

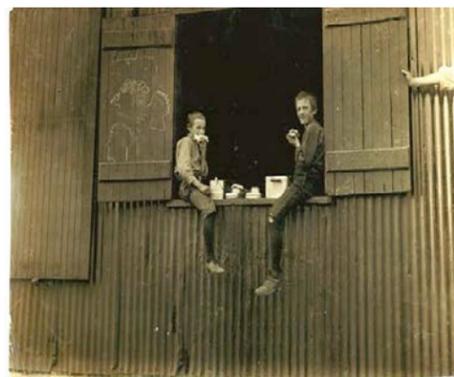
Executive Summary

Purpose

Nestled along the Monongahela River, Morgantown, West Virginia is no stranger to transportation obstacles. In the earliest times since settlement, the Town suffered from lack of transportation options. Harsh winters closing roads and an untamed river sought for little growth in the area. The year of 1886 brought major changes to the area including railroad and a series locks and dams taming a then wild river. These transportation options opened trading to nearby major cities and bolstered the economy for the area with large industrial facilities. A year later Morgantown gained additional reasoning for growth with the birth of West Virginia University. The University has continued to attract applicant's nationwide offering courses of study in education and medicine. The influx of jobs and education options sparked growth for the community. By 2010, 28, 827 people call Morgantown home. Proper planning for future growth is indicative to support the needs and of this diverse community.

The Town of Morgantown undertook the development of a Corridor Study for University Avenue (from Patterson Drive to Beechurst Avenue). The corridor area spans for 1.9 miles and is immensely diverse in land use and appearance including commercial nodes near the southern termini changing to a campus and residential setting along the way to a commercial center at the north. Along with diverse uses demands on the streets are diverse with sidewalks, public transportation and bicycles all moving through the public rights-of-way. The overall goal of the project is to improve the corridor for safer and smoother automobile, pedestrian and bicycle flows. The improvements will also create a more aesthetically pleasing environment that supports residents and the future development.

“The Goal of our project is the promotion of safe, beautiful and more efficient travel for every user in the University Avenue Corridor, and in so doing support existing communities as well as promoting favored redevelopment in the future.”

