

Penn State University Park Bicycle Master Plan



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Campus Team: Transportation Services, Office of Physical Plant
Consulting Team: Nelson\Nygaard

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All images from Nelson\Nygaard, except as noted.

EXECUTIVE SUMMARY

In collaboration with students, faculty, staff, and technical experts, Penn State University developed the Penn State University Park Bicycle Master Plan.

This plan, which came together through extensive campus engagement and analysis of biking conditions, describes a unique future for the University Park campus to provide a safe, convenient, and connected bike network. This proposed bike network, in combination with recommended operations and resources, will ensure that the improved system will be practical, effective, and supported for years to come.

CONTENTS

The Penn State University Park Bicycle Master Plan is organized to enable the reader to understand the project background and University goals in the early chapters. The concluding chapter outlines the recommendations for a bicycle network and implementation plan. The report includes the following:

- **Chapter 1: Introduction** | Introduces the purpose and background of the Penn State University Park Bicycle Master Plan, and its relationship to campus travelers, and describes the planning process, including community outreach and engagement efforts.
- **Chapter 2: Vision and Goals** | Discusses the overarching themes for the Penn State University Bicycle Master Plan, including guiding principles and performance measures, which will guide the evolution of bicycling on campus into the future.
- **Chapter 3: How Penn State Can Invite and Support Biking** | Outlines key considerations and best practices when managing the expansion of bicycling on a college campus, as well as a toolkit for facilities and infrastructure.
- **Chapter 4: Network Plan and Implementation** | Presents the recommendations for a comprehensive bicycle network to address campus needs and defines the action items that the University will undertake.
- **Appendices** | Includes supporting documents such as the Map Atlas, a collection of maps detailing the existing infrastructure and demand conditions, and the Engagement Summary Memo, a complete report of the results from each of the campus engagement activities.



KEY FINDINGS & RECOMMENDATIONS

The network and implementation recommendations of this plan were created in response to key findings from outreach and engagement feedback which include:

- There is a desire for more bicycle facilities and infrastructure.
- There is an opportunity to enhance bicycle safety at University Park.
- Campus travelers would like to see better bicycle connections and bike-friendly areas to, from, and within campus.
- Campus travelers want more education, training, and culture around biking.
- There is confusion about limited biking zones and signage.
- The Spin program has challenges and should be improved to meet needs and expectations of all campus travelers.

The plan also seeks to build off the momentum of existing successful programs and investments that have been made at University Park in recent years which include:

- The Bike Den
- Ample bike parking supply in many areas of campus
- Limited access network for slower travel in some parts of campus
- Improved crossings at some conflict points

As part of a collaborative process these findings guided the creation of six project goals which align with the vision for the plan – “policies, programs, and projects make Penn State a place where students, faculty, and staff experience bicycling with delight and confidence.”

1. Bicycling grows as a safe, affordable, culturally accepted, and sustainable transportation option that replaces personal vehicles for the university commute and/or cross-campus travel.
2. Bicycling improves the quality of life for students, faculty, staff, and visitors by providing increased exercise / recreation and environmental sustainability.
3. Bike commuters feel supported with high quality end of trip facilities such as accessible changing areas, more covered parking, and incentives.
4. Shared bikes and micromobility enrich the quality of life on the Penn State campus.
5. People on bikes experience a predictable and connected experience to and within campus.
6. Penn State continues to be recognized as a leader in campus-focused bike facilities planning and support.

These are supported by eight guiding principles derived from the project steering committee, the 2008 Bike Plan, the Center Region Long Range Transportation Plan, and staff and student engagement. Scoring factors were developed in collaboration with the project leadership committees to assess the potential effectiveness of projects and programs for Safety, Connectivity, Demand, Comfort, Commute, Engagement, and Feasibility.

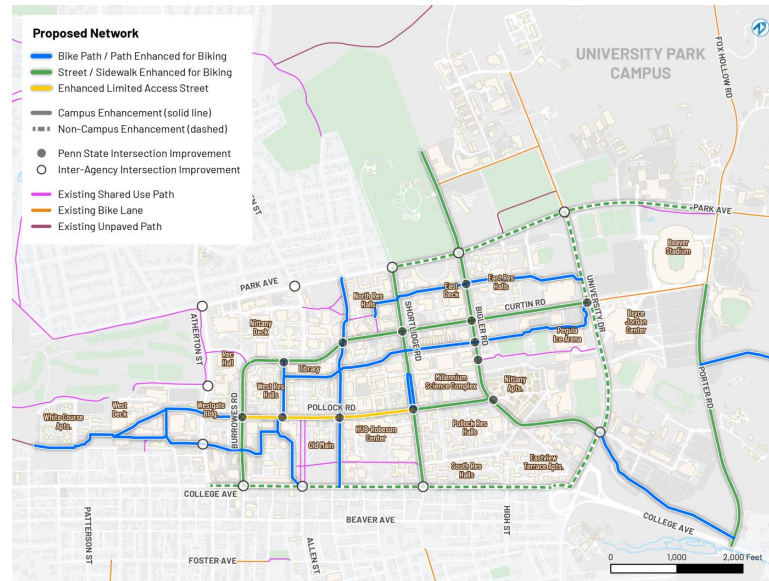
The plan recommendations are comprised of a Biking Network for bike circulation and storage, and Operational and Program Strategies for supporting infrastructure implementation and advancing campus bicycle culture.

The network was developed through robust analysis and review of existing patterns and gaps, composite demand of travel markets (to, from, and within campus), requests from engagement, feasibility of construction, and consideration of potential safety conflicts. The network includes a variety of proposed bike pathway and street enhancements intended to support bicyclists on campus. Elements of the proposed projects within the bike network include short-term strategies such as signage and pavement markings, as well as long-term strategies such as rebuilding the curb and widening the right-of-way. The network is organized into two sets of recommendations:

- **10 Keystone Projects** of the highest priority for addressing demand and connectivity.
- **12 Supporting Projects** that serve lower demand links and would reinforce network completeness to be implemented after the Keystone network is installed.

The Biking Network is reinforced by recommended Operational and Program Strategies. Programmatic strategies address long-term goals; encourage broader education and outreach about bicycling on campus; work to develop incentives that get people out of their cars and on bikes more; improve the University's ability to focus its investments and make the right decisions; and establish a fair and flexible process for prioritizing what gets done in the coming years. Program strategies are consolidated into four topic areas:

- Alumni Development
- Campaigns Promoting and Educating Riding
- Incentives and Increasing Access



- Culture and Fun

Operational strategies establish measures for a well-maintained bike system across campus, and one that is well-supported by dedicated staff, protocols, and operating budget. Operational strategies are consolidated into three topic areas:

- Maintenance
- Staffing and Budgeting
- Standards and Project Delivery

To track the University's progress in implementation of the plan, distinct indicators are provided to measure the ongoing performance of campus bicycling for increasing safety, networking connectivity, biking activity, low-stress comfort, and increased biking education.

1 INTRODUCTION

The Penn State University Park Bicycle Master Plan aims to outline strategies that will enhance the experience of biking to, from, and around campus. The plan builds on the University's ongoing efforts to advance bikeability, which has resulted in the campus' League of American Bicyclists Gold-Level Bicycle Friendly University designation.

Throughout this process, the project team engaged with students, faculty, and staff, evaluated the current landscape of biking on campus, defined specific goals and metrics for the project, and identified necessary tradeoffs to complete the bicycle network. The final plan has resulted in a clear vision based on shared goals and objectives.

PURPOSE

Why Biking is Important on a Campus

Bicycling is an important transportation option on any university campus. The opportunity to ride a bicycle as a primary form of transportation offers a myriad of benefits to campus travelers. It tends to be the most affordable, quick, and convenient choice for those travelling to, from, and within the core campus, especially for students and employees who typically live close by or within the campus boundaries. Whether a bicycle is used for commuting or not, having infrastructure to support more campus bicycling can increase the range of options and choices for everyone to get around campus during the day for appointments, errands, or recreation. It is also a helpful and efficient option to allow those living on campus to travel beyond the campus boundaries to access critical goods and services such as grocery stores, doctor's offices, or recreational opportunities. Having more people biking either to or around campus also reduces the traffic and parking demand for people that drive, and it can reduce campus congestion during the day for those that might park or take transit and then take a bike for inter-campus trips.

Bicycling is especially important for those who do not own a car. This is a trend that is not only prevalent on university campuses, but increasingly popular nationwide. Younger people are driving less and seeking alternative modes of transportation as they work toward finding ways to live more sustainable lifestyles. The capacity to reduce emissions by promoting bicycling as an alternative to driving is a crucial component to achieving environmental goals, both for campus affiliates and the University as a whole.

As the desire to travel by bike is predicted to grow over the coming years, it is increasingly important for the University to be responsible for providing high-quality, safe, and convenient bicycling infrastructure and services. In conjunction with this plan, the University has a unique opportunity to meet both the needs of campus travelers and address overarching campus goals by enhancing the bicycle network. The benefits of bicycling reach far and wide and can help achieve many elements of the University's mission, including:

- Growing opportunities for health and wellness
- Increasing staff and faculty retention and competitive student enrollment

- Reducing campus emissions, carbon footprint, and expanding campus sustainability
- Providing safe, efficient, and convenient transportation
- Creating a stronger sense of community and campus culture

Why This Matters to Students, Faculty, and Staff

The Penn State University Park Bicycle Master Plan seeks to address critical issues that are felt by students, faculty, and staff at University Park.

The plan responds to several key needs that all campus travelers may experience on a regular basis, including the following:

- Improving campus safety and comfort by **identifying and correcting points of concern**.
- Improving the wellbeing of the campus community by **prioritizing an environmentally sustainable mode of active transportation**.
- Encouraging bicycling as a mode of transportation by **expanding on the regional bike infrastructure system**.
- **Providing a comprehensive and practical strategy** for improving bicycle circulation at the University Park campus.

How this Plan will be Used

This plan cements a vision for building out a bike network and what programs would support a more bikeable campus. This vision was developed through engagement with the campus community and ongoing engagement with the campus community will be needed to keep priorities attuned throughout the implementation of the vision. This plan is meant to serve as a reference for bike facility priorities whenever general master plan or building projects are conducted or whenever a street is being paved or rebuilt over time. It also provides a framework for opportunity for fundraising, seeking grants, and/or earmarking ongoing funds for implementing aspects of the plan.

PROJECT CONTEXT

History of Bicycling on Campus

Penn State has made strides elevating the bicycling experience at the University Park campus. Over the past fifteen years, the University has advanced key foundations to creating a strong bicycle culture. By shepherding a bicycle master planning effort and advancing other initiatives that range from leading a successful shared micromobility partnership with Spin to hosting bike education programming, creating the intermodal Bike Den, and aggressively expanding bike parking supply and commuter support amenities, Penn State is laying the groundwork for a more active transportation-centered future.

As a result of these efforts, the University received the prestigious gold-level Bicycle Friendly University designation in 2020 by the League of American Bicyclists. This award reflects the University's work to enable safer and more accessible bicycling on campus. Prior to being awarded the gold-level

designation, the University was recognized as a Bicycle Friendly University since 2012 with the bronze-level distinction. They followed this accomplishment by receiving the silver-level Bicycle Friendly University award in 2016 due to their expanded efforts. Moving forward, the University can work toward achieving the platinum-level certification, which is the highest award designated by the League of American Bicyclists and of which only eight other universities achieved since the launch of the BFU program in 2011. The University will renew their designation with the League in 2024.

Penn State has also made strides in the realm of bicycling enforcement on campus. The University created the Bicycling Education and Enforcement Program (BEEP) to enhance campus safety for bicyclists and those who interact with bicyclists on campus. This is a collective endeavor between Penn State University Police and Public Safety and Transportation Services which includes training services around safety and rules, as well as enforcement for violating campus bicycling regulations. As outlined in the university safety policy SY16 and Pennsylvania state law, these may include offenses like riding without bike lights at night, or failing to stop at stops signs or for pedestrians in their designated right-of-way. The University also enforces their bicycle registration and permitting program per the Centre Region ordinance and Penn State University policy, which helps University Police in the event of stolen bikes and provides the University with valuable data about campus biking. To obtain a registration permit, a bicycle must be in good working condition, and the permit must be properly displayed once received. Unregistered bicycles parked on campus are subject to violation and may be impounded. These processes around enforcement and regulation are in place to ensure the safety and order of bicycling at University Park.

Previous and Overlapping Efforts

The project team’s approach to creating this plan has built upon prior momentum and planning toward a thoughtful campus bike system. Table 1 summarizes all the prior and current planning efforts that have addressed campus biking needs.

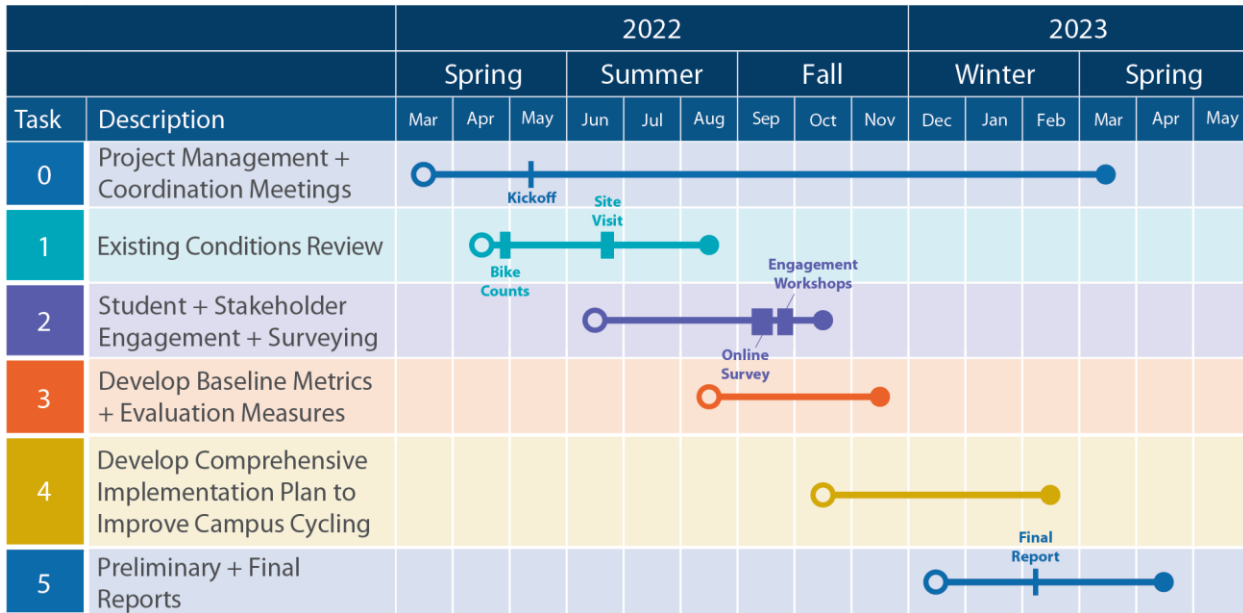
Table 1 Previous Plans

Plan	Year	Author	Description
The Pennsylvania State University - University Park Campus Bicycle Master Plan	2008	Penn State University	Internal Bike Master Plan created by staff to summarize project ideas and campus policies with the goal of increasing bicycle use and improving safety.
Penn State University Planned District Transportation Study	2013	Penn State University	Required plan documenting transportation activity and forecasts development in the University Planned District (UPD) to plan for future travel patterns, including multimodal travel.
Centre Region Bike Plan	2016	Centre Region Council of Governments	Plan created to uncover gaps in the existing bike network, promote biking as a primary mode of transportation, offer recommendations to improve biking, and help build partnerships and programs that support biking throughout the region.

Plan	Year	Author	Description
Pennsylvania State University Parking and TDM Plan	2017	Penn State University	The plan identifies comprehensive parking and TDM strategies to best accommodate the needs of the existing campus population and to accommodate future growth. Included are targeted recommendations for transit, bike and pedestrian infrastructure, parking, TDM programming, and marketing strategy improvements broken down by cost, impact, and timeframe.
Centre County Long Range Transportation Plan (LRTP) 2050	2020	Centre Region Council of Governments	LRTP that outlines transportation goals for the region over the coming decades. Updates from the previous LRTP (Long-Range Transportation Plan 2044) in the new plan include information about newly required performance-based processes.
Next Generation Connectivity and Mobility Plan (NextGen Plan)	Ongoing	Borough of State College	Comprehensive mobility plan to encourage and promote active transportation with an emphasis on safety, infrastructure improvements, multimodal travel, and sustainability.
Penn State University Planned District Transportation Study Update	Ongoing	Penn State University	Started in 2022, this update to the 2013 study will identify the associated transportation impacts from project development and activities within campus for 10-year horizon while also providing achievable action measures and phased recommendations for managing traffic, parking demand, and internal circulation. Recommendations will focus on enhanced and new TDM measures with proven mode shift potential in the context of campus student enrollment and staff hiring projections, travel behavior trends, and local transportation system changes and congestion levels.

Project Process and Timeline

Figure 1 Project Timeline



Committees that Guided the Planning Process

This planning process was guided by three committees: a Core Committee which steered everyday project management and University-side coordination efforts, a Steering Committee which reviewed draft findings and interim deliverables to provide planning guidance, and an Executive Committee which reviewed final draft recommendations to provide direction on scenarios for implementation. Those that served in this role are as follows:

Core Committee:

- Cecily Zhu – Sustainable Transportation Program Manager, Penn State Transportation Services
- Neil Sullivan – University Planner, Penn State Office of Physical Plant
- Jason Thomas, Special Projects Manager, Penn State Transportation Services
- Kurt Coduti, Project Manager, Penn State Office of Physical Plant

Steering Committee:

- Core Committee Members (see above)
- Rob DeMayo – Director, Penn State Transportation Services
- Rick Ward – Associate Director, Penn State Transportation Services
- Tom Flynn – Landscape Architect, Penn State Office of Physical Plant
- Meghan Hoskins – Director of Operations and Partnerships, Penn State Sustainability Institute
- James Saylor – Principal Transportation Planner, Centre Region Council of Governments
- Anne Messner – Senior Transportation Planner, Centre Region Council of Governments
- Brian Johnson – Student Representative, Penn State Student Fee Board and University Park Undergraduate Association
- Jada Quinland – President, Penn State Graduate and Professional Student Association
- Joshua Reynolds – Student Representative, Penn State University Park Undergraduate Association

Executive Committee:

- Core Committee Members (see above)
- Rob DeMayo – Director, Penn State Transportation Services
- David Snyder – Associate Vice President, Penn State Auxiliary & Business Services
- Bill Sitzabee – Vice President for Facilities Management and Planning & Chief Facilities Officer, Penn State Office of Physical Plant
- Steve Watson, Director of Planning, Design & Properties, Penn State Office of Physical Plant

Outreach and Engagement Activities to Understand Key Issues

Outreach and engagement with University Park campus travelers was a critical element of this plan. The various engagement activities offered multiple channels of input for all types of system users, which broadened the scale of understanding and feedback gathered by the project team. University students, faculty, staff, and other key stakeholders were engaged with several activities discussed in this section. A complete overview of findings from each of the engagement activities are documented in the Appendices section. The outreach and engagement activities included the following:

1. **Penn State University Park Campus Bicycling Survey:** This survey was used to identify values and priorities from the wider campus community and understand what counts in terms of advancing bicycle access, comfort, and safety for the various traveler types that live on, study or work at, or visit the University Park campus. There were 1,182 total survey respondents, 67% of which were faculty and staff and 29% were students. The results of this survey informed the final bicycle network and implementation plan which will help improve and expand opportunities for bicycling at University Park.
2. **On-campus Engagement Stations:** The project team held three on-campus engagement stations in September 2022 to gather the input of anyone on campus that wanted to share their experiences and preferences to inform the Bicycle Master Plan for the University Park campus. Each engagement station presented seven boards to participants regarding mode of travel, bike programs, bike and trail improvements, concerns, and conflict areas. A total of 302 comments were received on the boards.
3. **Online Mapping of Conflict Points and Desired Opportunities:** Spatial input on existing bicycle facilities and preferences for future improvements was collected by welcoming engagement station participants to draw on printed campus and regional maps as well as online through a wikimap (<https://wikimapping.com/Penn-State-Bike-Master-Plan.html>). Both exercises gave campus affiliates the opportunity to identify the specific locations of bike parking, conflicts with people riding bicycles, safety concerns, and desired bicycle infrastructure.
4. **Audits of Campus Conditions through Bike Ride Surveys:** The project team prepared a “bike audit” survey worksheet and activity to garner key insights from riders on campus. The team hosted two events with a total of 16 participants. The activity included riding a [3.5-mile route](#) along key campus corridors segmented into five sections for riders to give feedback concerning their experience after riding through each segment. For each segment of the route, riders were asked questions about their level of comfort, challenges they encountered, and the quality of the segment.

