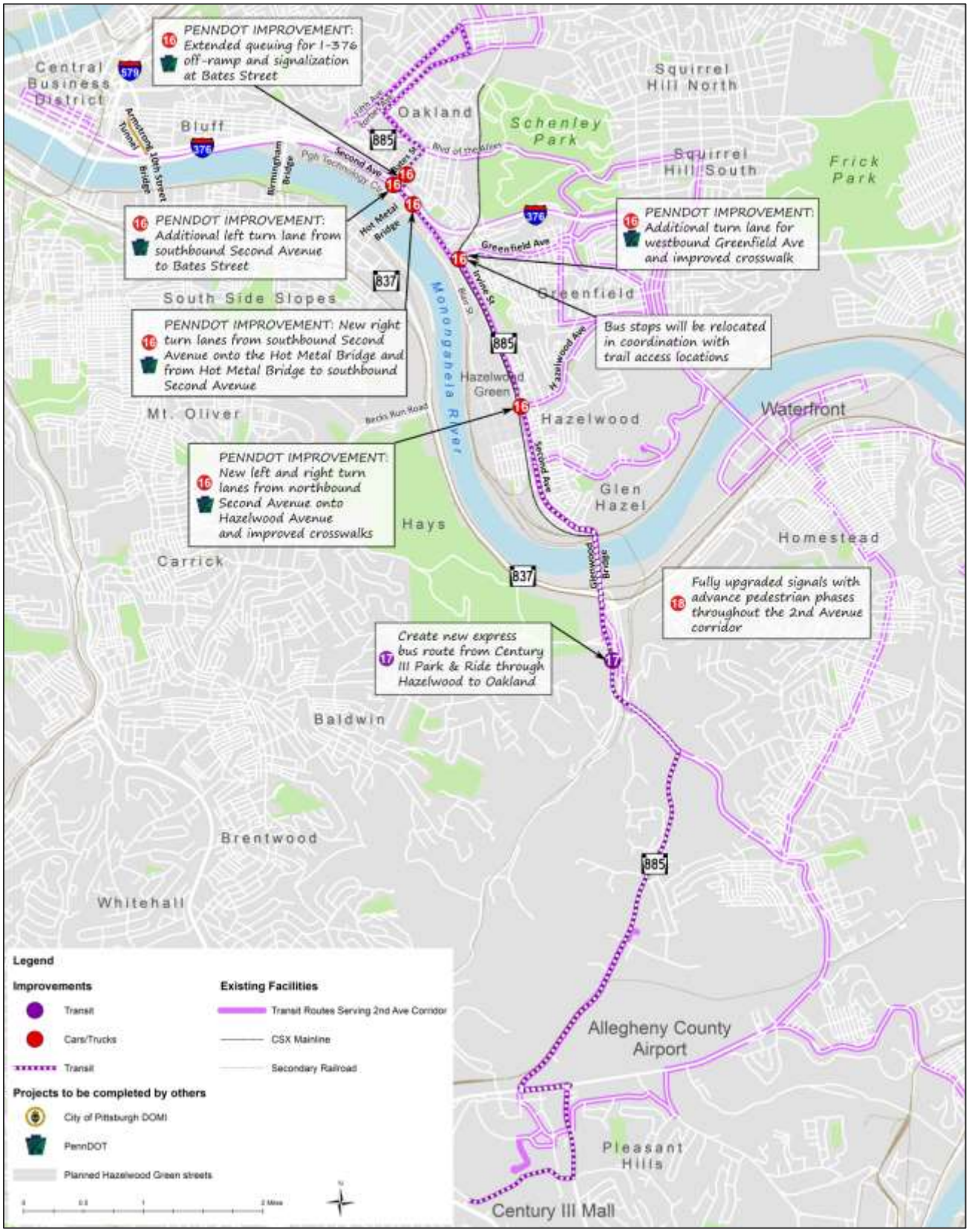


Exhibit 3-10: Fill in the Gaps Approach: Transit and Roadway



Detailed graphics are also available for the 10th Street Bridge Connection to Eliza Furnace Trail (*Exhibit 3-11*) and Proposed Mon River Trail from Duck Hollow to Hazelwood Trail (*Exhibit 3-12*).

Exhibit 3-11: 10th Street Bridge Connection to Eliza Furnace Trail

(Reference Project 1 in Exhibit 3-9)

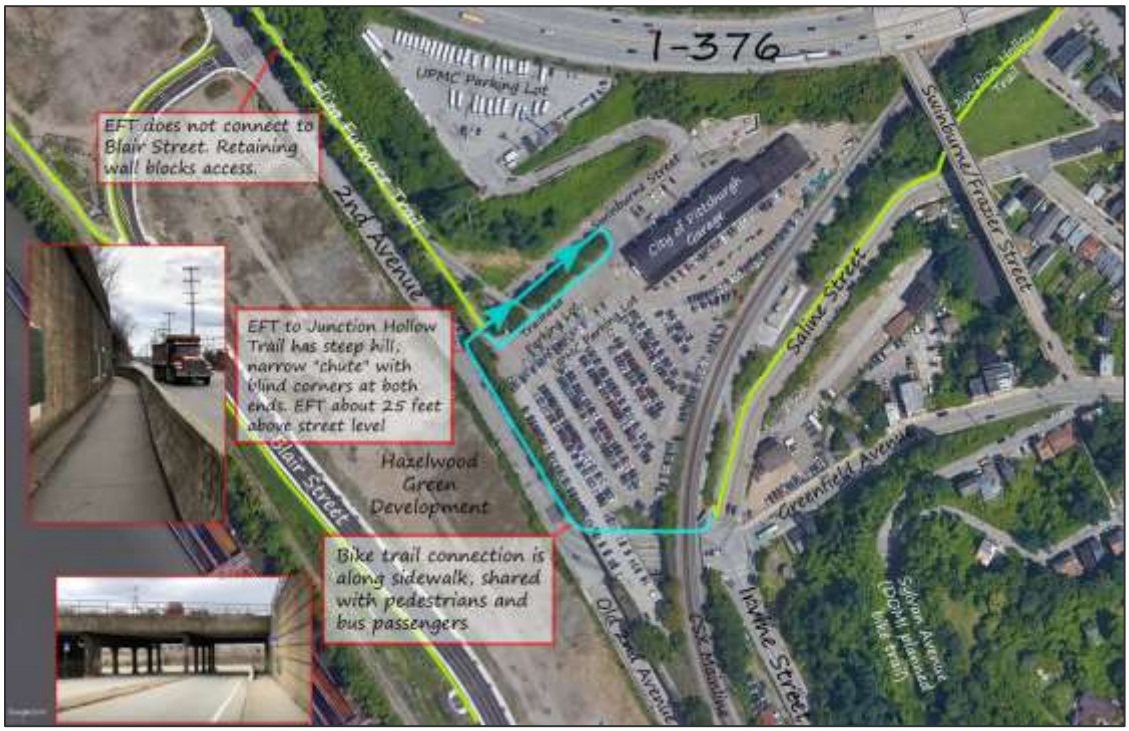
Exhibit 3-12: Rendering of Proposed Mon River Trail from Duck Hollow to Hazelwood Trail

(Reference Project 12 in Exhibit 3-9)

The intersection of Irvine Street, Greenfield Avenue, Saline Street and Second Avenue presents a particularly challenging situation for pedestrians and cyclists connecting from the Eliza Furnace Trail, Hazelwood Trail, Hot Metal Bridge, and Junction Hollow Trail (Saline Street). As discussed previously in the Public Input section, the lack of safe connections in this area was mentioned frequently during public outreach. Three major options to improve pedestrian and cyclist connections in this area were presented to the public, noting that the final plan may include more than one option (*Exhibit 3-13*).

Exhibit 3-13: Fill in the Gaps Approach: Irvine St/Greenfield Ave/Saline St/Second Ave Options
(Reference Projects 6 and 7 in Exhibit 3-9)

Existing Conditions:



Option A. Eliza Furnace Trail (EFT) to Junction Hollow Trail

Option B. Hot Metal Bridge to Hazelwood Trail

Option C. Eliza Furnace Trail Ramp to Hazelwood Green

MODERATE INFRASTRUCTURE APPROACH

The second group of proposed solutions is the Moderate Infrastructure Approach (*Exhibit 3-14*), which represents projects that involve substantial cost and infrastructure modification, but not as much as the Heavy Infrastructure Approach. The improvements presented here assume that all the projects in the Fill in the Gaps Approach have been completed; this set of projects is cumulative with the other approaches rather than being alternatives.

One of the major proposed changes is a Bus Rapid Transit (BRT) system to improve transit options for commuters through the SR 885/Second Avenue corridor. The BRT system would expand the roadway by about 3 feet on each side through the Hazelwood Business District to accommodate a shared transit/parking lane (*Exhibit 3-15*). The lane would be dedicated for transit during the peak period and direction (northbound in the morning, southbound in the afternoon), and at other times would be available for parking.

A new express bus service utilizing the transit lane would offer two interlacing routes, with starting points in the South Hills and the Waterfront and connecting to the planned BRT service to Oakland and downtown. Limited stops in Hazelwood would improve the community's connections to those job centers as well. Park-and-Ride lots at Century III Mall and the Hays interchange with SR 837 would offer commuters opportunities to park before entering the SR 885/Second Avenue corridor.

Exhibit 3-14: Moderate Infrastructure Approach

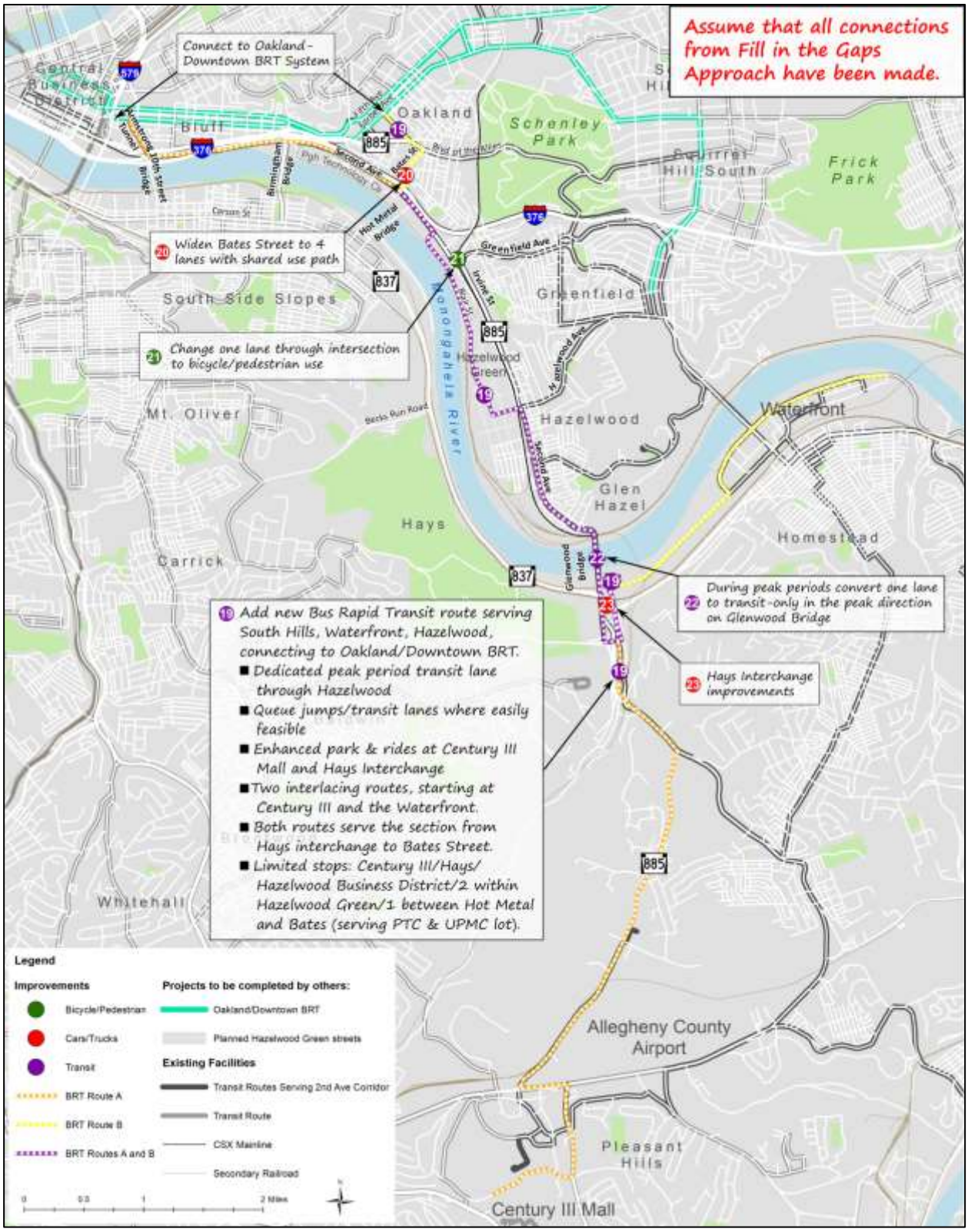


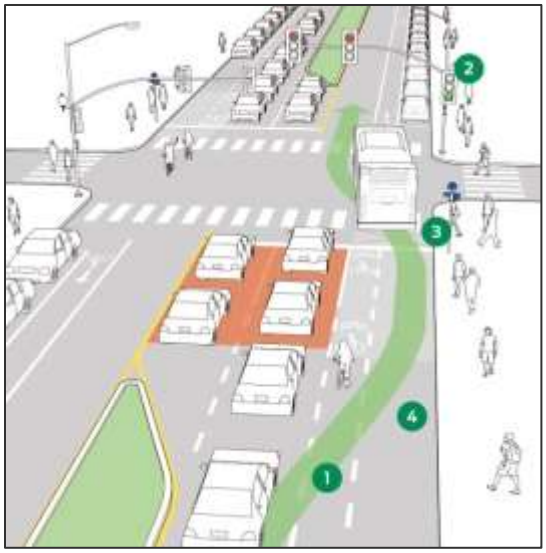
Exhibit 3-15: Second Avenue in Hazelwood Business District

Existing Conditions:

With dedicated rush hour transit lane in Moderate Infrastructure Approach:

Transit service in the Hazelwood business district would also benefit from 'queue jumps,' which offer buses a head start at each signalized intersection. The graphic below illustrates how a queue jump could work (*Exhibit 3-16*). Please note that the graphic is simply an example – the lane configuration shown is not what would be used for Second Avenue.

Exhibit 3-16: Example of Transit Service Queue Jumps[1]



1. Buses must have access to a lane and the ability to reach the front of the queue at the beginning of the signal cycle. Buses receive a head start with an advance green.

2. Separate signals must be used to indicate when transit proceeds and when general traffic proceeds.

3. The bus pulls into the stop, completes boarding, and then pulls forward onto a loop detector to receive the advance green.

4. The length of a shared head start/right turn lane should be long enough to allow storage of right-turning vehicles and allow buses to reach the queue jump during each signal cycle.

A bus head start can significantly improve bus performance by routing vehicles through congested intersections ahead of traffic. The ability for buses to use queue jumps and a dedicated lane through the business district would enable the service to offer travel times competitive with single-occupancy cars, which would reduce congestion in the Hazelwood neighborhood.

Another proposed improvement to the corridor is the conversion of the Irvine Street-Greenfield Avenue-Saline Street-Second Avenue underpass from a three-lane underpass to a two-lane underpass with additional space for bicycle/pedestrian use (*Exhibit 3-17*). The conversion would offer more space and protection to pedestrians, cyclists and transit users, which currently share a narrow sidewalk under the overpass. Allowing one lane each for northbound and southbound traffic would also simplify what is a currently a confusing configuration for drivers. This improvement could be accomplished without the redesign/reconstruction of the overpasses.

[1] Source: National Association of City Transportation Officials. https://nacto.org/publication/transit-street-design-guide/intersections/intersection-design/queue-jump-lanes/

Exhibit 3-17: Bicycle/Pedestrian/Transit Lane at Irvine St/Greenfield Ave/Saline St/Second Ave
(Reference Project 21 in Exhibit 3-14)

HEAVY INFRASTRUCTURE APPROACH

The projects included in the Heavy Infrastructure Approach generally require a major investment of funding and time, so they represent longer-term solutions (*Exhibit 3-18*). The Bus Rapid Transit (BRT) service proposed in the Moderate Infrastructure Approach would be enhanced with a dedicated transit corridor along the current mainline railroad that runs parallel to Second Avenue from the Monongahela River to the intersection with Greenfield Avenue and Saline Street. Shifting the railroad operations to the existing riverside rail line would reduce the risk of crashes at the at-grade crossing at Hazelwood Avenue, allow for dedicated transit use along the corridor, and enable the reconnection of streets and the community.

Without the need for a dedicated transit lane in the Hazelwood business district, there would be dedicated parking lane along both sides of the roadway (*Exhibit 3-19*). The proposed BRT would also benefit from a direct connection to the Oakland-Downtown BRT system at Brady Street/Birmingham Bridge, which would simplify the route and speed up the travel time.

The Heavy Infrastructure Approach also assumes that there is a limited lifespan to the railroad overpass at the Irvine-Greenfield-Saline-Second intersection that would necessitate that it be reconstructed in the future (*Exhibit 3-20*). A redesign of the intersection at that time could greatly improve traffic functionality and safety for all users.

