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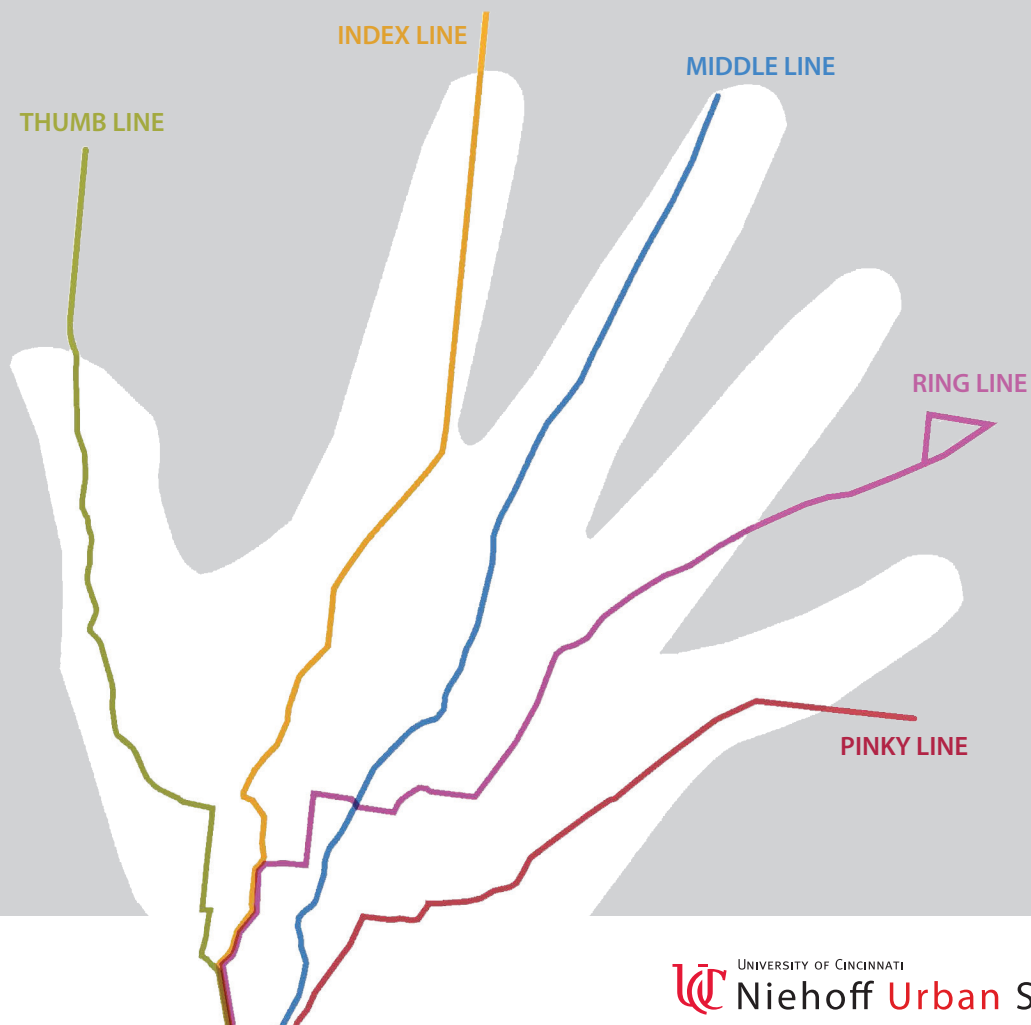
# Movement in the City

BUS RAPID TRANSIT

BIKE RAPID TRANSIT

*Fall 2012 - Spring 2013*

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PARTICIPANTS

Faculty

**Dr Richard Miller** Professor, Civil Engineering, College of Engineering and Applied Science  
**Dr Danilo Palazzo** Professor of Urban Planning, College of Design, Architecture, Art, and Planning  
**Frank Russell** Studio Coordinator, Adj. Assoc. Professor, Urban Planning, College of Design, Architecture, Art, and Planning  
**Mafe Ramirez** Teaching Assistant, Civil Engineering  
**San Jun Park** Graduate Assistant, Urban Planning

Students

Engineers

Benjamin Hall  
Benjamin Lafferty  
Bryan Hafertepe  
Carter Stitt  
Christopher Murphy  
Matt Brackman  
Matthew Vanhouten  
Ryan Lammi  
Derrick Schierloh  
Edward Lynch  
Eric Kelly  
Ethan Jacobs  
George Hurrell  
Jonathan Brate  
Joshua Ross  
Tristram Barnard  
James Moyer

Jason Barber  
Jay Sliger  
Jeffrey Gable  
Janna Barendswilt  
Zack Shindledecker  
Sean Moloney  
Tyler Kiefer  
Kaitlyn Sarmento  
Kelly Hecht  
Kevin Mills  
Lauren Anderson  
Mark Schutte  
Peter Johnson  
Hansel Bulen  
Jared Moore  
Michael Orth  
Michael Walsh

James Dole  
Curtis Hoffman  
Danny Luehrmann  
Ryan Cushenan  
Amanda Beiting  
Morgen Schroeder  
Megan Fox  
Justin Couch  
James Halterman  
David Counsell  
Tiffany Mosier

Planners

Olena Plyushch  
Nick Hoctor  
Kristin Bladh  
Wade Johnston  
Emily Johnson  
Ian Bulling  
Xin Chen  
Justin Rex  
Meredith Murphy  
Alexander Cassini

Stakeholders

**Eric Oberg**, Rails to Trails  
**Michael Moore**, City Architect, City of Covington  
**Tim Reynolds**, Transportation Planner, Parsons Brinkerhoff  
**Jared Arter**, Bike Share Hub Manager, City of Cincinnati  
**David Zelman**, Architect and Advocate Western Riverfront Trail  
**Robin Corrathers**, Director Ground Work Mill Creek  
**Jay Andress**, Advocate, Wasson Way Bike Trail  
**Nern Ostendorf**, Queen City Bike  
**Frank Henson**, Queen City Bike  
**Terry Garcia Crews**, Cincinnati Metro  
**Kevin Mischler**, Cincinnati Metro  
**Randy Simes**, Planner, UrbanCincy

Introduction

The vision of the Niehoff Urban Studio is to foster interdisciplinary collaboration that responds to current urban challenges in the Cincinnati Region. As part of the studio process, faculty and students engage directly with community stakeholders to propose equitable solutions that enrich the communities and the quality of life for the residents they serve. Within the studio structure, efforts are focused in bi-annual cycles, on specific urban design and community development topics. Beginning in fall 2012, the Niehoff Studio introduced “Metropolis and Mobility” which focuses on a understanding and advancing a variety of transportation systems within Cincinnati.

With transportation as the driving theme, the 2012-13 Movement in the City studio supported student work with both transit systems and bicycle transportation. In the area of Bus Rapid Transit the studio topic followed the program of the Greater Cincinnati Chamber of Commerce Agenda 360 led consortium of Cincinnati Metro and three other transit authorities. Bikeway Planning was conducted at the request of three civic advocacy groups that are advancing local bikeway concepts.

This document highlights some of the research and project proposals responding to case study research and challenges identified by stakeholder groups. It is designed to be a tool used to guide decision making to be used by the community, practitioners, and government officials.



“Bright Ideas for Mobility” Panel





Between the fall 2012 and spring 2013 semesters, three faculty and 55 students from the Civil Engineering and Urban Planning programs worked to engage with the BRT and Bikeway transportation networks in Cincinnati. Civil engineering students began work in the fall 2012 semester and conducted detailed research around bikeway and BRT development. The engineering students were joined in teams with planning students in the spring 2013 semester.

As interdisciplinary teams they conducted a survey of best practices, site specific research, and urban analysis, for both BRT systems and Bikeways. BRT design was directed at five of the seven urban arterial corridors already identified by Metro for consideration. Bikeway design was provided for three applications including a rails to trails proposal, a riverfront parks and trail concept, and the extension of an existing Mill Creek trail along a tributary waterway.

The final student work was presented during an open house and panel discussion that was well attended by students, faculty, practicing professionals, and community stakeholders. During the open house, students displayed their work. Following the student exhibit, the panel discussion entitled 'Bright Ideas for Mobility' was held. The panel, moderated by Randy Simes of UrbanCincy, included Terry Garcia Crews the CEO of Metro SORTA, Jared Arter Manager of Cincinnati Bike Hub, and Tim Reynolds, Transportation Planner at Parsons Brinkerhoff. During the discussion, the panelists articulated their visions for the future of Cincinnati's transportation network and encouraged everyone to become involved in supporting and advocating for diversity in transportation. See UrbanCincy.com for more coverage of the panel content. <http://www.urbancincy.com/2013/05/standing-room-only-crowd-packed-metropolis-mobility-event/>



# Research Topics

The topical research was primarily completed in the fall 2012 semester by civil engineers and focused on transportation planning. The research survey included innovative planning approaches in transit and bikeway planning relevant to Cincinnati

## BRT-Vehicles and Right of Way (ROW):

Students documented best practices and amenities that distinguish BRT from standard bus service. The team outlined vehicle types and features available and advantages for each choice. Students researched ROW including evaluation of case studies, exploration of ROW types, and assessing the feasibility of BRT ROW's in Cincinnati. The case studies included Pittsburgh, PA, Ottawa, Ontario, and Boston, MA.

## Transit Oriented Development (TOD):

Drawing from case study examples in Ottawa, Ontario and Cleveland, Ohio, the research for TOD highlighted the advantage of incorporating land-use planning with transit development to promote mixed use development and lessening auto dependence and congestion.

## Identity, Education and Wayfinding:

Identity and branding were identified as key parts of the implementation process, as they are important factors in attracting and maintaining BRT ridership and trail usership. The recommendations include developing wayfinding signage that identifies travel times and distances to regional landmarks and important institutions.

## Transit Signal Priority & Operations:

The research highlighted innovative practices and how to integrate technology into the BRT systems to coordinate bus travel with real time arrival information. These technological improvements can improve route speed, BRT service, and congestion without expensive infrastructure and roadway expansions.

Route - Cleveland



TOD - Winnipeg



Parking Bioswale - Warrenville



Station Design - York



Rail Trail/Waterway



Bike Lane



Off Road Shoulder



## Bikeways- Safety and Road Share:

An important aspect of bikeway planning is integrating motorized and non-motorized traffic safely on shared road networks. This research identified four types of shared road design and the major points of conflict between vehicular and bicycle traffic that occur.

## Bikeway- Right of Way and Environmental:

With new construction for bikeway and BRT ROW's, comes the opportunity to improve the performance of the built environment, including green infrastructure. The team identified the Springwater Corridor, in Portland, Oregon as exemplary of bike ROW design and implementation.

## Bikeway Conveniences, service, operations and weather issues:

Details of the bike path implementation and amenities were identified and outlined in the research summary. The summary highlighted the necessity of: smooth pavement; restroom facilities in trail areas not adjacent to commercial districts; designated maintenance teams; bike racks, benches and trash cans; and tree cover for shade and rain protection.