Once outreach and engagement activities concluded, the project team conducted a thorough analysis of all comments and feedback received by the campus community. The analysis involved distilling a wide range of comments and feedback to allow the project team to understand the most pressing issues and desired improvements for bicycling at University Park. Many of these points of feedback were location-specific, such as streets and intersections of concern, as well as general comments such as a desire for more bicycle infrastructure, enforcement, and education campus-wide.

2 VISION AND GOALS FOR THE PLAN

The project team worked to create a clear vision and goals based on guiding principles for creating a more bikeable campus. This process was key to ensure that the metrics relate to planning objectives and that the University measures what matters. The vision, goals, principles, and measures that follow were used as a framework for identifying and ranking projects in the bike network plan and also for ranking actions within programs and other staffing efforts. This framework can be used in an ongoing basis to track performance and/or re-rank implementation actions if priorities or campus goals shift.

VISION

Policies, programs, and projects make Penn State a place where students, faculty, and staff experience bicycling with delight and confidence.

At Penn State, getting back on a bike for transportation and recreation is normal, safe and fun and it enriches the campus experience.

Penn State's bicycle program is an integral element of the University's carbon reduction plan. Increased biking will reduce the need for cars, therefore cutting the University's greenhouse gas outputs.

GOALS

The Penn State University Park Bicycle Master Plan has identified six project goals. These project goals were informed by feedback from university staff, students, and other stakeholders during project coordination meetings and campus engagement activities.

A comprehensive bicycle network at Penn State University aims to improve mobility, safety, quality of life, and sustainability on campus. This would be done by building high quality bicycle infrastructure in priority areas, enhancing existing operations to accommodate the needs of all campus travelers, and educating the PSU community about available resources and programs through thoughtful communication strategies.

The plan is centered around the following campus goals:

1. Bicycling grows as a safe, affordable, culturally accepted, and sustainable transportation option that replaces personal vehicles for the university commute and/or cross-campus travel.
2. Bicycling improves the quality of life for students, faculty, staff, and visitors by providing increased exercise / recreation and environmental sustainability.
3. Bike commuters feel supported with high quality end of trip facilities such as accessible changing areas, more covered parking, and incentives.
4. Shared bikes and micromobility enrich the quality of life on the Penn State campus.
5. People on bikes experience a predictable and connected experience to and within campus.
6. Penn State continues to be recognized as a leader in campus-focused bike facilities planning and support.

GUIDING PRINCIPLES

The following guiding principles informed our existing conditions analysis and resulting project and program recommendations. Guiding principles build on the principles illuminated by the project steering committee, the 2008 Bike Plan, the LRTP, and staff and student engagement.

1. Maintain and grow partnerships within the Centre Region with a goal of providing a continuous bicycling network connected to the regional bike system.
2. Provide a comprehensive and practical strategy for improving bike circulation on the University Park Campus cohesively within the larger University Park Master Plan and campus priorities.
3. Improve safety by providing an understandable, logical, and enforceable bike system.
4. Increase availability and use of electric shared rideable options while maintaining a safe and predictable environment for everyone on campus.
5. Provide multiple channels of bicycle accessibility by expanding an affordable transportation option, developing a system that accommodates people with disabilities, and creating a network that serves users with a range of bicycling proficiencies.
6. Grow bicycle activity using effective actions for project and program development as informed by best practices of peer universities and input from campus affiliates.
7. Normalize bicycling as an acceptable and effective means for students and employees to commute and travel between on-campus obligations.
8. Prioritize investments that provide the University cost savings and support carbon reduction goals through an increase in bicycle mode share.

SCORING FACTORS

The following scoring factors were developed in collaboration with the project leadership committees in order to assess the potential effectiveness of projects and programs in meeting the goals and visions of the plan.

Table 2 Scoring Factors

Scoring Factor	How it will be measured (guiding questions)
Safety	Is the project located in a high-crash area or an area noted as feeling stressful?
Connectivity	Does the project connect to other bike facilities / close a network gap?
Demand	Does the project serve high demand connectivity nodes on campus? (e.g. major campus hubs, transit stops, park and rides, campus housing)
Comfort	Is the project located on a high stress segment? Can it increase comfort and reduce conflicts?
Commute	Does the project connect to high affiliate population densities off-campus within a bikeable distance of campus?
Engagement	Is the project requested by stakeholders?
Feasibility	Does this project fit reasonably within constraints and align with other planning and visual priorities?

PERFORMANCE MEASURES

Following our review of current bicycle activity and infrastructure on campus and connecting with campus stakeholders to understand needs for a supportive bicycle network, a set of performance measurements was developed. These performance measures are accompanied by specific indicators that could help assess the efficacy of the proposed improvements, which can also be used to track the University’s progress in implementation of the plan and realizing its goals and outcomes (as shown in Table 3).

Table 3 Performance Measures and Indicators

Performance Measure	Indicators of Performance
Safety	Crashes involving people biking and driving
	Crash trends in areas identified as high crash areas during planning effort
	Transit incident reports (decrease)
	“Sense of safety” (campus travel survey)
Connectivity	Miles of bikeways constructed
	Number of gap closures filled
Bicycle Activity	Ratio of personal bikes to Spin bikes at bike racks
	Bike rack utilization
	Bike registrations
	Spin bike usage
	Share of staff, students, and affiliates reporting biking to/from campus (campus survey)
	Bicycle activity at key intersections or screenlines
Comfort	Percent of people who report on a survey being interested but concerned about biking on campus
	Miles of low stress bikeways
	Miles of high stress bikeways
Bicycle Education	Awareness of bike rules on pathways
	Participation in bike programming
	Use of the Bike Den
	Compliance from BEEP enforcement-based education program

3 HOW PENN STATE CAN INVITE AND SUPPORT BIKING

Penn State University can support and advance campus bikeability by building a clear, visible, and legible complete and contiguous network for navigating cross-campus by bike via streets and pathways designed for high-comfort and low-stress facilities. The development of a bike network will need to draw on a best practice toolkit of facility and treatment design, assure staffing capacity for managing the buildout of the system, educating the campus community about bike safety, and managing other programs that support the network.

CAMPUS BIKING BEST PRACTICE TOOLKIT

A campus bike facility toolkit of best practices can be found on the pages that follow. The toolkit includes examples of treatments and designs organized within the following categories:

- Linear Street Facilities
- Intersection Treatments
- Pathway and Trail Facilities
- Bike Parking
- Facilities for Integrating Biking with Transit
- Signage
- Stencil and Thermoplast Pavement Markings

SAFETY AND CONFLICTS IN A CAMPUS CONTEXT

The campus currently supports bicycling with a mix of bike lanes, pathways, and dismount zones. Existing bike lanes lack bicycle stencil pavement markings, creating ambiguity about their purpose. This results in both cyclists riding the wrong way in the bike lane, creating potential hazards for cyclists, pedestrians, and vehicles, especially at intersections. This has been observed from both cyclists as well as from transit operators. Further, motorists have been observed using unmarked climbing lanes for loading or pick-up, causing people on bikes to reconsider whether they provide a reliable connection. On these streets, and streets without bike lanes at all, people on bikes need the confidence that they can ride in mixed traffic someplace along their journey. While most internal campus streets are slow enough that a collision may result in lesser severity injury outcomes, the possibility of an injurious safety incident may prevent some people from riding at all. On major campus boundaries, perceived and actual risks of serious injury collisions are higher due to increased traffic speeds and volumes.

Most pathways lack clarity on the proper placement for people on bikes and other mobility devices compared to those walking or using assistive devices like wheelchairs. Relying on communication from riders about the side they will pass on is insufficient for many reasons, including lack of skill in conveying such information and headphone and/or mobile phone distractions. Crowded periods between class changes increases the possibility of crashes, near misses, or just-in-time avoidance. This can create animosity and confusion about the proper right-of-use of bicycles on pathways.

Finally, multiple connections across streets between these facilities create unpredictable crossings, which are not only uncomfortable for cycling, but also result in frustration among people driving cars, operating transit, walking, and bicycling. When collisions do happen, the higher speeds and mass of vehicles leaves the people outside of them more at risk to serious or life-changing injuries.

BIKING-SUPPORTIVE CAMPUS POLICIES

- Provide legible and predictable street crossings
- Use design, maintenance, and rehabilitation practices that prioritize people walking and biking
- Provide best practice width and treatment designs to increase safety and comfort on both on-street bike facilities and paths to be used for biking
- Provide sufficient bike parking to support personal and shared Spin bikes
- Offer education, events, and incentive opportunities that support and promote campus biking
- Eliminate biking dismount zones on routes that provide through travel because they discourage riding and have low compliance

Linear Street Facilities

Bike lane infrastructure provides pathways for bicyclists to ride on streets.

Buffered bike lanes provide protection from traffic. Protection can be created by shifting parking lanes outward to create space between parked cars and the curb, using a landscaped planting strip, or maintaining a curb buffer.

Needs

In order to encourage more bicycling, the University should consider implementing infrastructure that increases the comfort and safety for all riders, especially in high volume areas.

Opportunities

Bike lanes appeal to those wary of riding on-street and they can reduce obstructions and conflicts between those who drive and those who bike. The University can make bicycling more accessible and comfortable for a wider range of people where sufficient right-of-way is available.

Linear street bicycle facilities may include:

- Bike lane
- Bike lane with green fill
- Raised bike lane (abovestreet-level)
- Buffered bike lane
- Cycle track/protected bike lane

Note: The recommended minimum width for an on-street bike lane is 5 feet. Best practice is 7 feet to allow room for passing and/or riding with children. The recommended width for a buffer between a bike lane and parking and/or a sidewalk is minimum 2 feet but best practice is 3 to 4 feet. If there are plantings in the buffer, 4 or 5 feet is recommended. If a bike lane is at sidewalk-level and parking is not present, the buffer between travel lanes and the bike lane can be narrower. The recommended minimum width for two-way bikeways is 10 feet but the best practice is 14 to 16 feet.

BEST PRACTICE – Cambridge, MA


Dozens of American cities have protected bike lanes (also known as “cycletracks”). Cambridge, MA was among the first cities to install such lanes. Located on Vassar Street near MIT, the lane is installed in a raised area along the sidewalk. A planting strip and curb protect cyclists from moving traffic, and the lane maintains a constant elevation even over driveway access areas. A different pavement marking and small bumps help to delineate the bikeway from the walking area.



Vassar Street Protected Bike Lane
Cambridge, MA

Table 4 Types of Linear Street Facilities

Treatment	Where is it most effective?	Cost	Example(s)	
<p>Bike Lane</p> <p>A section of roadway that is designated for bicyclists. It is typically distinguished with white painted markings and signage.</p>	<p>Streets without parking or loading conflicts or lower-volume streets</p>	<p>\$</p>		
<p>Bike Lane with Green Paint</p> <p>A section of roadway that is designated for bicyclists, distinguished with green paint and white markings.</p>	<p>Streets where there could be intersection or crossing conflicts and where increased visibility is helpful.</p>	<p>\$\$</p>		
<p>Raised Bike Lane</p> <p>A portion of the right-of-way designated for bicyclists. The facility's track is at the same level as the sidewalk, which provides vertical separation from vehicular traffic. It is often marked with paint and signage to distinguish the facility from the pedestrian right-of-way.</p>	<p>Streets where the right-of-way width allows for the infrastructure and the capital is available for this level of investment.</p>	<p>\$\$\$</p>		

Treatment	Where is it most effective?	Cost	Example(s)
<p>Buffered Bike Lane</p> <p>A section of the roadway that is designated for bicyclists, separated by a physical buffer. The buffer may consist of buffer striping, flex posts, planters, or concrete barriers.</p>	<p>Streets with higher-volumes and higher-speeds of moving vehicles</p>	<p>\$\$</p>	
<p>Cycle Track / Protected Bike Lane</p> <p>A section of the right-of-way that is designated exclusively for bicyclists, providing physical separation from vehicular and pedestrian traffic. This facility can provide one-way or two-way access for users.</p>	<p>Streets with higher-volumes and higher-speeds of moving vehicles that also have parking that could pose conflicts</p>	<p>\$\$</p>	

Intersection Treatments

Bicycle infrastructure at intersections, like bike boxes and through-lane painting, increase safety, comfort, and visibility for cyclists.

Needs

The University should consider ways to install treatments for cyclists at intersections along major bike desire lines. Creating clear designations for where a bicyclist should cross and where they should position to wait to turn can help clarify confusion and reduce stress and conflicts at intersections. For example, the crossing of Burrowes at Pollock does not have a clear path where people biking should cross, leading them to confusing movements as they cross the intersection.

Opportunities

Treatments can be installed in paint as part of a bike network expansion or intersection improvement. Intersection Treatments may include the following:

- Protected Intersection
- Green Crossings
- Two-can Crossings
- Leading Bike Interval (LBI)
- RRFB
- HAWK signal

BEST PRACTICE – Minneapolis, MN



Intersection Treatment in Minneapolis



Paint treatments through intersections, like those in Minneapolis, shown at left, help to increase the visibility of cyclists at intersections and to reduce conflicts with people crossing on foot.

Commented [AF2]: [Bikemin Ottom](#) I had to replace content here - can you help fix layout - overlaps happening




Figure 2 Intersection Applications and Appropriate Bicycle Facilities

Intersection Elements	Bike Boulevard	Conventional Bike Lane	Protected Bike Lane	Multi-Use Path or Trail
Physical Protection				
Pedestrian Islands			X	
Corner Islands			X	
Corner Wedges	X		X	
Centerline Hardening Treatment	X	X	X	X
Pavement Paint or Markings				
Bike Boxes	X	X	X	
Merging Areas		X	X	
Minor Roadway or Driveway Crossing		X	X	X
Signage & Signalization				
Bicycle-Specific Traffic Signals			X	X
Pedestrian and Cyclist Crossing Signs	X	X	X	X
Crossing Applications				
Raised Crossings	X	X	X	X
Pavers				X

Table 5 Types of Intersection Treatments

Treatment	Where is it most effective?	Cost	Example	
<p>Protected Intersection</p> <p>Provides physical separation between bicyclists and vehicular traffic at intersections and right-of-way priority for turning.</p>	<p><i>High-crash intersections with high bike volumes and a high volume of turning movement conflicts, along corridors with protected infrastructure</i></p>	<p>\$ <i>if paint</i></p> <p>\$\$\$ <i>if raised above street level</i></p>		
<p>Green Crossings</p> <p>Provides visibility and predictability for seeing bikes cross where a bike lane enters the road.</p>	<p><i>At street-to-street intersections where a bike lane enters the intersection.</i></p>	<p>\$</p>		

Treatment	Where is it most effective?	Cost	Example	
<p>“Two-can” Bike-Walk Crossings</p> <p>A roadway crossing facility that provides access for both bicyclists and pedestrians.</p>	<p><i>At the crossing of a pathway prioritized for both walking and biking</i></p>	<p>\$\$</p>		
<p>Leading Bike Interval (LBI)</p> <p>Gives bicyclists a few second head start to claim the right-of-way ahead of turning traffic at signals where bicyclists cross concurrent and parallel with through traffic.</p>	<p><i>Intersections with high bike volumes and high overall volumes, intersections with higher crash rates</i></p>	<p>\$\$\$</p>		
<p>Rectangular Rapid Flashing Beacons (RRFB)</p> <p>A pedestrian crossing sign with flashing lights to warn drivers of pedestrians who are crossing the roadway.</p>	<p><i>Placed on both sides of a crosswalk below the pedestrian crossing sign and above the arrow pointing at the crossing – reserved for locations with observed safety issues</i></p>	<p>\$\$\$</p>		

Treatment	Where is it most effective?	Cost	Example	
<p>HAWK</p> <p>Combines traditional signal expectations with pedestrian actuation, enabling either yield or full-stop crossings to occur.</p>	<p><i>To warn and control traffic at an unsignalized location to assist pedestrians in crossing a street or highway at a marked crosswalk, especially where there are significant safety issues</i></p>	<p>\$\$\$</p>		
<p>Green Treatments Approaching Intersections</p> <p>Bike Boxes and painted merging areas can help create visibility and predictability for cyclists approaching an intersection.</p>	<p><i>To warn turning cars going from a through lane to a right-turn lane or to create more visibility for bicyclists waiting at a stop light.</i></p>	<p>\$</p>		
<p>Trail-to-Street Intersection Setup Markings</p> <p>Markings that align the desired positioning for people on bike and on foot can help setup predictability.</p>	<p><i>At street crossings of pathways.</i></p>	<p>\$</p>		

Pathway and Trail Facilities

An off-street network for biking can create more direct connections with an even higher level of comfort for people biking, especially those that might be more concerned with riding in moving vehicle traffic. Pathways and trails on the campus can be built of a width with multi-use bike and pedestrian shared circulation in mind or, as width allows, separated facilities can be provided. The designs can be further reinforced by markings and striping of the trails (discussed in another section of the toolkit).

Needs

Many existing trails around the University lack connections to the core campus. To make the most of these outdoor areas and trails, and to expand the attractiveness of biking and walking, path connections are needed between conservation and recreation areas and nearby bike facilities and sidewalks.

Opportunities



Many conservation and recreation areas around the campus are within a few hundred yards of an on- or off-street bicycle facility or continuous sidewalk. Continuous connections may require new right-of-way, often on private land, but the rising popularity of biking and recreation have created enough momentum to support a collaborative and creative approach to making these “last mile” connections.

Pathways and trails treatments may include:

- Shared/Multiuse pathway:
- Separated trails (bike-priority circulation zone isolated from pedestrian-priority circulation zone)

Note: The recommended minimum width for a pathway where walking and biking share a use would be 10 feet. It is preferred that bike paths be at least 12 feet wide especially where there are higher volumes of people walking. Where it can be achieved, 14 to 16 feet wide is the preferred best practice for a shared use pathway. More cities are looking to provide separated facility trails where the 2-way biking trail would be at least 10 feet, there would be a minimum 2 foot buffer, and the sidewalk path would be at least 6 to 8 feet wide.

Table 6 Types of Paths and Trail Facilities

Treatment	Where is it effective?	Cost	Example	
<p>Multi-use Path</p> <p>Multi-use paths are trending to 14 feet or wider nationally and many systems are favoring division between faster and slower users (often people biking vs people on foot) – the markings and treatments vary from facility to facility.</p>	<p><i>Where a path is part of the designated biking network</i></p>	<p>\$</p> <p>for striping and signing</p>		
<p>Separated Trails (bike vs. pedestrian)</p> <p>Pedestrian and bicycle pathways with physical separation and designation based on the user's mode of travel.</p>	<p><i>Locations that have the width available and relatively higher-level of overall bike volume and observed or reported conflicts between users.</i></p>	<p>\$\$\$</p>		

Bike Parking

Adequate and secure bike parking is critical to promoting and supporting bicycling. Establishing clear standards for the University can help ensure that bike parking is convenient and easily used, and further considerations can involve regular maintenance programs.