Exhibit 3-18: Heavy Infrastructure Approach

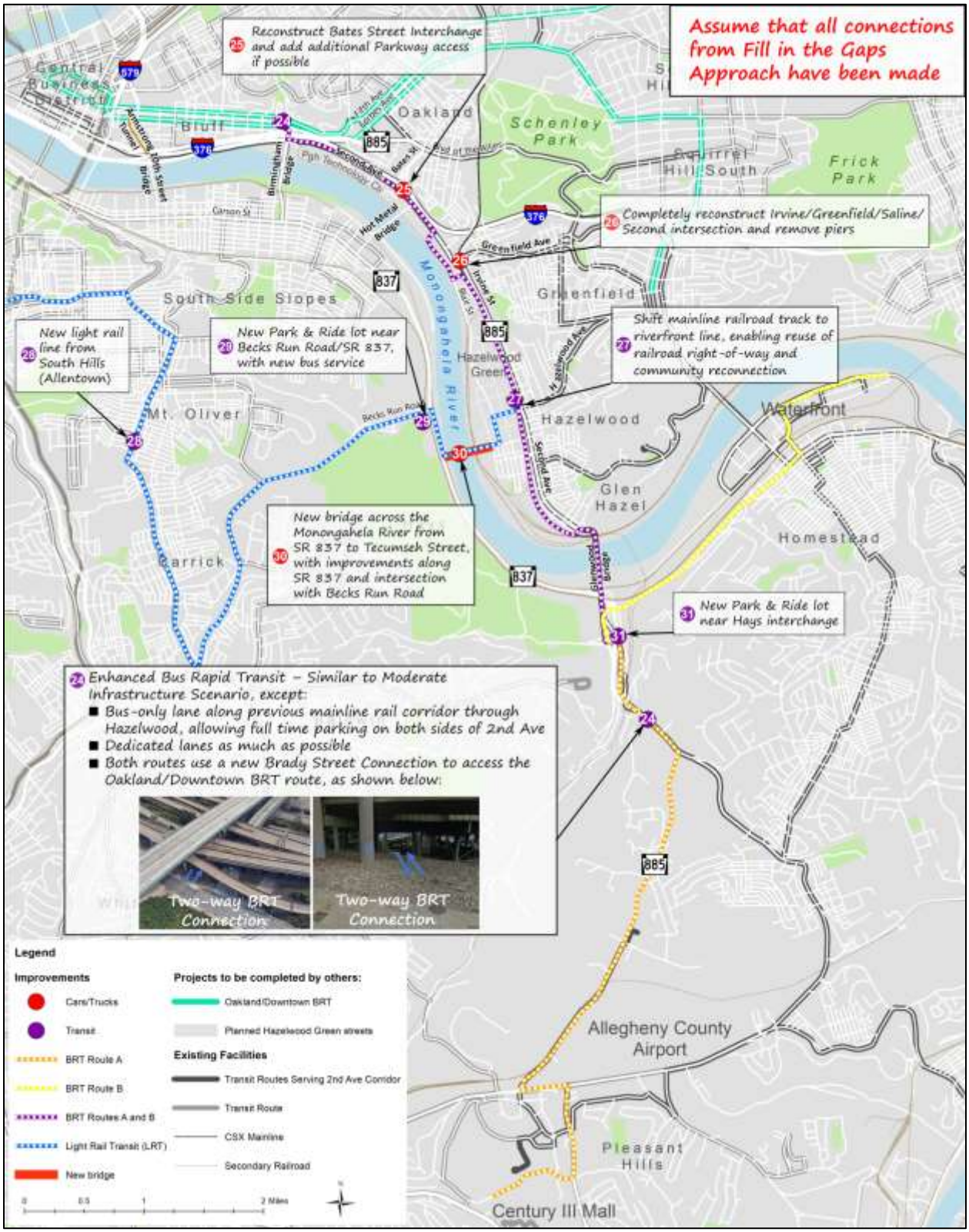


Exhibit 3-19: Second Avenue in Hazelwood Business District under Heavy Infrastructure Approach

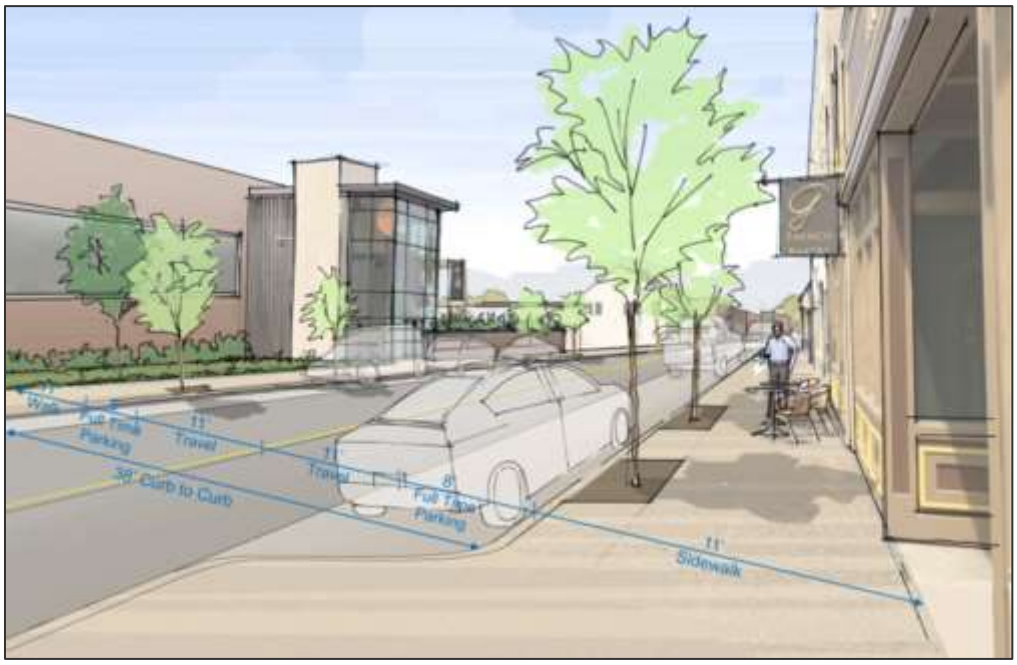


Exhibit 3-20: Reconstruction of Irvine St/Greenfield Ave/Saline St/Second Ave with Pier Removal

(Reference Project 26 in Exhibit 3-18)

GONDOLA AND FERRY

During the public input process, two additional transportation options were mentioned that merited evaluation: an aerial gondola (*Exhibit 3-21*) and a passenger-only river ferry/water taxi (*Exhibit 3-22*). Both options were evaluated separately from the three approaches to see how much traffic they could pull from the SR 885/Second Avenue corridor. There are two routes for each mode (*Exhibit 3-23*); travel times for these routes are included in the Measures of Effectiveness section.

Both options would improve localized access to and from the study area from the terminal points but would require effective integration with other modes of travel to provide access to and from a large area.

Exhibit 3-21: Example Aerial Gondola (Portland, OR)

Exhibit 3-22: Example Passenger-Only River Ferry Boats (East River, NY and Brisbane, AU)

Exhibit 3-23: Aerial Gondola and River Ferry Routes

FUTURE GROWTH LEVELS

The SR 885/Second Avenue corridor is poised for significant economic development that will help implement the City's plans. As future levels of growth increase, the potential for Bus Rapid Transit (BRT) or Light Rail Transit (LRT) in the study area also increases.

The transportation improvements were evaluated considering three levels of growth in addition to current conditions. The examination of alternative levels of growth (*Appendix E*) both reflects the uncertainty of the timing for the substantial levels of growth that are contemplated for key redevelopment sites in the study area and helps assess the degree to which potential transportation system improvements are needed to address near term or longer term.

- The Low Growth assessment included only minor amounts of infill development throughout the study area,
- The Medium Growth assessment included about two-thirds of the proposed Hazelwood Green development, and
- The High Growth assessment included the full amount of proposed Hazelwood Green development as well as the Pittsburgh Technology Center and SouthSide Works activity centers and additional infill development throughout the Hazelwood community

DEVELOPMENT DENSITY AND TRANSIT FEASIBILITY

The consideration of a range of development levels also facilitates consideration of a range of transportation system investments. This relationship is symbiotic; greater levels of human activity warrant higher levels of transportation system investment to accommodate travel demand. In turn, higher levels of economic activity provide greater returns to the tax base needed to invest in transportation. Additional development density also increases transportation system efficiency because compact development provides more possible travel destinations near each trip origin, resulting in shorter trip lengths.

Like most corridor studies, the SR 885/Second Avenue corridor is linear by definition. In the case of Second Avenue, however, the linear shape of the study area is reinforced by the topography along the north shore of the Monongahela River and its adjacent bluffs. The opportunity to consider improved transit services and systems in the SR 885/Second Avenue corridor depends in part on the degree to which the corridor, already compact in nature, will develop sufficiently to support higher levels of transit investment.

Based in part on the national experience between development density and transit service, the Virginia Department of Rail and Public Transportation developed *Multimodal System Design Guidelines* that help demonstrate this relationship in terms of 'activity unit density,' in which activity units are described as the sum of people living in an area and those working in the same area, and the density is obtained by dividing activity units by the number of acres. For instance, a 100-acre community with a thousand residents and a thousand jobs would contain 2,000 activity units, or 20 activity units per acre. These guidelines also provide commentary on what different levels of activity unit density tend to look like on the ground, and how all modes of transportation might be prioritized depending on need. The guidelines are developed for a statewide application, and therefore cover all levels of density across a transect of placetypes from most rural to most urban.

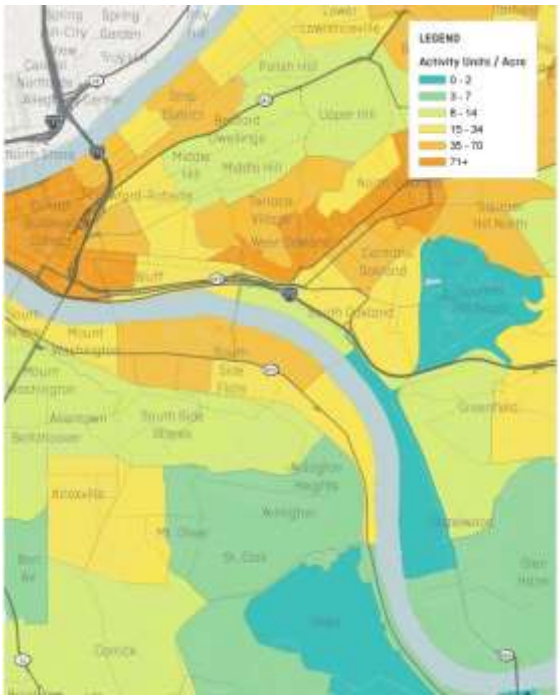
The relationship between development density and transit across the rural/urban transect is shown in *Exhibit 3-24*, along with the type of transit that might generally be found supportable by each level of density. A density level of at least 8 activity units per acre is generally needed to support fixed route bus service that operates on a regular schedule. About 15 activity units per acre is generally needed to support express bus service that might skip local stops along a route. About 35 activity units per acre are needed for transit service that operates at high levels of frequency in a generally exclusive right-of-way such as bus rapid transit (BRT) or light-rail transit (LRT).

Exhibit 3-24: Comparison of Transit Supportive Development Densities

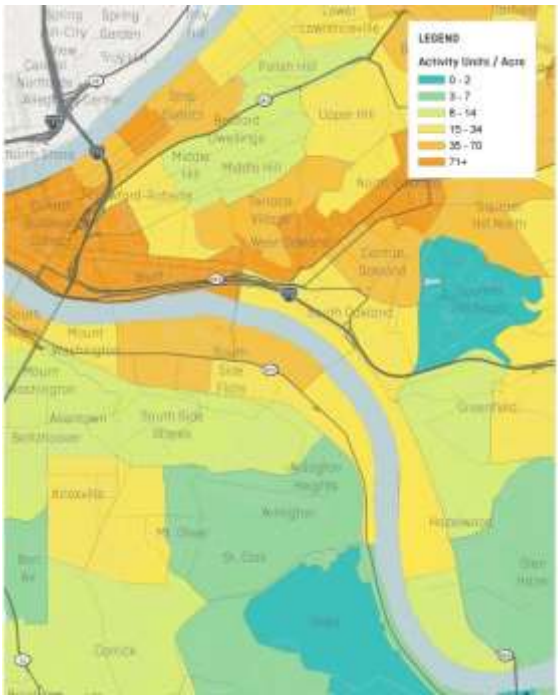
Transit service in the SR 885/Second Avenue corridor needs to be integrated into an already robust network of transit options in the region. The establishment of transit corridors is a combination of travel demand and right-of-way opportunity. For example, the Martin Luther King, Jr. East Busway connects downtown Pittsburgh to relatively high-density destinations in East Liberty and Edgewood, but by leveraging the historic Pennsylvania Railroad right-of-way. In contrast, the planned Downtown-Uptown-Oakland-East End BRT project more directly connects communities with higher levels of density, as indicated in *Exhibit 3-25*.

The SR 885/Second Avenue corridor area is shown in *Exhibit 3-25* in the context of existing and potential future levels of transit supportive development densities as described in *Exhibit 3-24*.

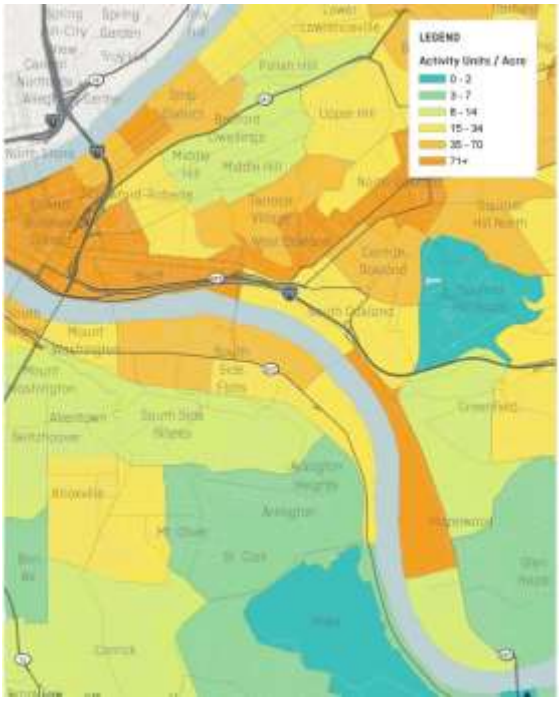
Exhibit 3-25: Future Growth Levels



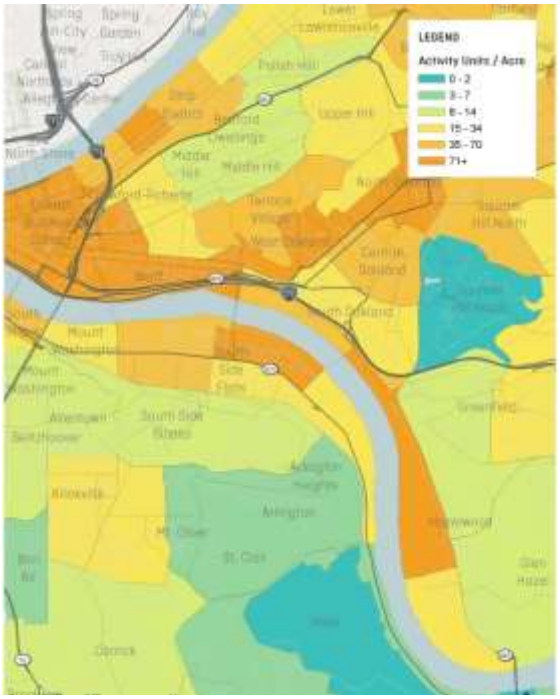
Existing: *Currently, the highest transit-supportive densities are in the Central Business District and Oakland.*



Low Growth*: Minor amounts of infill.*



Medium Growth: *About 2/3 of Hazelwood Green development*



High Growth*: All development at Hazelwood Green, Pittsburgh Technology Center, SouthSide Works, and infill development within the Hazelwood community*

TRANSPORTATION DEMAND MANAGEMENT

The term Transportation Demand Management (TDM) describes a range of strategies to improve the efficiency of the transportation system by accommodating travel demand through a range of travel modes and times of day. Most TDM strategies are directed toward shifting auto-driver trips during peak commuting periods to other travel modes (including auto passenger, transit rider, bicyclist, or pedestrian) or times of day to reduce traffic congestion. Many TDM strategies also contribute to complementary objectives to reduce the carbon footprint of travelers.

TDM actions typically include:

- Policy elements like direct parking charges; flextime and telework; equitable access to transport services such as transit, carsharing and bikesharing; 'unbundling' or 'shared' parking; and land use policies that encourage mixed uses to reduce trip lengths and facilitate access to resources like healthy food, health care, civic resources, and other activities of daily life.
- Facility elements like complete streets, transit stations and stops, remote Park-and-Ride lots, and access and circulation elements such as the peak period turning restrictions along Second Avenue.
- Service elements like transit and para-transit routes, ridesharing coordinators, wayfinding treatments and apps.

Transportation Demand Management (TDM) uses strategies to reduce the number of cars and trips on the road. Multiple TDM approaches are needed in the SR 885/Second Avenue corridor to target different types of travel. TDM strategies should be employed regardless of other transportation improvement options.

TRANSPORTATION DEMAND MANAGEMENT STRATEGIES

Both the City of Pittsburgh and SPC are already actively pursuing TDM strategies with various applications. The SR 885/Second Avenue corridor Transportation Demand Management strategies are guided by both regional and local TDM policies and procedures, with a focus on how existing approaches can be applied to the study corridor and their evolution facilitated over time.

Regional TDM Strategic Action Plan

SPC completed the Regional Transportation Demand Management (TDM) Strategic Action Plan in 2019. The plan seeks to enhance accessibility, mobility, system reliability, safety, economic development, quality of life, and cost-effective use of public funds throughout the region.

The plan's vision statement is: "All travelers across the Southwestern Pennsylvania region have access to, and are motivated to choose, healthy, sustainable, and effective travel options that reduce stress on the transportation network." Desired plan outcomes include:

- Reduced dependence on driving alone
- Increased access to a variety of affordable, effective travel choices
- Improved access to jobs

- Reduced time spent in traffic delays
- Equitable access to destinations for all population groups
- Enhanced community livability (walkable, bikeable places)
- Improved environmental conditions (reduced air pollution, greenhouse gases)
- Improved health and safety

The plan has five goals, with particular relevance to the SR 885/Second Avenue corridor described below:

Plan Goals, Priorities and Actions
Within the context of the plan's overarching vision statement and desired outcomes, a series of goals, priorities, and actions were developed. This section summarizes the goals outlined in the plan, highlighting the priorities and actions relevant to the SR 885/Second Avenue corridor. Additional details are included in *Appendix F*.

GOAL 1: Enhance the Ease of Use, Connectivity, and Effectiveness of Transit and Shared Mobility Options as well as Bicycling and Walking
The plan recommends focusing efforts on enhancing user experience and improving connectivity through infrastructure, education, enforcement, incentives, and effectiveness. Specific priorities and actions that are relevant to the SR 885/Second Avenue corridor include expanding the availability of shared mobility options at transit stations, making transit and HOV vehicle speeds more competitive through cost-effective priority treatments, and incentivizing Park-and-Ride and transit use through commuter programs. Additionally, the plan recommends that transit providers offer bulk discounts to employers and consider fare-free transit programs for targeted locations and population groups. It also recommends identifying strategic opportunities for new and expanded Park-and-Ride locations.

GOAL 2: Increase Employer Involvement to Improve Workforce Access to Jobs
The plan notes that employers play a significant role in the commute choices that employees make. The plan makes recommendations intended to encourage businesses to partner with transit agencies and engage in TDM activities. The plan highlights Pitt/CMU/Chatham as a model for providing discounted passes to employees and clients. Additionally, the plan suggests that existing certification programs such as Sustainable Pittsburgh, Best Workplaces for Commuters, and Bicycle Friendly Businesses certifications can be effective tools for motivating employers to increase their level of support of TDM. The report also recommends that employers develop 'live near work' programs and discusses disincentivizing parking through requiring parking payment and/or implementing a parking cash-out.

GOAL 3: Increase Awareness of Travel Options and Services
The purpose of this goal is to identify strategies for increasing public awareness of commute options. The plan notes that this is particularly important in the SPC region, where driving alone is the dominant mode of transportation, and in many cases, the default choice. This goal seeks to increase awareness of existing programs and services in addition to improving the public's understanding of the individual and shared benefits of active and public transit options.

GOAL 4: Promote Location-Efficient Development
Promoting development and re-development in activity centers would support the use of active and alternative transportation modes. The plan encourages the facilitation of private-sector

investments in location-efficient development. The key development sites along the SR 885/Second Avenue corridor, including the Pittsburgh Technology Park, SouthSide Works, and Hazelwood Green are examples of leveraging opportunities for compact development near the regional core (where motorized trip lengths are shorter than in less efficient locations) and supporting a higher level of transit service.

GOAL 5: Target Opportunities Beyond Work Trips and to Address Non-Recurring Sources of Delay

While many TDM efforts focus on work trips, this goal seeks to address non-work trips. Recommendations include encouraging and educating the broader public about travel options, such as marketing free or reduced cost rides for seniors and developing dynamic ride-sharing options. This goal could be supported by the Hazelwood circulator shuttle that would connect existing communities to new development opportunities and BRT transit stations. TDM strategies for non-recurring delays for activities such as special events and roadway construction would be applicable to the evolution of the SR 885/Second Avenue corridor. This section also discusses better management of freight and deliveries.

The plan recommends tracking indicators that describe awareness, activities, outcomes, and outputs. The plan also provides recommendations for how the region could better integrate TDM into planning and project development. Relevant to the SR 885/Second Avenue corridor planning project, this section of the report also includes recommendations for emphasizing TDM initiatives at a neighborhood-level and evaluating corridor projects and plans through a mode shift perspective rather than Level of Service (LOS).

City of Pittsburgh TDM Guidelines for New Developments

The City of Pittsburgh's Department of Mobility and Infrastructure (DOMI) has established TDM guidelines for new developments that specify the types of actions to be taken to both develop and implement an effective TDM plan. Land development proposals can mitigate their transportation impacts by developing a TDM plan that identifies physical improvements and programming strategies that shift vehicle trips to other modes of travel or otherwise move trips outside the peak hours of congestion. TDM plans for new developments are identified during the Department of Mobility and Infrastructure (DOMI) transportation impact review process for development projects. This document provides guidance on the process for developing and submitting a TDM plan.

TDM plans incorporate four components:

1. The development description establishes a baseline for site generated travel behavior and mode shares that would exist without active TDM plan elements.
2. Vehicle trip reduction and mode split goals describe the objectives of the TDM plan from an outcome-oriented perspective.
3. The package of TDM strategies describes both physical and programmatic improvements that are designed to achieve the goals.
4. A monitoring program sets out means to measure success in terms of both the delivery of the TDM package in component #3 and the effectiveness of the package as measured by progress toward the goals in component #2.