### Route Structure

- Maximum round trip time of two hours
- Single route structure is easy to understand
- Average station locations are ¾ miles apart to maintain competitive operating speeds and efficiency
- Shorter route spacing for higher density locations



### Handicap Concerns

- Boarding
  - Level boarding with "Precision Docking"
  - Near level or level boarding
  - Vehicle configurations
- Accessibility
  - Specialized seating
  - Adequate equipment (railings, seat belts, wheel chair locks/straps)
  - Assistance and stop notification systems



### Bike Racks

- External Storage
  - Retractable External bike racks
  - Bicycle storage at stops
  - Bicycle lockers at stops
- Internal Storage
  - Walk in area for bicycles
  - Horizontal bicycle racks
  - Vertical bicycle racks



### Real-Time Bus Location

- On demand bus location through web or SMS
- Subscription-based email and text message alerts
- Estimated arrival times and scheduled departure times
- Notices of service interruptions, emergencies, and other important events



WHY RIDE  
BRT

### Payment Options

- Fare collection to support efficient, multiple stream boarding
- Primary design attributes are fare collection process, fare transaction media, and fare structures
- Varied price to discount senior citizens, military personnel, and/or students to encourage their ridership on the BRT



### Speed of Service

- Faster travel time compared to regular bus system
- Few infrequencies from scheduled arrival times
- Signal priority system decreases wasted time at stop lights
- All day service spans makes the BRT reliable and available to a large market



### Seating/Standing

- A typical BRT seat takes up approximately 5.4 sq. ft.
- Up to four people can stand in an area of 2.7 sq. ft.
- Seating or Standing space is dependent on wheelchair and bicycle storage, as well as passenger demand, trip length, and service characteristics





## Site Reconnaissance

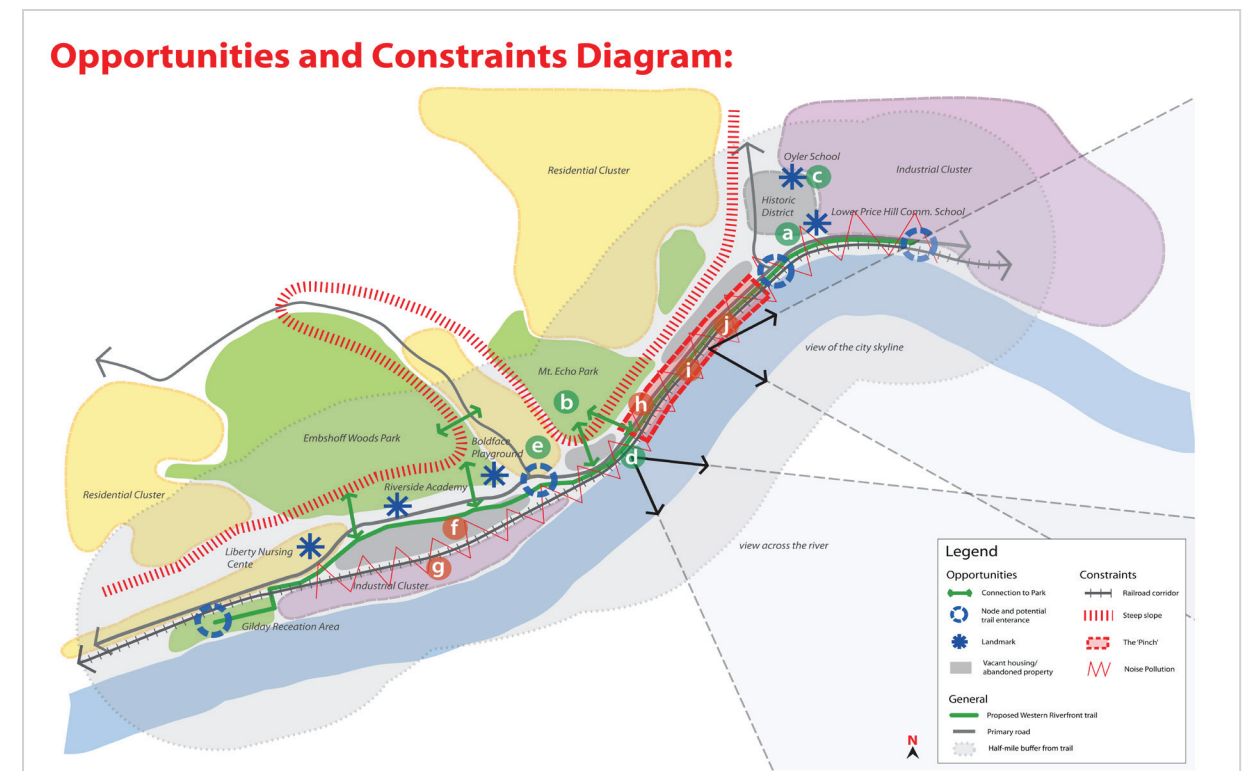
The foundation of the design work was built from site reconnaissance; including a detailed analysis of the transportation networks and identification of challenges and opportunities within the proposed BRT and bikeway corridors. Interdisciplinary student teams were asked to identify and distill the strengths, weaknesses, opportunities and threats (SWOT analysis) within the formal, social and technical structures of each corridor.

Through this comprehensive analysis and reconnaissance, students utilized and applied their disciplinary knowledge to evaluate the corridors from the perspective of built form and socioeconomic demographics. The findings began to direct further research and case studies were examined to support the final development proposals.

Study corridors for Bus Rapid Transit were established from the existing Metro BRT Plan which outlines seven corridors along existing radial arterials within the Greater Cincinnati and Northern Kentucky Region. Interdisciplinary teams evaluated five of the seven proposed BRT corridors (Hamilton, Vine, Reading, Montgomery, and Madison), as well as the Downtown BRT Hub area. Three Bike Trail studies were undertaken at the request of trail advocacy groups throughout the Cincinnati area. This collaboration yielded trail and greenway proposals for predetermined routes in the eastern (Wasson Way), central (West Fork Creek Trail), and western (Western Riverfront Trail) areas of the city.

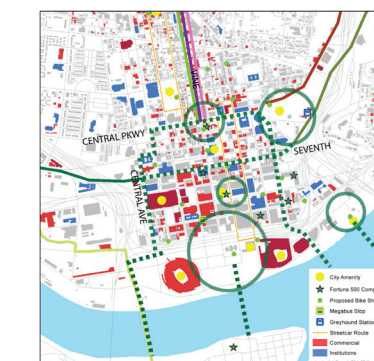


Hamilton Avenue corridor Reconnaissance

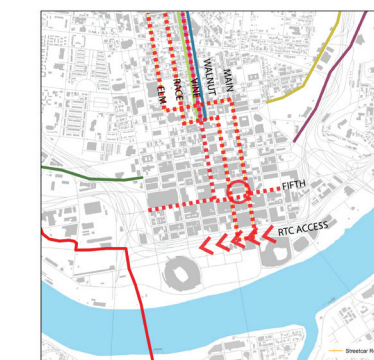


Western Riverfront Trail Reconnaissance

### OPPORTUNITIES



### CONSTRAINTS



CBD BRT Hub Reconnaissance

### Opportunities:



### Constraints:



Western Riverfront Trail Reconnaissance

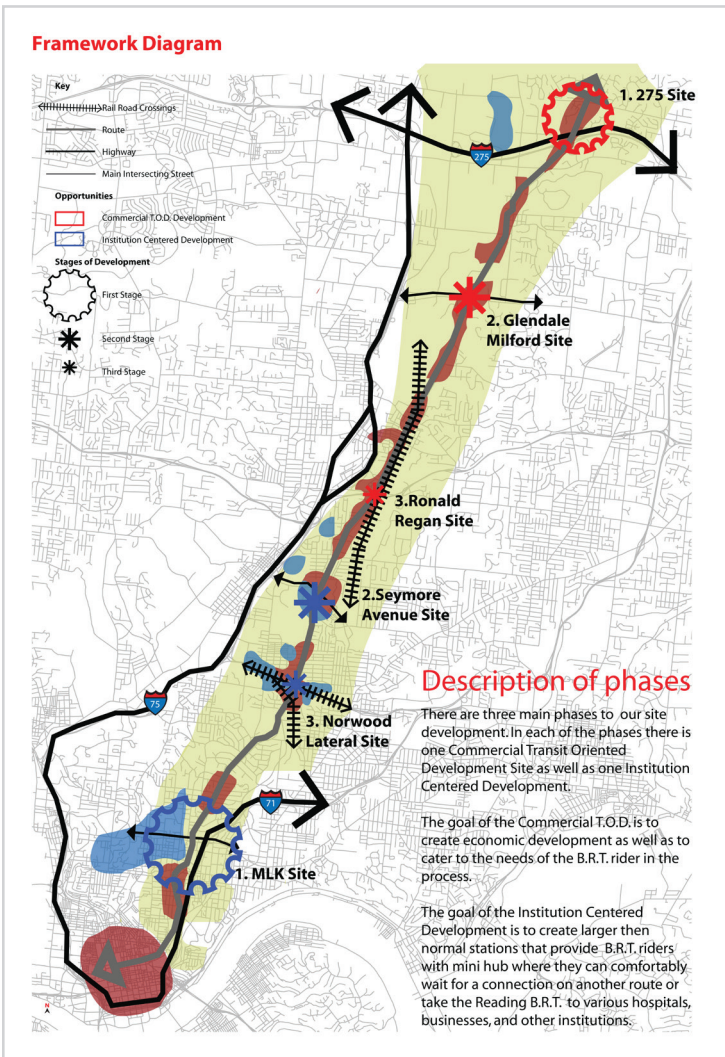


# Framework & Project Proposals

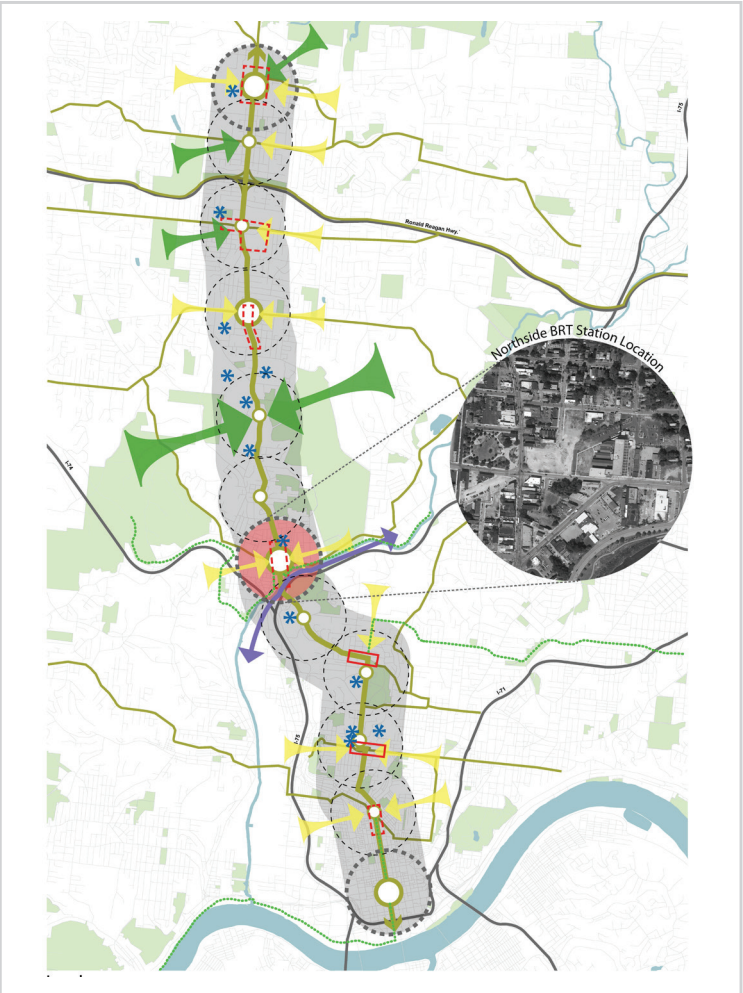
Before initiating specific individual urban design, engineering, or programming proposals, interdisciplinary student teams developed urban framework proposals which covered five of the seven Metro proposed BRT corridors. Notable framework concepts are described below. See <http://www.uc.edu/cdc/> for detailed posters.

## Redevelopment through BRT - Reading Road

BRT hubs can deliver people to centers of activity, particularly with workplace, civic, entertainment, and retail functions. Along with other measures BRT hubs can serve to revitalize blighted and underutilized areas that have been strategically identified for redevelopment along the Reading Road corridor at Norwood Lateral, Seymour Avenue(Jordan Crossing), Ronald Reagan Highway, and I-275.