The University should inventory and audit bike rack capacity and type to create a replacement plan for non-compliant racks while also expanding bike supply over time.

Needs

While new racks compliant with the latest standards have been installed on campus in recent years, many more are needed, and more spacing is often needed between racks to assure room to navigate between parked bikes to properly park. The University does not currently have bike parking guidance or requirements for new construction to assure a certain standard of type of rack, its placement, and/or its level of shelter.

Opportunities

The latest Association of Pedestrian and Bicycle Professionals (APBP) bike parking standards can be applied on campus. This guide recommends the placement of best practice racks including:

- Inverted U-racks
- Circle and post racks
- Bike corrals and covered bike parking racks
- Garage / high-capacity indoor racks

BEST PRACTICE – Chicago Bike Rack Program

To support its growing protected bike lane network, Chicago has installed bike racks throughout the city. They have a request-a-rack program and currently have 14,500 bicycle racks and 15 on-street corrals. The City also has established a formal minimum requirements guideline to ensure racks are cited in ideal locations.



On-Street Bike Corral in Chicago, IL
Credit: Chicago Complete Streets

BEST PRACTICE – Covered Racks, Portland, OR



Covered Bike Parking and Repair Station

Racks APBP recommends avoiding given design capacity and bike security issues:

- Schoolyard
- Wave
- Wheelwell
- Coathanger
- Bollard
- Spiral
- Swing arm secured

Figure 3 APBP Racks to Avoid











RACKS TO AVOID		Because of performance concerns, APBP recommends selecting other racks instead of these.
<p>WAVE also called undulating or serpentine</p> 	<p>Not intuitive or user-friendly; real-world use of this style often falls short of expectations; supports bike frame at only one location when used as intended.</p>	
<p>SCHOOLYARD also called comb, grid</p> 	<p>Does not allow locking of frame and can lead to wheel damage. Inappropriate for most public uses, but useful for temporary attended bike storage at events and in locations with no theft concerns. Sometimes preferred by recreational riders, who may travel without locks and tend to monitor their bikes while parked.</p>	
<p>COATHANGER</p> 	<p>This style has a top bar that limits the types of bikes it can accommodate.</p>	
<p>WHEELWELL</p> 	<p>Racks that cradle bicycles with only a wheelwell do not provide suitable security, pose a tripping hazard, and can lead to wheel damage.</p>	
<p>BOLLARD</p> 	<p>This style typically does not appropriately support a bike's frame at two separate locations.</p>	
<p>SPIRAL</p> 	<p>Despite possible aesthetic appeal, spiral racks have functional downsides related to access, real-world use, and the need to lift a wheel to park.</p>	
<p>SWING ARM SECURED</p> 	<p>These racks are intended to capture a bike's frame and both wheels with a pivoting arm. In practice, they accommodate only limited bike types and have moving parts that create unneeded complications.</p>	

Table 7 Types of Bike Parking



Treatment	Where is it effective?	Cost	Example
<p>Single U</p> <p>A type of bike rack in the shape of an inverted U that allows two bikes to park, one on each side</p>	<p>In the furnishing zone along a sidewalk</p>	<p>\$</p>	
<p>Circle and Post</p> <p>A type of bike rack with a circle intersected by a single post that allows two bikes to park, one on each side</p>	<p>In the furnishing zone along a sidewalk</p>	<p>\$</p>	
<p>Bike Corrals and Covered Bike Parking</p> <p>Bike parking infrastructure that allows multiple bikes to be parked in a single, designated area.</p>	<p>On-street on the curbside of where wider sidewalk areas/plazas allow.</p>	<p>\$</p>	

Treatment	Where is it effective?	Cost	Example	
<p>Garage / High-Capacity Indoor Rack</p> <p>Indoor, multi-space bike parking infrastructure that allows for high-capacity bike parking in a secured location (such as what is provided near the Bike Den in the West Deck)</p>	<p>Inside dorms or garages</p>	<p>\$\$</p>		

Facilities for Integrating Biking with Transit

Integration between transit and bike facilities, infrastructure, service, and commuters supports safe, sustainable, and effective travel, especially where there may be limited right-of-way around bus stops. The following page summarize a toolkit of treatments that can be used on streets that both carry transit and biking facilities in the same right-of-way.

Table 8 Types of Facilities for Integrating Biking with Transit

Treatment	Where is it effective?	Cost	Example
<p>Shared Bus-Bike Lane/Stop Zone</p> <p>Section of the roadway exclusively designated for shared use of buses and bicyclists. The facility is often distinguished with red fill and white markings.</p>	<p><i>At Bus Stops, Near Intersections</i></p>	<p>\$</p>	
<p>Floating Bus Stop</p> <p>A “floating” bus stop allows people going to the bus to board and safely pass over a bike lane which tucks behind the bus stop to reduce conflicts.</p>	<p><i>At high ridership bus stops, Where higher facility investment is possible</i></p>	<p>\$\$\$</p>	

Treatment	Where is it effective?	Cost	Example
<p>Bike Rack on Bus/Shuttles</p> <p>A bike rack located at the front or back of buses. This facility allows bicyclists to bring their bikes on public transit, creating multimodal access to and from destinations.</p>	<p><i>All buses and campus shuttles</i></p>	<p>\$\$</p>	

Signage

Clear signage and wayfinding clarifies where cyclists and pathway users should be and how they share, creates and reinforces a clear network and the belonging of biking, and helps create visibility promoting biking as an option. Signage can help reinforce pathway and street etiquette, it can create predictability for where you might expect to see bikes, and create and reinforce a sense of direction through the network.

The application of signage can vary based on contexts, but it can also be custom-designed to reinforce the campus brand in colors, font, and character while still following some standards in terms of what content makes most sense to guide the way. It is most important to install signage both at key decision junctions within the bike network and to apply it occasionally mid-way between those junctions to create a sense of what is to come ahead before arriving at a decision point.

Table 9 Types of Signage

Treatment	Where is it effective?	Cost	Example
<p>Bike-Walk Crossing Signage</p> <p>MUTCD warning sign that indicates people will be crossing by foot and by bike.</p>	<p><i>At path crossings of streets.</i></p>	<p>\$</p>	
<p>Multi-Use Pathway Yielding Signage</p> <p>Custom signage can reinforce etiquette of who should yield to who along shared-use / multi-use paths.</p>	<p><i>Mid-path between intersections along pathways that are part of the proposed bike network</i></p>	<p>\$</p>	

Treatment	Where is it effective?	Cost	Example
<p>Wayfinding Signage</p> <p>Signage that indicates key destinations and their biking distance gives people cycling an incentive to go by bike and how to pace their efforts. It can also reinforce where the bikeway goes where there are turns.</p>	<p><i>At intersections within the bike network</i></p>	<p>\$</p>	
<p>Bike/Pedestrian Priority and Separation Signage</p> <p>Signage can reinforce which side of a facility people walking vs biking should be on.</p>	<p><i>On pathways and in areas that separate walking from biking</i></p>	<p>\$</p>	

Stencil and Thermoplast Pavement Markings

The application of stencil and thermoplast markings in on-street biking facilities and on pathways can clearly designate where the bike network goes. They can be custom-designed to reinforce the campus brand colors and look, but should follow some precedents in the following toolkit in terms of what content is indicated. Painting with stencils can save costs but ordering thermoplast appliques can have more durability and add “crispness” to the aesthetic.

BEST PRACTICE



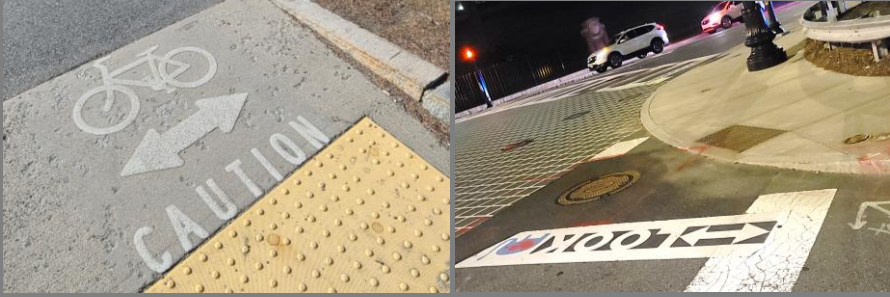
Portland, Oregon Multi-Use Pathway



Table 10 Types of Stencil and Thermoplast Markings

Treatment	Where is it effective?	Cost	Example
<p>Wayfinding Markings</p> <p>Stencil paint markings can be used as an on-the-ground indicator for where the bike network goes. The arrows tilt or point in the direction of the facilities.</p>	<p><i>In/near intersections</i></p>	<p>\$</p>	

Treatment	Where is it effective?	Cost	Example
<p>Green Paint on Bike Lanes and Sharrows</p> <p>Green paint or thermoplast fills create clarity in bike lanes about where vehicle circulation and access is vs where circulation has been designed for bikes.</p>	<p><i>The entire length of an in-street facility or just at intersections and in crossings on in-street facilities</i></p>	<p>\$</p>	
<p>Branding of Bike Lane Symbols</p> <p>Some striping departments have added local branding elements to bike lane stencils to reinforce a sense of place and add an element of fun to invite ridership.</p>	<p><i>Along the key bike network in bike lanes – but could be thought about on pathways as well.</i></p>	<p>\$</p>	

Treatment	Where is it effective?	Cost	Example
<p>Path Sharing Markings</p> <p>Thermoplast treatments can reinforce whether paths are shared or not and who has the right-of-way</p>	<p><i>On shared-use pathways</i></p>	<p>\$</p>	
<p>Multi-Use Path Orientation Marking</p> <p>Marking can indicate who should circulate where, such as bikes ride in the center of the trail vs who should navigate at the edges (as pictured at right).</p>	<p><i>On shared-use pathways</i></p>	<p>\$</p>	
<p>Crossing Caution Markings</p> <p>Custom stencil decals or appliques can encourage people looking down at the ground to look up and watch for faster-moving users at junctures.</p>	<p><i>At junctures between crosswalks and bike lanes or at trail intersections.</i></p>	<p>\$</p>	

4 NETWORK PLAN AND IMPLEMENTATION

KEY ISSUES TO RESOLVE THROUGH THE PLAN

Key findings from the outreach and engagement feedback analysis include the following:

- **There is a strong need for more bicycle facilities and infrastructure**, including on-street dedicated bike lanes, off-street pathways and trails, and bicycle parking. This was the most frequent topic noted on comments received during the engagement station activity (66 comments). It was also widely recognized as a main issue based on the results of the survey as well as the concluding open-ended comment section, where 90 respondents commented a desire for increased bicycle infrastructure. When asked the question, *How would the following influence your likelihood of bicycling to/from or around Campus?*, 63% responded that separated facilities, such as protected bike lanes, off-street pathways, and trails would make them much more likely to bike, and 77% responded that enhanced on-street facilities would make them somewhat or much more likely to bike). In another question, 72% of respondents said that more bicycling infrastructure was the highest priority factor for needed improvements to bicycling on campus. Most respondents (72%) also said more secure/covered bike parking options would increase their likelihood of biking. Physical space to park bicycles is currently limited on campus, often taken up by Spin bikes or abandoned bicycles. More covered and secure bicycle parking is especially important to reduce the risk of stolen bikes and allow for a more comfortable biking experience.

While it is evident that there is a desire to have more bicycle facilities campus-wide, results from the feedback show that there is a heightened need on roadways within the core campus, including Curtin Road, Pollock Road, Shortlidge Road, and Burrowes Road. Respondents also shared the need for better infrastructure on high-traffic roadways surrounding the perimeter of University Park, including College Avenue and Park Avenue that are under PennDOT's authority.

“I love the idea of biking on campus, but with no bike lanes and not even any marked shoulders on campus roads, I'm surprised that it is encouraged without a change in road infrastructure. I'd love to ride a bike to the office if there were separate or at least designated bike lanes that didn't conflict with campus roads that vehicles are driving on.”

- **Bicycle safety is a perceived problem at University Park, but not just for people riding bicycles.** This issue was frequently cited during the engagement pop ups (55 comments), the bike audits, on the Wikimaps, and throughout the survey. When asked if survey respondents have ever been involved in a bicycle collision or close call while biking at University Park, 65% reported yes. Safety was also the top concern of respondents when asked about what factors prevent them from biking more regularly around campus. There is a wide range of potential safety issues prevalent on campus that are not only experienced by bicyclists, but by those using other modes of transportation such as drivers of cars and buses, and pedestrians. In addition to general safety comments, twenty-four comments received during the engagement sessions were specifically related to this issue. 72% of survey respondents agree or strongly agree that there are conflicts where people both walk and bike on campus, and 58% disagree or strongly disagree that people riding bicycles follow the rules of the road and respect motorists on

campus. In another survey question asking what factors would influence their likelihood to ride a bicycle, 73% of respondents said less conflicts with automobiles and lower vehicle speeds and 75% said less conflicts with other people bicycling or walking. There were many comments that noted there should be more enforcement for bicyclists who do not follow the rules of the road.

“Way too often, I see near-collisions with either motorists or pedestrians. Bicyclists who do not follow the rules (and there are many) are a danger to those around them.”

- **The Spin program has challenges, and should be improved to meet needs and expectations of all campus travelers.** Feedback from the outreach and engagement activities included numerous comments about challenges that Spin users have experienced, in addition to concerns that non-Spin users expressed. Riders that frequently use Spin have issues with broken or faulty bikes, lack of designated Spin parking areas and dismount zones, and general confusion about how the Spin bikes work and where the appropriate zones are located where they can be ridden and parked. Other comments noted that the program is costly, and although it is already heavily subsidized, the University should consider further subsidizing the program for students.

On the other hand, respondents that do not use the Spin program also expressed concerns, primarily when interacting with pedestrians or regular bicyclists. The top reported issues included comments that Spin bikes take up too much of the bike racks and block other bike parking spaces, and that Spin users ride too fast on the pathway causing many close calls with pedestrians.

“Free bikeshare in general would make me want to bike more. I just don't bike because it costs money to use the Spin bikes, and bringing my own bike would cause me to worry about taking care of it around campus.”

- **Campus travelers would like to see better bicycle connections and bike-friendly areas to, from, and within campus.** The engagement workshops garnered 17 comments related to lack of connections to existing trails, bike facilities, and destinations, and 15 comments expressing a desire for more clarity on where biking is allowed in general. As stated in several comments, safe and convenient connections and direct routes are critical to encourage bicycling among riders of all levels of proficiency.

“Having the core of campus off limits to biking hurts a lot of folks from being able to comfortably bike to campus. Lots of people work in the buildings there, and ironically there are bike racks at many of the buildings in the blocked off area. It would really help a lot of folks to bike to campus if that central area had adequate paths available and was opened up for biking.”

- **Campus travelers want more education, training, and culture around biking.** When asked about awareness of the Bike Den and training programs, 44% of participants from both the survey and workshops collectively said they did not know about the program. Similarly, 35% of participants said they did not know about the bicycle repair stations, 21% of which would use the stations had they known.
- Engagement participants observed safety concerns, especially those between bicyclists and other transportation modes, would improve if there were more educational resources about biking or required training for bicyclists riding on campus.

BUILDING RECOMMENDATIONS FOR IMPLEMENTATION

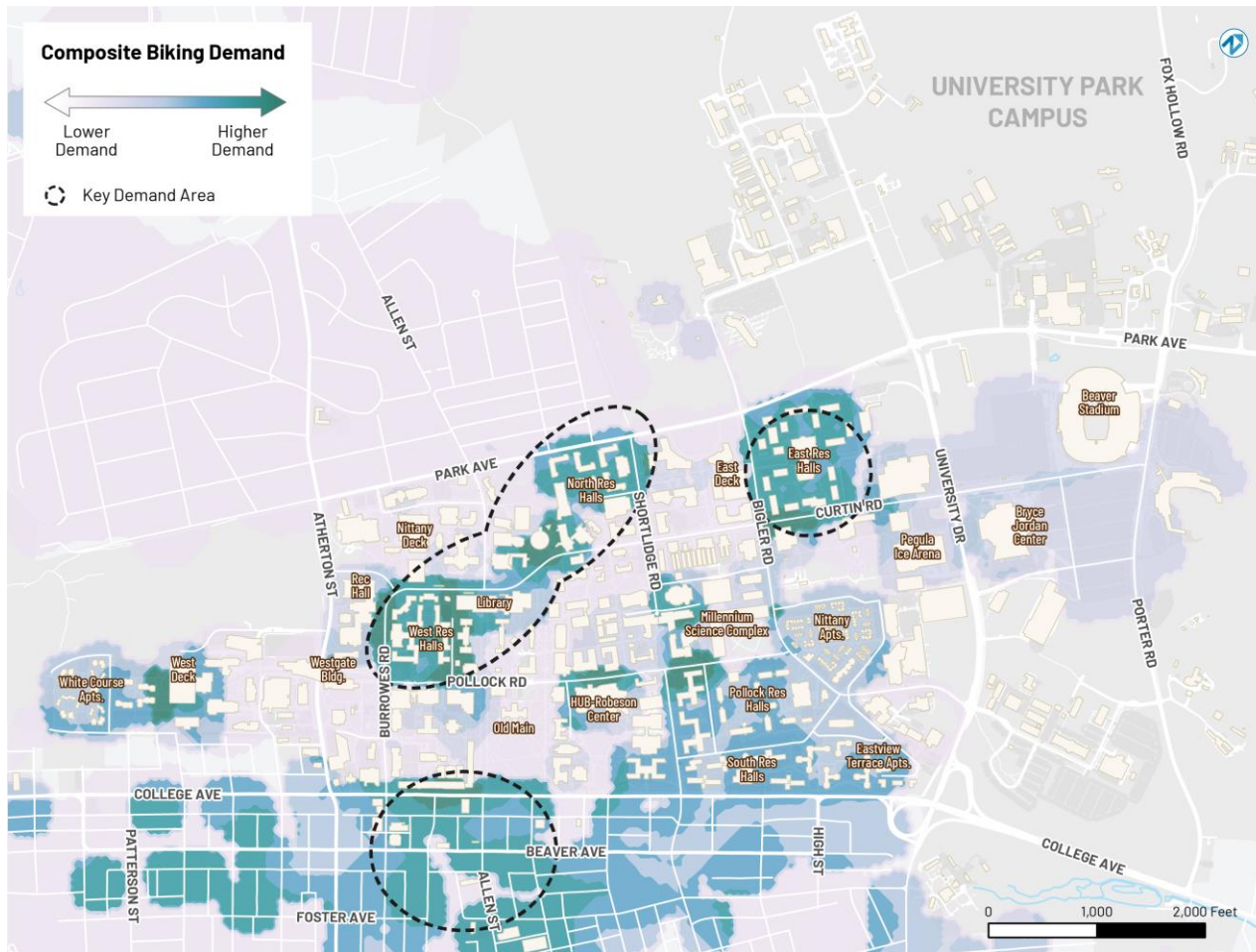
The pages that follow summarize strategies and projects recommended by the plan. The process for designing the network came from a process based in conditions analysis, ascertaining needs and desires from campus engagement, and understanding key nodes of demand that drive biking activity. The resulting network plan recommends facilities that include:

- Gap closure segments;
- Gaps where there is higher walking and biking demand;
- Improvements to existing facilities to create low stress user experiences;
- Intersection upgrades to increase biking comfort; and
- Areas in need of supportive amenities such as more bike racks, shade, corrals, signage, benches, and commuter facilities.