Site-level TDM plans can target a wide variety of trip purposes, although the most common are those to manage commute trips to and from site office space, as those trips contribute disproportionately to congestion due to their relative trip length and tendency to occur during regional rush hours. TDM plans are expected from significantly sized development projects, generally those that would generate 100 new peak hour vehicle trips or where trip reduction efforts are deemed integral to project success due to geographic location, proposed reductions to otherwise required on-site parking, or similar transportation related site characteristics. Each of the key development sites in the corridor (Pittsburgh Technology Park, SouthSide Works, and Hazelwood Green) meet the criteria triggering a TDM plan. The proposed TDM plans are reviewed by DOMI in conjunction with transportation impact analysis studies. The TDM guidelines recognize that TDM plans need to be customized to best fit the site being developed and the context of the surrounding community, although the types of actions to be considered can be categorized as including:

- Programmatic elements such as:
    - TDM coordination and staffing for administrative, monitoring, and marketing efforts to both implement the site-level package and participate in broader neighborhood, citywide and regional TDM efforts; particularly important in shifting the responsibility for TDM success from developers to tenants over time as the site evolves.
    - Parking management approaches including: unbundled parking to shift the burden of parking cost from owners to tenants; shared parking to promote a 'park once and walk' for those who will drive to the development site
    - Flexible working hours and options for telecommuting
    - Providing transit subsidies and passes
- Site-level elements such as:
    - Site design to prioritize pedestrian site access, both from nearby development and transit stops, as well as to enhance the non-motorized traveler experience as comfort and perceived safety are instrumental to encouraging modal shift
    - Bicycle facilities that might include secured bicycle parking, bikeshare stations, access to shower facilities on-site, and access to or promotion of bicycle repair services
    - Transit station enhancements, including real-time traveler information onsite
    - Priority parking spaces for carpool/vanpool vehicles

Strategic Approaches for the SR 885/Second Avenue corridor

TDM strategies in the SR 885/Second Avenue corridor should synthesize both the regional level activities in the regional TDM Strategic Action Plan and the approaches in the City of Pittsburgh's site-level development review process, as well as incorporate means to manage expectations for localized conditions in the corridor. *Exhibit 3-26* describes four groups of strategic approaches that address different targeted trips and destinations specific to the corridor:

- The employer-based strategies are focused on commute trips to jobs centers, both within the corridor and the destinations (notably downtown and Oakland) where TDM programs can reduce peak period, peak direction through travel in the corridor.

- The regional mode share programs can focus primarily on more effective transit services in the corridor for all trips; again, the most cost-effective transit services are those that are oriented toward connecting the corridor to the regional core, such as the new BRT line recommended in the corridor plan.
- Curbspace management strategies may be incorporated into both regional and site-level planning but are also applicable for general street design and operations within the corridor and particularly to serve the existing commercial and service uses within the Hazelwood community; a balance is needed between short-term parking for storefront access, bus stops, loading and delivery activities, and possible shared-economy services such as bikeshare stations or pick-up areas for ride-hailing services and other micromobility options.
- Residential access and circulation is an important element to continue to coordinate with both existing and future residents; a balance should be maintained between leveraging the prior investments in transportation infrastructure with providing appropriate levels of neighborhood protection, such as the peak period turning prohibitions along Second Avenue in Hazelwood to minimize cut-through traffic.

Exhibit 3-26: Transportation Demand Management Strategic Approaches

Travel Demand Management Strategic Approaches			
Approach	Elements	Targeted trips	Areas
Employer-based	Parking, ridesharing, flex-time, information	Commute trips to jobs centers	Downtown, Oakland, Pittsburgh Technology Center
Regional mode share	Transit programs	Travel to regional core	Downtown, Oakland
Curbspace management	Parking, information	Second Avenue businesses	Hazelwood Business District
Residential access and circulation	Through traffic management	Through trips	Hazelwood

Awareness of Land Use as a TDM Strategy

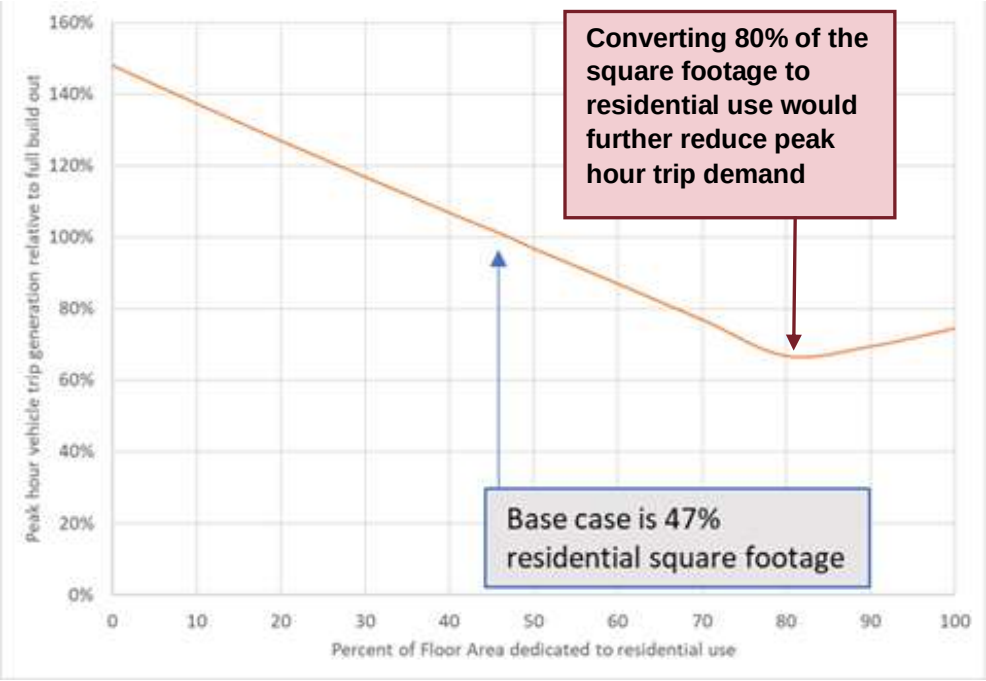
The previous paragraphs describe TDM actions that are generally considered state of the practice in minimizing the adverse effects on congestion for a proposed land use. However, establishing travel-efficient land use itself can be thought of as a TDM strategy. Balancing jobs and housing in activity centers is a useful way to address rush hour congestion. The SR 885/Second Avenue corridor study does not recommend any explicit changes to any of the land uses currently proposed for development sites. Yet an awareness of the effect of balancing land uses provides a useful demonstration of the potential for land use to be part of the solution, rather than the problem, in managing traffic.

For instance, the Hazelwood Green buildout mix is balanced in terms of space, but is office-heavy in terms of trips. *Exhibit 3-27* shows how potential conversion of some of the proposed office space to residential space would reduce rush hour trips (up to a certain point). The Hazelwood Green high scenario totals based on the presentation to the Pittsburgh Planning Commission in September 2018, including 3,800 dwelling units, and about 11,800 office jobs, 1.14 million square feet of manufacturing space, and about 250 thousand square feet of other

community services. That mix of uses results in about 47% of the total square footage dedicated to residential use. However, jobs space utilization is higher than residential space utilization, with about 250 square feet of working space per employee, as contrasted with typically over 1,000 square feet of living space per employed resident. Therefore, a mix of square footage equally split between office and residential will generate far more trips oriented inbound in the morning (to the offices) and outbound in the evening (from the offices). The degree to which that phenomenon contributes to peak period congestion is also a function of regional accessibility; an office site close to downtown draws employees to that site who also contribute to regional congestion flows whereas an office site located at the regional periphery may incent more reverse-peak-direction commuting.

Exhibit 3-27 shows the results of a sensitivity test wherein the number of Hazelwood Green site-generated trips contribute to prevailing congestion along Second Avenue (inbound toward the regional core in the morning and outbound in the evening). The proposed levels of roughly 47% floor space being residential space and 53% commercial generates the amount of peak period, peak direction trips – inbound to the site in the morning and outbound in the evening. By shifting more floor area space from commercial space to residential use, the Hazelwood Green site shifts commuting patterns away from the regional patterns, reducing total trip generation and more effectively utilizing the less-busy reverse. That trend holds true to a certain point; if the site were to be developed with the same square footage but with more than 80% of the floor area dedicated to residential uses, the directionality of the site trips would shift and the residential users heading towards downtown would be causing more congestion than the office workers heading in from southern portions of the region.

Exhibit 3-27: Land Use Mix



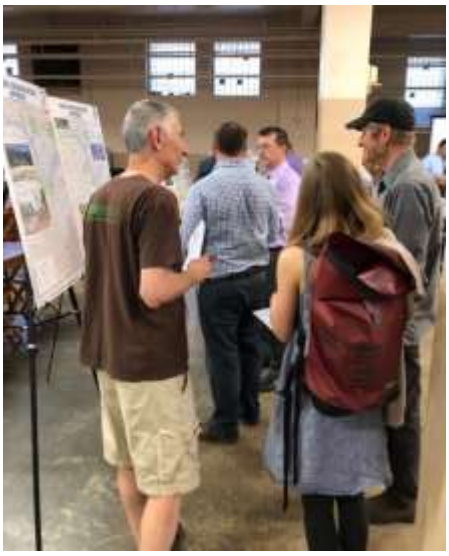
As previously noted, the diversity of land uses as an input variable was not explicitly considered as a SR 885/Second Avenue corridor recommendation, partly because there are many market

and policy factors other than travel demand efficiency that affects the degree to which a development site is viable. Yet as the corridor matures, a continued evaluation of land use diversity in the corridor can provide valuable context for understanding travel demands and their contribution to corridor congestion.

PUBLIC INPUT ON POTENTIAL SOLUTIONS

The potential solutions and performance measures included in the previous sections were presented to study stakeholders on April 30, 2019 and to the public on May 8, 2019. Participants had the opportunity to view displays and listen to a summary of the proposed projects.

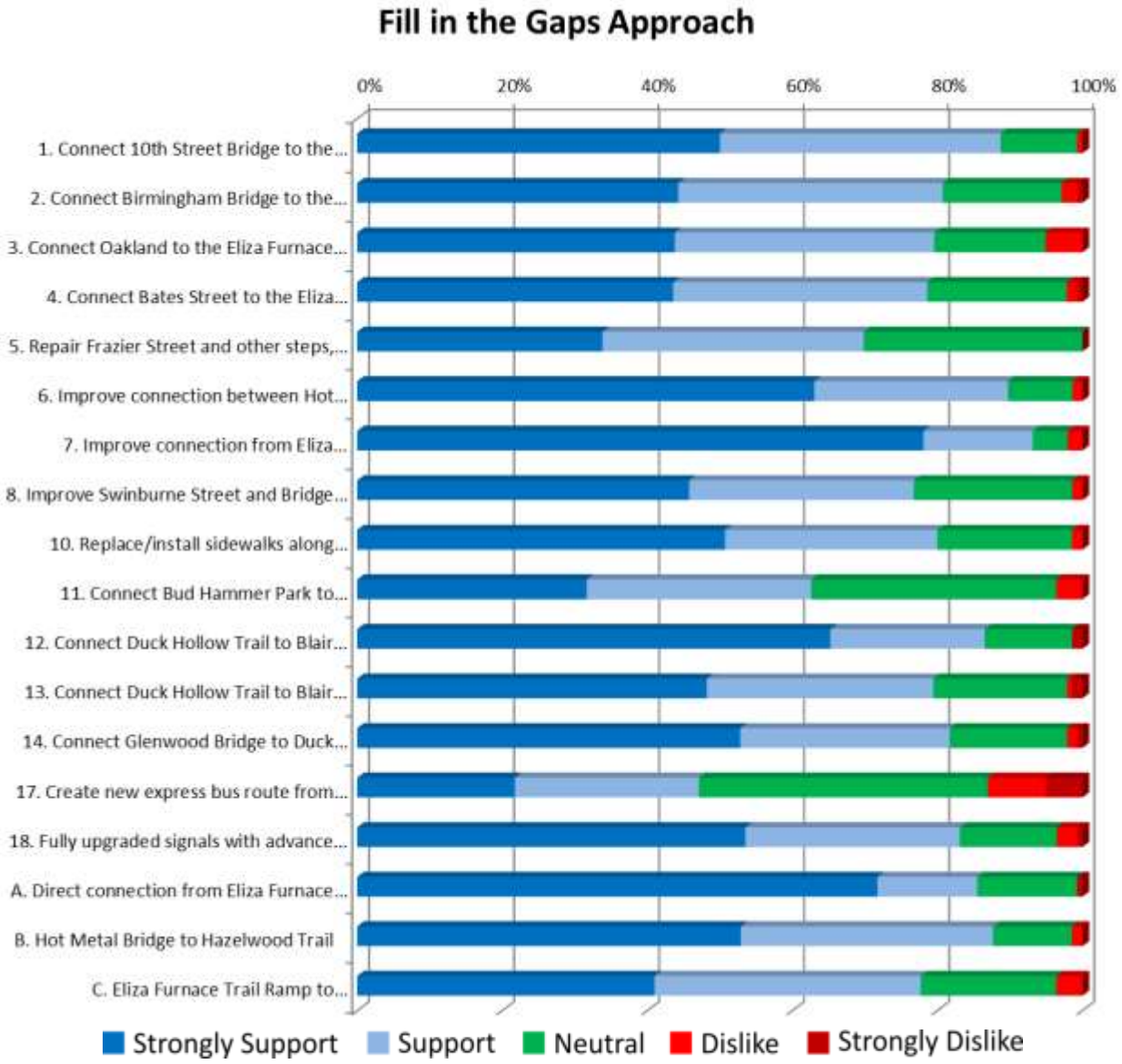
Participants were given feedback forms with a line corresponding to each numbered project presented on the displays. For each project, they could indicate their level of support: Strongly Support, Support, Neutral, Dislike, and Strongly Dislike. The forms also offered areas to explain what the participant would like to change, or to explain why they liked or did not like the ideas. See *Appendix D* for an example feedback form.



For those who could not attend a meeting, the displays were posted on the project website, along with an online version of the feedback form that was available from May 12 through May 26, 2019. In addition, the proposed projects were presented at a Hazelwood Initiative community meeting on June 11, 2019.

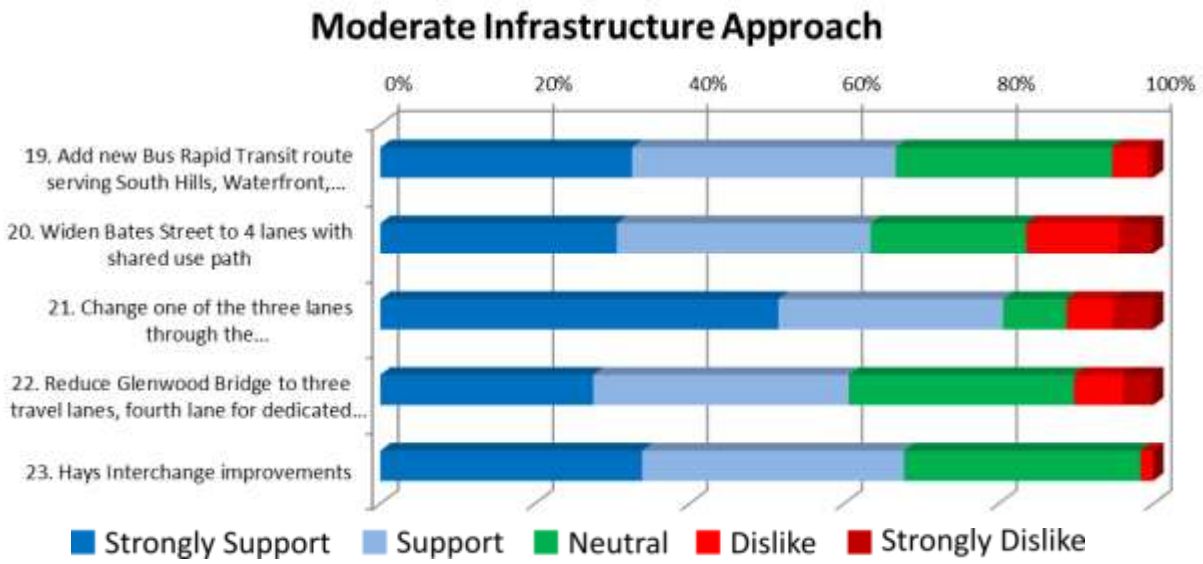
A total of 153 feedback forms on proposed projects were submitted from the meetings and online survey. Selected results are presented below (*Exhibit 3-28* through *Exhibit 3-30*), and complete results are included in *Appendix D*. The numbered projects in these graphs correspond to the numbered projects in previous *Exhibit 3-9*, *Exhibit 3-14*, and *Exhibit 3-18*.

Exhibit 3-28: Feedback on Fill in the Gaps Approach



The proposed projects in the Fill in the Gaps Approach received broad support from the vast majority of respondents (*Exhibit 3-28*). The only project with less than 50% positive support was the express bus route from the South Hills. Comments received on that project indicated that many did not see a need to travel to Century III Mall, and that some misunderstood that the express bus would not stop in Hazelwood (it would). Data on travel patterns indicate that many commuters through the SR 885/Second Avenue corridor are coming from the South Hills, so a bus route from there to Oakland would be beneficial. Bus routes currently serving the Century III Park-and-ride only go downtown.

Exhibit 3-29: Feedback on Moderate Infrastructure Approach

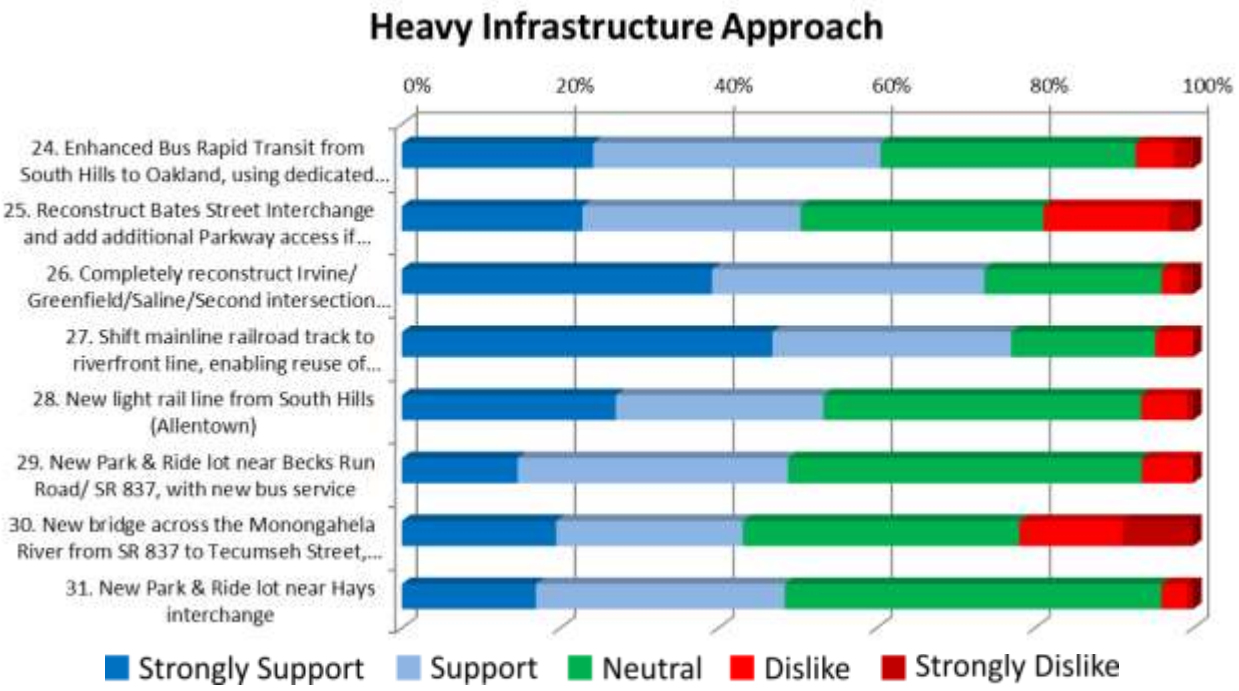


The projects in the Moderate Infrastructure Approach also received largely positive support from the respondents (*Exhibit 3-29*). The project with the most negative ratings was widening Bates Street, with comments related to skepticism that there is space to do it, and the belief that it is too steep and heavily trafficked to be a viable option even if widened.