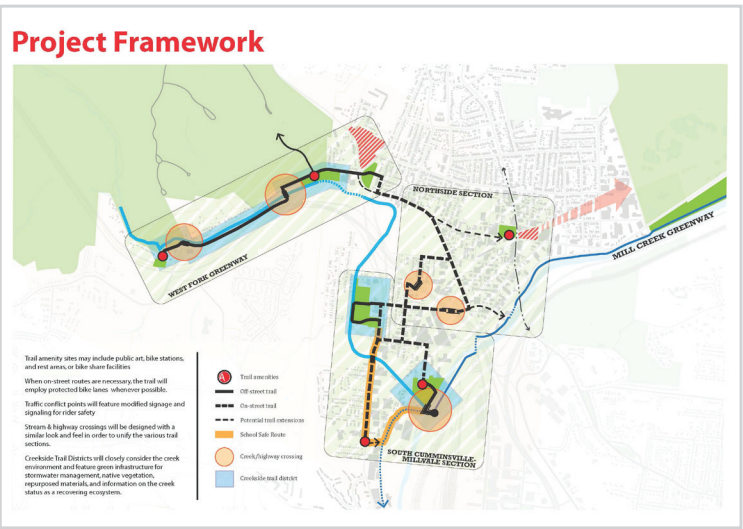


Reading Road



Hamilton BRT

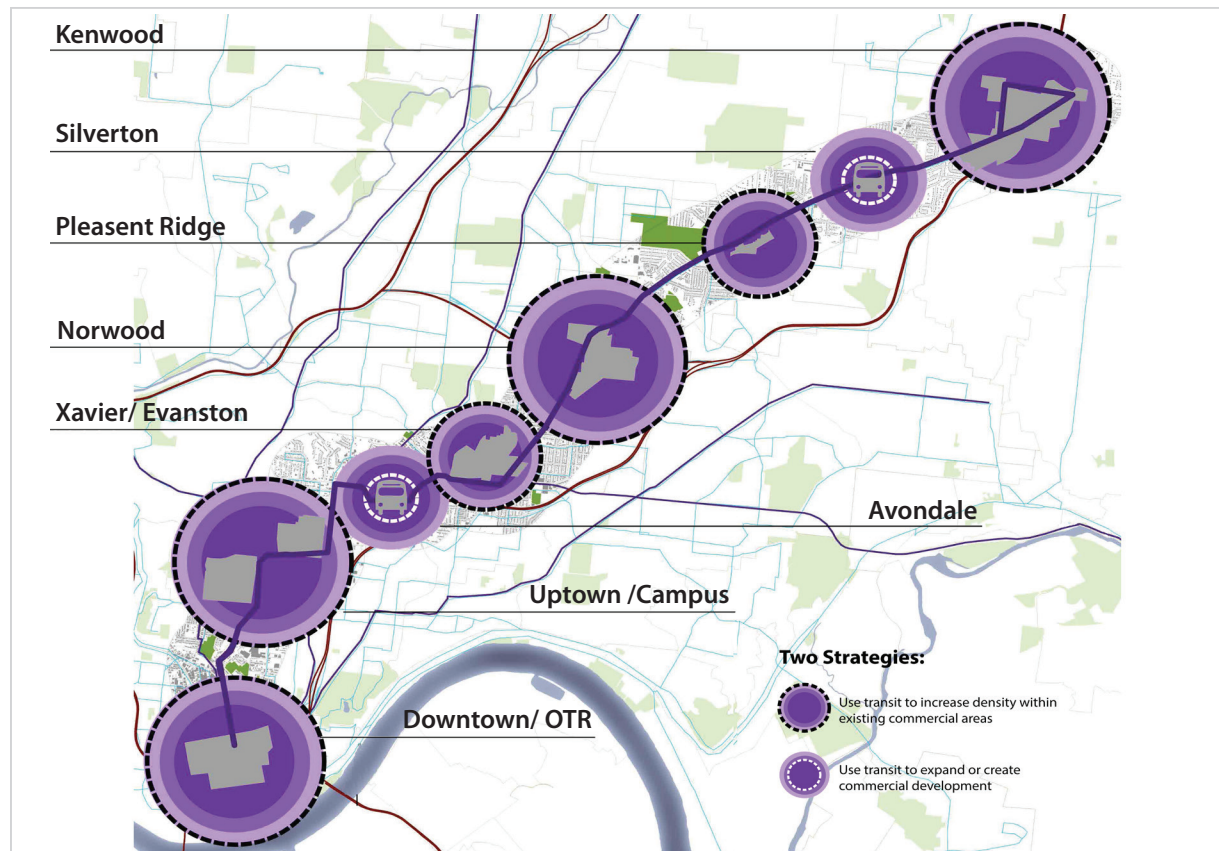
**A linear linkage of historic NBDs - Hamilton Avenue**  
Preserving and linking Cincinnati's historic and compact Neighborhood Business Districts with fast center to center BRT service promises to better integrate large portions of the city that today are functionally and perceptually fragmented.



West Fork

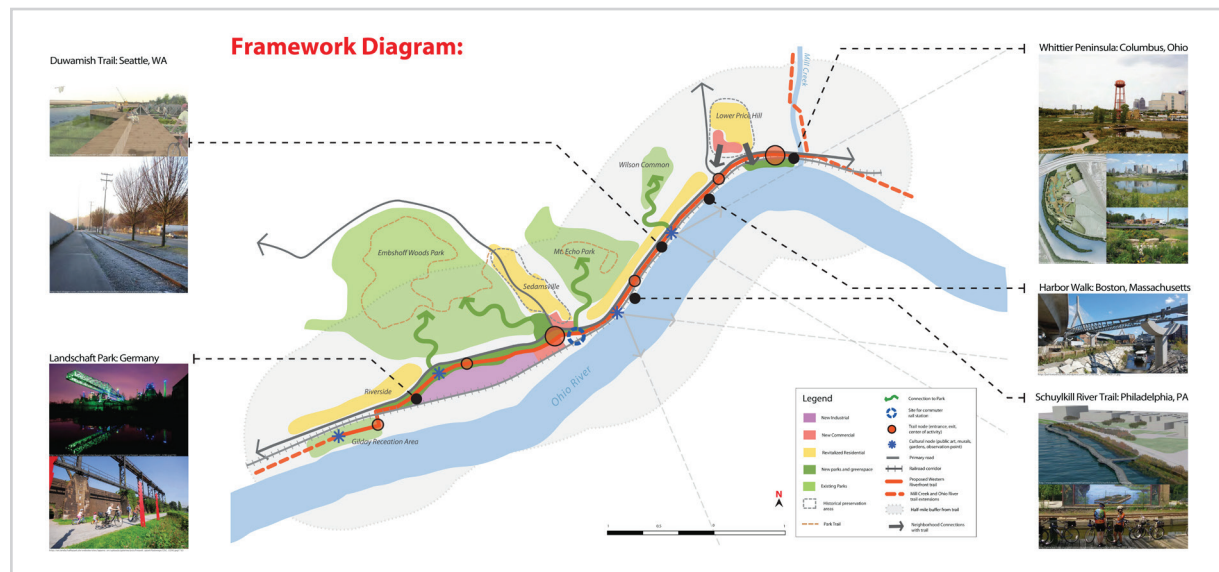
**Reknitting Communities through Bikeways - West Fork Bikeway Trail**  
Bikeways can reknit communities across severe physical and perceptual barriers. The West Fork Bikeway ties together a community divided by a highway and uncovers a hidden waterway.





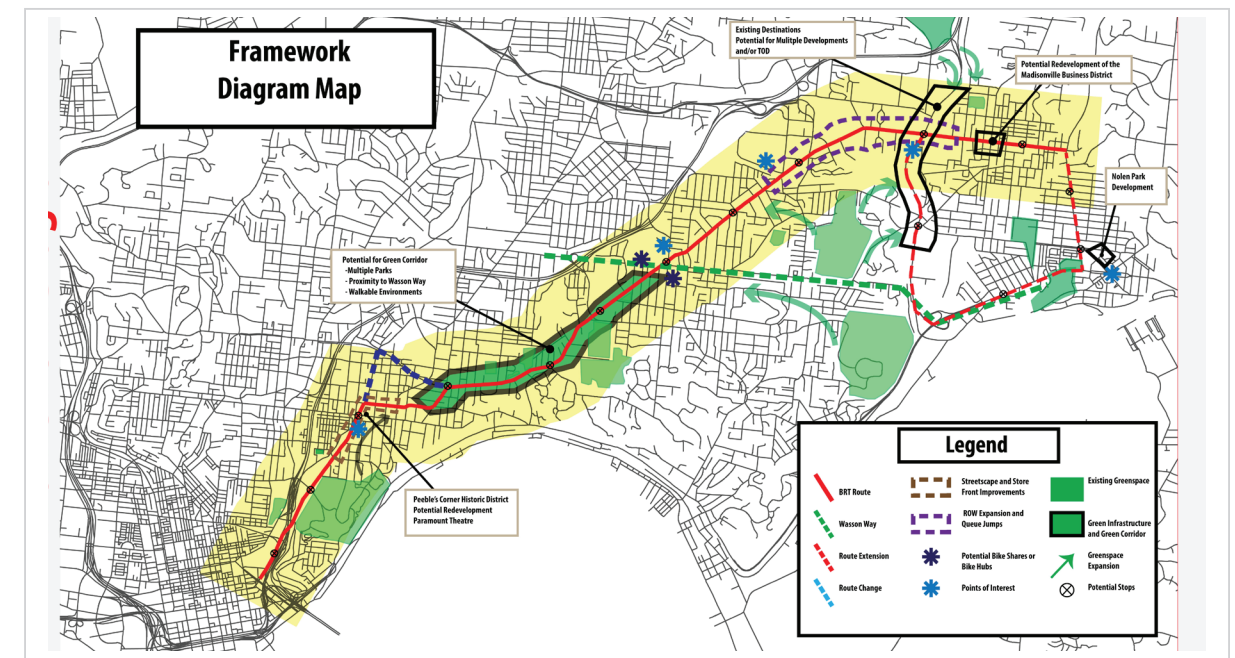
## Density and BRT - *Montgomery Road*

Carefully positioned BRT hubs can centralize and densify existing sprawling development areas for greater resource efficiency, pedestrian comfort and progressive place-making.



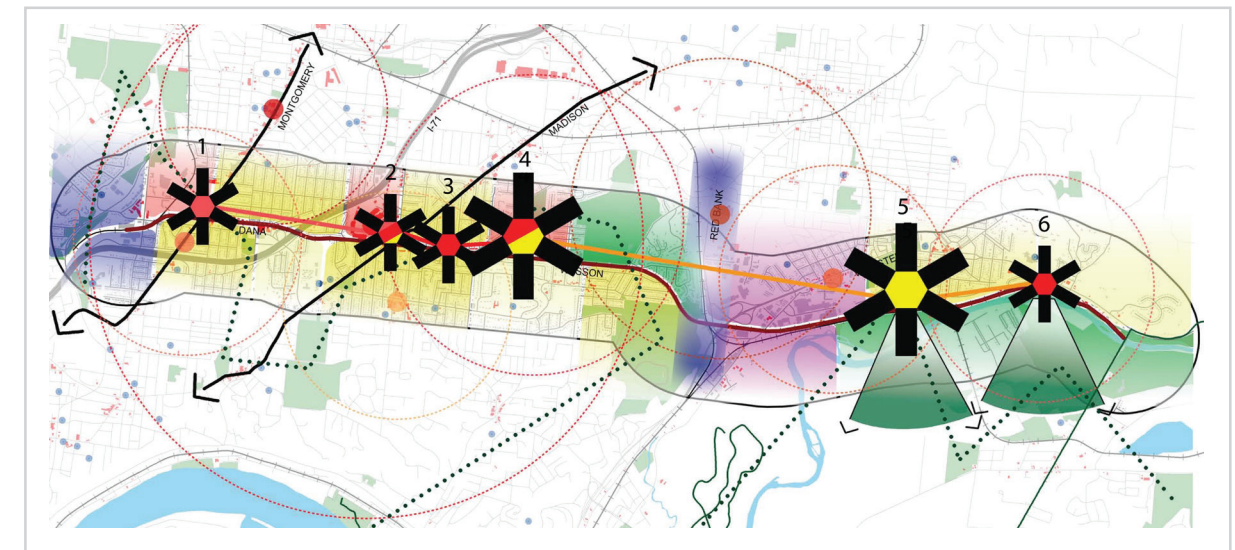
## Bikeways and Natural Assets - *Western Riverfront Trail*

Bikeways can reframe existing natural assets and can provide access and connection to the larger network of natural areas. The proposed Western Riverfront Trail opens this portion of the Ohio River to access from the abutting communities and the region as a whole. The trail links to existing parks while providing new greenspace opportunities.



## BRT supports Lifestyles - *Madison Road*

BRT corridors can function to make accessible all aspects of a desirable urban lifestyle. This is particularly true of the Madison Road Corridor which links some of the cities premier residential districts and regional employment destinations, with all forms of entertainment and shopping ranging from historic pedestrian districts to big box retail centers.