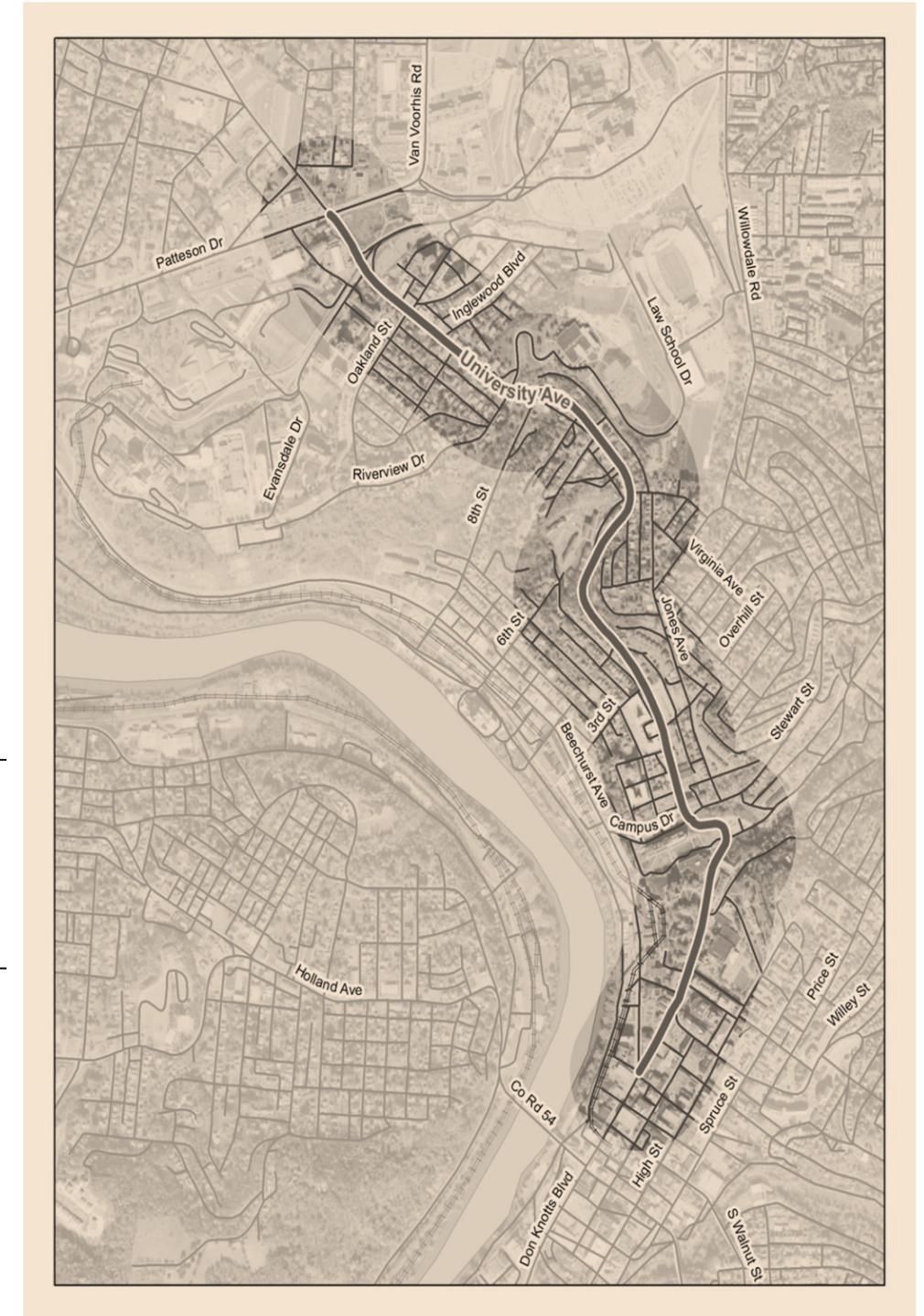


Economy Glass Works, 1908

- Source: Lewis Hine, LC-DIG-nlc-01178, Library of Congress Prints & Photographs Division, Washington, DC, 20540



Photo taken in front of Commencement Hall, removed in 1965 to make way for the Mountainlair Student Center in front of Grumbein's Island on University



Project Study Area

Performance

Understanding the demographics and dynamics of an area build recommendations that are best suited for the community. The University Corridor is dominated by students from West Virginia University and they rely heavily on walking, biking and public transportation to and from campus. A Quality Level of Service was completed to understand how the corridor currently operates for multi-modes of travel. The study indicated that areas along the corridor scored comparatively lower to others area due to the lack of sidewalks, shoulders widths and dedicated bicycle travel facilities. The bicycle score would be markedly worse if the travel speeds were higher on the roadway, but could be much improved if wider shoulders or separation existed between the roadway and the bicycle path of travel. Fairly high transit frequencies contribute to a good score, although better stop facilities/amenities would elevate the score still higher.

Mode of Travel	University Avenue			
	Northbound	Southbound		
Pedestrian	4.5	E	3.5	C
Bicycle	4.2	D	4.2	D
Transit	4.7	B	5.7	B

Multimodal Quality/Level-of-Service (Existing) – Numeric Scores Reflect Sidewalk Quality Based on a Number of Factors, such as Sidewalk Width and Condition, Pavement Condition, and Presence of Amenities

A similar study was completed for vehicles to understand how volumes of traffics are being handled within the study area. Results indicated the portions of University Avenue as well as other area roadways are experiencing extensive degrees of congestion. The 8th Street/University Avenue intersection and the College Avenue/University Avenue intersection encounter substantially more delay than any other location studied. All of this information was used to help identify issues and design specific solutions during the analysis phase of the study.