The project includes supporting programmatic and operational strategies, as well as built network strategies. The bike master plan steering committee and the project's core committee voted to prioritize each of the strategy themes in terms of their relative importance for the plan. That resulted in the following relative ranking in level of priority:

1. Infrastructure / Built Network Strategies
2. Communications and Wayfinding Strategies
3. Bike Education and Promotional Strategies
4. Data Collection and Reporting on Biking Activity and Planning Progress
5. Biking-Supportive Programs
6. Bike Planning Staffing and Operations Strategies

Figure 4 Areas of Higher Biking Demand



Bike Network Creation

The creation of the bike network includes a variety of proposed bike pathway and street enhancements intended to support bicyclists on campus. Elements of the proposed projects within the bike network include short-term strategies such as signage and pavement markings, as well as long-term strategies such as rebuilding the curb and widening the right-of-way.

Each of the Keystone Projects described below provide an overview of the project, the existing condition of the project site, and the potential outcomes of the intervention.

The Keystone Projects discussed below include the following:

- College-Park Connector
- Bike Lanes on Burrowes
- Pollock Striping and Gateway Enhancements
- Westgate Connector
- Curtin Pathway
- Academic-Athletic Connector
- Bike Lanes on Shortlidge and Gateway Enhancements
- Residential Connector
- College Ave – Collaborative Rebuild
- University Drive Upgrades

Figure 5 Bike Master Plan: Full Network Vision

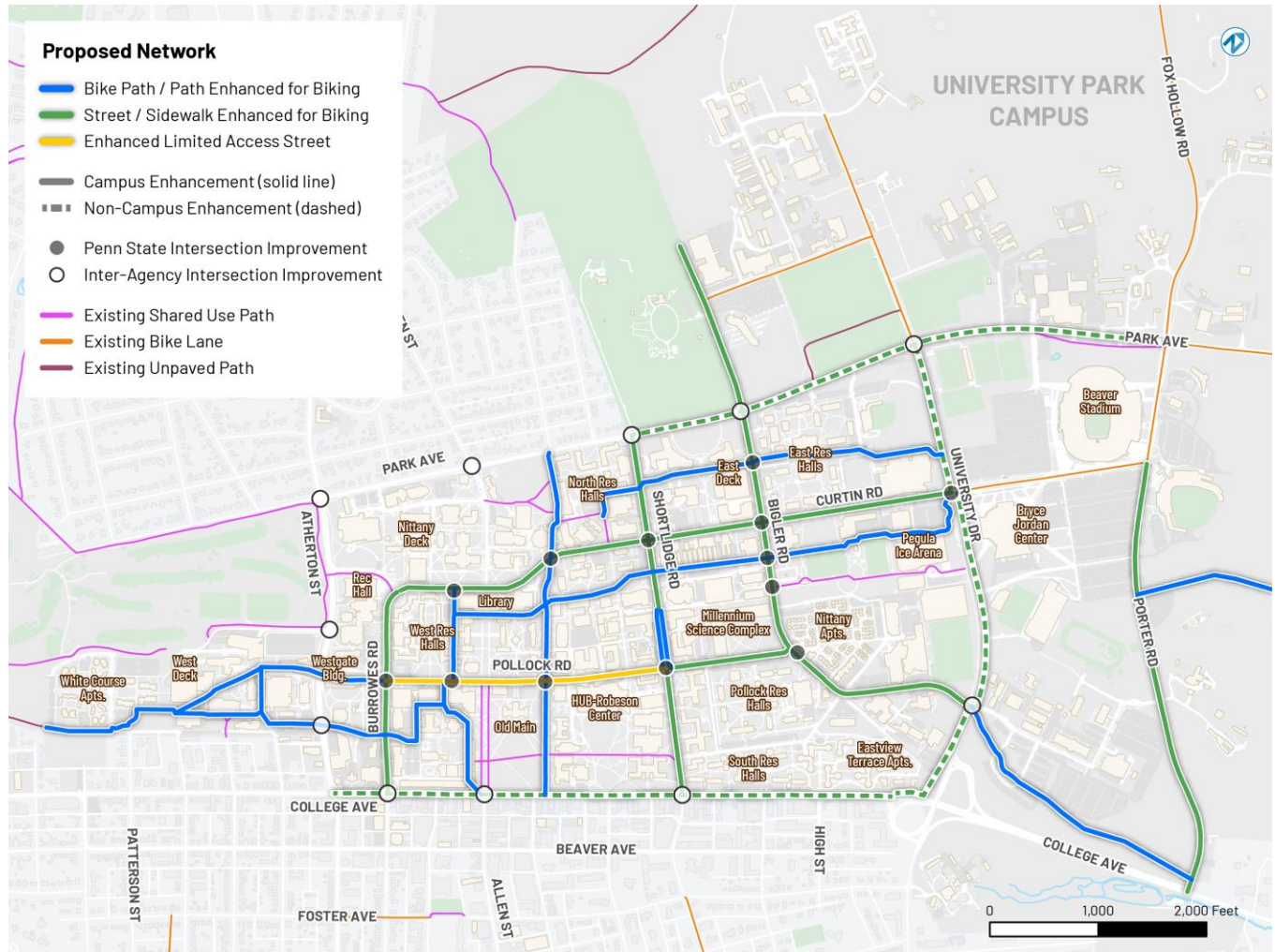
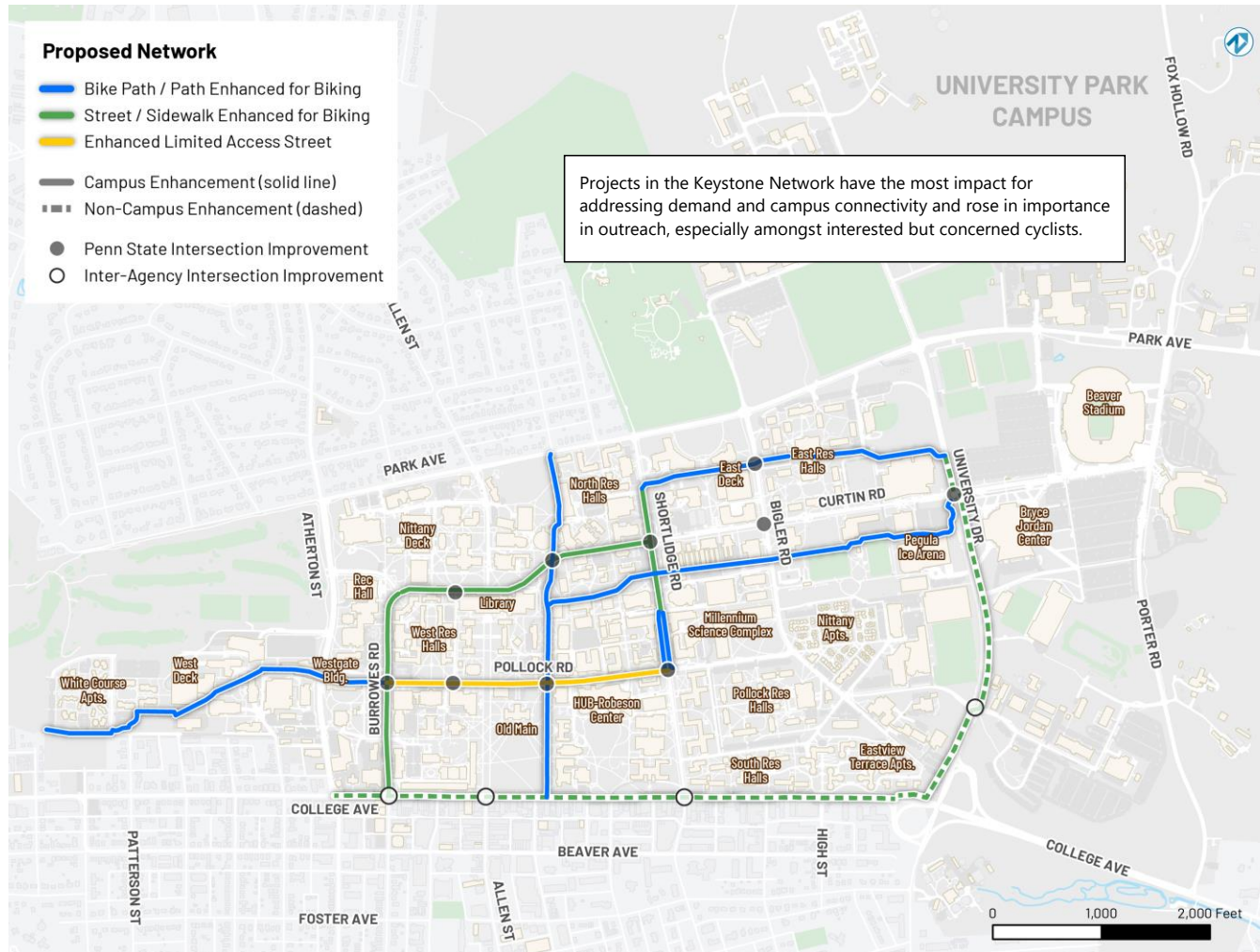
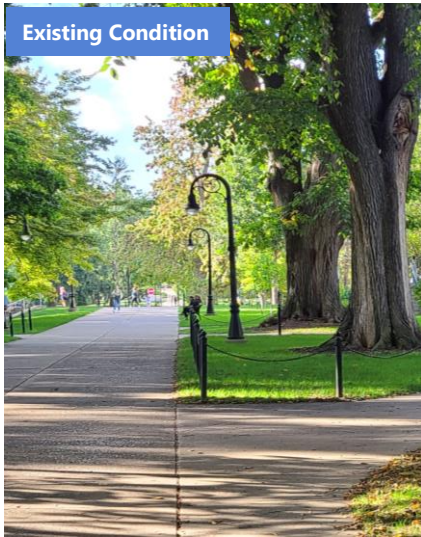






Figure 6 Proposed Keystone Projects



College Park Connector

The College-Park Connector would run across the core campus from College Avenue to Park Avenue, following an existing concrete pathway. This pathway would be a shared-use one that would become the encouraged bike route over using the Allen Street mall. This connector would enhance connections to and from downtown where there is very high bike and pedestrian demand for trip linkages. It would also connect to the existing enhanced multimodal crossing of Park Avenue near McKee Street.

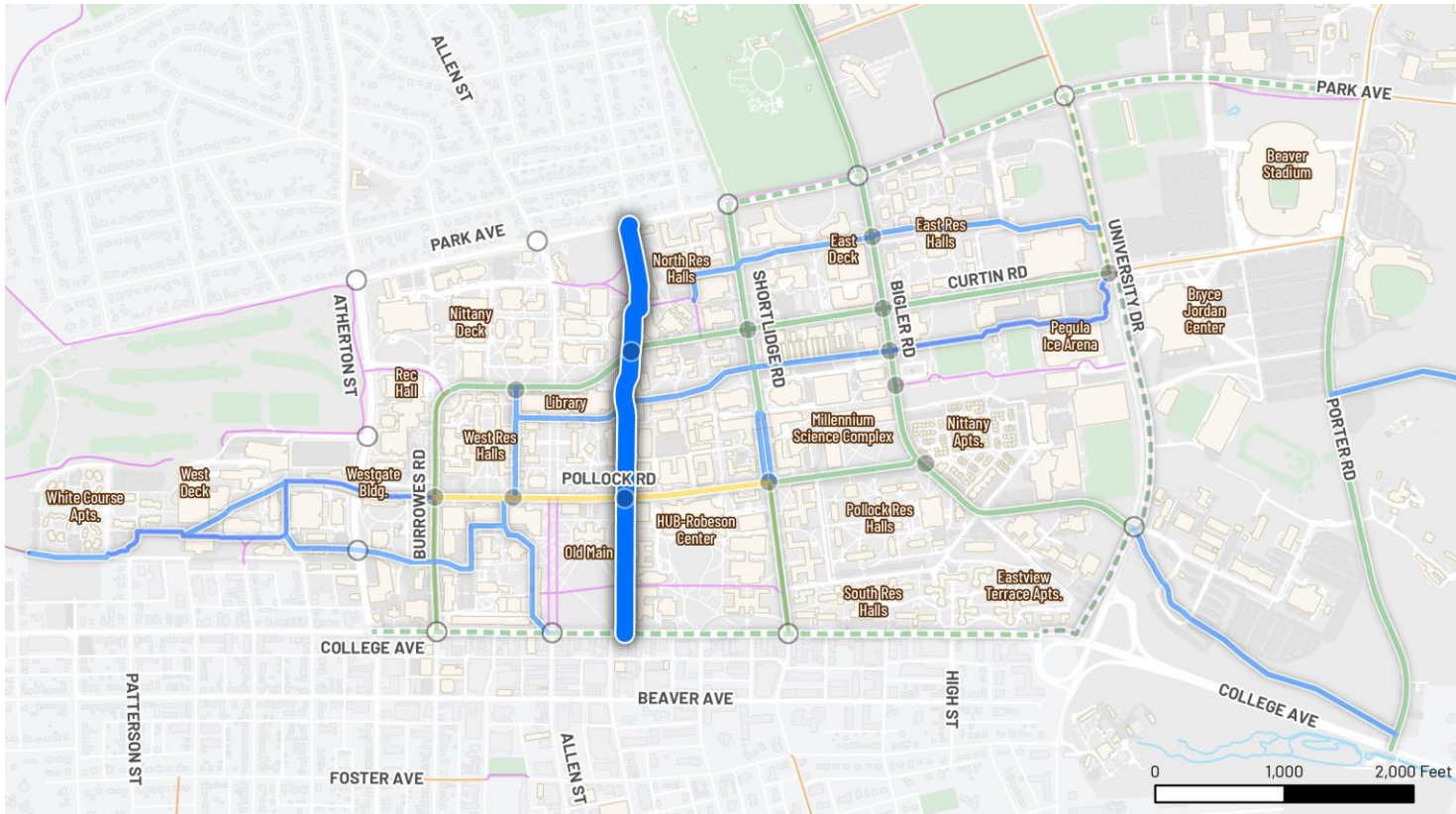


Relative Level of Cost	Level of Impact for Attracting Biking	Implementation Difficulty	Intermodal Design Considerations	Candidate for Near-Term Implementation
 Medium	 High	 High	Ped-Bike Sharing on Pathway, Vehicle-Bike Yielding at Crossings	

Project Elements	Decals and/or signage to: <ul style="list-style-type: none"> - ID as part of Network - Encourage Pathway-Sharing - Support wayfinding - Potential pathway-widening
Early Actions	Designate in the network, sign and mark the pathway. Remove ped only sign areas and bicycle detour signage, paint crossing of Curtin.
Long-term Improvements	Enhance crossings, widen pathway anywhere where under 12 feet and widen to 14 feet where possible. Plan for a more direct route for biking through the Palmer Museum of Art area when rebuilt.
Benefits of the Facility	<ul style="list-style-type: none"> ▪ Axis connecting downtown and adjacent neighborhoods to center of campus.
Alignment with Master Plan Projects	2. Oswald Tower demolition & landscape restoration 3. East Library accessible parking & loading improvements
<i>See Figure 20</i>	

Commented [AF3]: [@Kevin Ottrem](#) formatting goofed as I had to crop out the sign the client didn't want in view here - can you help get this straight again?

Figure 7 Keystone Project – College-Park Connector



Bike Lanes on Burrowes Road

Burrowes Road currently has a white stripe on the northeast curb to indicate a bike lane in the uphill climbing direction. Because the bike lane does not have bike stencils, many cyclists will ride in the wrong direction in the climbing lane, creating potential hazards for cyclists, pedestrians, and vehicles, especially at intersections. The curb-to-curb width is wide enough to stripe bike lanes on each of the curbs if the travelway is narrowed. In the longer-term, raising the bike lanes can provide further protection, comfort, and safety.

Relative Level of Cost	Level of Impact for Attracting Biking	Implementation Difficulty	Intermodal Design Considerations	Candidate for Near-Term Implementation
● Medium	● Medium	● Medium	Vehicles Driving in or Loading /Idling in the Bike Lane	✓

Project Elements Bike stencils and/or green bike lane treatments in both directions with potential to further enhance facilities over time

Early Actions Stripe and paint bike lanes on both curbs – consider green paint fill

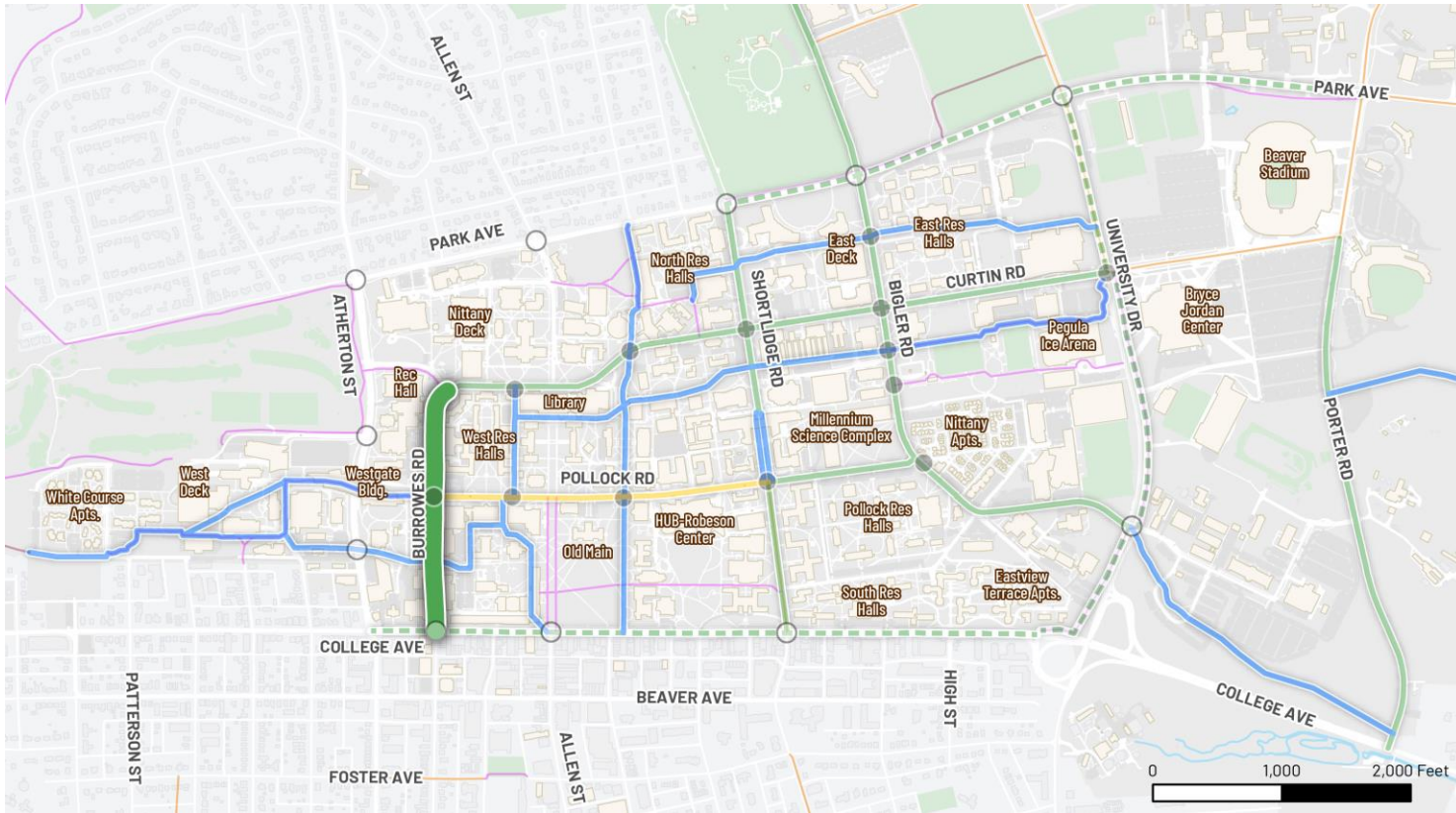
Long-term Improvements Consider raising bike lanes above street level and/or adding buffers. Coordinate intersection improvements at Pollock

- Benefits of the Facility**
- Clarity of facility
 - Serves a link of high demand for cycling
 - Safety
 - Connection for demand between downtown and near library

Alignment with Master Plan Projects 12. Align with future campus planning
See Figure 20



Figure 8 Keystone Project – Bike Lanes on Burrowes Road



Pollock Road Striping and Gateway Enhancements

Pollock is a key link with high biking demand that connects West Campus to the core and students that flow into campus from residence halls to the east. The intersection with Burrowes does not have a clear way for bikes to enter in and out of Pollock – rebuilding the curb ramps and striping cross-bike markings can help enhance the western entry. At the Shortlidge intersection, a parking hut invites cars to consider entering an area that has been prioritized for non-vehicular travel, which leads to confusion and increases the chance of potential safety conflicts for the most vulnerable roadway users. A current effort to enhance a gateway near Old Main has proposed striping a 2-way bikeway along a curb of Pollock, which this plan supports and recommends striping along the north curb which has the higher position in the cross-slope of the roadway.