### **Bikeways and Equity** - *Wasson Way Rail to Trail*

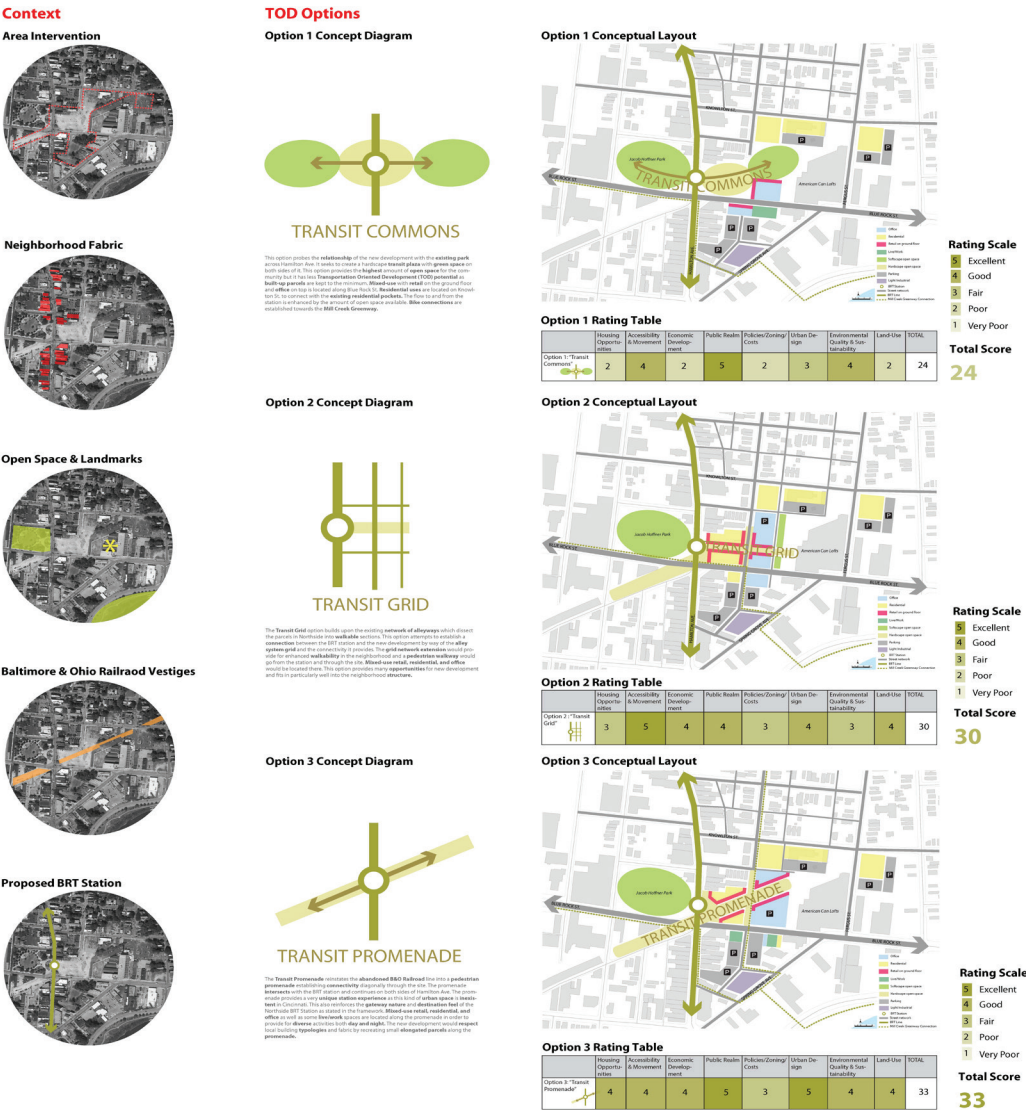
Bikeways can serve to connect and promote the appreciation of large areas of great diversity at an experiential level not possible in individual auto travel or even Bus transit. The proposed Wasson Way bike trail would provide recreational as well as functional movement opportunities among the dense racially and socioeconomically segregated neighborhoods of the east side and provide access to all users to key institutions, green spaces, necessary retail centers, and future links to BRT and light rail transit.



# Research Concepts Applied

The following is a sampling of applications of model concepts explored throughout Movement in the City studio by interdisciplinary teams. Stakeholder collaboration, best practices research and site reconnaissance, served as the foundation for developing the rationale for the application of each concept. See <http://www.uc.edu/cdc/> for detailed posters.

## Northside Transportation Oriented-Development Options Analysis



Hamilton Avenue BRT Hub concept development

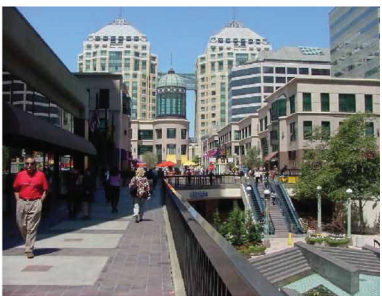
## Bus Rapid Transit

### Transit Oriented Development (TOD)

TOD is a key concept related to how transit affects city development. New development can be stimulated through the presence of transit hubs and also potentially around bikeway trailheads. This development type is oriented around pedestrian convenience and consequently tends to minimize walking travel distance by being more densely structured vertically, rather than horizontally. TOD is also marked by a preference for an integrated mix of uses for the convenience of both residents and other users. Almost all of the BRT corridors and some of the Bikeway corridors contain blighted and underutilized areas at potential BRT hub or trailhead locations. Students also saw the utility of making more dense mixed-use TOD development at areas of current high economic value as a way of enhancing the quality of place and functionality. An example of this application is the extension of a bikeway spur from the Wasson Way trail into a reimagined redevelopment of the Hyde Park Plaza superblock.



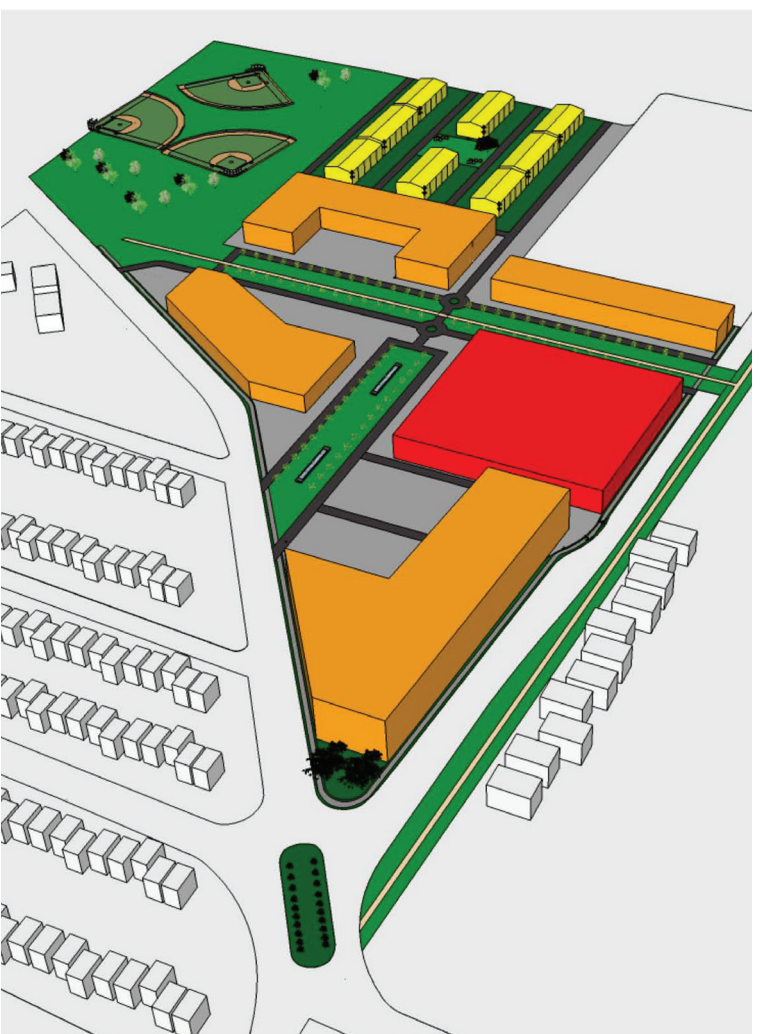
Lindergh City Station and Medical Center  
Atlanta, GA



Oakland City Center  
Oakland, CA



Pearl District TOD  
Portland, OR



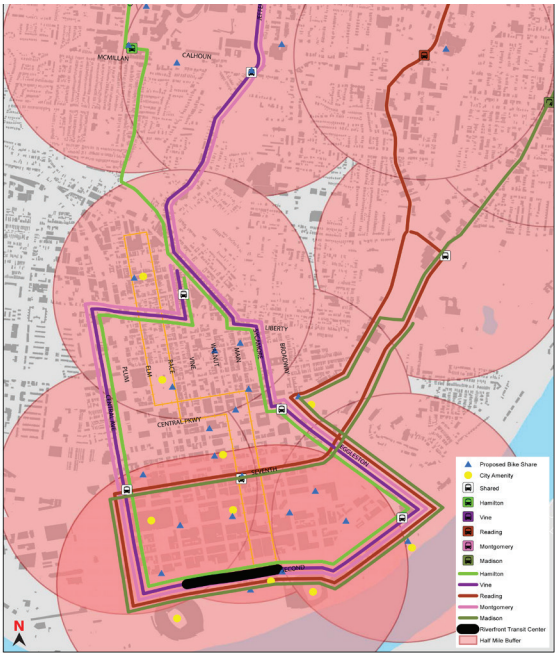
Hyde Park Plaza envisioned as a more dense mixed use TOD



Connecting the Transit Corridors

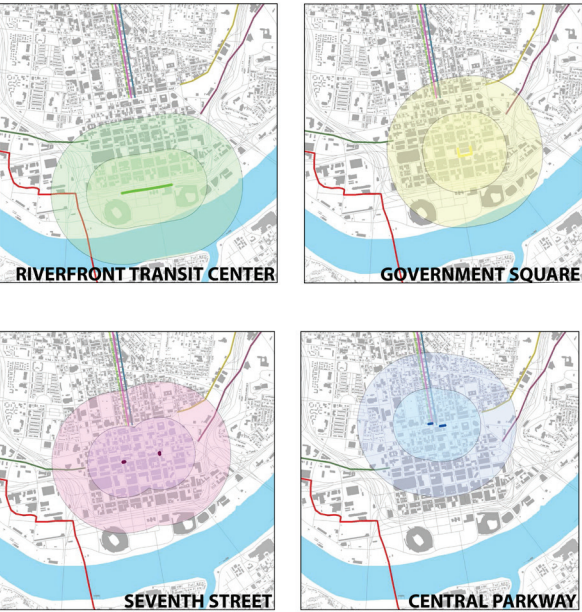
Downtown will function as the convergence point of the seven proposed BRT corridors. Right of Way (ROW) design and specific street types are proposed by students to better integrate the BRT into the existing downtown street grid and accommodate traffic through prioritized bus lanes and peak traffic adjustments. The aim is to seamlessly integrate the regional transit corridors within the downtown urban fabric.

The location and character of a centralized downtown BRT hub was seen as an important consideration. Of the alternatives (Government Square, Central Pkwy) the existing Riverfront Transit Center is recommended as the Downtown BRT Hub, but with improved amenities such as retail kiosks, bike accommodations, and others.



Downtown BRT Hub Location analysis

HUB OPTIONS



ANALYSIS MATRIXES

	Least Desirable				Most Desirable			
	RTC	Gov. Sq.	7th St	Central Pkwy	RTC	Gov. Sq.	7th St	Central Pkwy
1/2 MILE RADIUS								
Commercial	152	260	295	323	1.0	0.3	0.3	0.8
Institutional	23	34	38	37	4.0	2.0	2.0	3.0
Employment	49,049	61,511	63,189	48,507	1.3	0.3	0.3	1.3
Fortune 500s	5 of 6	6 of 6	6 of 6	4 of 6	0.3	0.3	0.2	0.3
PROJECTIONS								
Property Acquisition	n/a	landlocked	\$1.9 mil	\$1.7 mil	2.0	1.5	1.0	1.0
Investment	\$300 k	n/a	\$15 mil	\$15 mil	0.8	0.4	0.8	0.8
Capacity	500 bus/hr	67 bus/hr	60 bus/hr	40 bus/hr	9.5	4.8	4.6	7.2
TOTAL								

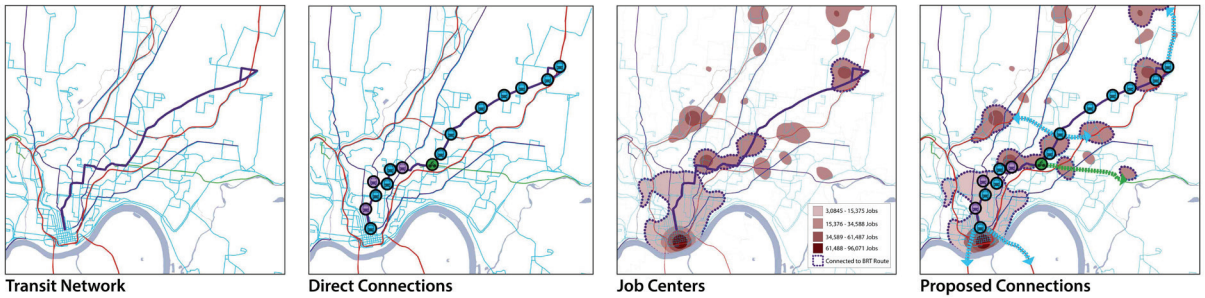
DOWNTOWN ROUTE TYPOLOGIES



Multi-modal Opportunities and Connections

Multi-modal opportunities were explored wherever bikeways and BRT lines were in proximity. The downtown BRT hub concept, in particular, accommodates the layering of transportation types with the convergence of the multiple BRT routes, regular bus routes, future streetcar lines, parking facilities, as well as bike trails and facilities. The proposed BRT hub in the existing riverfront transit center connects it with the adjacent riverfront bike hub that provides biking storage and comfort facilities as well as rental and bike-share programs.