The gondola and ferry options received mixed support, with many commenting that they would be interesting but would not substantially address the traffic problems and would not want public funds spent on them. Others expressed some enthusiasm for having additional alternatives to travel without a car, particularly to SouthSide Works and the Waterfront.

The Transportation Demand Management solutions presented also received generally positive support. Imposing parking fees and removing rush hour turning restrictions received the most negative comments, related to perceived impact on the local neighborhood.

Exhibit 3-30: Feedback on Heavy Infrastructure Approach



In feedback for the Heavy Infrastructure Approach (*Exhibit 3-30*), all the projects received at least 40% positive support. Reconstructing the Bates Street interchange and building a new bridge received more negative comments, mostly related to concerns about how much public funding would be required and whether the improvements would alleviate traffic or simply induce additional demand.

SUMMARY

Following the preparation of the Existing Conditions Report, extensive public outreach solicited feedback on the transportation needs of the SR 885/Second Avenue corridor in February and March 2019. Keeping that input in mind, a multidisciplinary team analyzed the big picture to identify regional solutions to reduce the number of single-occupant cars in the corridor. The group also prioritized small-scale connections with big impacts for bicycle and pedestrian users.

The potential solutions were presented back to stakeholders and the public in April and May 2019 with opportunities for participants to express their support or dislike for specific projects. The projects received mostly positive support, with detailed comments and feedback that was used in crafting the final plan. The potential solutions address the projected traffic increases with minimal impacts to the community, although how well they address congestion will depend on the pace of development and when improvements can be in place.

State Route 885/Second Avenue Multimodal Corridor Study

SECTION 4. Final Plan

This page intentionally left blank

SECTION 4. Final Plan

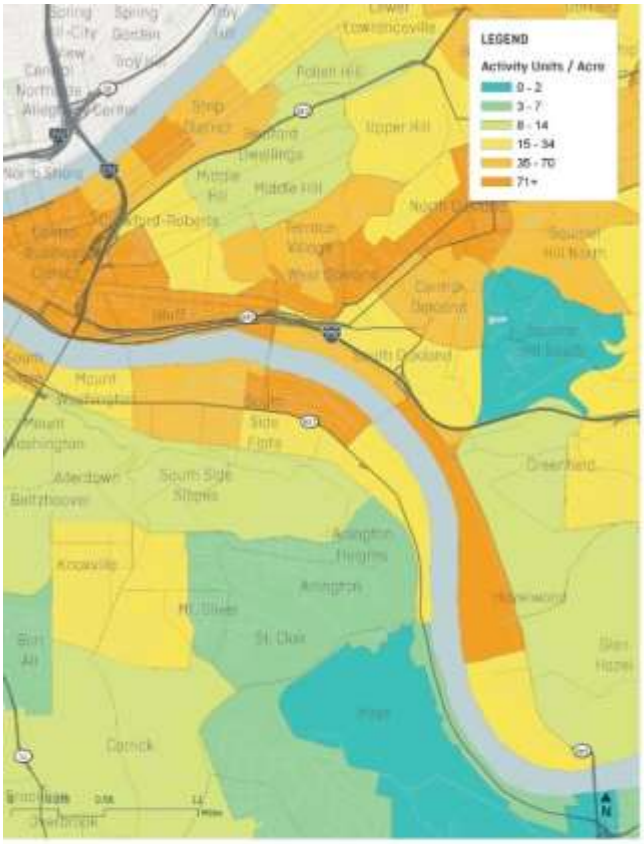
MULTIMODAL CONNECTIONS

PREFERRED ALTERNATIVE

Based upon the results of the alternatives analysis and stakeholder and public feedback, the Steering Committee selected a hybrid alternative that combined key elements from each of the three infrastructure investment scenarios. The level of development that will occur along the corridor can be influenced by the Steering Committee through regulation and approvals, but the overall demand for development will be dictated by market forces. Based on the uncertainty in market forces, the Steering Committee chose to plan for the high growth scenario to provide for the greatest flexibility to accommodate multimodal transportation as the study area and region develop (*Exhibit 4-1*). The preferred alternative was further refined in order to help meet the overall goals of the study based upon this anticipated development.

The transportation improvements included in the preferred alternative have been designed to operate as an integrated multimodal system that will improve mobility and access for people and freight traveling to, from, and through the study area. With that in mind, many of the specific improvements serve multiple modes of travel.

Exhibit 4-1: High Growth Scenario



High Growth: All development at Hazelwood Green, Pittsburgh Technology Center, SouthSide Works, and infill development within the Hazelwood community.

The improvements are mapped in three broad groups: Bicycle and Pedestrian Improvements (*Exhibit 4-2*), Transit Improvements (*Exhibit 4-3*) and Roadway Improvements (*Exhibit 4-4*). The improvements that serve multiple modes of travel are included on multiple maps, using the same project number. To provide context, the maps show projects that have been planned or are underway by other agencies in addition to those proposed as part of this plan. Costs presented in this chapter are planning-level estimates in year 2019 dollars.

The bicycle and pedestrian improvements create connections between the Duck Hollow Trail, Great Allegheny Passage, Hazelwood Trail, Junction Hollow Trail and Eliza Furnace Trail as well as improving access between the study area neighborhoods, South Side, Waterfront, Downtown, and Oakland.

Exhibit 4-2: Final Plan – Bicycle and Pedestrian Improvements

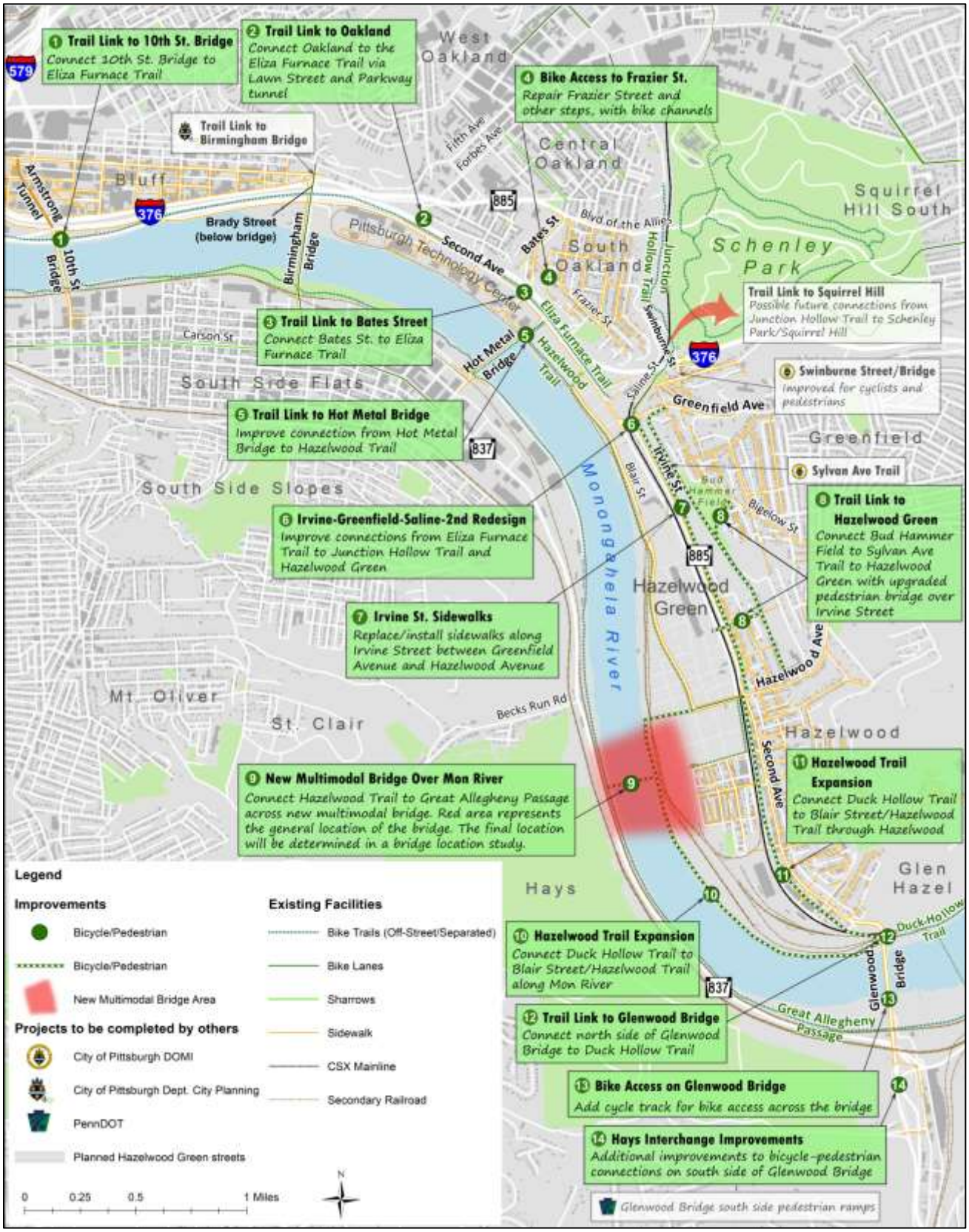


Exhibit 4-3: Final Plan – Transit Improvements

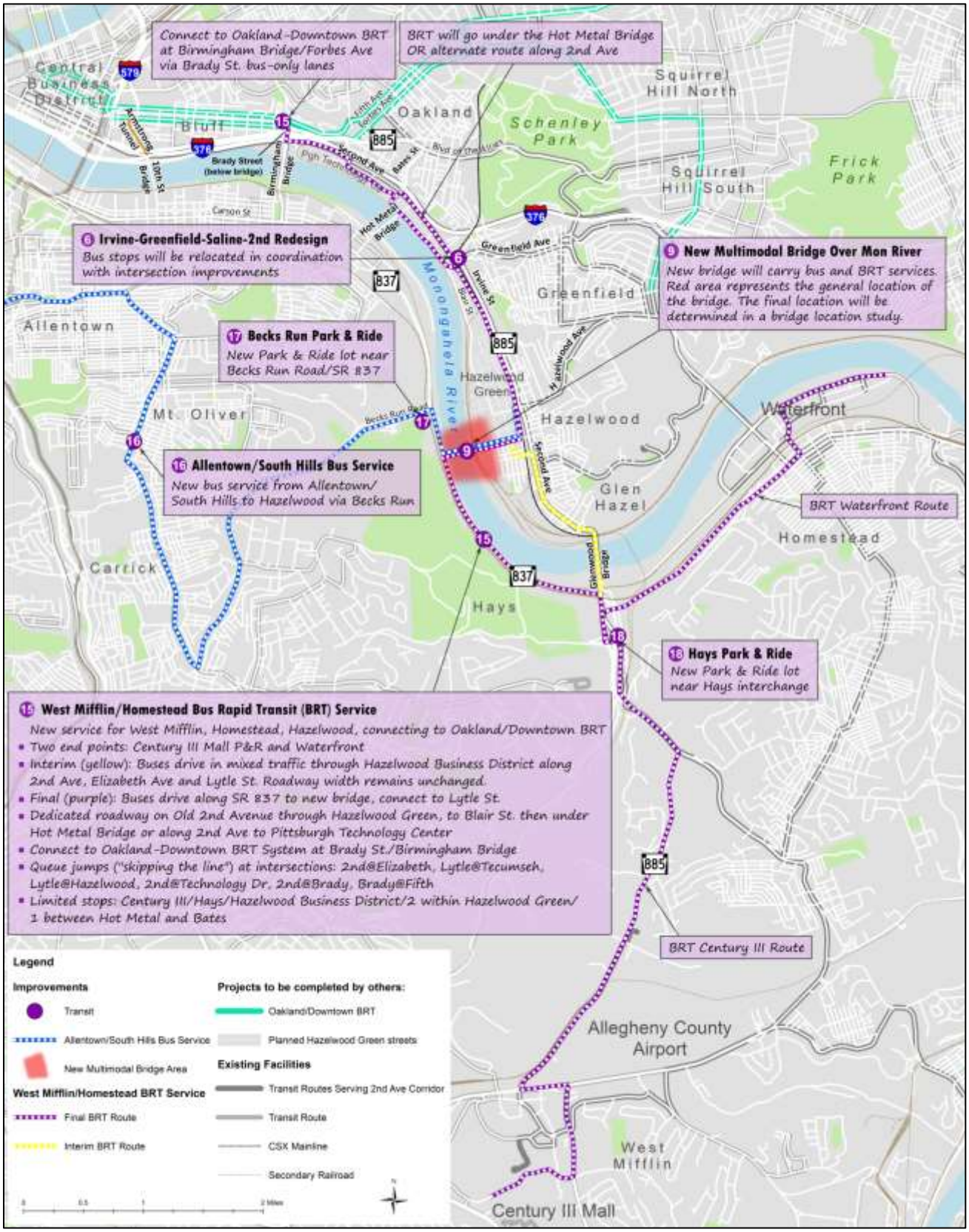
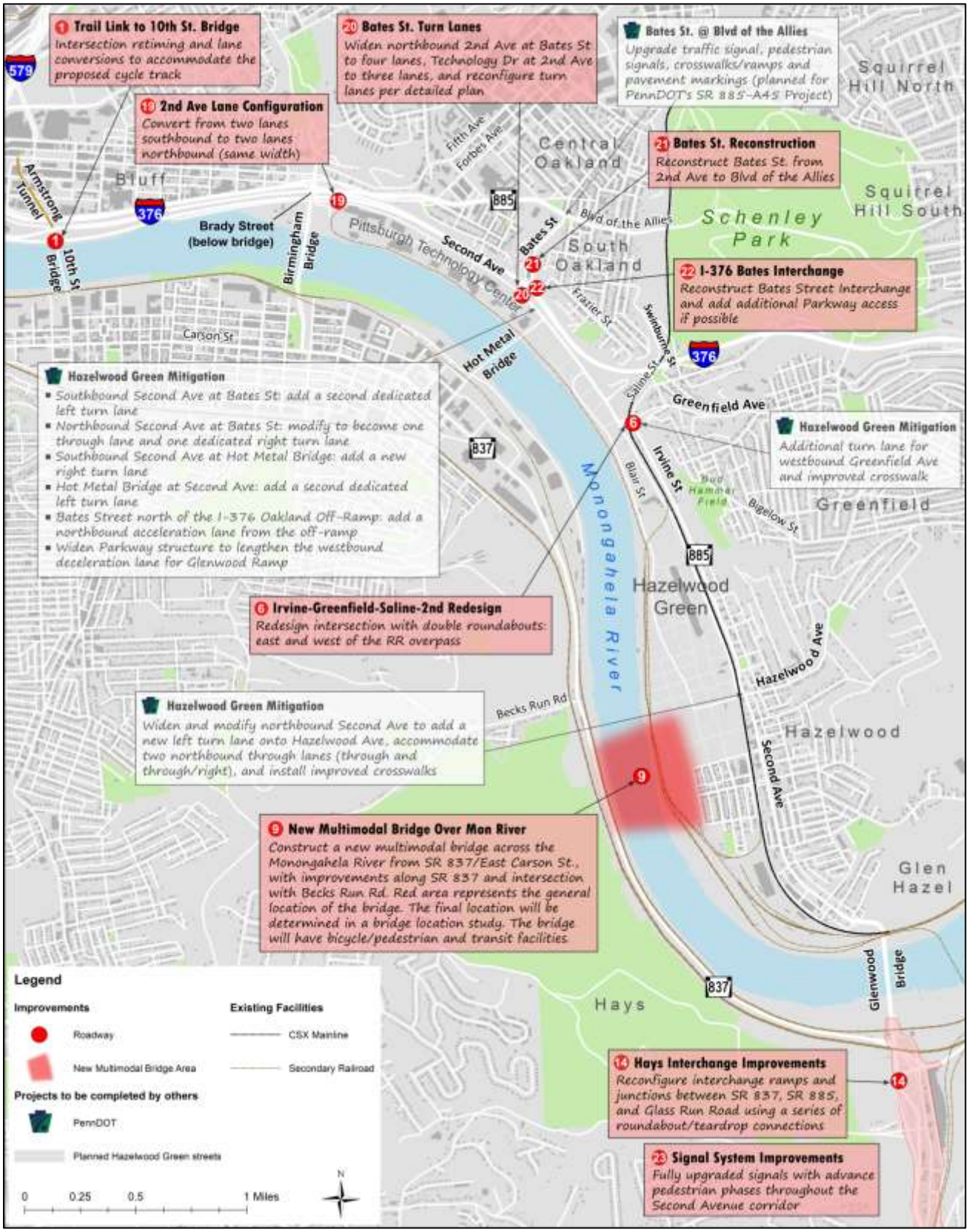


Exhibit 4-4: Final Plan – Roadway Improvements



SECOND AVENUE IN THE HAZELWOOD BUSINESS DISTRICT

Under the Preferred Alternative, Second Avenue in the Hazelwood Business District will maintain its current roadway and sidewalk width (*Exhibit 4-5*). In fact, after the Bus Rapid Transit and other improvements are complete, traffic should be reduced along this section of the corridor, which would allow full-time parking along both sides of the street. The traffic reduction and additional parking should benefit Hazelwood's neighborhood livability and economic vitality.

Minor changes in this area include left- and right-turn lanes for northbound traffic at Hazelwood Avenue as part of the Phase 1 Hazelwood Green traffic mitigation, and traffic signal and pedestrian improvements at each intersection.

Exhibit 4-5: Rendering of Current/Future Second Avenue in Hazelwood Business District

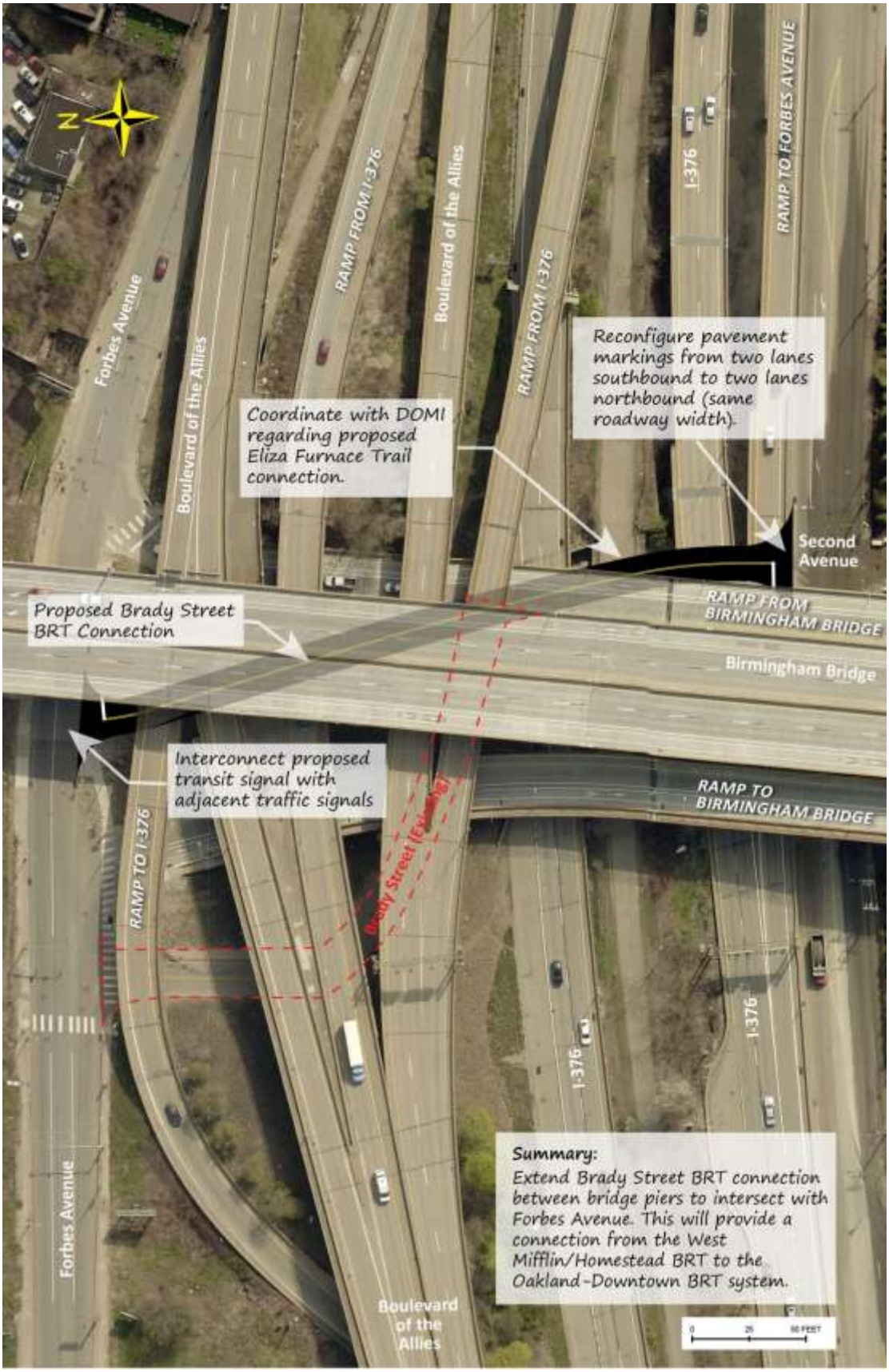
DETAILS OF SELECTED IMPROVEMENTS

Each of the projects included in the final plan was reviewed from a planning-level feasibility standpoint. Some of the projects, such as the trail connection between Duck Hollow Trail and the Glenwood Bridge (Project 12), were included in previous studies such as PennDOT's *Parkway East Corridor Transportation Network* plan. Others needed to be further refined as part of the State Route 885/Second Avenue Multimodal Corridor Study. Environmental and property impacts for each of the detailed improvements were categorized into low, medium, or high. For low impact projects, permitting should be streamlined with nominal impacts to private property, while high impact projects would require a longer permitting process and/or have larger impacts to private property. A summary matrix that includes the final plan's project descriptions, and projected timeframes and costs is also included as *Exhibit 4-15*.