Penn State Transportation Services





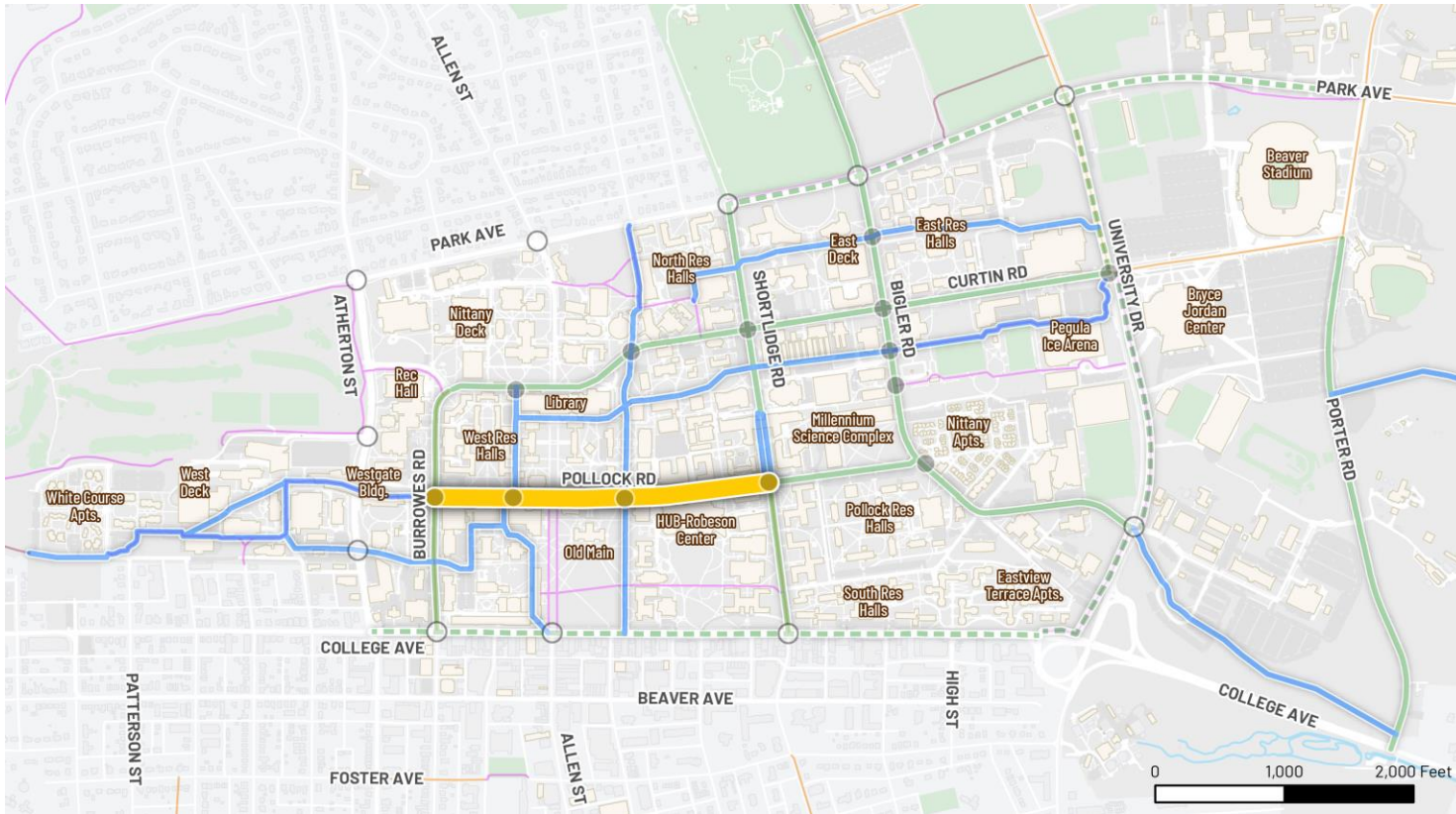




Relative Level of Cost	Level of Impact for Attracting Biking	Implementation Difficulty	Intermodal Design Considerations	Candidate for Near-Term Implementation
 Medium	 Medium	 Medium	Bike-Pedestrian Conflicts and Conflicts with Loading Vehicles	
Project Elements		<ul style="list-style-type: none"> Striping two-way bikeway to clarify usage Redesign intersection of Burrowes for bike crossings and curb cuts aligned with biking desire line Remove gatehouse near Shortlidge and redesign that gateway to clarify this is a limited access area prioritized for people walking and biking 		
Early Actions		Stripe 2-way bikeway on the north curb At each intersection, add stencils or stripe markings to indicate Pollock being a limited access area for vehicles		
Long-term Improvements		Rebuild the intersections of Burrowes and Pollock (to create a more direction connection with cross-bikes to get to/from Westgate) and Shortlidge and Pollock (removing the gatehouse and creating a clear gateway that reinforces this as a limited-access way for vehicles), consider filling the two-way bikeway with a thermoplast with bike stencils		
Benefits of the Facility		<ul style="list-style-type: none"> Increased safety and clarity, Key demand area 		
Alignment with Master Plan Projects		Not applicable		

Figure 9 Keystone Project – Pollock Road Striping and Gateway Enhancements



Westgate Connector

As the West Campus grows, many people would like to bike to and from this area using the safe crossing option provided by the design of the Westgate Building which overpasses Atherton Street. Currently stencils encourage people to walk their bike through the building overpass even though the throughway is wider than almost any pathway on campus. This plan recommends officially inviting through-biking travel by striping a bikeway along the eastern edge of the building and then signing the pathways that come out of the building for wayfinding down to the trail network at the end of West Campus Drive.

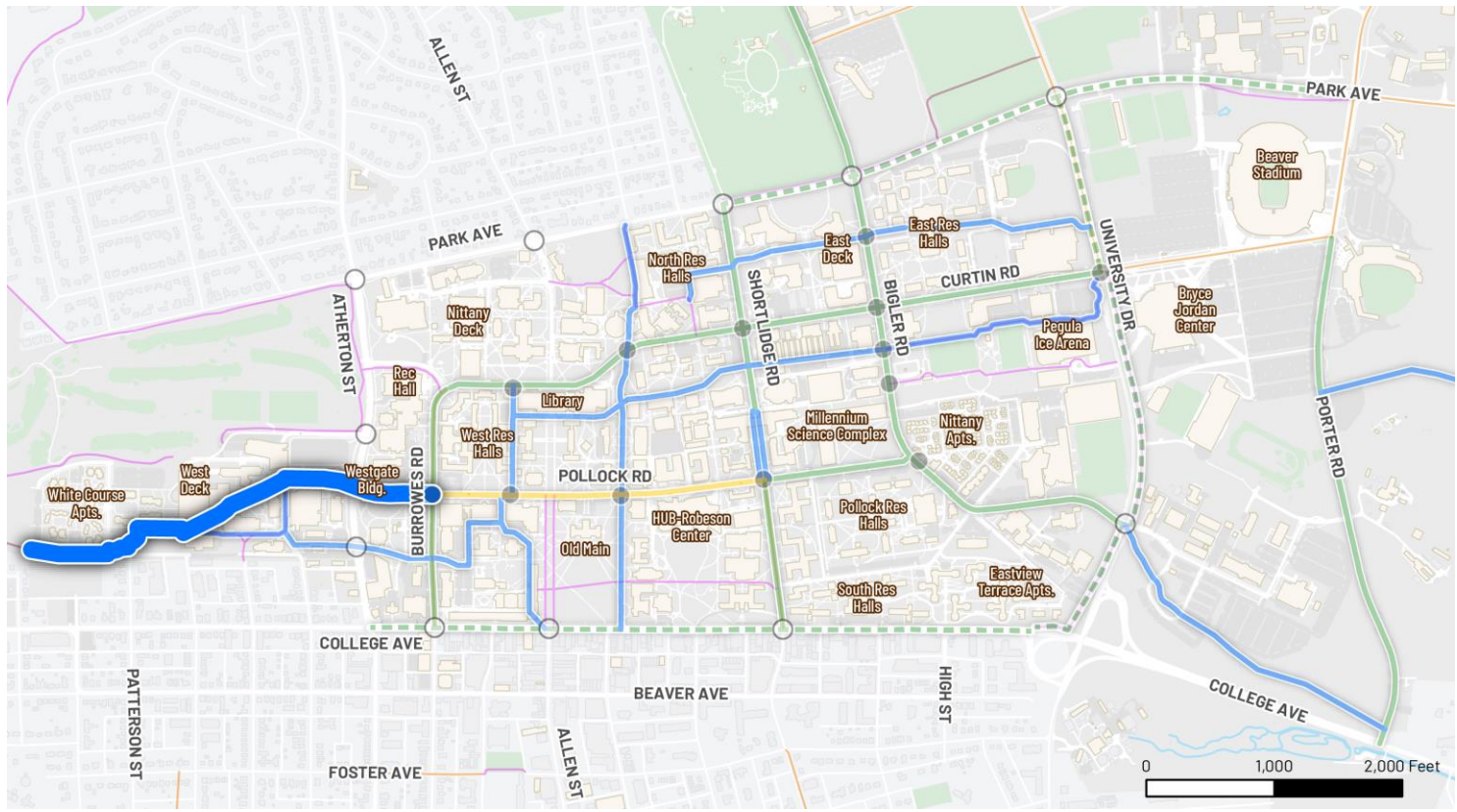
Relative Level of Cost	Level of Impact for Attracting Biking	Implementation Difficulty	Intermodal Design Considerations	Candidate for Near-Term Implementation
 Medium	 Medium	 Medium	Ped-Bike Sharing through West-Gate and along Pathways	

Project Elements	Stripe two-way bikeway along south side of Westgate path through-way, Sign and mark pathways for biking navigation, enhancing wayfinding and way to bike at intersections and crossings
Early Actions	Stripe a 2-way bikeway through the Westgate Building (on the side opposite the eatery) Designate pathways as in the network, sign and mark pathways for shared use
Long-term Improvements	Examine opportunities for pathway widenings and intersection enhancements
Benefits of the Facility	<ul style="list-style-type: none"> ▪ Clarifies connection to and through west campus ▪ Connects to off-campus pathways
Alignment with Master Plan Projects	Not applicable (Current project nearing completion)

Existing Condition






Figure 10 Keystone Project – Westgate Connector



Curtin Pathway

Curtin Road has a high share of people walking, biking, and taking transit going to and from residence halls, the library, and the campus core. With no clear space for people to bike, people are often riding amid transit vehicles that regularly need to pull to and from the curb for boarding. This plan recommends that, in the interim, the concrete pathway along the north curb is formalized as a multi-use pathway. In the long-term, this edge should be redeveloped to provide a separated bikeway from a path for walking. Where pathways in the bike network cross this corridor, the curb ramps and crosswalks should be enhanced to include green cross-bike markings.

Relative Level of Cost	Level of Impact for Attracting Biking	Implementation Difficulty	Intermodal Design Considerations	Candidate for Near-Term Implementation
 High	 Medium	 Medium	Bike-Ped-Transit Circulation – Very Active, Crossings for Bike-Ped	

Project Elements Widen pathway along north curb and stripe/sign to indicate as a multi-use pathway

Early Actions Stripe crossings for biking, sign and mark the concrete along the north curb as a shared use pathway

Long-term Improvements Widen and enhance pathway

Benefits of the Facility

- Key high demand connection, allows clearer delineation between transit and moving vehicles and people biking

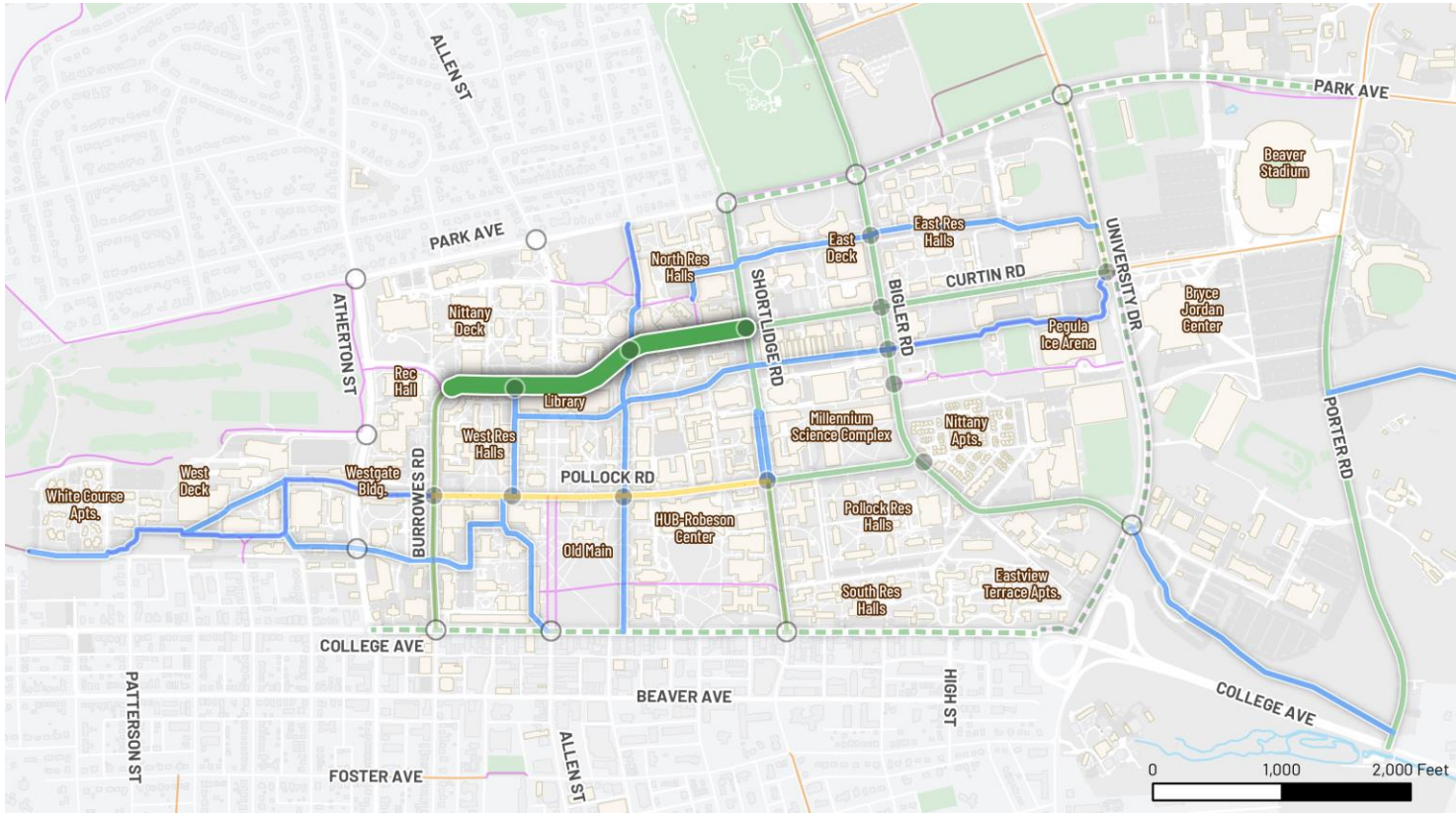
Alignment with Master Plan Projects 4. Long-term potential building site
See Figure 20

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Existing Condition



Figure 11 Keystone Project – Curtin Pathway



Academic-Athletic Connector

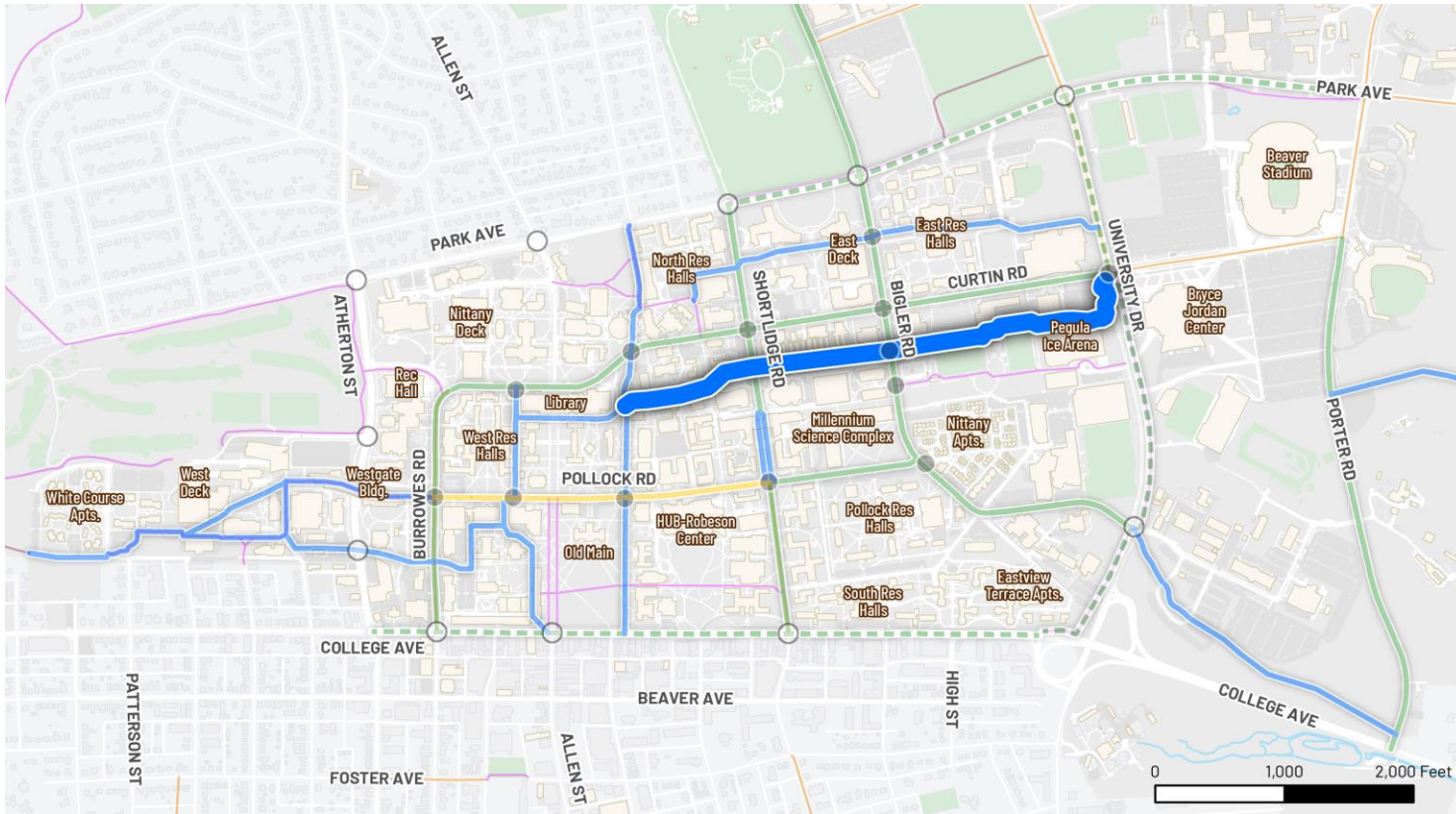
The existing pathway alignment between the library and the athletic campus has ample width to be enhanced to accommodate shared use of walking and biking to invite connections between these higher cycling demand zones of campus. This route runs parallel to Curtin Road offering a lower-stress segment for biking between academic hubs and residential, gym, and sports hubs. The pathways east of Bigler Road can also be enhanced over time, as separated bike-ped pathways in segments as each master plan building in that area gets developed.