Outside of the city center, design teams took advantage of the proposed Wasson Way Bike Trail which will become a rare and much needed east-west cross town connector. Wasson Way’s planned route intersects proposed BRT routes at three locations. Teams noted multi-modal bike-BRT hub possibilities within TOD proposals for Montgomery/Dana in the current Xavier University-Evanston redevelopment area, and at Madison/Edwards/Wasson in a re-visioning of a higher density future around this area which includes portions of the Rookwood Commons retail area. The Western Riverfront Trail took advantage of a parallel rail line to propose a new westside multi-modal commuter hub at Sedamsville.



Interconnectivity among modes along Montgomery Road





### Park and Ride Opportunities

Student teams recognized the importance of integrating the existing area travel habits present in suburban auto oriented lifestyles. Even in the existing metro polycentric structure, with strong retail/office clusters along the outer beltway, strong commuting patterns remain between outer suburban areas and the central employment areas. All of the BRT lines stretching into peripheral metro areas considered this opportunity.

The proposed Reading Road BRT, highlighted the potential for expanding the already high ridership of the existing Reading Rd. Bus line by recommending that a park and ride be developed at the outer terminus of the Reading Road Corridor. This concept leverages a location along the I-275 beltway with a park-ride facility and a future TOD build-out.



Montgomery BRT Park and Ride

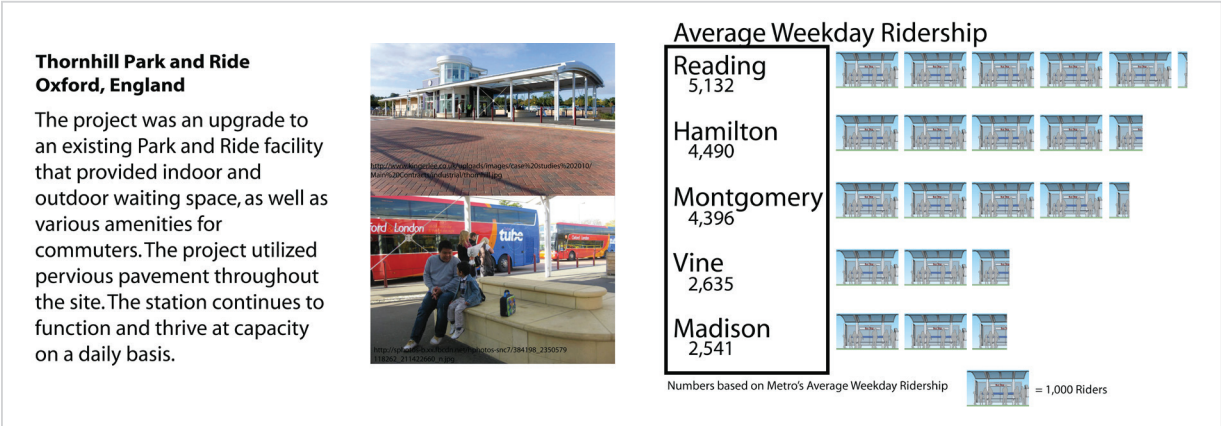
### Integrating Green Infrastructure

Infrastructure improvements within the public Right-of-Way allow for considerations beyond transportation which can address environmental issues. This includes measures to better manage storm water, ameliorate the urban heat-island effect, and sequester carbon and airborne particulates to improve air quality. Several BRT corridor proposals took advantage of this opportunity through shading and storm water infiltration with extensive tree planting and other landscape applications. Permeable paving on sidewalks was proposed to promote stormwater absorption on site. This applied not only to the BRT corridors but also to best practices in park and ride facility surface parking design.

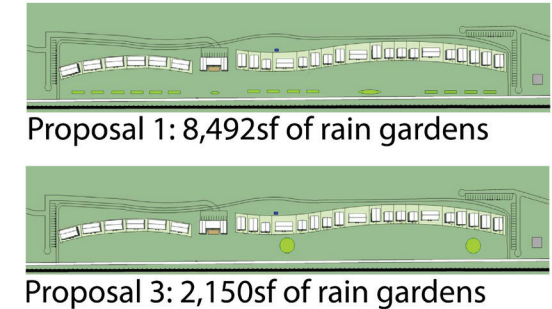
Along a portion of the Madison BRT line, the design team established a concept of a defined “green corridor” zone where green infrastructure applications could be matched to the existing conditions and quantified to show maximum impact. An extension of this concept points toward the pairing of BRT with “green” identity zones which might complement the perceived positive environmental aspect of transit and go further to contribute to the branding of BRT in Cincinnati.



Permeable Paving, Plant Shading, and Rain Gardens in Montgomery BRT Corridor Park and Ride



### LOHAS Rain Gardens



**Proposal 2: 4,300sf of rain gardens**

The rain garden can hold up to 29,604 gallons of runoff, 26% of total site runoff.

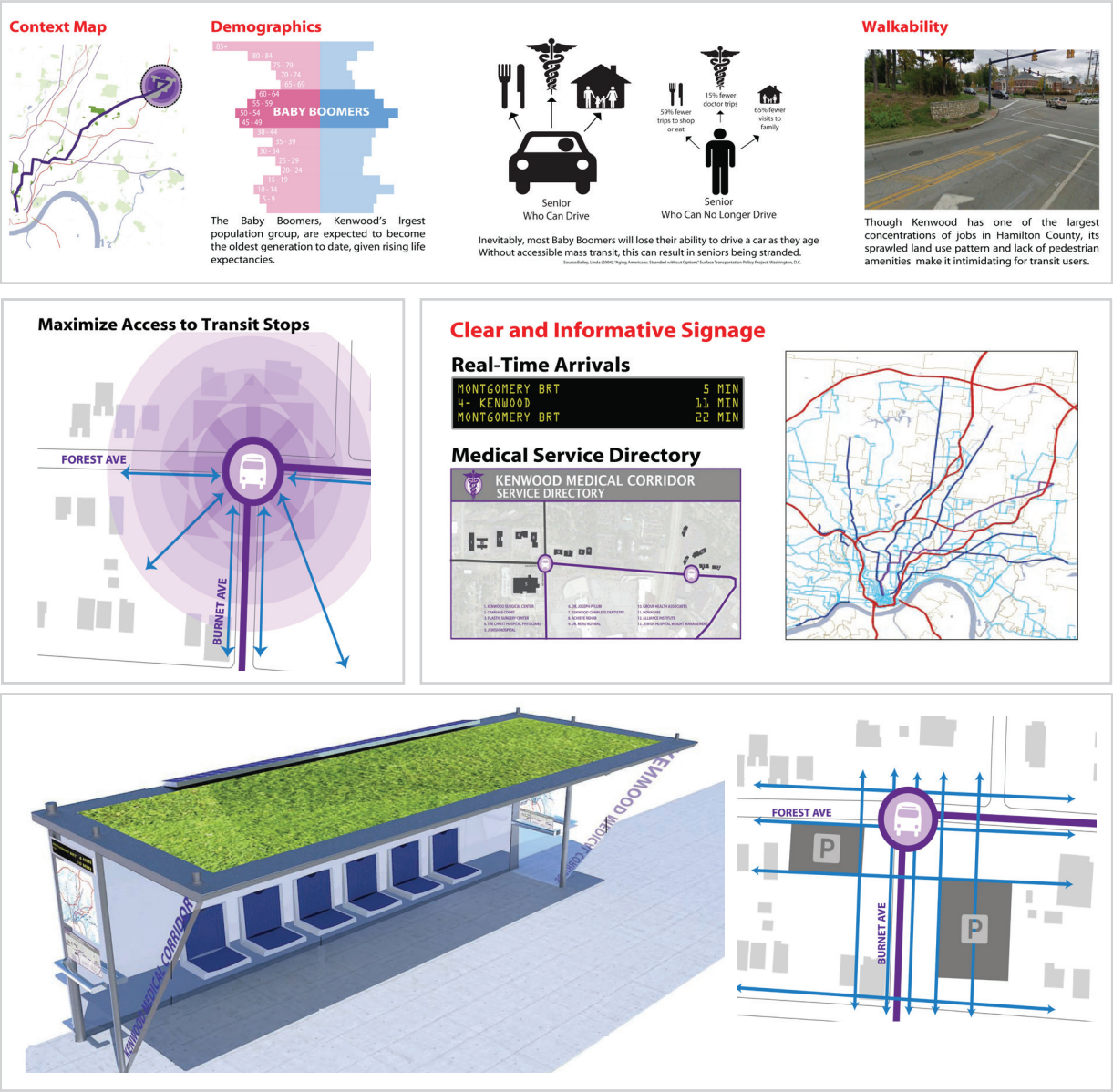
Stormwater Management at Wasson Way's Proposed LOHAS Community



Branding and Identity

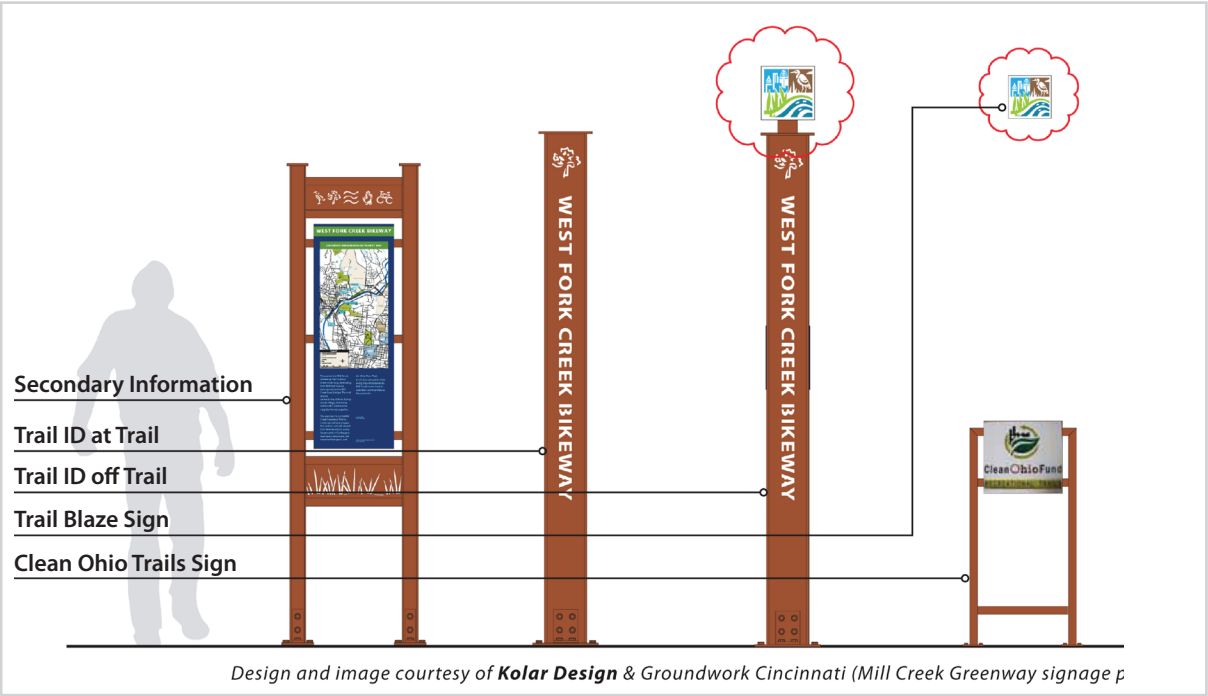
Appealing to both existing and potential new ridership is critical for BRT success. Likewise branding is important to educate potential users about the uses and benefits of bike trails. Accordingly, student teams spent substantial effort considering this dimension. Branding and identity could be realized at a number of ideally integrated scales including through the design of small scale components, such as signage, vehicles, shelters, to the highlighting of the uniqueness of a portion or entire length of a corridor.