WEST MIFFLIN/HOMESTEAD BUS RAPID TRANSIT ROUTING DETAILS

The proposed West Mifflin/Homestead Bus Rapid Transit (BRT) route shown as Project 15 in previous *Exhibit 4-3* would connect Park-and-Ride lots at the Waterfront, Hays, and Century III Mall to the Port Authority's planned Downtown to Oakland BRT system on a more efficient route. The system would include two interwoven routes. One route would begin at the Waterfront shopping center, stop at the Hays Park-and-Ride, continue along East Carson Street across the proposed multimodal bridge, into the Hazelwood community, Hazelwood Green, Pittsburgh Technology Center, and finally connect to the Downtown to Oakland BRT system. The second route would begin at the Century III Mall Park-and-Ride, continue to the Hays Park-and-Ride, and from there follow the same route as the Waterfront line. The BRT would use dedicated transit lanes where available as well as general-purpose travel lanes. Dedicated BRT guideway would exist along the proposed multimodal bridge, Old Second Avenue, and Brady Street (*Exhibit 4-6*). The headways (time between buses) would match the proposed Downtown to Oakland BRT headways.

Exhibit 4-6: BRT Brady Street/Birmingham Bridge Connection



There are two options that the BRT could follow to connect the Hazelwood Green development with the Pittsburgh Technology Center. One option would provide dedicated BRT lanes beneath the Hot Metal Bridge connecting to Technology Drive within the Pittsburgh Technology Center (*Exhibit 4-7*). This option would provide dedicated BRT lanes and allow the BRT to avoid several congested intersections: Second Avenue/Irvine Street/Greenfield Avenue/Saline Street, Blair Street/Second Avenue, Hot Metal Bridge/Second Avenue, and Bates Street/Second Avenue.

Exhibit 4-7: Proposed BRT Route and Multi-Use Path Beneath Hot Metal Bridge

The alternative path would enter mixed traffic at the Second Avenue/Irvine Street/Greenfield Avenue/Saline Street intersection and proceed along Second Avenue through the Blair Street/Second Avenue, Hot Metal Bridge/Second Avenue, and Bates Street/Second Avenue intersections where it would make a left turn onto Technology Drive. Both routes are feasible but have different impacts and operations. The dedicated guideway option would provide a faster and more reliable BRT travel time, which would make the BRT more competitive when compared to other modes of travel and encourage a higher mode shift from single occupant vehicles. The tradeoffs would be increased property impacts to the Hazelwood Green and Pittsburgh Technology Center sites, and the creation of more impervious surface. The mixed traffic alignment would operate less reliably and more slowly than the dedicated guideway option. For example, the travel time between Hazelwood Avenue and Oakland would increase approximately 20% under the mixed traffic option when compared to the dedicated guideway option. This would make transit less competitive and likely result in reduced mode shift from single occupant vehicles.

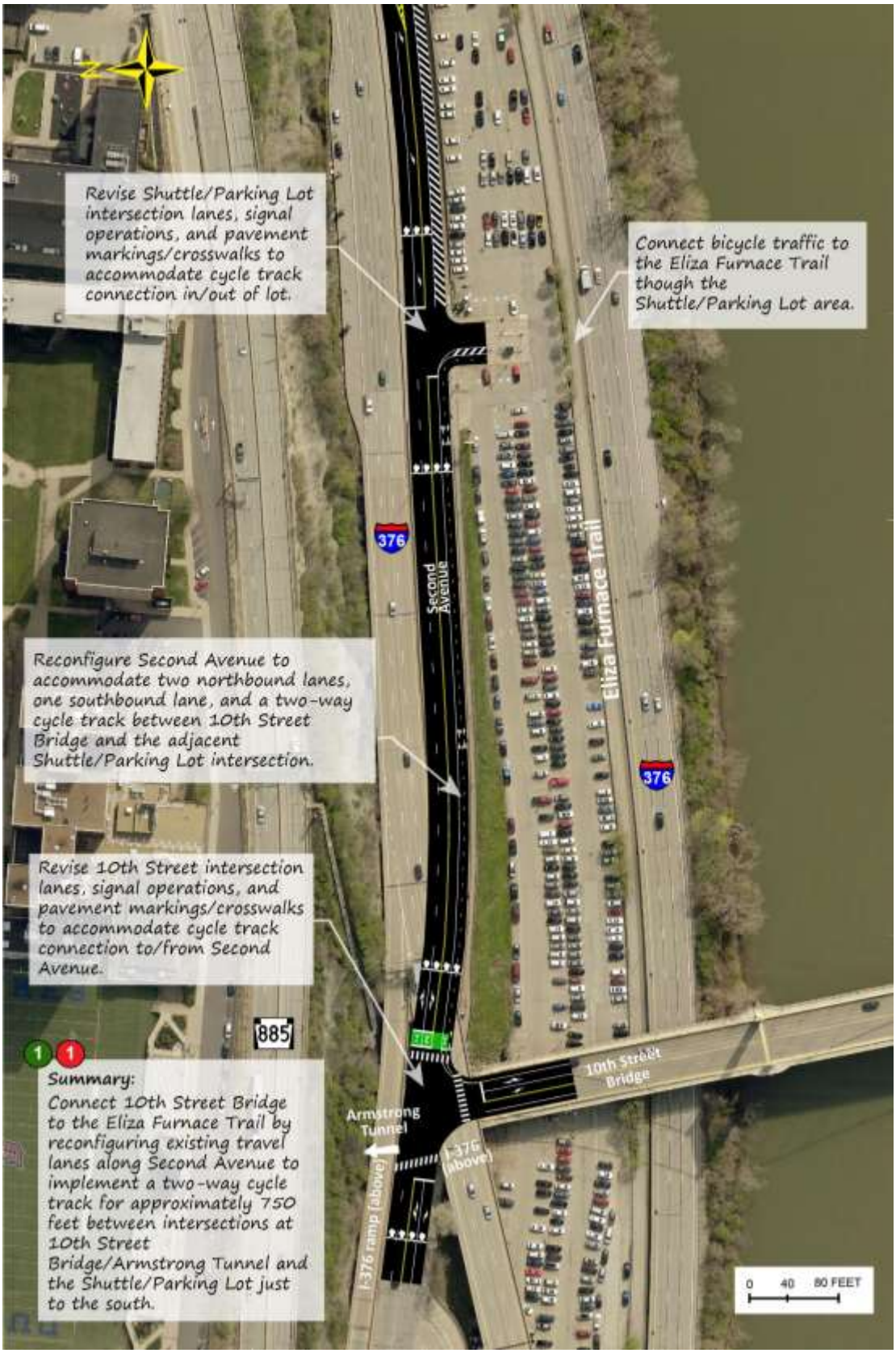
An interim scenario was developed that would allow the BRT to begin operating before the new multimodal bridge is complete. The interim scenario route would travel from the Hays Park-and-Ride across the Glenwood Bridge and along Second Avenue in mixed traffic, turning left at

Elizabeth Street and then right along Lytle or Blair Streets. From there, the BRT would travel along the same path as the final BRT. Initiating BRT operations in the short term would offset some of the impacts of the development that may occur while funding for the proposed new bridge is secured and construction is completed. The interim BRT would operate in the existing roadway width through the Hazelwood neighborhood and would include queue jumps and Transit Signal Priority at select signalized intersections. The implementation cost for this improvement would be moderate ($23M-$27M) and the impacts would be moderate.

TRAIL LINK BETWEEN THE 10TH STREET BRIDGE AND ELIZA FURNACE TRAIL

The goal of this connection is to provide improved connectivity for bicyclists between the recently improved 10th Street Bridge and the Eliza Furnace Trail (*Exhibit 4-8*, also Project 1 in *Exhibit 4-2* and *Exhibit 4-4*). The proposed improvement would be accomplished by converting the eastbound Second Avenue approach to the 10th Street signal to a through-left turn lane and a dedicated right turn lane onto the 10th Street Bridge. This would be accompanied by installing a right-turn overlap signal so that the right turn onto the bridge from Second Avenue can occur at the same time as left-turning traffic from the 10th Street Bridge onto Second Avenue. This change would allow the section of Second Avenue between the 10th Street Bridge and the entrance into the City of Pittsburgh's parking lot to be re-striped to provide a cycle track or bike lanes. Alternatively, the curb line can be extended and the cycle track can be constructed at the same elevation as the sidewalk to provide positive separation between the cycle track and motorized traffic. Bicyclists would then be able to access the Eliza Furnace trail through the City of Pittsburgh parking lot. The implementation cost for this improvement would be low (less than $600K) and the impacts would be relatively low.

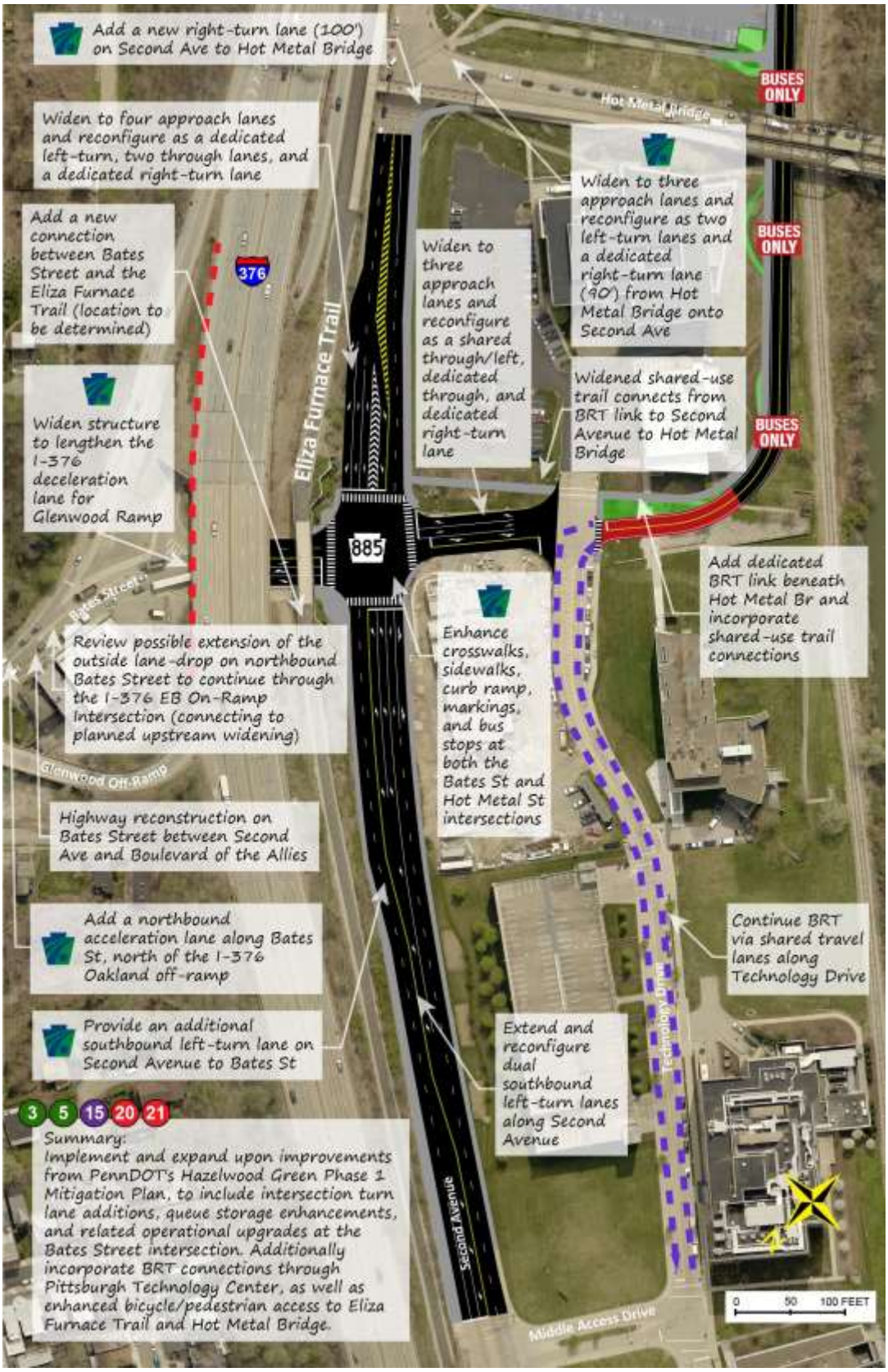
Exhibit 4-8: Trail Link between 10th Street Bridge and Eliza Furnace Trail



MULTIMODAL IMPROVEMENTS TO SECOND AVENUE/BATES STREET/PITTSBURGH TECHNOLOGY CENTER

The goal of this improvement is to provide key connections for transit, bicycles, pedestrians, automobiles, and trucks (*Exhibit 4-9*, also Projects 3, 5, 15, 20, and 22 in *Exhibit 4-2*, *Exhibit 4-3*, and *Exhibit 4-4*). Bicycle and pedestrian improvements include ramps from Bates Street to the Eliza Furnace Trail and improved connection to the Hot Metal Bridge from the Hazelwood Trail via the connection beneath the Hot Metal Bridge. The transit improvements would include a BRT connection beneath the Hot Metal Bridge to Technology Drive, or alternatively in mixed traffic along Second Avenue, turning at Bates Street to access Technology Drive. Truck and automobile improvements include constructing an additional right turn lane onto Bates Street from northbound Second Avenue, extending the southbound Second Avenue turn lane onto Bates Street, and adding an eastbound through lane from Technology Drive onto Bates Street. These improvements will be in addition to the Phase 1 Hazelwood Green improvements that will be implemented by PennDOT. The implementation cost for this improvement would be moderate ($9.5-$11 million), and the impacts would be moderate.

Exhibit 4-9: Multimodal Improvements to Second Ave/Bates St/Pittsburgh Technology Center



MULTIMODAL IMPROVEMENTS TO IRVINE STREET/GREENFIELD AVENUE/SALINE STREET/SECOND AVENUE

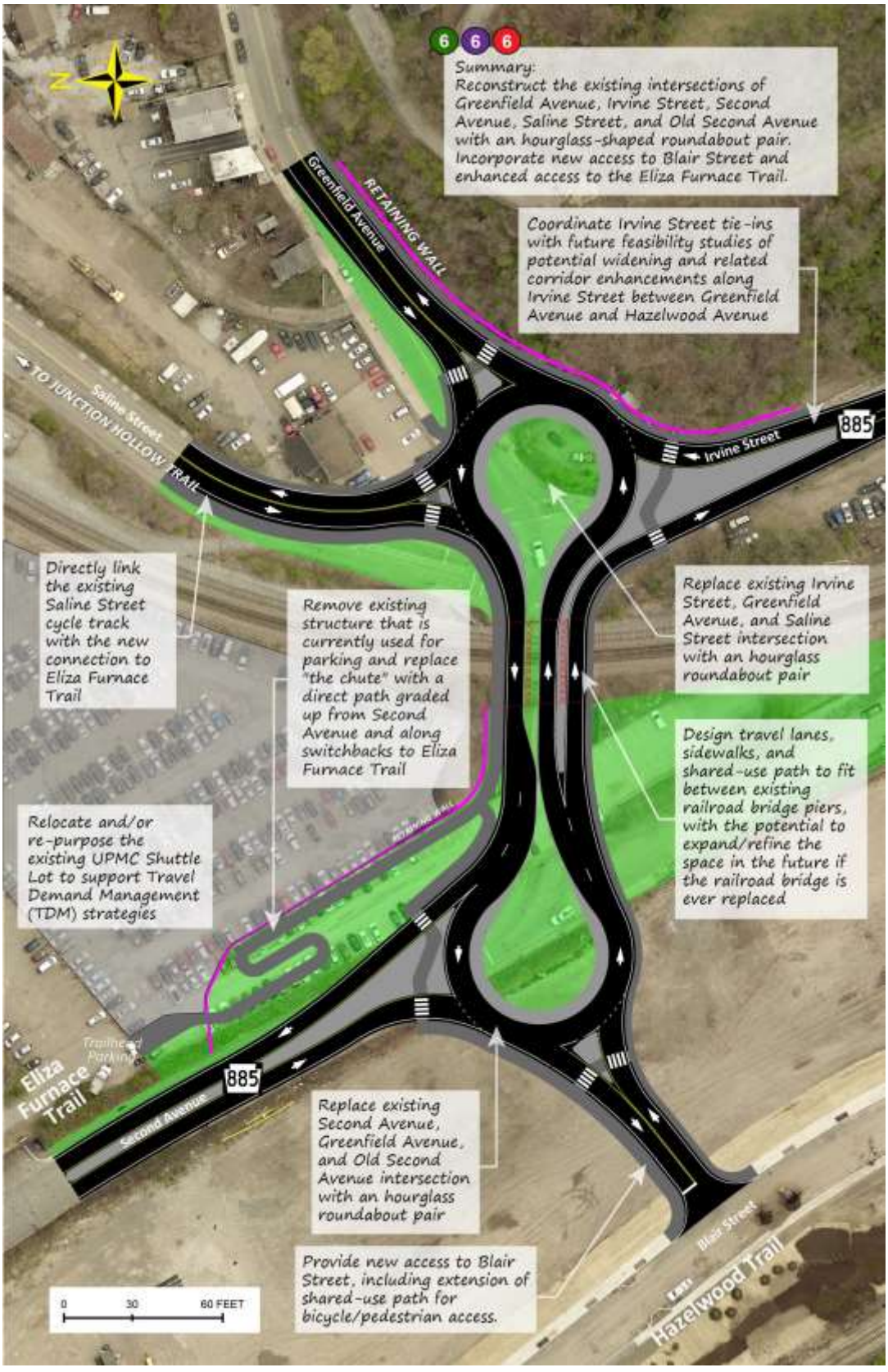
The goal of this project is to improve pedestrian and bicycle connections, improve transit safety, and improve automobile and truck circulation while constructing an additional access point into the Hazelwood Green development (*Exhibit 4-10*, also Project 6 in *Exhibit 4-2*, *Exhibit 4-3*, and *Exhibit 4-4*). The improvements would replace the existing undesirable connection between the Junction Hollow Trail and the Eliza Furnace Trail, anecdotally referred to as the 'Chute,' which was one of the most commented on existing conditions along the corridor during this study's public outreach.