Relative Level of Cost	Level of Impact for Attracting Biking	Implementation Difficulty	Intermodal Design Considerations	Candidate for Near-Term Implementation
● Medium	● Medium	● Medium	Bike-Ped Sharing in Short-Term, Separating Bike-Ped in Long-Term, Vehicle conflicts at crossings	

Project Elements	Sign and stripe pathway, widen and separate biking vs walking where possible
Early Actions	Designate as part of biking network, sign and stripe pathways, stripe crossings
Long-term Improvements	Widen pathway as projects develop and created bike-walk separated pathways where possible (ideally 16 feet if shared and 8 foot sidewalk, 10 foot bikeway, 2 foot buffer if separated)
Benefits of the Facility	<ul style="list-style-type: none"> Delivers key demand connection, ample room for feasibly enhancing pathways
Alignment with Master Plan Projects <i>See Figure 20</i>	<ol style="list-style-type: none"> Greenhouse replacement project Long-term potential building replacement site Natorium replacement/improvement site Long-term potential building replacement site Tennis facility site

Figure 12 Keystone Project – Academic-Athletic Connector



Bike Lanes on Shortlidge Road and Gateway Enhancements

The Shortlidge Mall has adequate room for multi-use but the curb cuts and crosswalks at either end need to be retrofit for being wide enough for people biking to use them and for them to align with cross-bike markings which should be provided on both sides of the Pollock Road intersection. At Science Drive, the curb should be modified to be mountable by bicycles – this will serve a connection to use the Mall more easily in the interim. Bike lanes should be striped on each curb north of Science Drive in the interim. In the long-term, those two lanes could be consolidated into a raised two-way bikeway could be built along the north curb (when a future building is added on that side of the street (as proposed in the Master Plan)).

Relative Level of Cost	Level of Impact for Attracting Biking	Implementation Difficulty	Intermodal Design Considerations	Candidate for Near-Term Implementation
● Medium	● Medium	● Medium	Bike-Ped Sharing along Pathways, Clarifying Bike-Ped Crossings at Intersections, Resolving Vehicle Conflicts at Intersections	

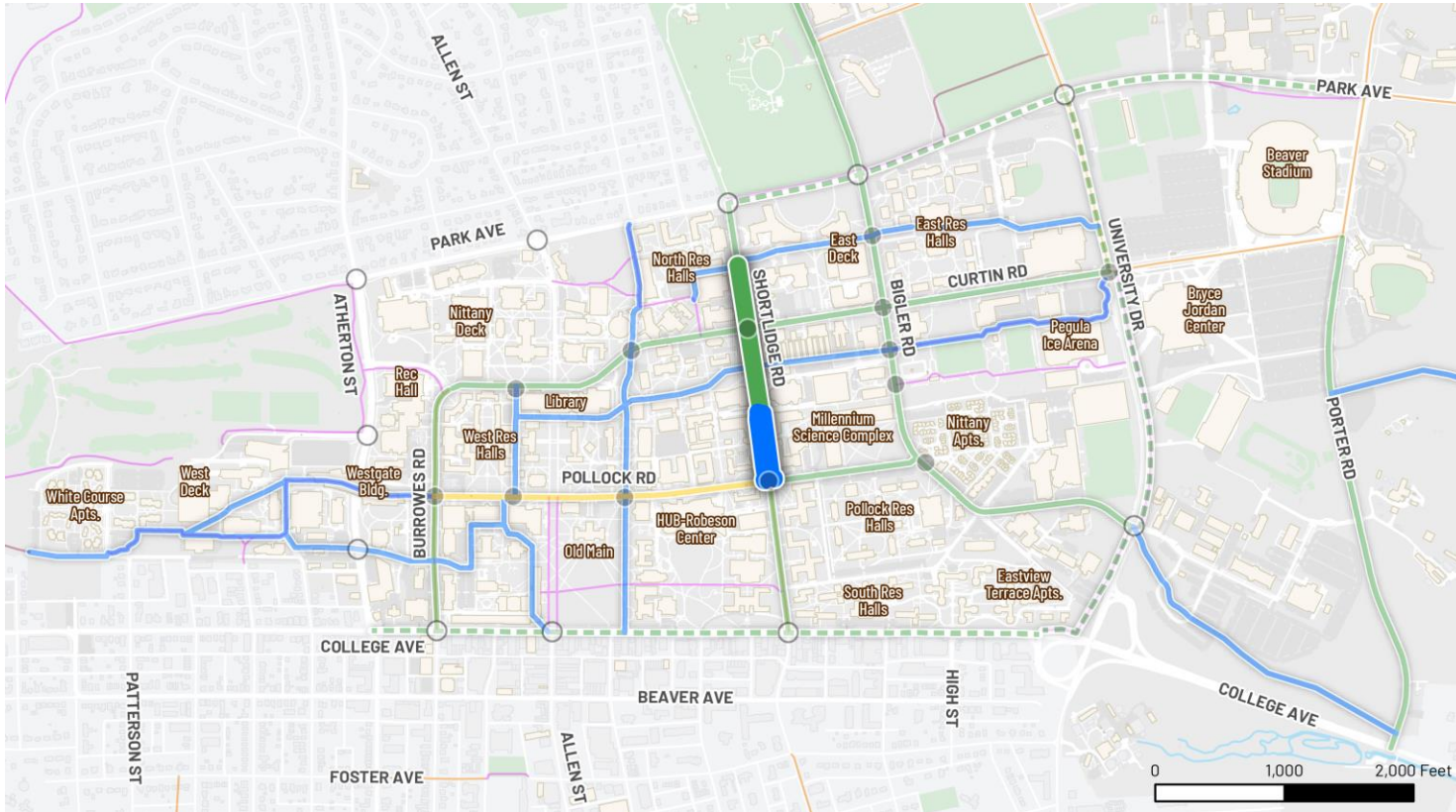


Penn State Transportation Services

Project Elements	Bike lanes, enhanced curb cuts and markings near mall
Early Actions	Paint bike lanes on each curb on Shortlidge (north of the Mall), Install wayfinding signs at intersections and install signs on the mall encouraging slower riding and people biking yielding to people walking
Long-term Improvements	Rebuild Shortlidge north of Science Drive to create raised two-way bike lanes along north curb, Rebuild curbs and enhance crossings at intersections on either end of the Mall for bike-walk crossings, Build or stripe symmetrical bike lanes, one in each direction on the Mall tucked against the tree allee in the center
Benefits of the Facility	<ul style="list-style-type: none"> Gap closure, clarifying navigation of the Mall
Alignment with Master Plan Projects	4. Long-term potential building site
<i>See Figure 20</i>	




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Figure 13 Keystone Project – Bike Lanes on Shortlidge Road and Gateway Enhancements



Residential Connector

Many students travel between the North Residence and East Residence Halls and the Intramural Building. Indicating a pathway as a Residential Connector through path stencil markings and signage will help designate a preferred biking connection through this high-demand segment. Each intersection along these pathways should be enhanced for bike crossings.

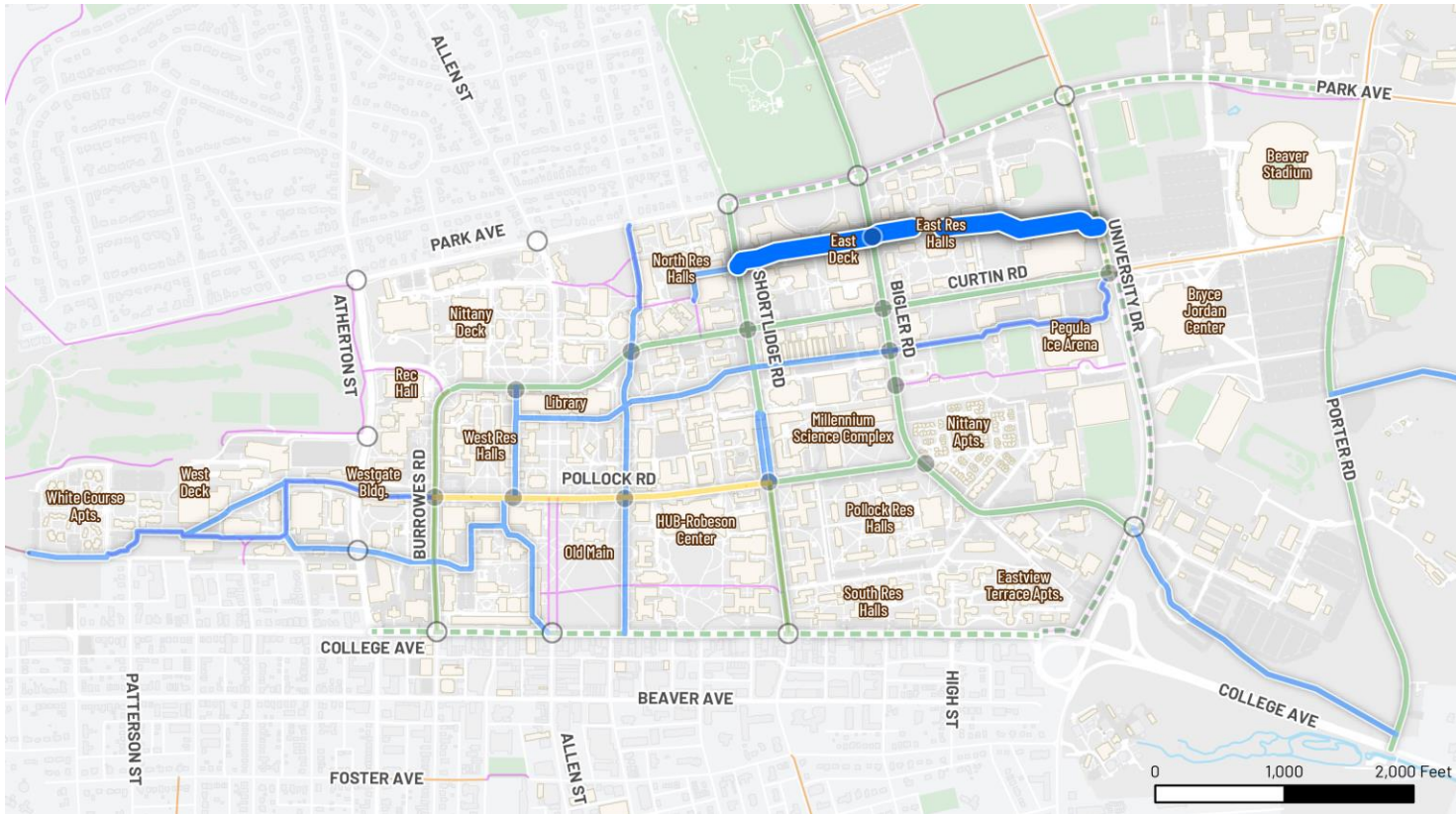
Relative Level of Cost	Level of Impact for Attracting Biking	Implementation Difficulty	Intermodal Design Considerations	Candidate for Near-Term Implementation
 Medium	 Medium	 Medium	Bike-Ped Sharing on Pathways	

Project Elements	Signing and striping pathway, enhancing crossings, trail width and alignment tweaks where narrow or indirect
Early Actions	Sign and stripe pathway, paint crossings
Long-term Improvements	Widen pathways less than 12 feet
Benefits of the Facility	<ul style="list-style-type: none"> ▪ Demand connector between student residences and hubs of activity
Alignment with Master Plan Projects	Not Applicable

Existing Condition

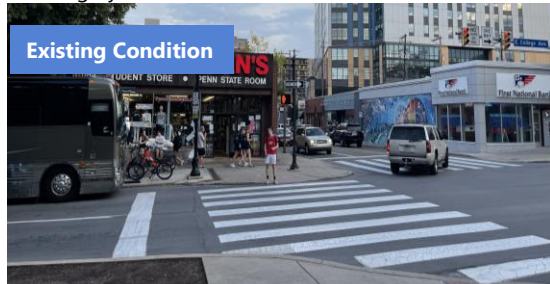


Figure 14 Keystone Project – Residential Connector



College Avenue-Collaborative Rebuild

The College Avenue right-of-way has a wiggling line of ownership split between the University, PennDOT, private property, and the Borough. A survey of the latest conditions and utilities should be done to inform a corridor re-visioning process in collaboration with the Borough. This corridor is important for access as a “main street” between downtown and campus. It is also a critical link between off-campus student housing and campus. There is currently not a clear pathway to navigate this corridor by bicycle. Bicyclists ride the pathway along the campus edge but there are multiple pinch points. Having a dedicated two-way facility and/or expanded multi-use pathway along this edge would go far in decreasing the stress and risks of navigating this corridor by bicycle. However, this would likely have some tradeoffs with on-street parking, vehicular travel, and/or room for landscape features. Further, almost every intersection along this corridor could use an enhancement in both ramps and crosswalks to allow better navigation to campus by bicycle. At high-activity intersections like Allen Street, a protected intersection design should be explored, providing a clearer waiting area for those crossing by bike.



Penn State Transportation Services

Relative Level of Cost	Level of Impact for Attracting Biking	Implementation Difficulty	Intermodal Design Considerations	Candidate for Near-Term Implementation
● Medium	● Medium	● Medium	Transit-Bike-Parking-Walkway-Vehicle-Circulation Tradeoffs	

Project Elements

Collaboration with Borough and PennDOT, major infrastructure to rebuild slopes/curb on campus side of street, 2-way bikeway and access points along this edge, bike-walk crossings and lights, enhanced access ramps

Early Actions

Sit in with Borough meetings to collaborate on design and process

Long-term Improvements

Rebuild campus edge in collaboration with PennDOT and Borough

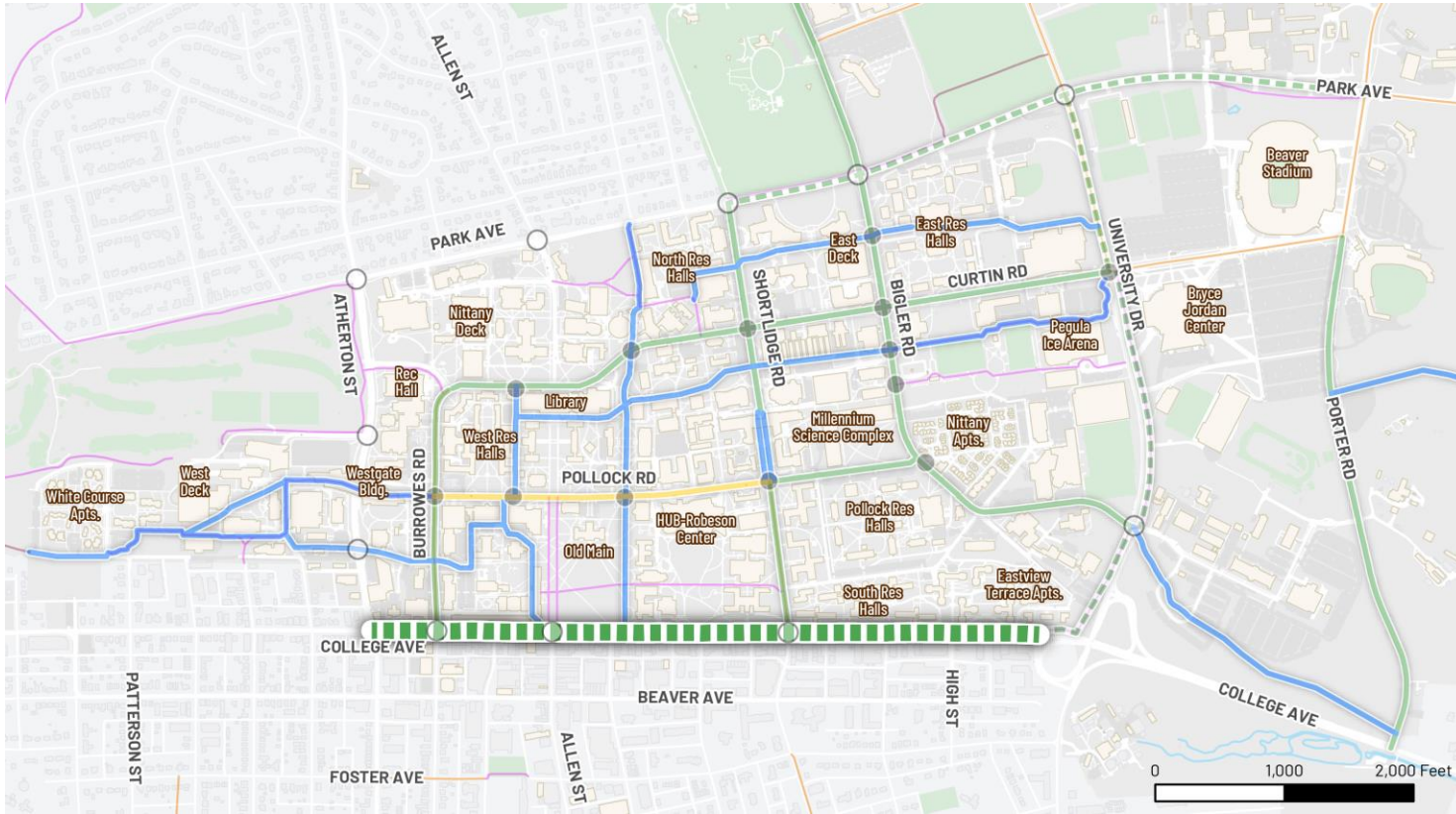
Benefits of the Facility

- Enhances seam with locus of town activity, enhances access to off-campus housing

Alignment with Master Plan Projects
See Figure 20

- 10. Allen St Gates & College Ave intersection upgrade

Figure 15 Keystone Project – College Avenue-Collaborative Rebuild



University Drive Upgrades

University Drive currently has a separated bikeway and sidewalk along its northern edge. Signage and markings can help clarify and reinforce the bike friendliness of this corridor. Each unsignalized crossing should also have marked bike crossings and bicycles should have the right-of-way. The University should participate in meetings with PennDOT, College Township, and the Borough to help realize these enhancements and to think through opportunities to rebuild the intersection at Hastings. This location could warrant a protected bike intersection design to allow safer crossings for those going from the north side of the street to where the bike trail transitions to the south side.