The Madison BRT corridor included both branding for a segment of the line, e.g. “green corridor” area, but also for the corridor as a whole through its “Live-Work-Play” theme which sought to express the ability of residents to understand and experience a new accessibility to a full range of daily destinations afforded through the convenience of the new BRT.

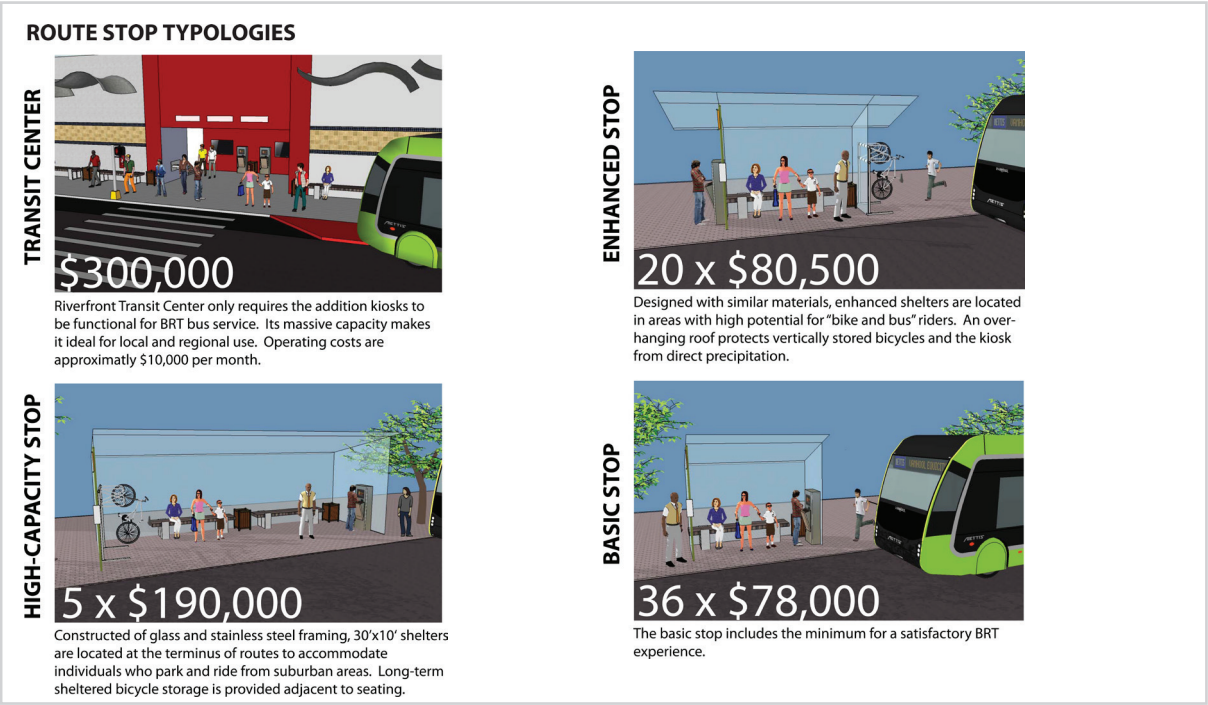


Analysis, Operations, and Branding for the Montgomery BRT Corridor “Health Line”

The Montgomery BRT corridor highlights the opportunity for connectivity among the health services in the growing Kenwood/Blue Ash area in particular. This proposal integrates a detailed branding scheme to capture the ridership of an aging demographic and respond to their needs. Along this line, a holistic approach incorporates senior friendly branding, signage and accommodations along with an educated familiarity with the assets of the “Kenwood Medical Corridor” that it could connect and weave together.



Sample Bikeway Wayfinding and Branding System



Language of Stop Types developed for Downtown BRT system



Public Space Concepts

The exploration of public space concepts was possible at many of the proposed BRT hubs. Ideas included integrating bus shelter infrastructure with public space amenities including services. TOD proposals often included a public space around hub locations as a defining place node for the development. Several BRT hub locations took advantage of adjacent underutilized space to create a defined public area. The Hamilton BRT corridor proposal for Northside identified an abandoned rail right-of-way (Vandalia) for a pedestrian promenade tied to the BRT hub.



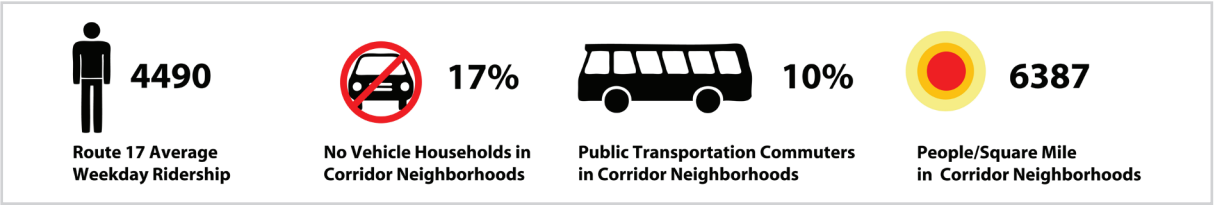
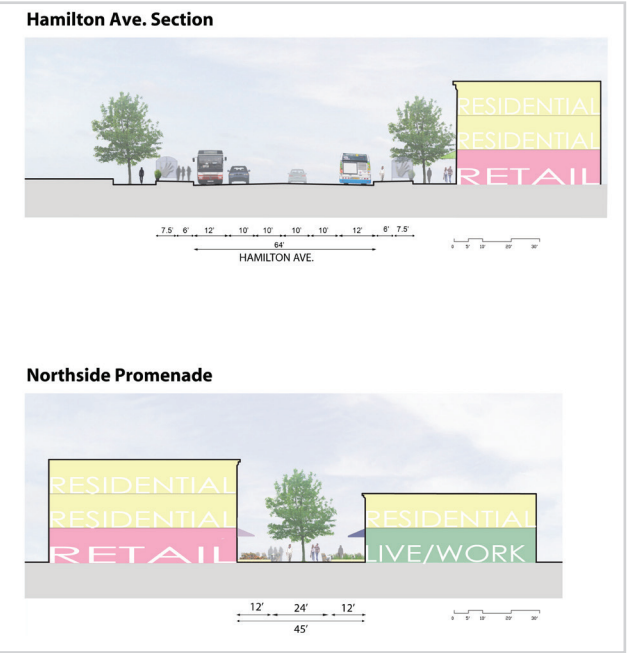
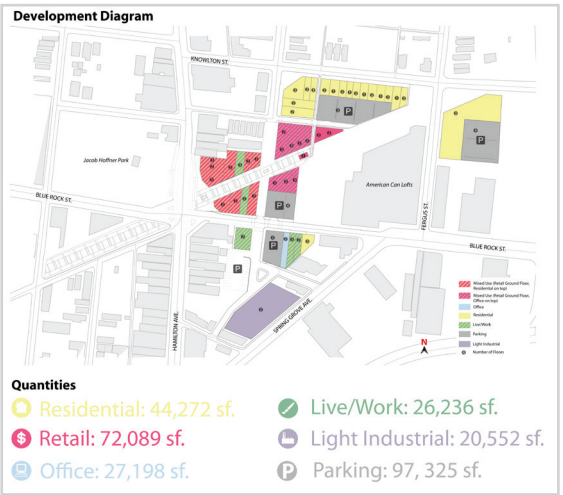
Hamilton Avenue Pedestrian Promenade and BRT Hub

Economic Development

Student teams explored how transit, and BRT in particular supports economic development on a number of levels. Among Cincinnati’s Neighborhood Business Districts (NBD’s) vehicular access and parking is limited because of historic build density, topography, and ROW dimensions. High capacity BRT lines promise more accessibility to consumers who might struggle with these barriers to auto accessibility as well as for those riders who do not own cars. Likewise, better accessibility to a remote workplace can be accommodated by BRT and this supports a continued residential population as a consumer base in these NBD’s.

The Hamilton Avenue BRT proposal highlights adaptations necessary to accommodate BRT at the center of the historic Northside Business District including attention to infill character for an appropriate mix of uses that complements its built form and neighborhood character. On the Reading Road BRT corridor, the presence of a BRT at a vacant former commercial area at Seymour (Jordan Crossing) may spur the necessary redevelopment of this underutilized site.

Hamilton Avenue BRT Hub land use and form concepts

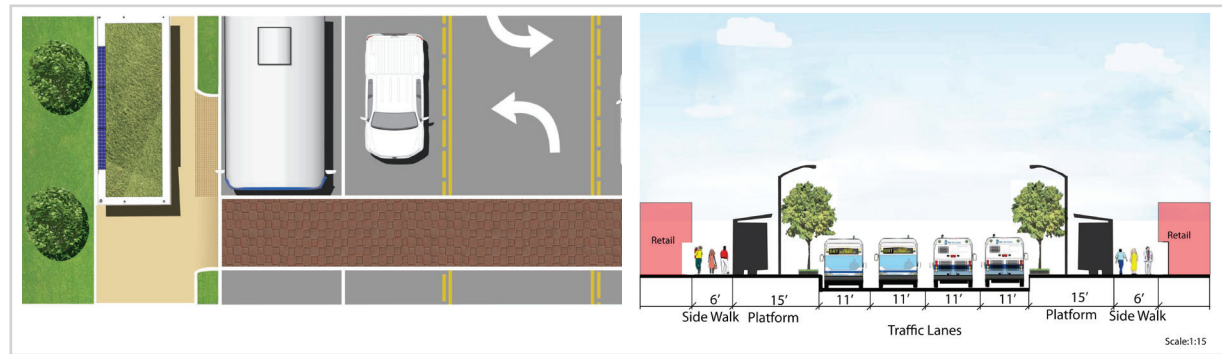




Innovative Technical Solutions for Bus Rapid Transit

A variety of technical applications were incorporated into Team BRT planning . These included traffic-BRT coordination, Priority signalization, detailed ROW design, and others. Some of the areas of study were detailed travel lane design, peak hour lane alternation, turning radius modifications, and pedestrian safety considerations.

The design team for the Vine Street BRT line developed alternative methods to improve BRT-auto traffic circulation at key points of anticipated congestion. The student team for the Madison Avenue Corridor BRT proposal not only evaluated the existing conditions of the proposed corridor, they continued the analysis through a standardized evaluation for BRT corridors developed by the Institute for Transportation and Development Policy. The application of this BRT Standard of 2012 profiled the strengths and weaknesses within the corridor design across broad criteria. The findings were incorporated with opportunities for performance improvements.