The proposed connection would replace the 'Chute' with a direct connection using City of Pittsburgh property. This improvement would include demolition of the existing parking structure that parallels the railroad structure and construction of a retaining wall along the City of Pittsburgh property boundaries so that the trail slope meets ADA requirements. The improvement will also provide a direct connection to the Hazelwood Trail at Blair Street. From a transit perspective, this improvement will relocate the existing bus stops along the current median to the far sides of the roundabouts. If the selected BRT route uses mixed traffic along Second Avenue, it would access the roundabout at Old Second Avenue (not shown in *Exhibit 4-10*).

The current pair of closely-spaced intersections would be replaced by a double-hourglass roundabout, which would improve safety, reduce driver confusion, and better accommodate the expected growth along the corridor. The direct connection to Hazelwood Green would reduce traffic on Second Avenue and Irvine Street by allowing traffic from Squirrel Hill and the Parkway East to enter Hazelwood Green directly. The implementation cost for this improvement would be moderate ($12-$14 million) and the impacts would be moderate.

In conjunction with this intersection improvement, additional investigation and feasibility studies should be considered to further explore corridor widening and enhancement opportunities along Irvine Street between Greenfield Avenue and Hazelwood Avenue. The Irvine Street improvements may consider widening to accommodate two travel lanes in each direction, and/or opportunities to address infrastructure and maintenance needs, sidewalk additions, bus stop access, and on-street parking/loading concerns identified based on public/stakeholder input. Any future re-configurations along Irvine Street should be accounted for in the ultimate design of intersection tie-ins at either end of the segment, including the proposed roundabout junction with Greenfield Avenue and Saline Street, and the Hazelwood Avenue intersection relative to lane add/drop locations at the transition into the Hazelwood Business District.

Exhibit 4-10: Multimodal Improvements to Irvine St/Greenfield Ave/Saline St/Second Ave



NEW MULTIMODAL BRIDGE ACROSS THE MONONGAHELA RIVER

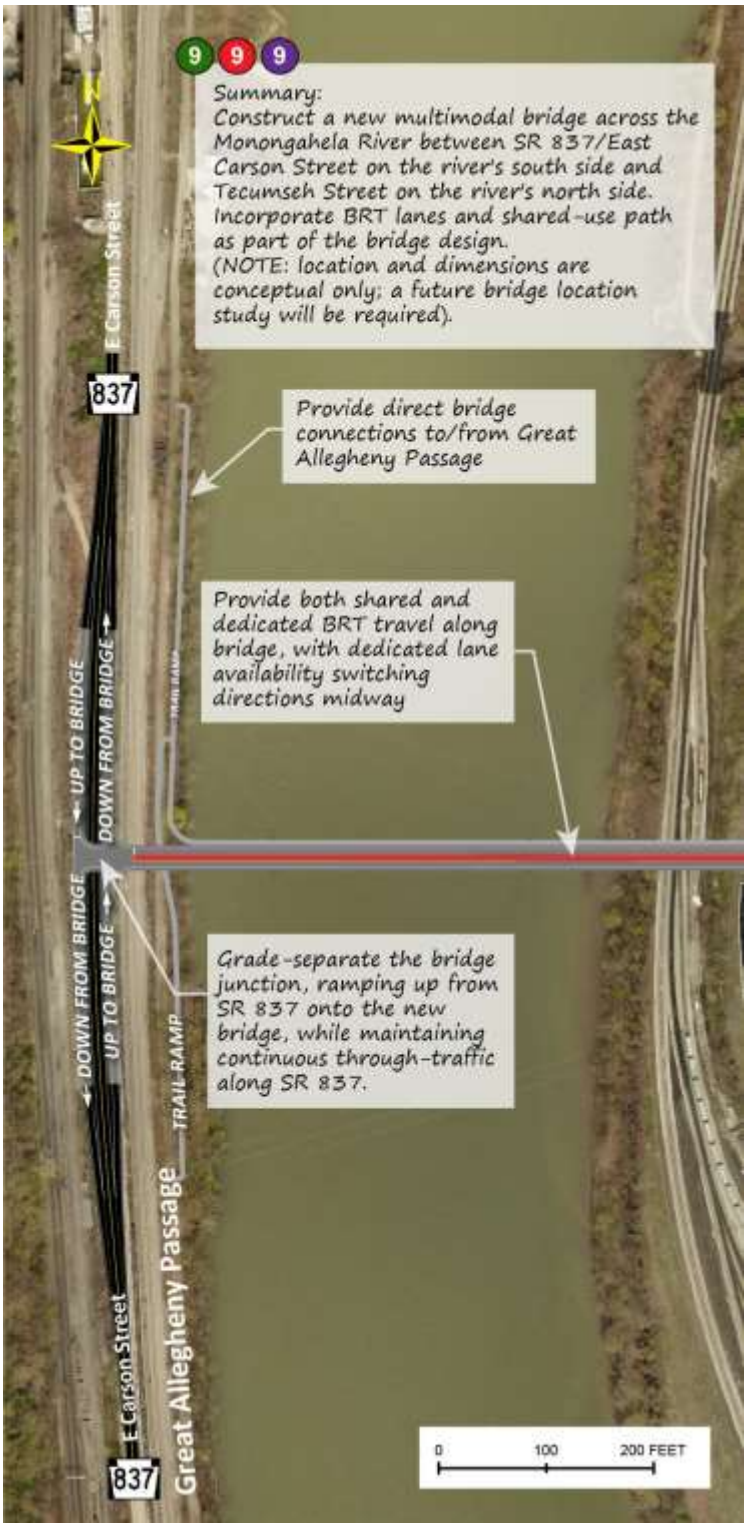
The goal of this project is to improve transit mobility, provide key pedestrian and bicycle connections between the Hazelwood Trail and Great Allegheny Passage, provide access for all modes of travel between Hazelwood and the Waterfront and South Side, and reduce the impact of the anticipated growth in traffic in Hazelwood Green and the Pittsburgh Technology Center on the Hazelwood Community's quality of life (*Exhibit 4-11* and Project 9 in *Exhibit 4-2*, *Exhibit 4-3*, and *Exhibit 4-4*).

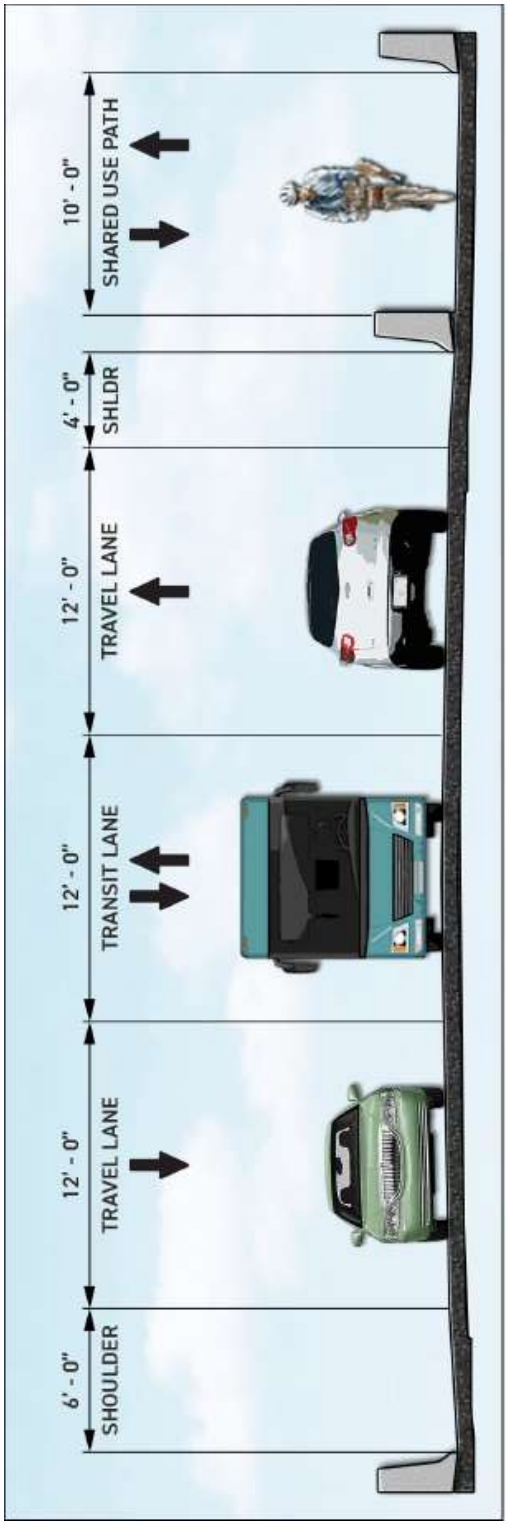
Currently, the Hazelwood Green development and Hazelwood neighborhood west of the railroad are divided from the rest of the community, with the only grade-separated access points at Elizabeth Street and Blair Street. From a disaster resiliency standpoint, the proposed multimodal bridge across the Monongahela would provide a critical third access point for these areas in the event of a train blocking access for the at-grade railroad crossings.

In the future, if the need for this river crossing is confirmed, ownership of the bridge would have to be determined first, then the ultimate location of the bridge would need to be determined through a feasibility/bridge location study. A general bridge location is shown here. The bridge would be located just south of Becks Run Road and cannot connect directly to Becks Run Road due to clearance requirements for the multiple railroads at that intersection.

Regardless of the bridge location, the bridge at a minimum should include a multi-use path for pedestrians and bicycles (or separate bicycle and pedestrian facilities if desired), a dedicated transit lane, and one lane of traffic in each direction for automobiles and trucks. The dedicated transit lane would be westbound only from the mid-point of the bridge to SR 837 and eastbound only from the midpoint of the bridge towards Hazelwood. The end of the bridge at SR 837 should provide uninterrupted flow of traffic on SR 837 with ramps to and from both directions of SR 837 terminating at a traffic signal on the bridge. The bridge should end at-grade on the Hazelwood side of the Monongahela River prior to entering the community in order to prevent the creation of a physical barrier. The implementation cost for this improvement would be high ($85-$115 million) and the impacts would be high.

Exhibit 4-11: New Multimodal Bridge Across the Monongahela River





HAZELWOOD TRAIL EXPANSION

Two planned improvements create connections between the Duck Hollow Trail, which currently ends on the east side of the Glenwood Bridge, and the Hazelwood Trail, which ends at Hazelwood Avenue. Project 10 would connect the trails via the riverfront, between the railroad and river, with piers for those who would like to fish (*Exhibit 4-12*). Project 11 would connect the trails via the Hazelwood neighborhood to provide access to local residents. The route shown in previous *Exhibit 4-2* for Project 11 is only one of several potential routes for the trail. The final route would be selected later after additional community input.

Exhibit 4-12: Rendering of Planned Riverside Hazelwood Trail Expansion

MULTIMODAL IMPROVEMENTS TO GLENWOOD BRIDGE AND HAYS INTERCHANGE

The goal of this improvement is to enhance bicycle and pedestrian access and improve mobility for buses, automobiles, and trucks (*Exhibit 4-13* and *Exhibit 4-14*, and Projects 13, 14 and 18 in previous *Exhibit 4-2*, *Exhibit 4-3*, and *Exhibit 4-4*).

To improve bicycle/pedestrian access and safety, the improvement would include reducing the Glenwood Bridge to two northbound lanes and one southbound lane of traffic. The outside southbound lane would be converted to a cycle track. The cycle track would transition to a multi-use path on the south side of the Glenwood Bridge. The path would then circle back to use the existing structure that currently carries traffic from SR 837 from the south towards Glass Run Road (which will be abandoned for motorized traffic) and ultimately connect to the Great Allegheny Passage and the Waterfront. In addition, this connection could be used as a future access to the planned Hays Woods trail system.

For vehicular traffic, the plan includes two options. With Option A (*Exhibit 4-13*), the existing traffic signals and ramps would be converted to a series of roundabouts. The roundabouts are configured to simplify decision making by reducing the number of decisions that drivers need to make at each intersection.

Option B (*Exhibit 4-14*) simplifies operations by converting the Baldwin Road access from a full roundabout to a right-in/right-out access point onto northbound SR 885. Traffic from Baldwin Road destined for Glass Run Road would need to use the teardrop intersection at SR 837 and the Glenwood Bridge rather than the original full roundabout included in Option A. In addition, the southbound ramp from SR 885 to Glass Run Road would remain a two-way stop condition in Option B rather than be included as part of the hourglass roundabout as shown in Option A. These improvements simplify construction and operations while making access from Baldwin Road less direct.

Either of the two options would also create space for a proposed Park-and-Ride within or nearby the interchange. The implementation cost for this improvement would be moderate ($19-$22 million) and the impacts would be moderate.

Exhibit 4-13: Multimodal Improvements to Glenwood Bridge and Hays Interchange (Option A)

Exhibit 4-14: Multimodal Improvements to Glenwood Bridge and Hays Interchange (Option B)

SUMMARY OF IMPROVEMENTS

To support implementation for improvements to the SR 885/Second Avenue corridor, a summary of the final plan improvements, along with estimated timeframes and cost ranges have been included in *Exhibit 4-15*. Relevant assumptions include the following:

Timeframe

Timeframes were estimated based on the level of funding that would be required to implement the project, as well as the anticipated level of effort to plan, program, design, permit, and construct each improvement. In most cases public sector, developer, and grant funding shouldbIn addition to traditional funding for implementation. From this context, timeframes are described as:

- **Short-term**: 1 to 6 years. These improvements are relatively straightforward to define in preparation for taking the next steps to pursue design and construction funding. They may be candidates for future updates to a four-year Transportation Improvement Program (TIP).

- **Medium-term**: 6 to 12 years. These improvements require higher levels of funding and may require additional effort prior to funding-related decisions. They may be more appropriate for the latter half of a broader Twelve Year Program (TYP).

- **Long-term**: more than 12 years. Additional studies or extensive design would be required in order to provide specifics necessary for funding. These improvements may be covered by a Long Range Transportation Plan (LRTP) or broader visions.

The timeframes above do not reflect a project prioritization or implementation plan; rather they focus on how soon a given project could be implemented if championed through a typical project development process. In all cases, the actual timeframes for implementation opportunities or decisions will ultimately be driven by factors beyond the scope of this study. Such factors will certainly include funding availability, the pace of local/regional developments and related infrastructure needs, and the potential for public/private grant opportunities (outside of typical public transportation budgets). Additional factors will include agency priorities, future project champions and/or partnerships, future feasibility or conceptual design considerations, and overarching competition among local, regional, and statewide transportation needs.

Cost Ranges

Cost ranges summarized in *Exhibit 4-15* reflect rough order-of-magnitude, planning-level estimates only, in 2019 dollars. No funds are currently planned or programmed for these improvements, and no feasibility studies or conceptual design efforts have been conducted to establish specific costs.

Ranges presented here were compiled for each project using high-level assumptions and engineering judgement for major construction elements alongside a variety of percentage-based allowances, contingencies, and relevant or comparable transportation project costs around the region. Should any project be selected to move forward in the planning process, additional agency coordination, feasibility studies, and/or conceptual design efforts will be required to further define the scope and scale of each project, which will influence future cost revisions.

Exhibit 4-15: Final Plan – Improvement Summary Table

Project	Page 4-2	Page 4-3	Page 4-4	Name	Detail Page	Timeframe [a]	Cost Range [b] ($ Millions)
1				Trail Link to 10th St. Bridge	4-9	Short	$0.5M - 0.6M
2				Trail Link to Oakland [c]	-	Medium	$11.5M - 13M
3				Trail Link to Bates Street	4-11	Medium	*Included in #20*
4				Bike Access to Frazier St.	-	Short	$2M - 2.5M
5				Trail Link to Hot Metal Bridge	4-11	Medium	*Included in #20*
6				Irvine-Greenfield-Saline-2nd Redesign	4-13	Medium/Long	$12M - 14M
7				Irvine St. Sidewalks	-	Short/Medium	$1.8M - 2.3M
8				Trail Link to Hazelwood Green	-	Medium	$12M - 13.5M
9				New Multimodal Bridge Over Monongahela River	4-15	Long	$85M - 115M
10				Hazelwood Trail Expansion - Monongahela River	4-17	Long	$17M - 20M
11				Hazelwood Trail Expansion - Hazelwood	4-17	Medium	$2.5M - 3M
12				Trail Link to Glenwood Bridge [c]	-	Long	$7.5M - 9M
13				Bike Access on Glenwood Bridge	4-18	Long	*Included in #14*
14				Hays Interchange Improvements	4-18	Long	$19M - 22M
15				West Mifflin/Homestead BRT Service [d] [e]	4-6, 4-11	Medium	$23M - 27M *(+ $9M - 11M per yr)*
16				Allentown/South Hills Bus Service [d] [e]	-	Medium	$12.5M - 15M *(+ $6M - 8M per yr)*
17				Becks Run Park-and-Ride	-	Medium	$6.5M - 8M
18				Hays Park-and-Ride	4-18	Medium	$10M - 12M
19				2nd Ave Lane Configuration [f]	-	Short	$0.6M - 0.7M
20				Bates St. Turn Lanes	4-11	Medium	$9.5M - 11M
21				Bates St. Reconstruction	4-11	Long	$32M - 35M
22				I-376 Bates Interchange [c] [g]	-	Long	$10.7M (*PennDOT*) $2.3M (*Study*)
23				Signal System Improvements [h]	-	Short/Medium	$4M - 5M *(Upgrade)* $9.5M - 11M *(Replace)*

Table Notes:

(a) Timeframes were estimated as Short-Term ≈ 1-6 years; Medium-Term ≈ 6-12 years; and Long-Term > 12 years.

(b) Funds are not programmed; costs reflect rough order-of-magnitude estimates only, pending future feasibility studies (by others).

(c) Costs for Projects 2, 12, and 22 are partially derived from Phase 2 of the Parkway East Corridor study (PennDOT, 2018).

(d) Costs for Projects 15-16 summarize initial capital/implementation costs plus estimated annual transit operating expenses.

(e) Costs for Projects 15-16 exclude relevant components that may be captured by other project estimates (e.g. #9, #17-18, #20).

(f) Costs for Project 19 assume mill & overlay of the existing roadway; upgrades to markings only may be an option at < $50k.

(g) Costs for Project 22 assume $10.7M from (c), plus $2.3M for additional interchange alternatives analysis/feasibility studies only.

(h) Costs for Project 23 include separate ranges for minor/major equipment upgrades versus broader equipment/pole replacements.

CONCLUSION: HOW THE PLAN MEETS THE STUDY GOALS

After the plan was further refined it was evaluated to see how well it met the overall goals for the SR 885/Second Avenue Multimodal Corridor Study. The goals were evaluated using qualitative and quantitative methods, referred to as performance measures. The overall goals were:

1. Focus on decreasing the prevalence of single-occupancy vehicle trips
2. Provide the mobility services and facilities necessary to enable growth and development in neighborhoods along the corridor
3. Encourage bicycle travel along the corridor on a complete trail network
4. Increase the use of transit, transit progression, carpool, and other modes throughout the corridor
5. Preserve and enhance the local quality of life and economic prosperity along the corridor
6. Promote solutions that are contextual to the changing character of adjacent land uses

ANALYSIS METHODS

The plan was evaluated using a project-specific travel demand and operations model using VISUM software. The model integrated the SPC Regional Travel Demand Model and Streetlight Data (p. 2-49) along with travel time observations, ridership data from the Port Authority of Allegheny County (p. 2-19), and traffic counts (p. 2-23). The model was calibrated to match existing conditions. The model predicts future travel demand by mode throughout the system based upon various land use scenarios as well as multimodal transportation investments.

The future year 2040 High Growth Land Use Scenario is expected to add over 6,700 trips to the morning peak hour (7:00 – 8:00 a.m.) and 8,300 trips to the afternoon peak hour (4:15 – 5:15 p.m.) when compared to the 2040 No-Build conditions. As a point of comparison, a standard arterial with no traffic signals in the City of Pittsburgh can be reasonably expected to carry approximately 1,800 vehicles per lane in an hour. Following a traditional approach to accommodating the growth by widening roads would require between 4 and 5 additional unsignalized through lanes; if the arterials were signalized it would likely require between 7 and 8 additional through lanes. This perspective emphasizes the need to provide a truly multimodal solution, as proposed by this plan, which would be both more cost effective and more sustainable over time while providing transportation choices to people traveling to, from, and through the study area.