Existing Condition

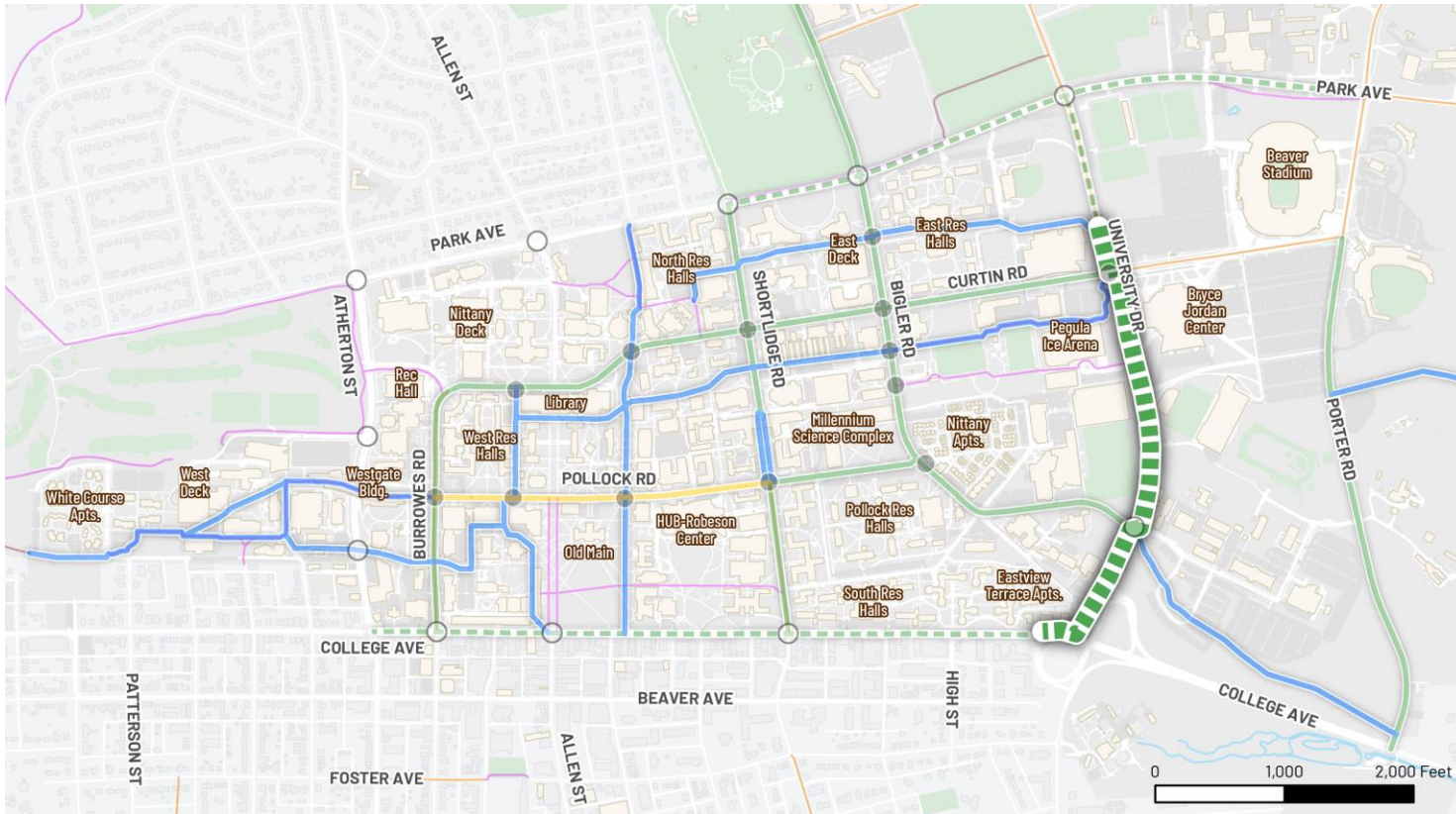


Penn State Transportation Services

Relative Level of Cost	Level of Impact for Attracting Biking	Implementation Difficulty	Intermodal Design Considerations	Candidate for Near-Term Implementation
● High	● Medium	● Medium	● Medium	

Project Elements	Collaboration with Borough and PennDOT, Enhance signage and markings on pathways, enhance crossings and intersections, Create bike-ped priority at intersections and retime for Leading Ped/Bike Intervals
Early Actions	Collaborate to install markings on pathways to clarify sidewalk vs bike trail, Sit in on meetings with agencies to request enhancements
Long-term Improvements	Build infrastructure on University north of Curtin to continue facility, create protected bike intersection at Hastings and University and at Curtin and University and at University and Park, widen bike facilities where possible. In the longer-term, the University should also press PennDOT to widen the bridge over Colleague Avenue and to include clear markings through the interchange.
Benefits of the Facility	<ul style="list-style-type: none"> Increased safety, enhanced off-campus access to key demand areas, Access for biking on game days
Alignment with Master Plan Projects	13. Planned crossing & realignment of Dauer Rd <i>See Figure 20</i>

Figure 16 Keystone Project – University Drive Upgrades



Supporting Projects *(See Figure 17)*

Table 11 Supporting Projects

Project	Project Elements	Benefits	Relative Cost	Relative Difficulty to Implement
Bike Lanes on Bigler (from Park to University)	Stripe bike lane on each curb, striped cross-bike markings at intersections	Student dorm connections, Athletic campus connections	\$	LOW
Curtin Pathway Extension to Athletics (from Shortlidge to University)	Rebuild roadway to include a multi-use pathway on one side of the street, will involve regrading and therefore a detailed survey of this section should be collected to determine grading and utility conflicts.	Student dorm connections	\$\$\$	HIGH
Academic-Athletic Connector Terminus at Library (from Foster to College-Park Connector)	Redefine pathway/plaza in front of library to clarify a through-way for biking	Connector pathway connections to close a link in the bike plan	\$\$	HIGH
Library-College Connector (from Library to College)	Restripe Foster to have biking facilities, Redevelop pathway for a multi-use path near Hammond campus redevelopment, ending at Allen Street	Opportunity to align with a masterplan project, high demand link between core of campus and downtown	\$\$\$	HIGH
Railroad Avenue to Pollock Connector (Secondary connector to enhance a safer crossing of Atherton)	When west campus development progresses, identify a pathway for biking connections between main campus and west campus, Enhance at-grade crossing on Atherton	Replicating a link of medium to high demand, Addressing a link that already has latent crossing demand (and creating safer outcome)	\$\$\$	HIGH
Park Ave Pathway (from Shortlidge to Fox Hollow)	Collaborate with regional TIP process, State College Borough, College Township, and Centre Region MPO to implement a two-way multi-use pathway along North Curb Shortlidge to University, switch to South Side University to Fox Hollow	Connection to off-campus trails, Connection to off-campus staffing centers, Recreational connections to athletic campus and the arboretum	\$\$	MEDIUM
Pollock Road Pathway (from Shortlidge to Bigler)	Analyze feasibility to make this segment of Pollock one-way (or narrower) in order to fit a two-way bikeway at sidewalk level along the north curb	Student dorm connections to core of campus, reduces bike and vehicle safety conflicts through a node of higher traffic volumes and high bike-ped activity	\$\$	HIGH
Bike Lanes on Shortlidge (from Pollock to College)	Analyze feasibility to make this segment of Shortlidge one-way for driving to make	High demand link, Addresses conflicts with higher-volume vehicle	\$\$	HIGH

Project	Project Elements	Benefits	Relative Cost	Relative Difficulty to Implement
	room for two-way bike facility (either one on each curb in each direction or a two-way on the east side of the street)	trips going in and out of garages and that currently use the bike lane for ad hoc pickup and dropoff		
Hastings Road Connector (from University to Porter)	Build a multi-use pathway	Off-campus connections	\$\$\$	MEDIUM
Bike Lanes on Porter (from Curtin to College)	Stripe bike lanes on each shoulder	Off-campus connections	\$	LOW
Medical Center Connector (from Porter to Medical Center)	Build a multi-use pathway	Off-campus connections	\$\$\$	MEDIUM
Bike Lanes on University Drive (from Park to Curtin)	Continue the separate bike-ped facility north to Park – can either separate a bike lane on each curb or have same cross-section as south of University (conduct a survey to evaluate design feasibility) – collaborate with PennDOT to assure bike lane either has bollards, a jersey barrier-like divider, or is raised above street-level to assure protection from high volumes of fast-moving vehicles	Off-campus connections, Closes a link in the bike plan	\$\$	MEDIUM

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Figure 17 Supporting Network

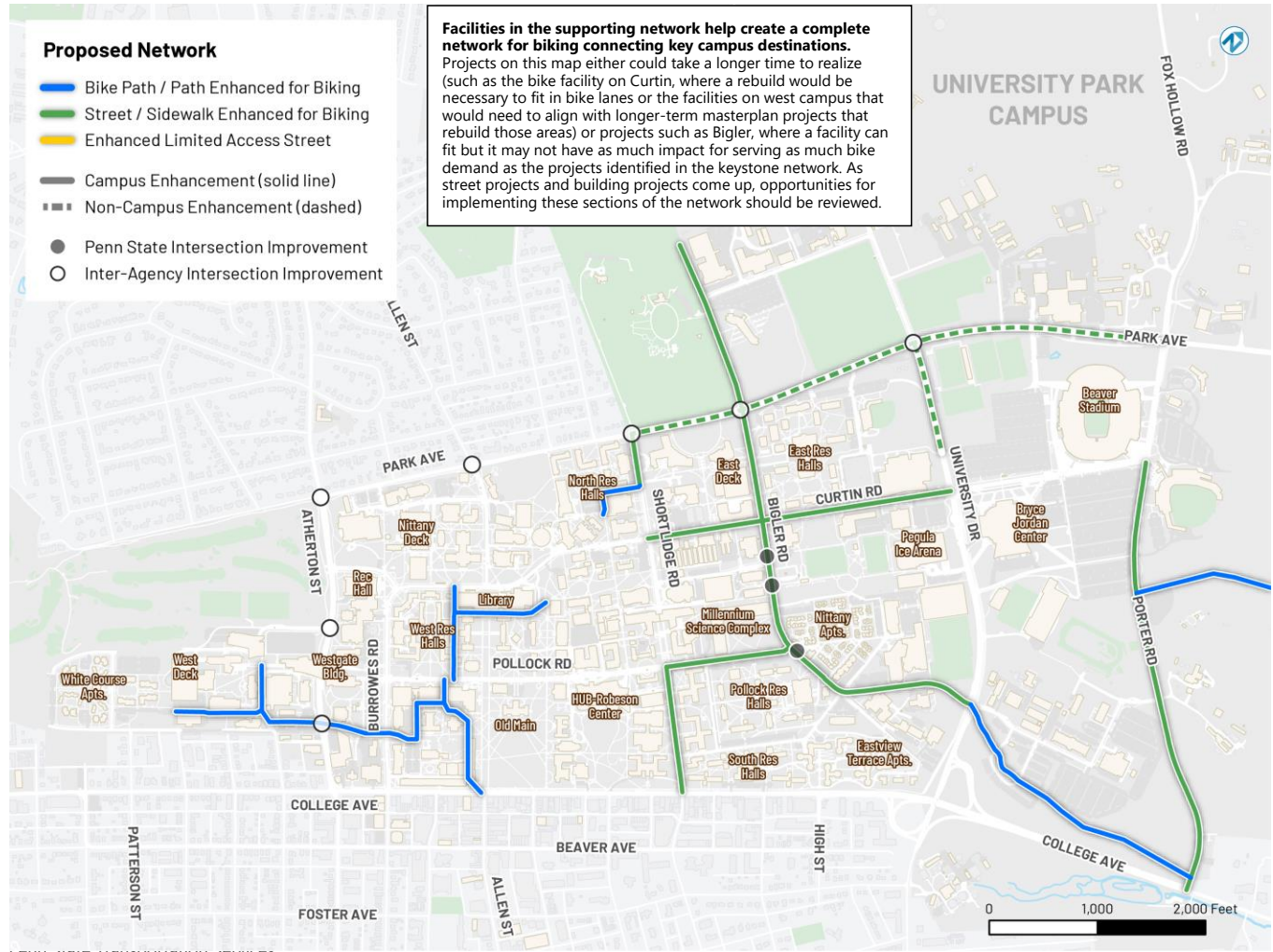
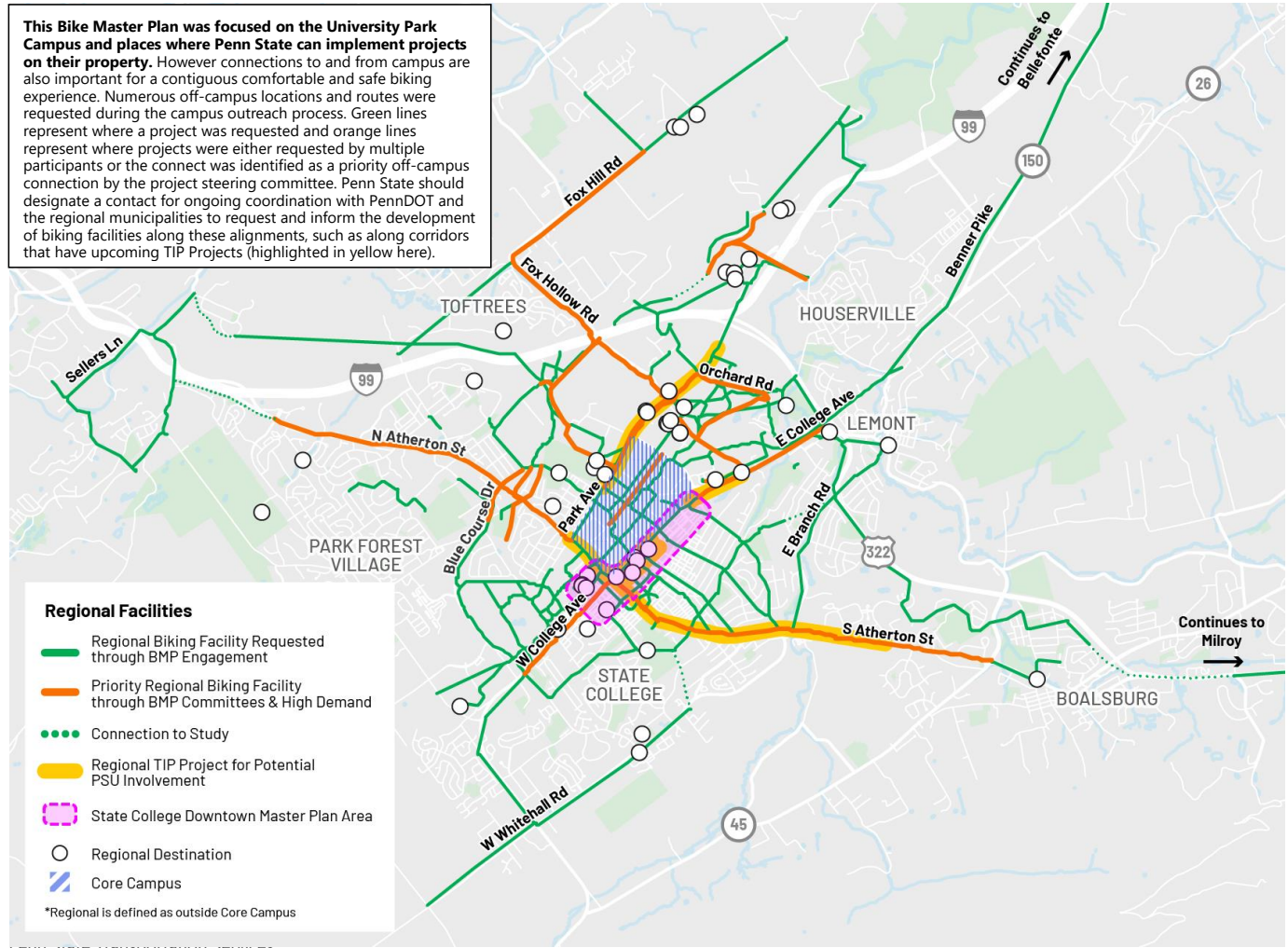






Figure 18 Proposed Network – Biking Proposed Regional Network



Building a Network for Bike Circulation

Creating a complete bike network involves enhancing pathways, adding bike lanes on some streets, and enhancing intersections for more clarity where bikes may cross and how. Adding signage, stencil and thermoplast markings will clarify and reinforce elements such as where the network is and goes and how users should interact on facilities.

Cost	Impact	Difficulty	Priority	Early Action
 High	 Medium	 Medium	 High	

Level of Meeting Goals





Increase Modeshift to Bicycling	MEDIUM
Bicycling Improves Quality of Life	MEDIUM
Bike Commuters are Supported with Facilities at Destination	HIGH
Shared Bikes and Micromobility Increase Quality of Life	LOW
Bicyclists have a Predictable and Connected Ride to and within Campus	HIGH

Action Steps

- A1 | Create a complete dedicated lanes and trails network for biking that improves connectivity to key destinations and activity hubs and fills gaps between existing facilities
- A5 | Provide thermoplastic markings on pavement indicating the bike network along key pathways and lanes
- A6 | Install signage at key junctures to indicate bike network
- A7 | Allow green coloring in bike lanes and crossings at street-level
- A10 | Coordinate with municipalities and PennDOT to advocate for off-campus network or pathways and infrastructure

Building Bike Network Supports

A complete network for circulation should also include ample bike racks that are secure in keeping bikes upright and allowing multiple ways to secure both the frame and the wheels. SPIN bikeshare also makes use of bike racks and, in high demand areas, striping off drop zones with tape goes a long way in making sure bike racks are available for people that need to secure personal bikes. Providing shelter, cover, and increased lighting also increases the security and quality of the bike parking and locking experience. Some campuses also provide organized systems for storing bikes during the summer while students are away. This helps overcome logistical barriers to getting a bike to campus and can enable people to keep riding year-over-year with less logistical difficulty. Lastly, installing automated bike counters can help the University more easily track success in increasing modeshift to biking.

Cost	Impact	Difficulty	Priority	Early Action
 Medium	 Medium	 Medium	 High	

Level of Meeting Goals

Increase Modeshift to Bicycling	MEDIUM
Bicycling Improves Quality of Life	MEDIUM
Bike Commuters are Supported with Facilities at Destination	HIGH
Shared Bikes and Micromobility Increase Quality of Life	LOW
Bicyclists have a Predictable and Connected Ride to and within Campus	HIGH

Action Steps

- A2 | Increase bicycle parking supply + quality of facilities (and more covered parking) - plan expansion and succession over time
- A3 | Increase the number and distribution of drop zones for Spin bikes in areas of higher demand (both for end of trips and where bike parking demand relative to supply is higher generally) – Early Action potential
- A9 | Survey and plan for lighting needs of bike racks (night visibility)
- A11 | Provide summer bike storage
- A8 | Install an automated bike counter(s) (such as Eco-Counter) on campus

Operational Strategies

The operational strategies discussed in the following section are critical elements to the systemic continuity of the bike plan. These tactics will allow the University to achieve a robust and well-maintained bike system across campus, and one that is well-supported by dedicated staff, protocols, and operating budget.

Each page below provides an overview of the strategy, the level to which the strategy aligns with the goals of the plan (low, medium, or high), and action steps listed in order based on priority.

Operational strategies are consolidated into the following topic areas:

- Maintenance
- Staffing and Budgeting
- Standards and Project Delivery

Maintenance

Coordinated and continual maintenance of infrastructure, facilities, and resources is a necessary component to a successful campus bike network. A bike facility maintenance protocol would prioritize the sweeping, pavement repair, upgrades to repair stations, and re-painting of bike lane infrastructure throughout campus. To sustain a safe and enjoyable bicycling environment, the University should consider establishing protocols for all kinds of bike maintenance for infrastructure and resources. Better maintenance of bike facilities can be coordinated with existing road maintenance programs through clear direction and protocols.

Cost	Impact	Difficulty	Priority	Early Action
● Low	● Medium	● Low	● Low	

Level of Meeting Goals

Increase Modeshift to Bicycling	LOW
Bicycling Improves Quality of Life	LOW
Bike Commuters are Supported with Facilities at Destination	LOW
Shared Bikes and Micromobility Increase Quality of Life	LOW
Bicyclists have a Predictable and Connected Ride to and within Campus	LOW

Action Steps





A4 | Increase/improve bicycle repair stations

Ongoing Actions:

- Prioritize ongoing sweeping and snow-clearing from streets and pathways with dedicated bike facilities
- Repaint streets and pathways with dedicated bike facilities as needed
- Regularly inspect signage, racks, and other bike facility elements as needed
- Evaluate ongoing progress of new programs and infrastructure treatments

Staffing and Budgeting

Staffing and fiscal resources are limited within PSU's Transportation Services. To successfully administrate, manage, and lead to create a robust bike system network and set of programs with adequate tracking and outreach, dedicated staff with the correct skillsets and capacity are needed to progress bike plan efforts. More staff capacity could also help with budgeting and fundraising for implementing bike plan recommendations.