BRT ROW Design

BRT Transit Hub Station Details

### Station Design and Station Bus Interface

Category	Max Score	Score Obtained	Oberlinville	HydePark/Rockwood	De Sales Corner	Oakley Station	Madisonville	Green Corridor	30 Year Extreme
Platform Level	6	6	6	6	6	6	6	6	6
Safe and Comfortable Boarding	3	0	0	1	0	3	0	3	3
Number of Doors on Bus	3	3	3	3	3	3	3	3	3
Docking Bays and Sub-Steps	2	0	0	0	0	0	0	0	0
Sliding Doors in BRT Stations	1	0	0	0	0	1	0	1	1
Sub Total	15	9	9	12	9	13	9	13	13

### Integration and Access

Category	Max Score	Score Obtained	Oberlinville	HydePark/Rockwood	De Sales Corner	Oakley Station	Madisonville	Green Corridor	30 Year Extreme
Universal Access	3	3	3	3	3	3	3	3	3
Integration with Other Public Transport	3	2	2	2	2	2	2	2	2
Pedestrian Access	3	2	3	3	3	3	3	3	3
Secure Bicycle Parking	2	1	0	0	0	0	0	0	0
Bicycle Lanes	2	1	0	1	0	2	0	1	2
Bicycle Sharing Integration	1	0	1	1	1	1	1	1	1
Sub Total	14	9	11	12	11	13	11	9	13

### Infrastructure

Category	Max Score	Score Obtained	Oberlinville	HydePark/Rockwood	De Sales Corner	Oakley Station	Madisonville	Green Corridor	30 Year Extreme
Busway Alignment	7	1	1	1	1	1	1	1	1
Segregated Right-of-Way	7	1	1	1	1	1	1	1	1
Intersection Treatments	6	1	2	2	2	2	1	2	2
Parking Lanes at Stations	4	0	0	0	0	0	0	0	0
Minimizing Bus Emissions	4	4	4	4	4	4	4	4	4
Station Set Back from Intersections	3	2	3	3	3	3	3	3	3
Center Stations	3	0	0	0	0	0	0	0	0
Pavement Quality	2	1	2	2	2	2	2	2	2
Sub Total	36	10	13	25	13	29	12	23	30

### Service Planning

Category	Max Score	Score Obtained	Oberlinville	HydePark/Rockwood	De Sales Corner	Oakley Station	Madisonville	Green Corridor	30 Year Extreme
Off-Board Fare Collection	7	6	6	6	6	6	6	6	7
Multiple Routes	4	0	0	0	0	0	0	0	0
Peak Frequency	4	1	1	1	1	1	1	1	1
Off-Peak Frequency	3	1	1	1	1	1	1	1	1
Express, Limited, Local Services	3	2	2	2	2	2	2	2	3
Control Center	3	3	3	3	3	3	3	3	3
Leveled or Flag Van Corridors	2	2	2	2	2	2	2	2	2
Hours of Operation	2	1	1	1	1	1	1	1	2
Multi-Corridor Network	2	2	2	2	2	2	2	2	2
Sub Total	30	18	18	18	18	18	18	18	26

### Passenger Information Systems

Category	Max Score	Score Obtained	Oberlinville	HydePark/Rockwood	De Sales Corner	Oakley Station	Madisonville	Green Corridor	30 Year Extreme
Branding	3	2	2	2	2	2	2	2	3
Passenger Information	2	2	2	2	2	2	2	2	2
Sub Total	5	4	4	4	4	4	4	4	5

### Deductions

Category	Max Score	Score Obtained	Oberlinville	HydePark/Rockwood	De Sales Corner	Oakley Station	Madisonville	Green Corridor	30 Year Extreme
Low commercial speeds, minimum average commercial speed below 10mph	-10	0	0	0	0	0	0	0	0
Peak passengers per hour per direction below 1,000	-1	0	0	0	0	0	0	0	0
Lack of enforcement of right-of-way	-1	0	0	0	0	0	0	0	0
Significant gap between bus floor and station platform	-1	0	0	0	0	0	0	0	0
Station encroaches on sidewalk or busway	-3	-3	-3	-2	-3	0	-3	-2	0
Overcrowding	-1	0	0	0	0	0	0	0	0
Poorly maintained buses and stations	-3	0	0	0	0	0	0	0	0
Distance between stations too long or too short	-2	-2	-2	-2	-2	-2	-2	-2	-2
Deduction Total	-36	-10	-10	-9	-10	-7	-10	-9	-2

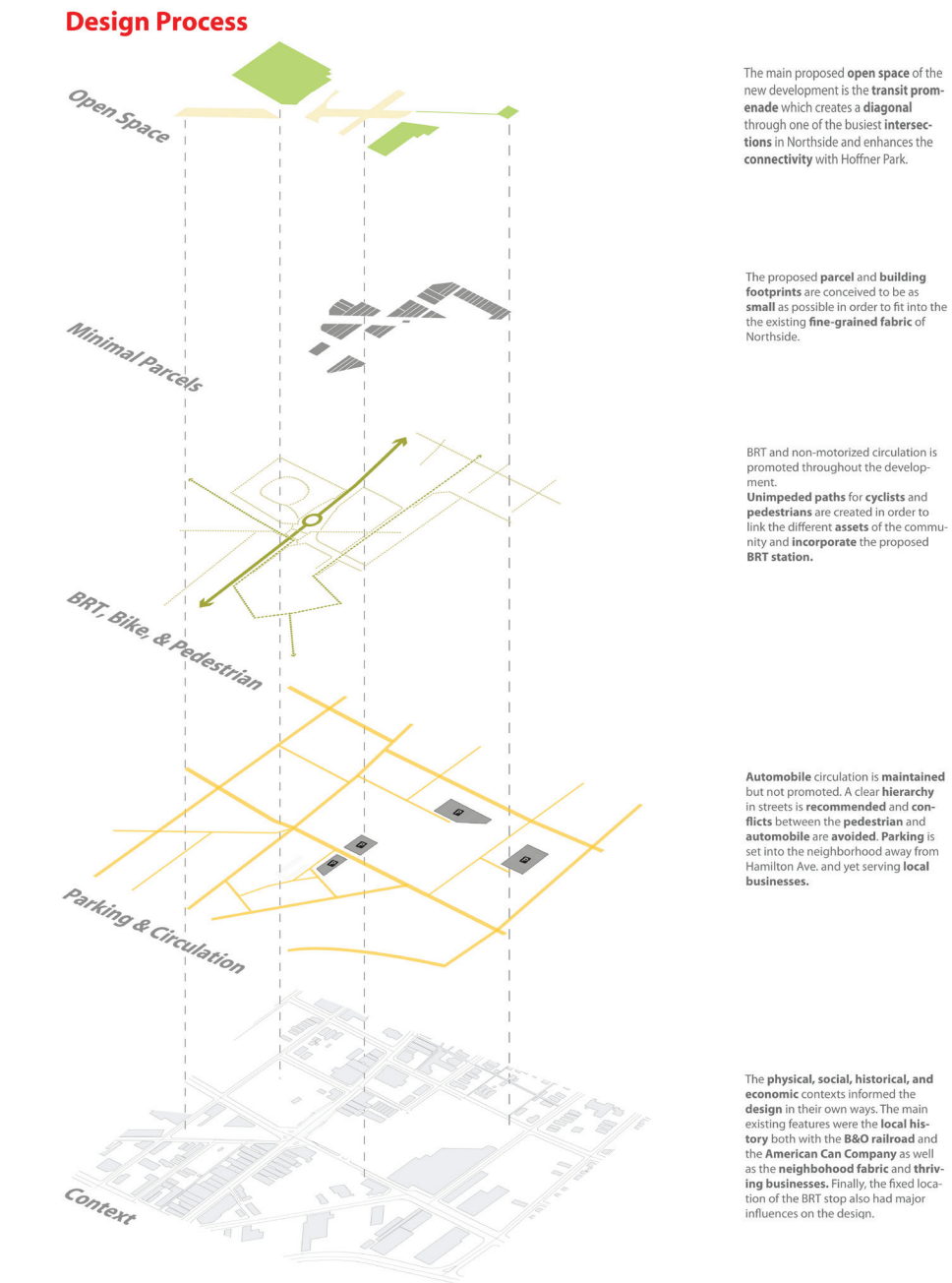
### Service Planning

Icons for Gold BRT points or above, Silver 75-90 points, Bronze 50-60 points, and a 'ONLY' bus sign.

BRT Corridor Rating System

Integrating BRT with Existing Neighborhood

The Hamilton Ave Corridor proposal reinforces the Transit Oriented Development capacity of the existing walkable Northside Neighborhood Business district. Referencing the past industrial history of Northside, the urban design concept integrates a vacant railroad right-of-way as a public promenade lined with mixed-use retail and residential development directly adjacent to the proposed BRT corridor.



Northside Neighborhood Business District Context analysis

### Bike Oriented Development (BOD)

In the same way that BRT supports Transit Oriented Development, Bike trails have the potential to support Bike Oriented Development (BOD). This was expressed by several design teams including the Wasson Way trail team which included a Bike trail spur integrated into new dense mixed use development at Hyde Park Plaza. The Wasson Way team also explored an innovative BOD idea that stemmed from an understanding of the lifestyle of biking. The Neyer Development plan, part of the Western Riverfront Greenway Proposal, identifies opportunities for connections and improvements to the Sedamsville Business District. This plan builds on existing business and creates a recreational connection between the riverfront and the adjacent business district.

The Hyde Park Plaza BOD, part of the Wasson Way Corridor, capitalizes on opportunities to redevelop a typical auto oriented retail plaza into a mixed-use, multi-modal, transit-oriented development. The proposal identifies multiple connections to nearby green spaces and the potential for layering multiple transportation options.

The Wasson Way Proposal highlights the opportunity for synergy between residential development and bike way planning. The project integrates a community that promotes Lifestyles of Health and Sustainability or LOHAS along the bike path. The residential development is a unique opportunity to actively demonstrate opportunities for bike oriented development and sustainability.



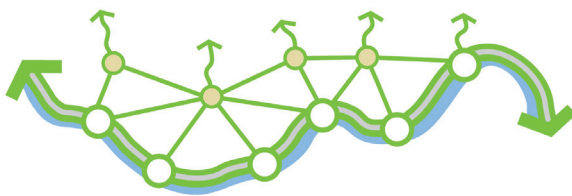
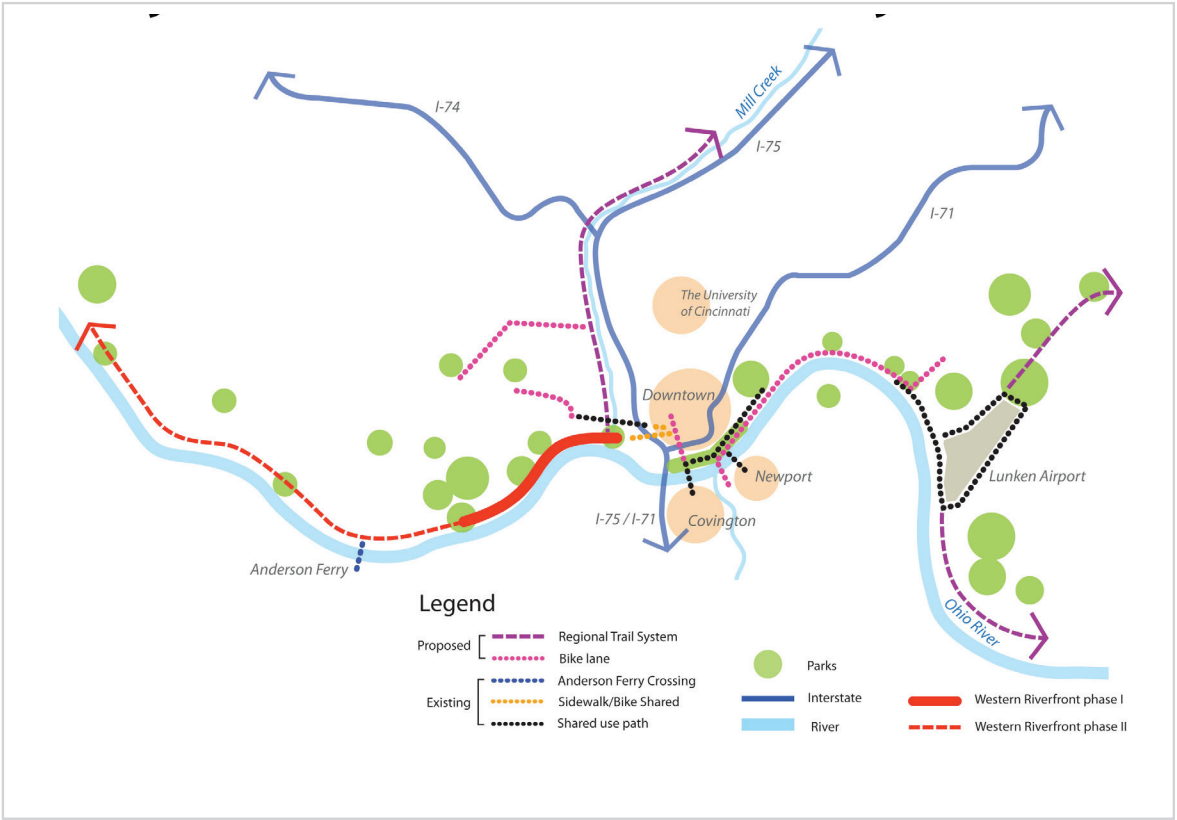
LOHAS community concept for Wasson Way in Mariemont

### Local and Regional Connections

While BRT corridors operate to strengthen regional connections among the existing roadway network, new bikeways create opportunities to create completely new movement networks.