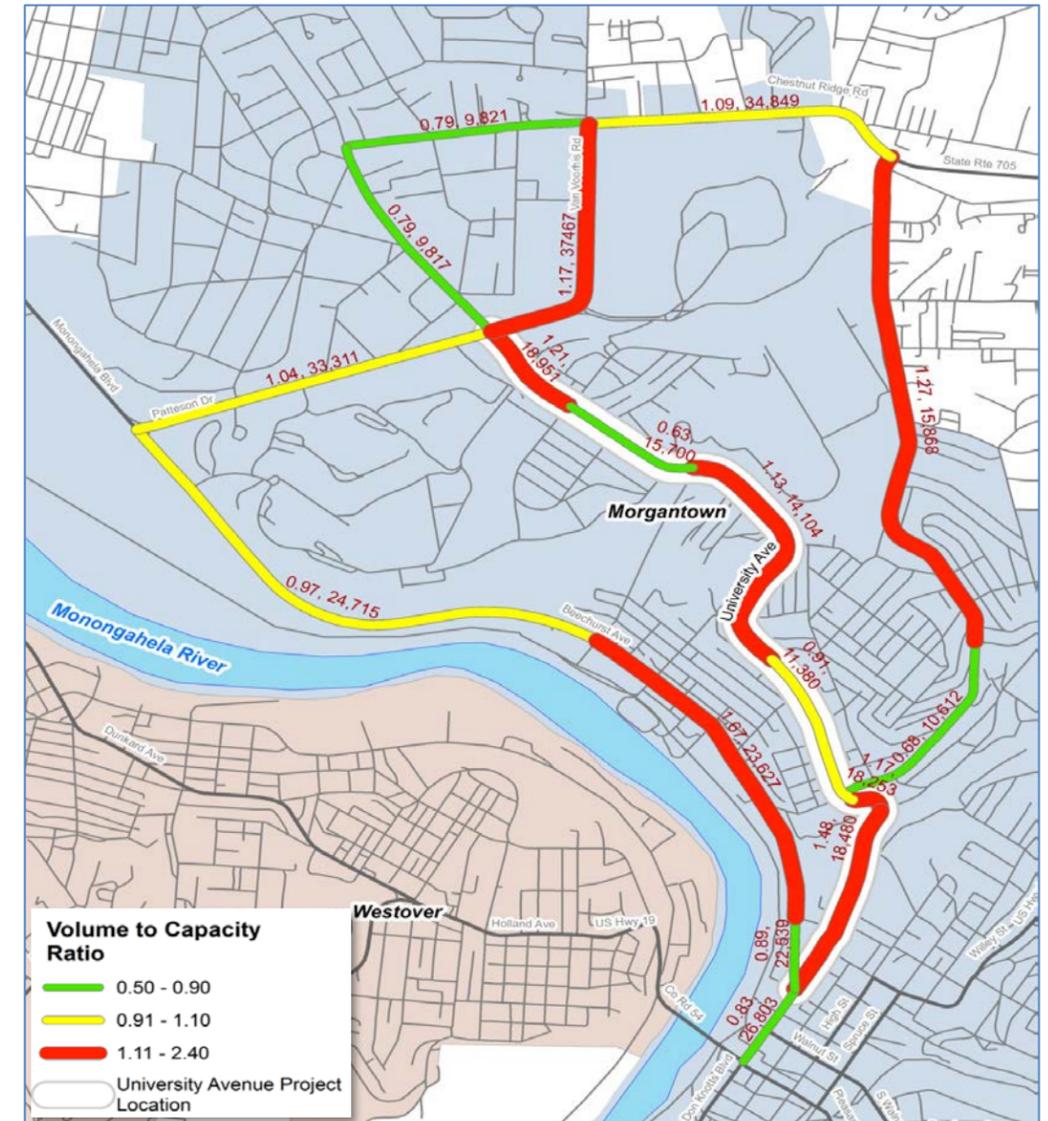
18%

of work trips in Morgantown are made by walking

Past Planning Efforts

A review was completed of past, adopted plans and policies that may influence recommendations stemming from the current study. The following are plans/policies reviewed and considered during the development process :

- City of Morgantown Comprehensive Plan (2013)
- City of Morgantown Downtown Strategic Plan (2010)
- City of Morgantown Pedestrian Safety Plan (2010)
- City of Morgantown Bicycle Plan (2012)
- Greater Morgantown Metropolitan Planning Organization Complete Streets Plan (2008)
- Feasibility Study for Grumbeins Island (2011)
- Morgantown Monongalia MPO Long Range Transportation Plan (2012)
- Morgantown Monongalia MPO Bicycle Plan (2013)
- University Avenue Pedestrian Crossing Project



Roadway Vehicular Capacity compared to Volume (V/C Ratio) – green indicates capacity to spare, red indicates operating over capacity.