Cost	Impact	Difficulty	Priority	Early Action
 Medium	 Medium	 Medium	 Medium	

Level of Meeting Goals

Increase Modeshift to Cycling **MEDIUM**

Bicycling Improves Quality of Life **MEDIUM**

Bike Commuters are Supported with Facilities at Destination **LOW**

Shared Bikes and Micromobility Increase Quality of Life **LOW**

Bicyclists have a Predictable and Connected Ride to and within Campus **MEDIUM**





Action Steps

- B5 | Training Program for Integrating Transit Operations and Safe Biking
- B4 | Assign responsibility to measure performance (safety, modeshift, etc)

See also: Data-tracking, Surveying, and Reporting Strategy on page 82.

Standards and Project Delivery

The University should establish the necessary standards and mechanisms for project delivery on efforts related to campus biking. By doing so, this will support the implementation of many of the planned programs and strategies outlined in this plan. Resources such as the toolkit included in this plan can inform standards for bicycle infrastructure and facility design.

Cost	Impact	Difficulty	Priority	Early Action
 Medium	 Medium	 Medium	 Medium	

Level of Meeting Goals

Increase Modeshift to Cycling	LOW
Bicycling Improves Quality of Life	MEDIUM
Bike Commuters are Supported with Facilities at Destination	LOW
Shared Bikes and Micromobility Increase Quality of Life	LOW
Bicyclists have a Predictable and Connected Ride to and within Campus	MEDIUM

Action Steps

- B1 | Adopt standards for bicycle infrastructure designs and materials
- B2 | Update bike rack standard to align with the guidance in the Association of Pedestrian and Bike Professionals (APBP) bike parking guides
- E2 | More enforcement for speeding bikes + bikes in 'no bike zone

Program Strategies

The programmatic strategies outlined in this section address long-term goals; encourage broader education and outreach about bicycling on campus; work to develop incentives that get people out of their cars and on bikes more; improve the University's ability to focus its investments and make the right decisions; and establish a fair and flexible process for prioritizing what gets done in the coming years.

Each page below provides an overview of the strategy, the level to which the strategy aligns with the goals of the plan (low, medium, or high), and action steps listed in order based on priority.

Program strategies are consolidated into the following topic areas:

- Alumni Development
- Campaigns Promoting and Educating Riding
- Incentives and Increasing Access
- Culture and Fun

Alumni Development

Collaboration with University alumni will support the execution of many programs and projects. The University can organize events and outings to reconnect alumni with the campus via biking activities. These strategies can help spark interest in alumni engagement by providing new campus experiences and by showing the developments that have been completed, or are still needed, to the bike network. Alumni can support this effort by sponsoring larger capital projects related to biking.

Cost	Impact	Difficulty	Priority	Early Action
● Low	● Medium	● Low	● Low	

Level of Meeting Goals

Increase Modeshift to Bicycling	LOW
Bicycling Improves Quality of Life	LOW
Bike Commuters are Supported with Facilities at Destination	LOW
Shared Bikes and Micromobility Increase Quality of Life	LOW
Bicyclists have a Predictable and Connected Ride to and within Campus	LOW

Action Steps

- G2 | Create alumni engagement / development program to promote and realize bike facility buildout

Campaigns Promoting and Educating Riding

Efforts to promote and provide education on riding will help more people who bike on campus to understand the basic skills or knowledge to safely ride a bicycle in traffic, while also educating motorists and transit operators to be more aware of the presence of cyclists.

Multiple avenues of promotion and education should be used to consistently reach a wide range of campus travelers. On-campus events, social media, flyers and signage, and other forms of campaigning are valuable tools to maintain presence of and continually promote campus biking resources and information. New programs and strategies should also be considered for development as campus biking increases over the coming years.

Cost	Impact	Difficulty	Priority	Early Action
● Low	● Medium	● Medium	● Medium	✓

Level of Meeting Goals

Increase Modeshift to Cycling	MEDIUM
Bicycling Improves Quality of Life	MEDIUM
Bike Commuters are Supported with Facilities at Destination	LOW
Shared Bikes and Micromobility Increase Quality of Life	MEDIUM
Bicyclists have a Predictable and Connected Ride to and within Campus	MEDIUM





Action Steps

- C4 | Increase awareness of bike safety and bike rules on pathways using multiple channels such as webpage, signage, social media, etc.
- C2 | Increase the awareness of BEEP
- C5 | Develop bike buddy/pool system to promote safe and social bike commuting
- C6 | Formalize and expand learn-to-bike program
- C8 | Create a new biker program for encouraging and supporting new staff/faculty and students
- D1 | Increase signage on central campus to clarify 'no bike zones'
- C7 | Create a marketing campaign to promote biking occasionally / making bike trips during the day
- D2 | Publish a bike network map online that is promoted at key annual transportation and training events

Incentives and Increasing Access

Programs offering incentives and increased access promote the use of bicycling as a primary form of transportation. Without price incentives, bicycling may be less attractive than other modes.

PSU should offer specific subsidies, benefits, and promotional events to incentivize commuting by bike. Incentives can be offered through a variety of means. Direct annual subsidies can be offered as “bike commuter benefits” to employees who bike to work. Promotional events such as bike gear giveaways and bike safety training sessions can be offered. Partnerships with student groups and/or local bicycle shops can be created to provide periodic free on-campus bike maintenance. “Bike and walk to work” challenges can be held, with challenge winners receiving prizes that promote bike and walk commuting.

Cost	Impact	Difficulty	Priority	Early Action
 Medium	 Medium	 Medium	 Medium	

Level of Meeting Goals

Increase Modeshift to Bicycling	MEDIUM
Bicycling Improves Quality of Life	MEDIUM
Bike Commuters are Supported with Facilities at Destination	LOW
Shared Bikes and Micromobility Increase Quality of Life	LOW
Bicyclists have a Predictable and Connected Ride to and within Campus	LOW

Action Steps

- C3 | Create incentives for bicycle commuting (bike gear subsidy, bike loaner program, partner with existing bike organizations)
- G4 | Create a 'bike pantry' designed to collect donations and give away free gear and bikes to low-income students
- B3 | Implement a low-cost option for Spin or other affordable bike rental/purchasing service
- E1 | Improve/simplify and promote bicycle registration process

Data-Tracking, Surveying, and Reporting

To understand campus travel and the extent to which biking occurs on campus, it is critical to consistently track data on commute modes, parking occupancy, and other transportation program performance measures. Various performance measures in place can then be used to adjust policies over time.

Cost	Impact	Difficulty	Priority	Early Action
Medium	Medium	Medium	Medium	✓

Level of Meeting Goals	
Increase Modeshift to Bicycling	LOW
Bicycling Improves Quality of Life	LOW
Bike Commuters are Supported with Facilities at Destination	LOW
Shared Bikes and Micromobility Increase Quality of Life	LOW
Bicyclists have a Predictable and Connected Ride to and within Campus	LOW

Action Steps

- F1 | Create a new system for documenting and reporting crashes (and responding through coordinating between State, Borough, and Campus)
- G1 | Evaluate Spin bike program challenges and opportunities on a regular interval
- F2 | Annual survey of campus bike awareness and satisfaction
- F3 | Annual summary report of bike modesplit, satisfaction, perception of safety, miles of plan built, and data on safety

Ongoing coordination effort on activity and safety tracking;






Create a dedicated job task responsible for coordinating with the Borough and PennDOT to conduct camera and tube counts of biking activity at key gateways around the campus on a regular basis. Also create a job task responsible for tracking activity and collaborating with PennDOT and the Borough to collect similar bike crash data and to aggregate an incident report summary annually. Start collecting post-crash data information on how the crash happened, what other user/vehicle type was involved in the bike crash, whether the crash resulted in injury, and thorough location data metrics (on a path, in the street, what cross streets, what nearest building, etc). Also create a post-crash response plan to respond to trends that lead to incidents.

Commented [AF7]: [Kevin Ottum](#) I would like to get this paragraph to stay on this page please

Culture and Fun

Developing a strong campus culture around bicycling is an important facet in the process of normalizing biking as a primary mode of transportation for all campus travelers.

Existing resources and avenues for creating a strong campus biking culture should be utilized and enhanced to maximize modeshift to biking. Reliance on the Bike Den will be critical to offer a centralized platform for related efforts. Ideas for methods of enhancing bike culture and fun include group bike rides, giveaways, and pop-up events.

Cost	Impact	Difficulty	Priority	Early Action
 Medium	 Medium	 Medium	 Medium	

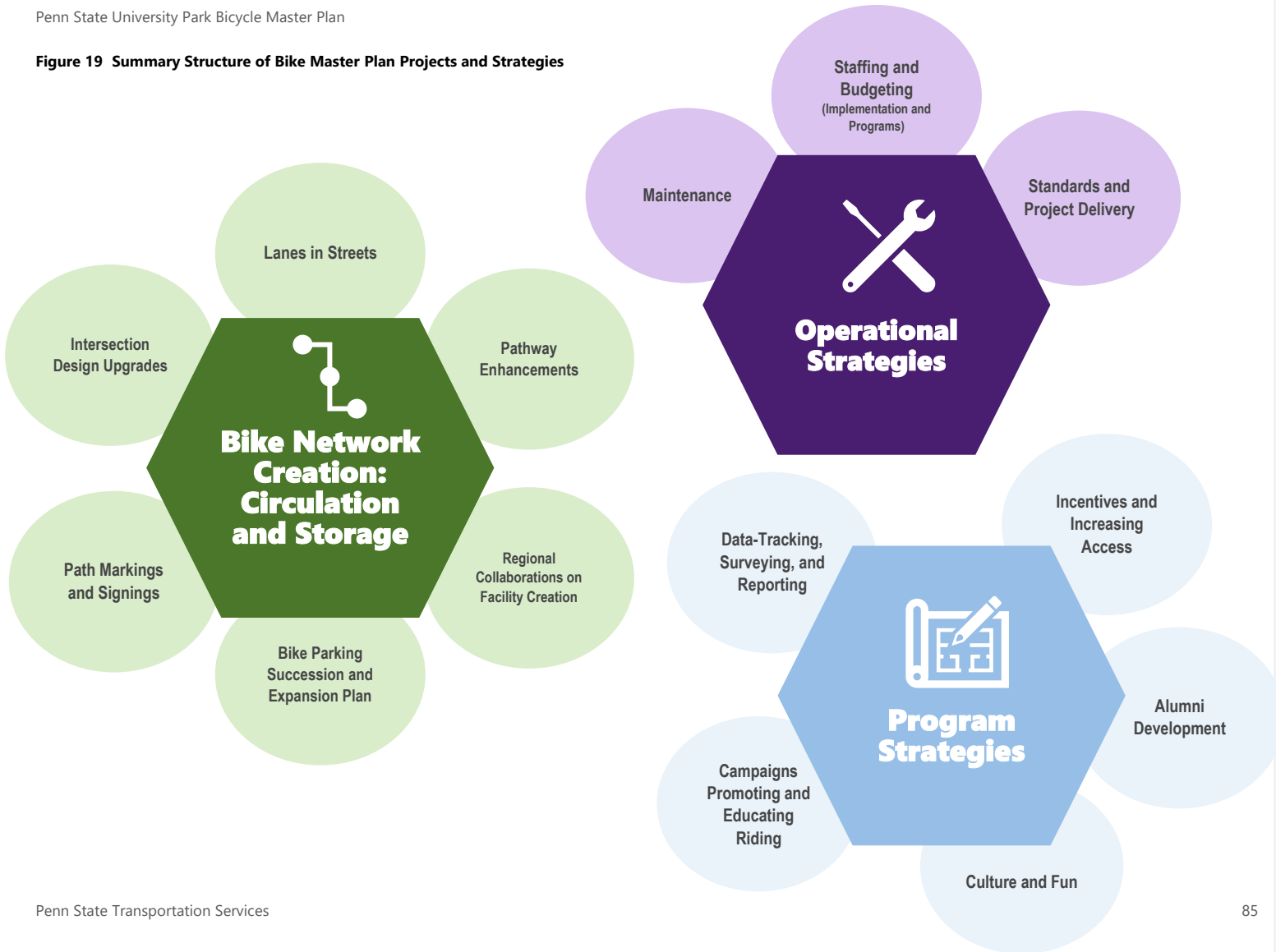
Level of Meeting Goals

Increase Modeshift to Bicycling	MEDIUM
Bicycling Improves Quality of Life	MEDIUM
Bike Commuters are Supported with Facilities at Destination	LOW
Shared Bikes and Micromobility Increase Quality of Life	LOW
Bicyclists have a Predictable and Connected Ride to and within Campus	LOW

Action Steps

- C1 | Promote Bike Den, event calendar, and other existing bicycle education resources
- G3 | Annual group bike ride audit

Figure 19 Summary Structure of Bike Master Plan Projects and Strategies



PROJECT DELIVERY AND ACCOUNTABILITY

The University does not yet have a dedicated funding source for the delivery of the projects and programs in this plan. However, it does have a variety of funding streams into which these recommendations can be integrated. This plan is intended to inform capital renewal projects, University, State and municipality roadway projects, ongoing campus building facilities projects, and future campus master planning efforts. (Master Plan projects that could support facility implementation are mapped in Figure 20). With this intention, future projects can be scoped with these improvements in mind, making them more cost effective and aligned with University transportation, sustainability, and quality of life goals.

It is important to lay out clear roles and responsibilities relative to implementation and decision-making around future steps in the process. As with other foundational plans that affect campus change, this plan must be included in the scoping of all new building, road, and parking lot or structure projects. It requires ongoing participation in municipality and PennDOT project scoping on gateway and boundary streets to improve connections to campus.

With this as a starting point, any given campus related project can facilitate better biking, better bike parking, and better connections within and to campus.

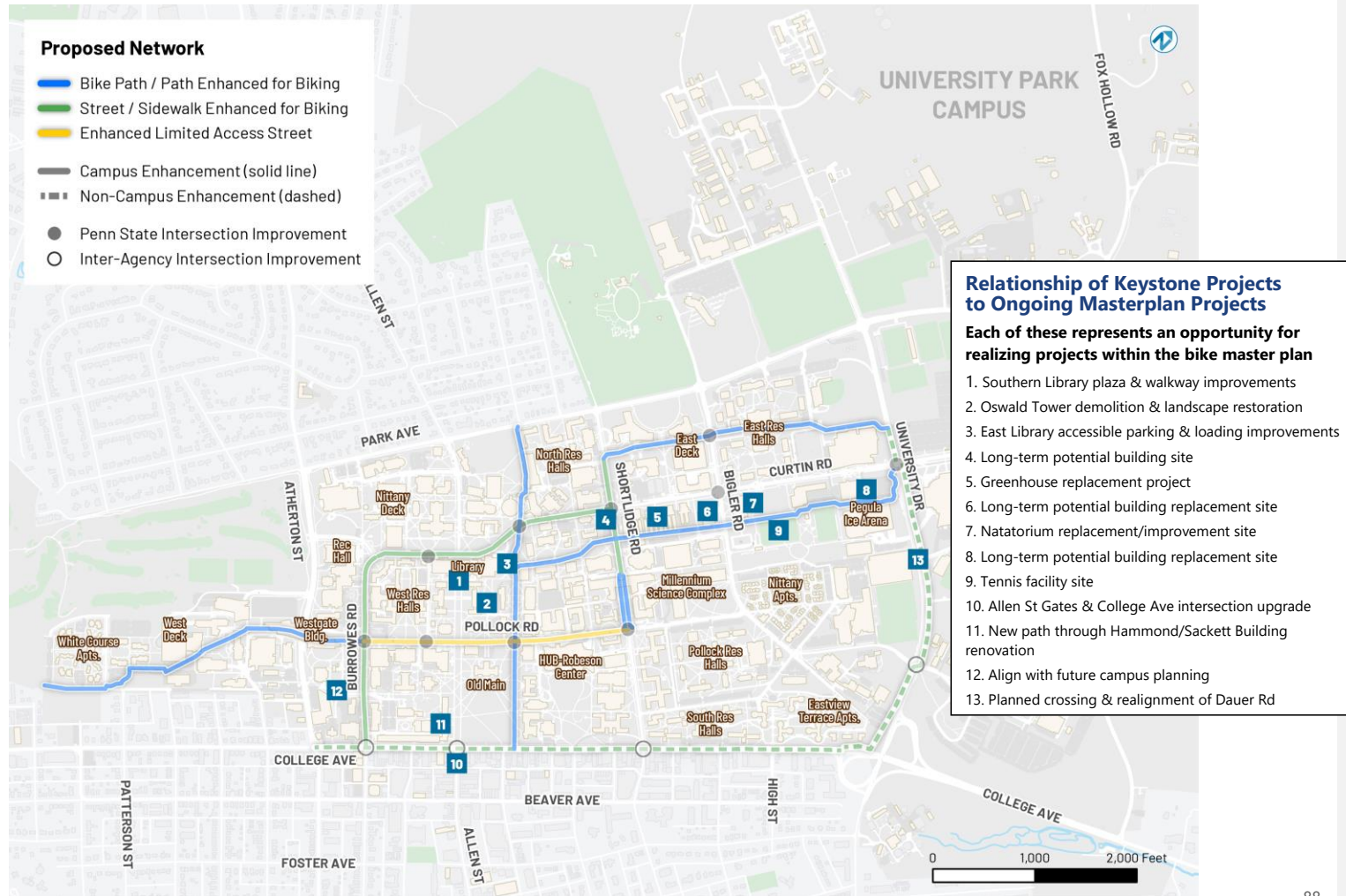
The recommended process for implementing the principles and projects in this plan include:

- 1- Reference the plan annually to inform upcoming maintenance and rehabilitation efforts
- 2- Reference the plan during the scoping of building or capital projects to include pathway widenings, parking, or bike lane projects
- 3- Look for opportunities to integrate planning infrastructure that creates self-enforcing and aesthetically pleasing parking and wayfinding
- 4- Measure activity patterns and metrics on a regular basis to support accountability and goals-tracking
- 5- Search for additional funding when plan elements overstretch the limits of project budgets
- 6- Include the Office of Physical Plant in tradeoff decisions when this plan's recommendations conflict with other campus priorities

PENN STATE: LEADING ON BIKING

Penn State University is poised to cost effectively improve its Bike Friendly University status by integrating investments with facility maintenance, campus planning re-design and campus construction projects. Furthermore, the efforts to seamlessly connect and separate people on bicycles from people walking and operating vehicles responds to student and affiliate requests for more sustainable transportation options that support better physical, mental and social health for all.

Figure 20 Keystone Projects: Relationship to Ongoing Building and Masterplan Projects



APPENDICES

MAP ATLAS

RIDE AUDIT WORKSHEET

ENGAGEMENT SUMMARY

SURVEY SUMMARY

PROJECT MATRIX

INDEX OF FURTHER READING AND RESOURCES

- [Association of Pedestrian and Bicycle Planners Bike Parking Guides](#)
- [NACTO Urban Bikeway Design Guide – Working Papers](#)
- [NACTO Urban Street Design Guide, Transit Street Design Guide, and Don't Give Up at the Intersection Guide](#)
- [Getting to the Curb: A Guide to Building Protected Bike Lanes that Work for Pedestrians](#)
- [USDOT Guide to Achieving Multimodal Networks](#)