The Wasson Way Trail is a new east-west connector that has the potential to connect to both citywide bikeways and regional bike trails. The connections include the local Mill Creek Trail and the 72 mile regional Little Miami Bike Trail that offers connections to the statewide Ohio-to-Erie Trail. The Western Riverfront Trail will connect previously inaccessible riverfront areas through the central business district to the same regional Little Miami Bike Trail.

Within the city, all three proposed bikeways will connect residential areas to commercial service and workplace zones and also function to connect natural resources, parkland, and institutional assets at the level of the pedestrian and biker.

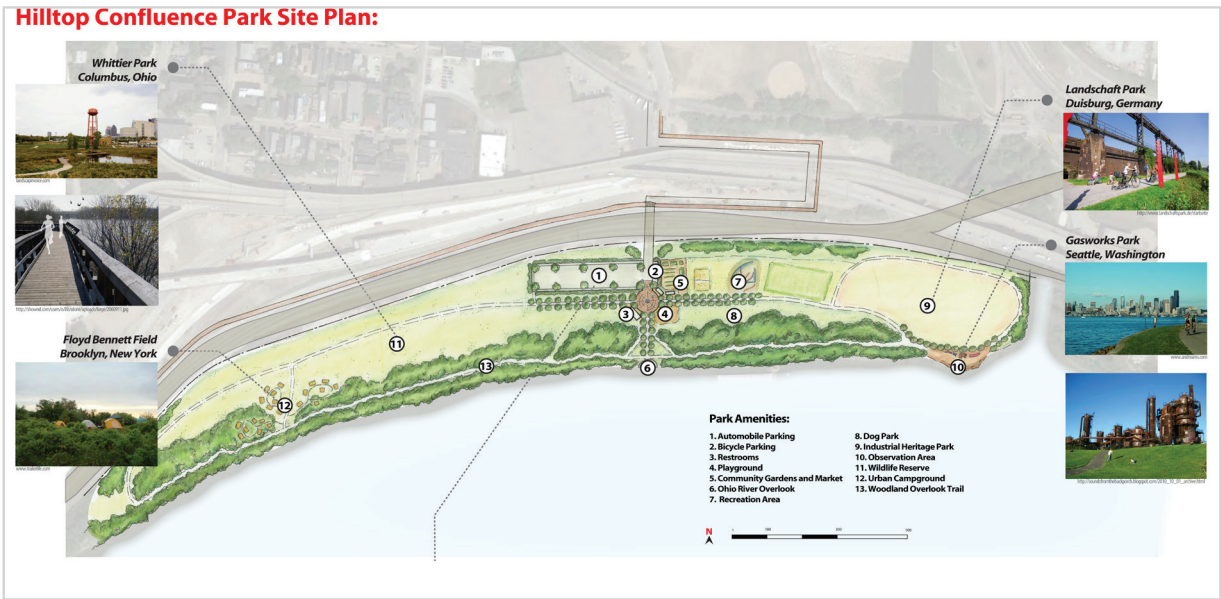
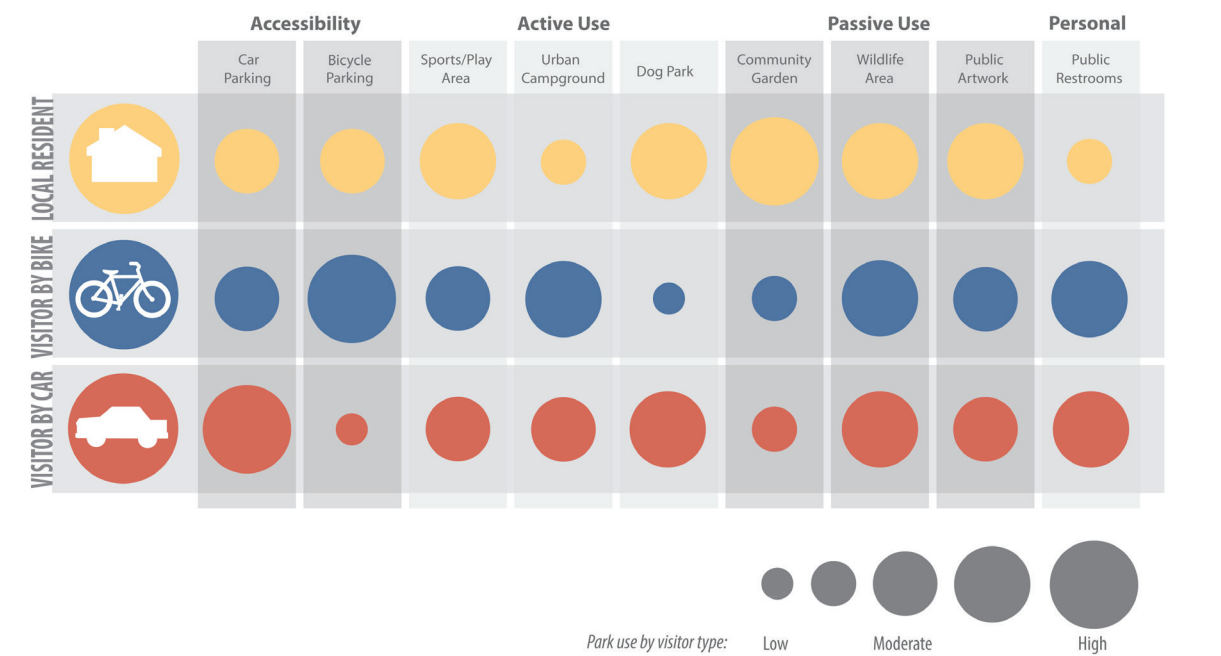


Connectivity promoted by the Western Riverfront Trail



Public Greenspace Development

As bike trials promote the connection of existing public greenspace, they also allow the possibility of making accessible property for new parks and public spaces. A key aspect of the Western Riverfront Trail is the creation of a new riverfront park space that serves both bikers and the adjacent community of Lower Price Hill. This is a proposed community park at the confluence of the Mill Creek and the Ohio River and is envisioned as a public amenity to provide a destination for both passive and active programs, including a unique urban camping area for long distance bikers.



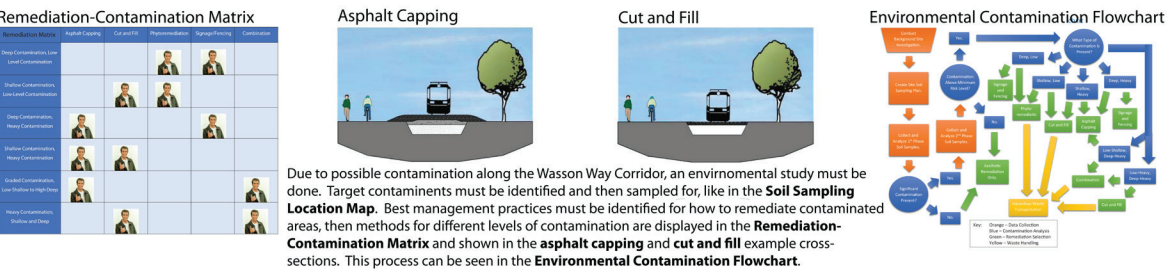
Green Space Concept and Programming for the Western Riverfront Trail

Innovative Technical Solutions and Infrastructure for Bike Trails

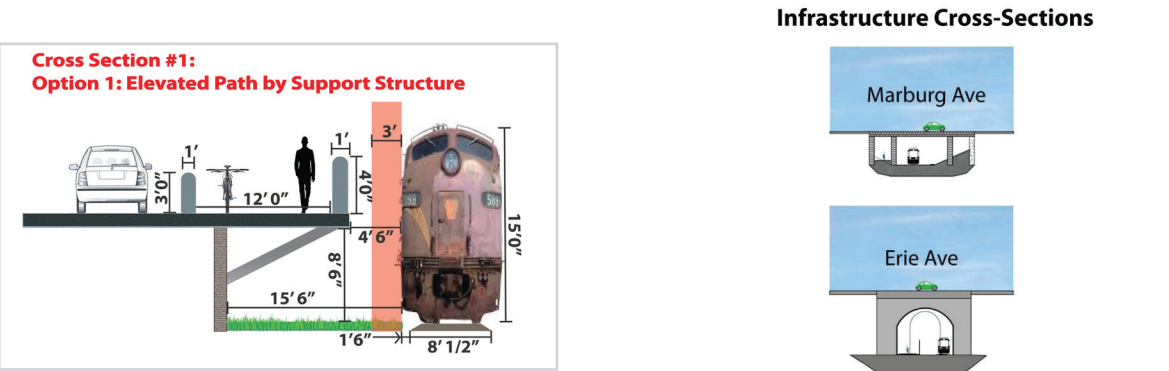
Bike trail design introduces a variety of technical challenges, especially where the Trail occupies current or future rail lines that are not currently accessible to pedestrians.

All three student bike trail proposals incorporate important infrastructure improvements that include pedestrian accessibility measures to overcome topographic barriers, shared pedestrian-bike bridges over road and water ways, at-grade bike trail crossings, and the design of comfort facilities for bikers.

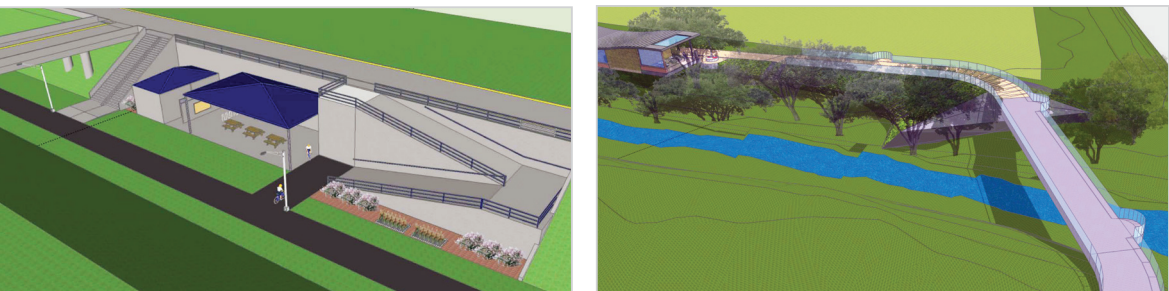
Both the Western Riverfront Trail and Wasson Way must also accommodate existing rail lines and a future LRT line respectively. Both project designs took into consideration required clearances and separation options that would allow the two modes to co-exist.



Environmental Remediation Method for Former Rail Lines along Wasson Way



Rail and Bikeway alignments for Western Riverfront Trail and Wasson Way



Access and comfort Station at Wasson Way

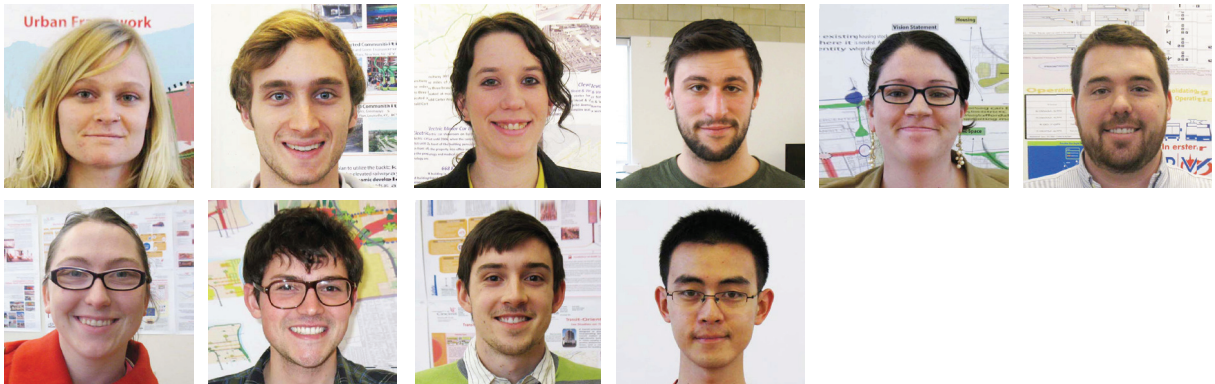
Bridge and Bike Center at West Fork Creek Trail



ENGINEERING STUDENTS



PLANNING STUDENTS



FACULTY



OPEN HOUSE







# Niehoff **Urban** Studio

College of Design, Architecture, Art and Planning  
University of Cincinnati

2728 (Short) Vine Street | Cincinnati, Ohio 45219

(513) 556-3282 | [design.center@uc.edu](mailto:design.center@uc.edu) | [www.uc.edu/cdc](http://www.uc.edu/cdc)



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