The performance measures used to evaluate the plan include the following; additional details are also included in *Appendix G*:

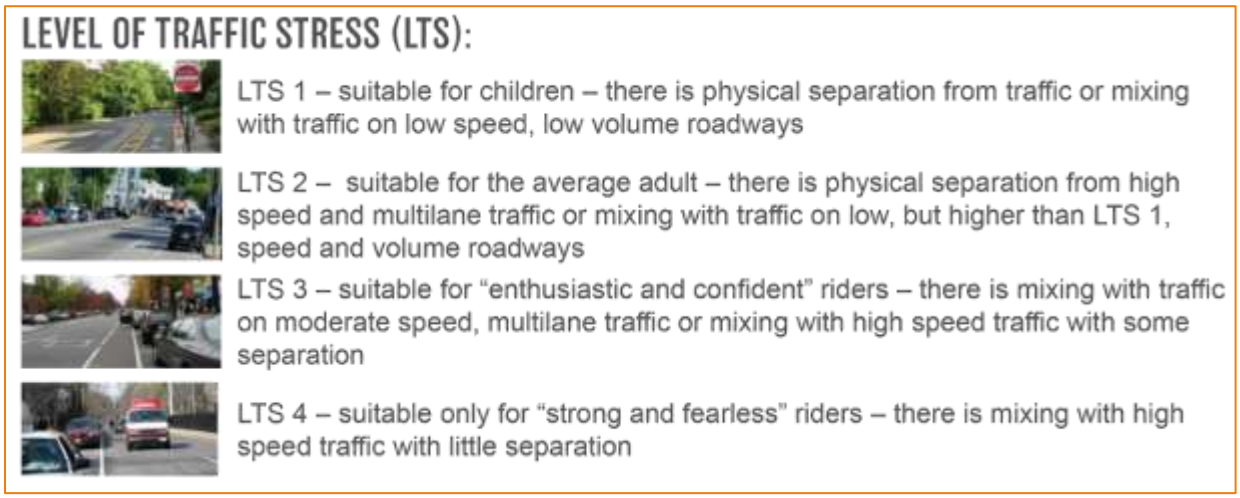
- Bicycle Level of Traffic Stress (Goals 1, 2, 3 ,5)
- Walk Accessibility (Goals 1, 2, 4, 5, 6)
- Access to Jobs by Mode (Goals 1, 2, 4, 5, 6)
- Travel Time by Mode (Goals 1, 2, 3, 4)
- Increase in Total Biking, Walking, and Transit Trips (Goals 1, 2, 3, 4, 5)
- Neighborhood Livability for Second Avenue (Goals 5, 6)
- Automobile Volumes Crossing the Monongahela River (Goals 1, 4, 5, 6)
- Change in Increase in Total Biking, Walking, and Transit Trips with Transportation Demand Management (Goals 1, 2, 3, 4, 5)

BICYCLE LEVEL OF TRAFFIC STRESS

Level of Traffic Stress (LTS) is a performance measure that considers the bicycle infrastructure as well as traffic volume and number of lanes of any adjacent streets. It ranks each facility on a scale from 1 to 4, with 1 being suitable for children and 4 being suitable for use by only the most fearless riders (

Exhibit 4-16).

Exhibit 4-16: Bicycle Level of Traffic Stress (Definitions)



The study area network was evaluated for Level of Traffic Stress for the existing conditions (*Exhibit 4-17*) and final plan conditions (*Exhibit 4-18*). For locations where multi-use trails exist or are proposed adjacent to a street, the LTS is depicted for the trail. The final plan improves the LTS at key locations, including the 'Chute' (1), connection from the Duck Hollow Trail to the Hazelwood Trail (2), connection from Hazelwood to the Great Allegheny Passage (3), and Glenwood Bridge (4).

The final plan allows seamless travel between the Great Allegheny Passage, Duck Hollow Trail, Hazelwood Trail, Eliza Furnace Trail, and Junction Hollow Trail using LTS 1 routes, significantly improving the availability of bicycling as a choice of travel mode for a broad section of travelers by improving safety and comfort. This is especially important given Hazelwood's close proximity to the residential and commercial areas of downtown Pittsburgh, Oakland, and Homestead.

Exhibit 4-17: Bicycle Level of Traffic Stress (Existing Conditions)

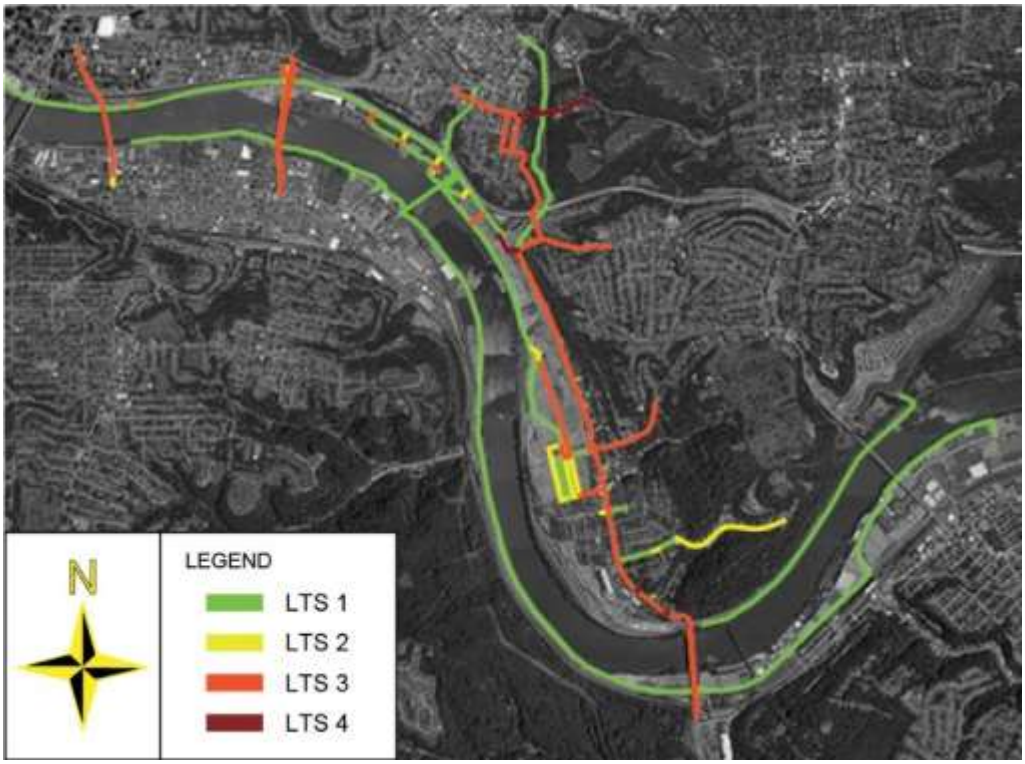
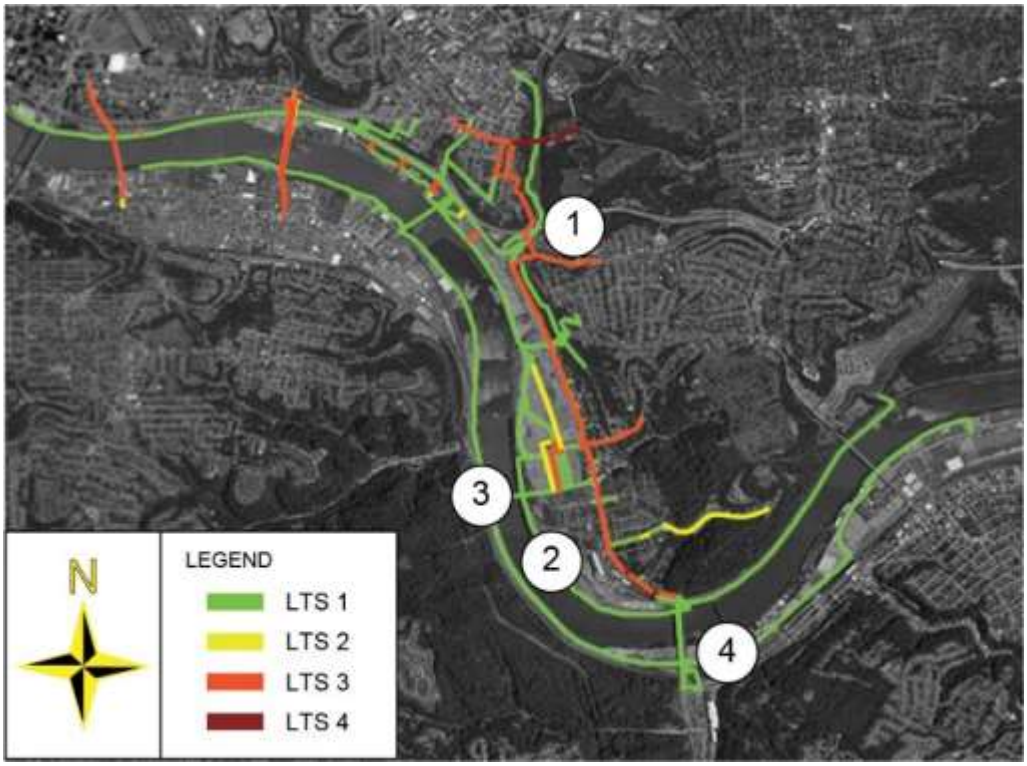


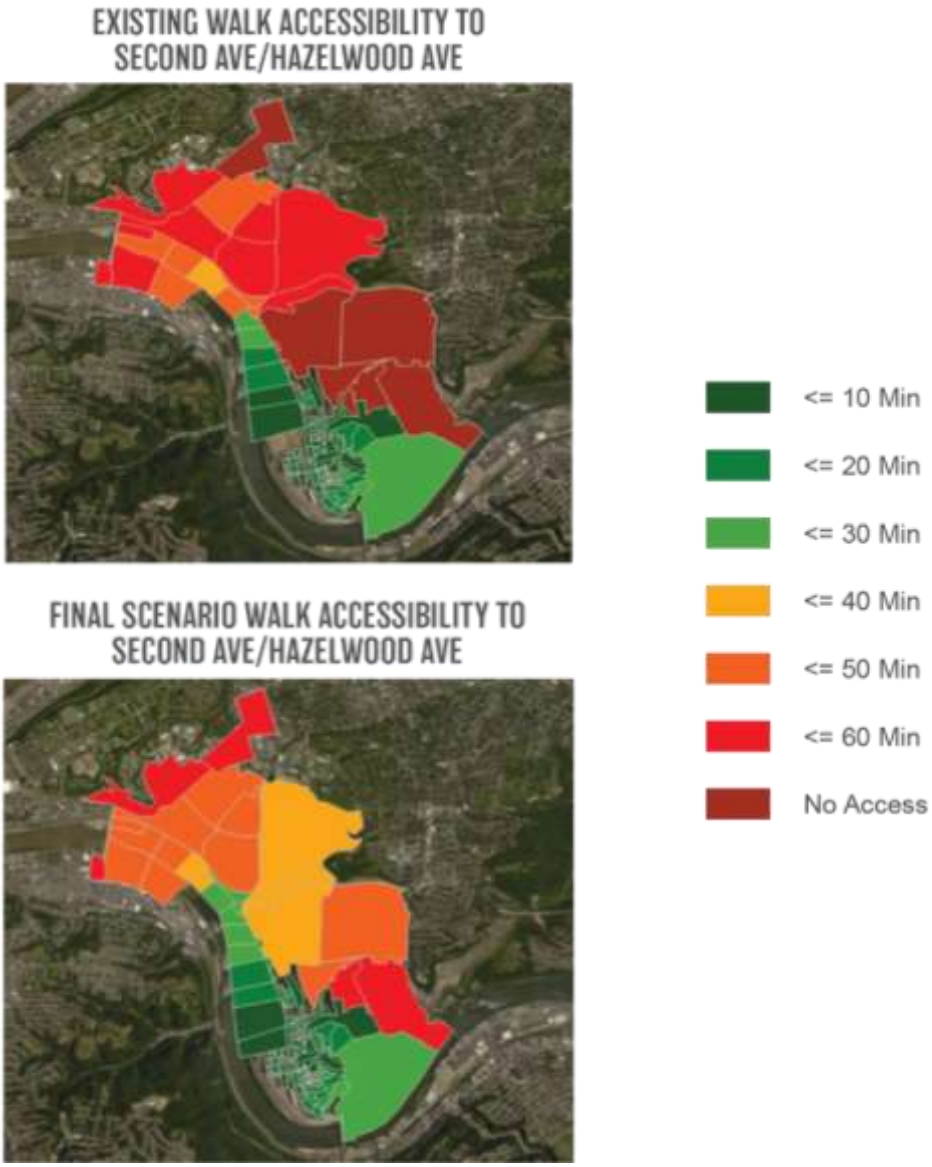
Exhibit 4-18: Bicycle Level of Traffic Stress (Final Plan Conditions)



WALK ACCESSIBILITY

Walk accessibility is a performance measure that evaluates how long it would take to walk from a single location to all other locations within the study area using only sidewalks or trails. In this case, the time it would take to walk from the intersection of Second Avenue and Hazelwood Avenue was evaluated, assuming a walking speed of 3 miles per hour for relatively flat areas and 1 mile per hour for significant slopes. The walk accessibility was measured for both the existing condition and final plan scenarios for comparison (*Exhibit 4-19*). Many of the locations, such as the Bluff, become significantly more accessible under the final plan. It has been well documented that shorter trips make it significantly more likely that someone would walk rather than drive, which makes improving walk accessibility a critical component of the plan.

Exhibit 4-19: Walk Accessibility (Existing and Final Plan Conditions)

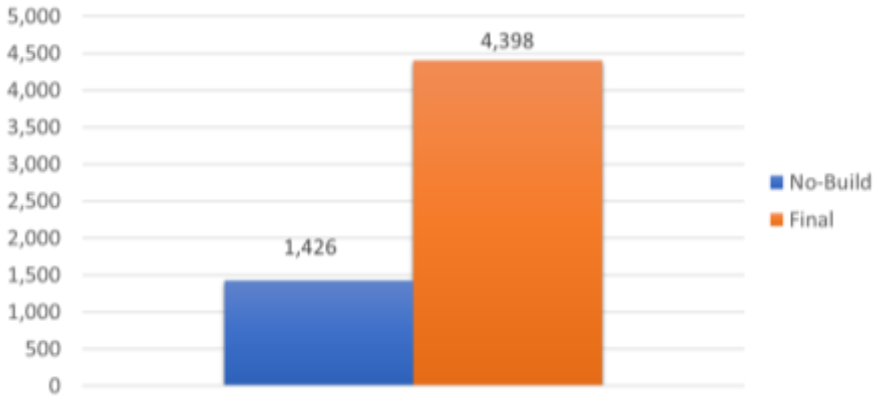


ACCESS TO JOBS BY MODE

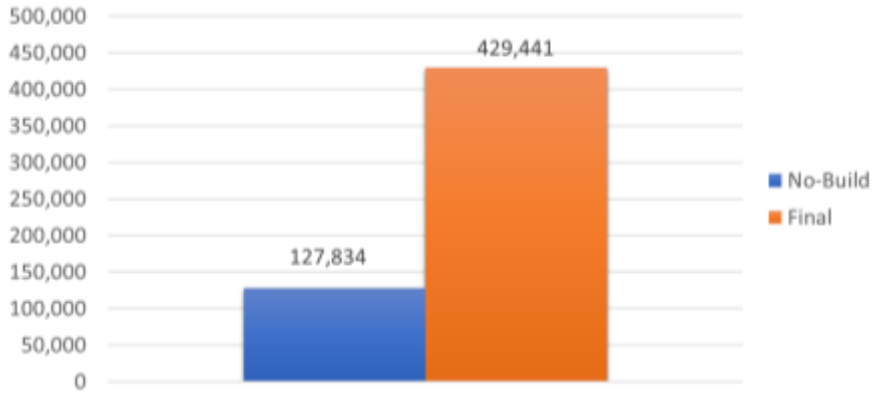
Access to jobs by mode is a performance measure that evaluates how many jobs are accessible from a specific location within a 20-minute trip. In this case, the number of jobs accessible from the intersection of Second Avenue and Hazelwood Avenue by walking on sidewalks or trails, driving or riding in a car, and using transit was evaluated for the final plan (orange bars) and No-Investment (blue bars) scenarios (*Exhibit 4-20*). The final plan significantly increases the number of jobs accessible using each mode of travel. This emphasizes the positive impact on the economic competitiveness for office, industrial, and commercial development and quality of life for residents that the plan's investments will have.

Exhibit 4-20: Access to Jobs within 20 Minutes by Mode from Second Ave/Hazelwood Ave

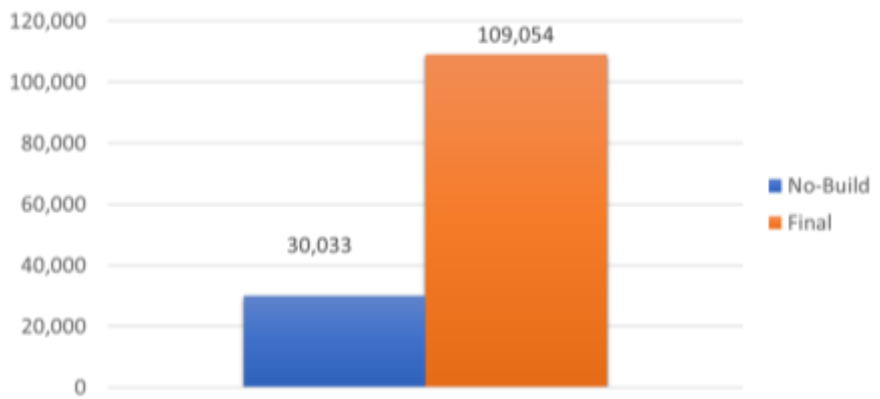
WALK



DRIVE



TRANSIT



TRAVEL TIME BY MODE

Travel time by mode is a performance measure that provides a comparison of how long it takes to travel between two locations using each mode of travel. For walking trips, it was assumed that people would only travel on routes with sidewalks or trails. The time is measured to or from the intersection of Second Avenue and Hazelwood Avenue and measures the peak direction of travel (e.g. Inbound to Downtown in the AM and Outbound from Downtown in the PM). The Overall Corridor travel time is the travel time from the Glenwood Bridge to the 10th Street Bridge.

Travel time is provided for automobiles, buses, bicycles, and pedestrians (*Exhibit 4-21*). The conditions listed include no additional investment (No-Build), scenario prior to construction of the proposed multimodal bridge (Interim), and final plan (Final).

The final plan generally improves travel time for all modes of travel. In addition, it makes transit significantly more competitive when compared to automobile travel. This increased competitiveness is an important factor in promoting transit as a preferred mode of travel.

Exhibit 4-21: Travel Time by Mode to/from Second Ave/Hazelwood Ave

AM PEAK DIRECTION TRAVEL TIMES (MINUTES)

	To Downtown	To Oakland	From Waterfront	Overall Corridor
No-Build Scenario	22-26-26-86	23-29-N/A-N/A	12-22-44-147	26-44-N/A-N/A
Interim Scenario	17-14-26-86	11-12-20-58	11-19-44-147	22-22-27-90
Final Scenario	14-13-26-86	8-10-20-58	10-16-25-84	20-19-27-90

PM PEAK DIRECTION TRAVEL TIMES (MINUTES)

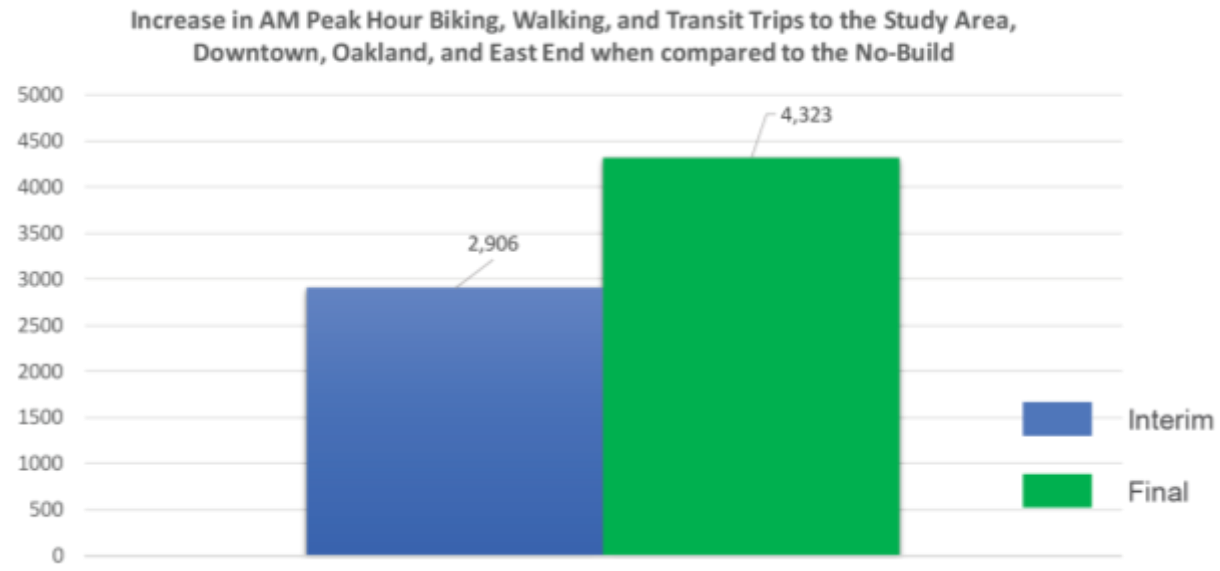
	From Downtown	From Oakland	To Waterfront	Overall Corridor
No-Build Scenario	24-38-26-86	14-28-N/A-N/A	12-22-44-147	29-51-N/A-N/A
Interim Scenario	20-15-26-86	12-11-20-58	11-20-44-147	26-23-27-90
Final Scenario	18-14-26-86	10-10-20-58	10-16-25-84	22-18-27-90

INCREASE IN BIKING, WALKING, AND TRANSIT TRIPS

Increase in biking, walking, and transit trips is a performance measure that directly quantifies one of the key goals of the plan – reduction in non-single-occupant-vehicle (SOV) trips. This measure aggregates all the non-automobile modes together to determine how many fewer automobiles there would be on the road when compared to the no-investment scenario (*Exhibit 4-22*). This measure is provided for the scenario without the completion of the multimodal bridge (Interim) and upon implementation of the entire plan (Final).

By reducing automobile traffic by over 4,300 trips in the morning peak hour, it would eliminate the need for 4 additional signalized arterial through lanes or 2 freeway lanes. When compared to the estimated 6,700 additional trips created during the morning peak hour by the high growth scenario the plan goes a significant way in reducing the creation of additional SOV trips on the network. Some of the decrease in SOV trips is a result of the mode choice to and from the study area, while some of it is from the change in mode choice for commuters traveling through the study area.

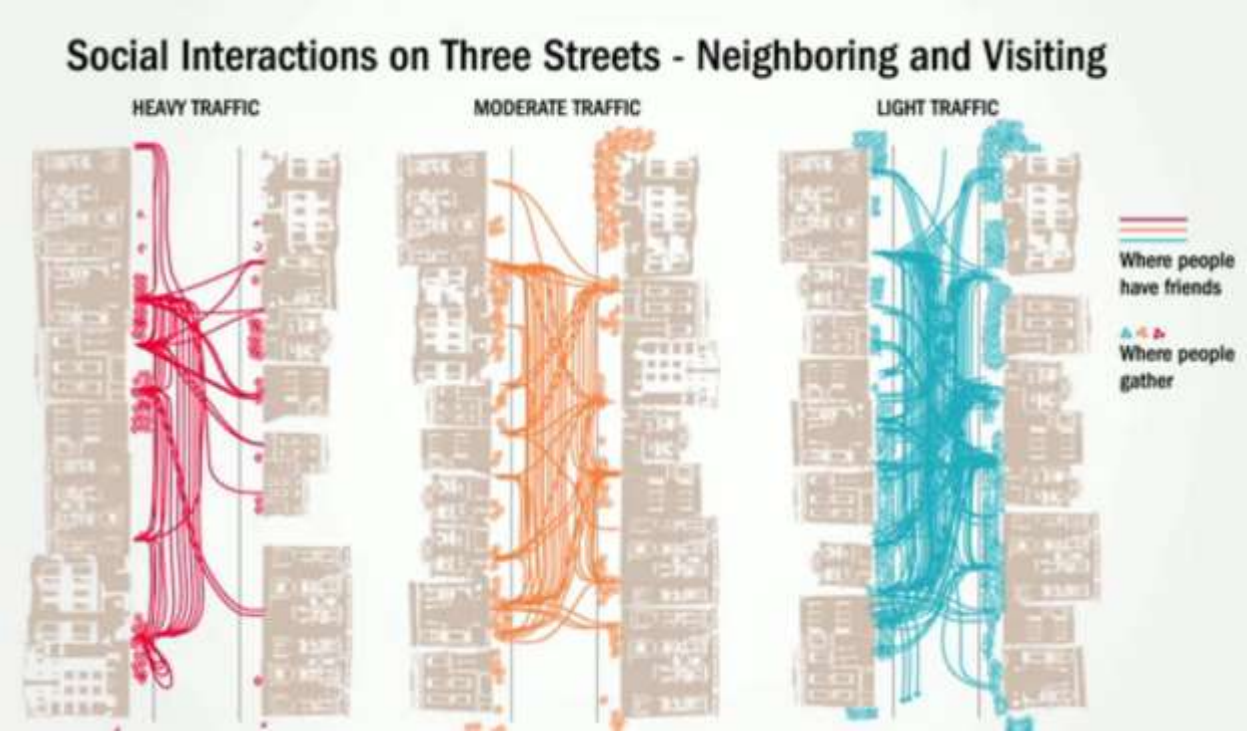
Exhibit 4-22: Decrease in AM Peak Hour Automobile Traffic



NEIGHBORHOOD LIVABILITY FOR SECOND AVENUE

Neighborhood livability is easy to evaluate qualitatively, but more difficult to quantify. From this perspective, livability was quantified based upon the findings of *The Environmental Quality of City Streets* by D. Appleyard and M. Lintell and further confirmed in *Does the Livability of a Residential Street Depend on the Characteristics of the Neighboring Street Network?* by W. Marshall and C. McAndrews. This research measured the number and spatial distribution of social interactions on a given street based on the amount of automobile traffic along the street (*Exhibit 4-23*). High volume streets were defined as streets exceeding 16,000 vehicles per day, moderate volume streets were defined as between 8,000 and 15,999 vehicles per day, and light traffic streets were less than 8,000 vehicles per day.

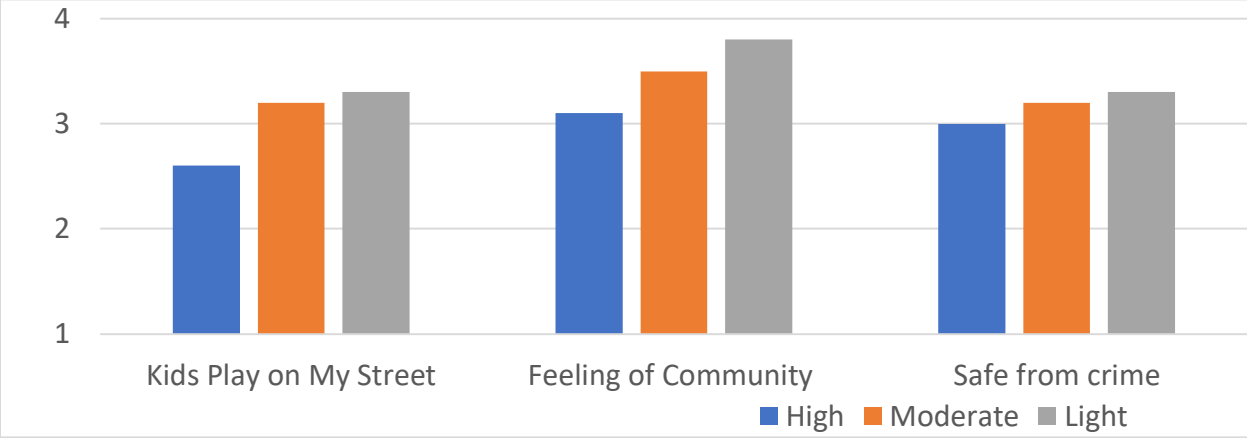
Exhibit 4-23: Social Interactions on Streets by Traffic Volume



The findings indicate higher automobile traffic volume streets resulted in fewer social interactions while lighter automobile traffic streets resulted in more social interactions. The updated findings further quantified that the character of the street also influenced the sense of satisfaction.

Specific perspectives from residents along high, moderate, and light traffic streets included specific perceptions on characteristics such as “Kids Play on My Street,” “Feeling of Community,” and “Safe from Crime” (*Exhibit 4-24*).

Exhibit 4-24: Neighborhood Perspectives on Livability by Traffic Volume



In order to measure livability, the daily traffic volume along Second Avenue north of the Glenwood Bridge was evaluated. Volumes were evaluated for the Existing Conditions, no additional investment (No-Build), scenario prior to construction of the proposed multimodal bridge (Interim), and final plan (Final).

- Existing – 17,900 – Heavy Traffic
- No-Build – 21,800 – Heavy Traffic
- Interim- 19,600 – Heavy Traffic
- Final – 10,400 – Moderate Traffic

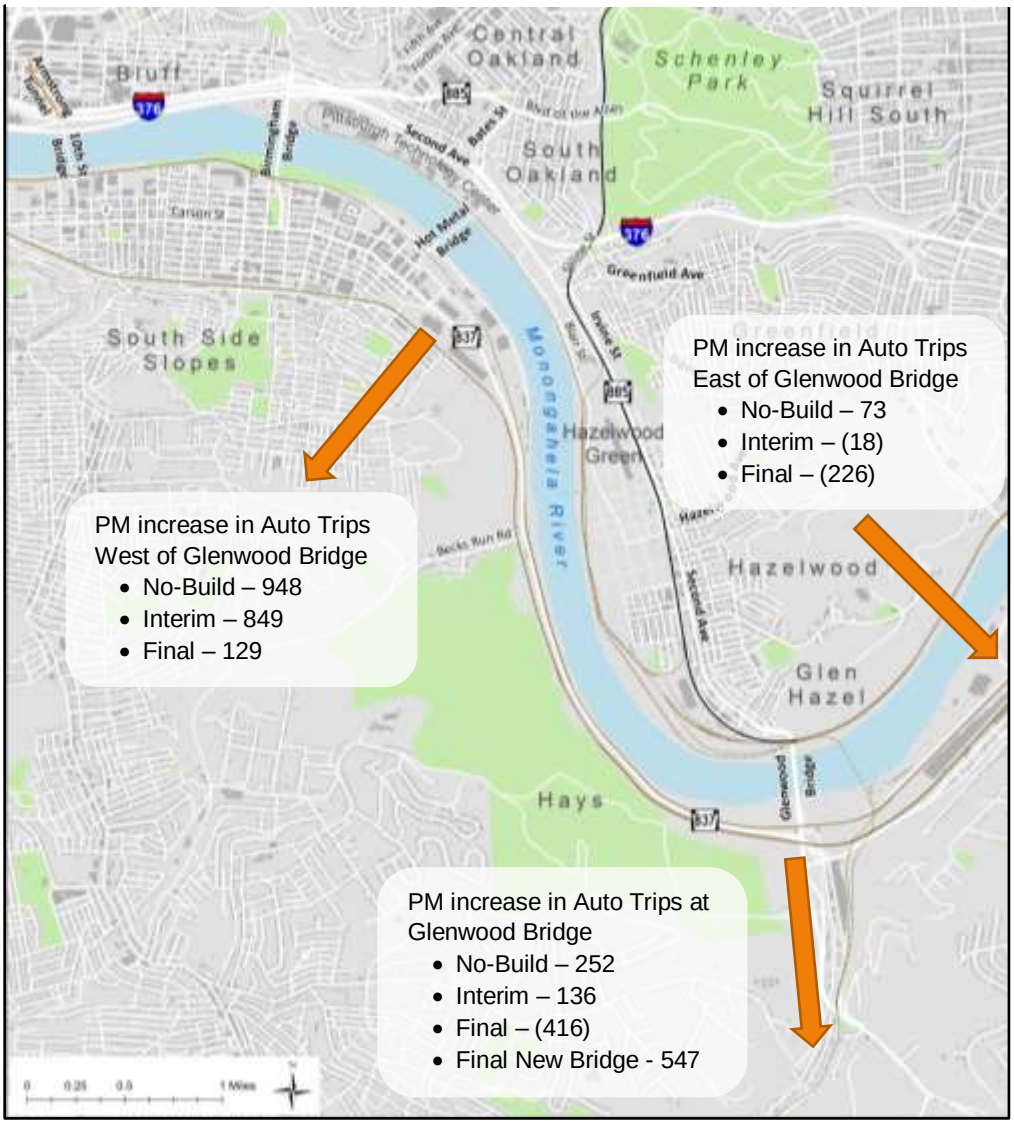
Based upon this comparison, the final proposed plan would shift Second Avenue through the Hazelwood neighborhood from the 'Heavy Traffic' category described above to the 'Moderate Traffic' category, which can be expected to noticeably improve the livability of Second Avenue and the quality of life for its residents.

In addition, the final plan would allow for full-time parking along both sides of the Second Avenue in the Hazelwood Business District, which would further enhance economic viability. The plan enables a future design of Second Avenue through Hazelwood to incorporate a more Complete Streets approach with a focus on pedestrian and bicycle safety that is appropriate for a community main street.

AUTOMOBILE TRAFFIC CROSSING THE MONONGAHELA RIVER

The change in traffic volumes crossing the Monongahela River is a performance measure that directly quantifies the impacts of the plan on SOV traffic volumes. Traffic volumes were produced for the afternoon peak hour (rush hour) crossing the Monongahela River. Volumes were provided for the 2040 no additional investment (No-Build), scenario prior to construction of the proposed multimodal bridge (Interim), and final plan (Final). The bridge crossings were grouped into three sets: West of the Glenwood Bridge, Glenwood Bridge and Multimodal Bridge, and East of the Glenwood Bridge (*Exhibit 4-25*). Numbers in parentheses in the Exhibit are negative, indicating a reduction in trips compared to existing conditions.

Exhibit 4-25: Change in Southbound PM Peak Hour Auto Volume Compared to Existing Conditions



The overall increase in all southbound traffic crossing all Monongahela River bridges in the PM peak hour for each of the scenarios when compared to the existing conditions is:

- No-Build – 1273
- Interim – 967
- Final – 34

The overall increase in trips is only 34 cars when you consider all crossings together. The new Multimodal Bridge is expected to have 547 southbound PM peak hour trips, which will shift significant traffic from the other bridge crossings. The result is that trips east of Glenwood Bridge will be lower than the existing conditions.

For perspective, the High Growth Scenario is expected to add 8,300 trips to afternoon peak hour and yet only adds 34 automobile trips crossing the Monongahela River southbound during the afternoon peak hour. Based on this evaluation, the final plan significantly helps accomplish the goal of the study to provide improved access by all modes of travel and reducing the demand for SOV trips.

CHANGE IN THE INCREASE IN BIKING, WALKING, AND TRANSIT TRIPS DUE TO TDM

The change in the increase in biking, walking, and transit trips due to the implementation of transportation demand management (TDM) strategies is a performance measure that directly quantifies one of the key goals of the plan to implement strategies to increase the use of non-single-occupant-vehicle (SOV) modes of travel. Transportation demand management and its applications to the SR 885/Second Avenue corridor are discussed in greater length in Section 3.

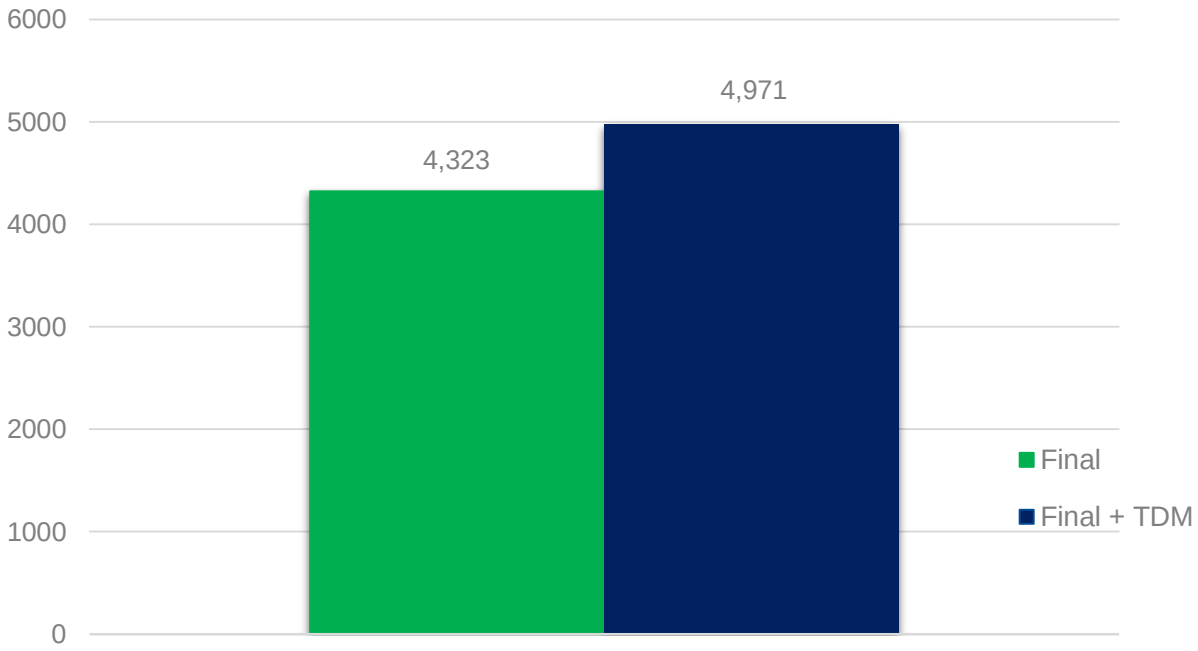
From this perspective, the implementation of the following TDM strategies to reduce the number of cars on the road was evaluated. Strategies included:

- Flex/Telework Policies
- Circulator Shuttles
- Increase TDM Awareness
- Encourage Transit Subsidies
- Discourage Parking Subsidies

It is expected that TDM strategy implementation would have a projected 14% reduction in single-occupant-vehicle (SOV) travel during the morning peak hour (*Exhibit 4-26*). The 14% reduction in trips was calculated by adding the trips that were removed from the corridor through parking charges/discouraging parking subsidies, transit subsidies, TDM programming, a circulator shuttle, and implementing Flex/Telework policies and subtracting that total from the modeled AM peak hour trips entering the study area based on the study's travel model. The percentage difference between the original AM peak hour trips entering the study area and the new calculated number that reflects the reduction due to TDM shifts.

This strategy helps meet the goals of the study by further reducing SOV travel and providing transportation choices.

Exhibit 4-26: Decrease in AM Peak Hour Automobile Traffic Due to TDM Strategies



NEXT STEPS AND IMPLEMENTATION

As discussed in this study, none of the 23 improvements described in the final plan currently have funding. In order to become a reality, each improvement will need to be championed by one or more agency, which can provide additional planning and details, then identify relevant funding sources.

Some of the improvements could feasibly be implemented in the short-term (less than 6 years), as described in *Exhibit 4-15*. Others are more complex and would require additional studies to supply the details necessary to obtain funding. Additional studies would also offer the community and stakeholders additional opportunities to provide input on the final design and understand how the improvements will affect them.

In all cases, the actual timeframes, priorities, and implementation decisions will ultimately be driven by factors beyond the scope of this study. Such factors will certainly include funding availability, the pace of local/regional developments and related infrastructure needs, and the potential for public/private grant opportunities (outside of typical public transportation budgets). Additional factors will include agency priorities, future project champions and/or partnerships, future feasibility or conceptual design considerations, and overarching competition among local, regional, and statewide transportation needs.