Complete Street Framework

The premier challenge of this project is balancing the needs of the community in a confined physical space. Though the project carries constraints, it is important to recognize that all streets serve a combination of functions, all of which are intimately tied to the travelway, pedestrian, and building zones. The basic context zones of streets help define the role of the street and its design throughout its lifecycle.

A core assumption was gaining an understanding of the latest thinking of how properties in the vicinity of University Avenue would develop and re-develop. Anticipating future development is always challenging, but the assumptions used in the Study relied on the input of professional planners and businesspeople that work with proposed development actions every day. The project team also considered how existing development parameters like building setbacks from the street, allowable heights/density, design elements (e.g., to encourage and support walking and transit use) and market forces might change demands on University Avenue.

The consultant was tasked with working with the City to develop a **corridor overlay district** that may include regulatory measures such as right-of-way encroachment measures, access management guidelines, spacing standards and protocols for development and redevelopment. Early coordination resulted in identifying a number of refined objectives:

1. A primary concern is to arrange setbacks (or build-to lines) to accommodate future widening of the roadway and intersections in the corridor.
2. Manage intersection spacing and driveway spacing to help preserve roadway capacity and reduce crashes and crash-related delays.
3. Consider existing zoning and future zoning in terms of the impacts to the demand for roadway capacity, in part conducted through an independent future year assessment in *CommunityViz™* software.
4. Address how future commercial nodes of development in the corridor might differ from each other with respect to design, density, and range of services/products offered to the community.

Complete Streets Basic Context Guide

Three Context Zones...

- Defined by the overall environment and framework of the corridor
- Stresses context-specific treatment for three primary areas:
 - Building form and massing
 - Pedestrian space and design treatments
 - Travelway modal integration (bike, transit, vehicular)



1. Travelway Zone

- Defined by the edge of pavement or curb line that traditionally accommodates the travel or parking lanes needed for vehicles in the transportation corridor
- Recommendations focus on modes of travel and medians
- Travelway zone focuses on two objectives:
 - Achieve greater balance between travel modes sharing the corridor
 - Promote human scale for the street and minimize pedestrian crossing distance



2. Pedestrian Zone

- Extends between the outside edge of the sidewalk and the face-of-curb located along the street
- Quality of the pedestrian realm is achieved through four primary areas:
 - Continuous pedestrian facilities (on both sides of the road if possible) to maximize safety and mobility needs
 - High-quality buffers between pedestrians and moving traffic
 - Safe and convenient opportunities to cross the street
 - Consideration for shade and lighting needs



3. Building Zone

- Define and frame the roadway
- Building scale and massing focus on two areas:
 - Orientation (setbacks, accessibility, etc.)
 - Design and architectural character (height, etc.)



Managing Growth: Generalized Overlay District

The purpose of an overlay district for all portions of the studied corridor should be to ensure that the character of the University Avenue Corridor retains and promotes historical character; creates desirable economic growth through infill development and redevelopment; and preserves transportation mobility and safety for every type of user while promoting a density and complementary mix of uses that support fixed-route transit service. This information is provided as a policy directive, but is not adopted as part of any overall ordinance changes by the City of Morgantown. Additional review through the normal process required of ordinance revisions will be required to refine and adopt the final language into the code of ordinances.

The University Avenue Overlay District (“District”) should be comprised of two tiers and two segments, as defined as follows:

Segment A: University from Beechurst Ave to Campus Drive

Segment B: North Street to WV 705 (Patterson Ave)

Areas designated as Commercial Nodes should have specific requirements adopted as part of this overlay district, with the specific purpose of creating high-quality, integrated development patterns that support commercial activities targeted towards the area’s residents and employees. Potential provisions that should be pursued under the overlay district include: Frontage Design, Retail Frontage, Awnings and Galleries, Vista, Cross-Block Passage, Building Preservation, Corner Lot Frontages, Height, Off-Street Parking, Bicycle Parking and Signage.

Provisions to be considered for Tier 1 and 2 include: Building Aesthetics, Pedestrian Scale Lighting, Off-Street Parking Relocation, Street Trees and Driveway Spacing.

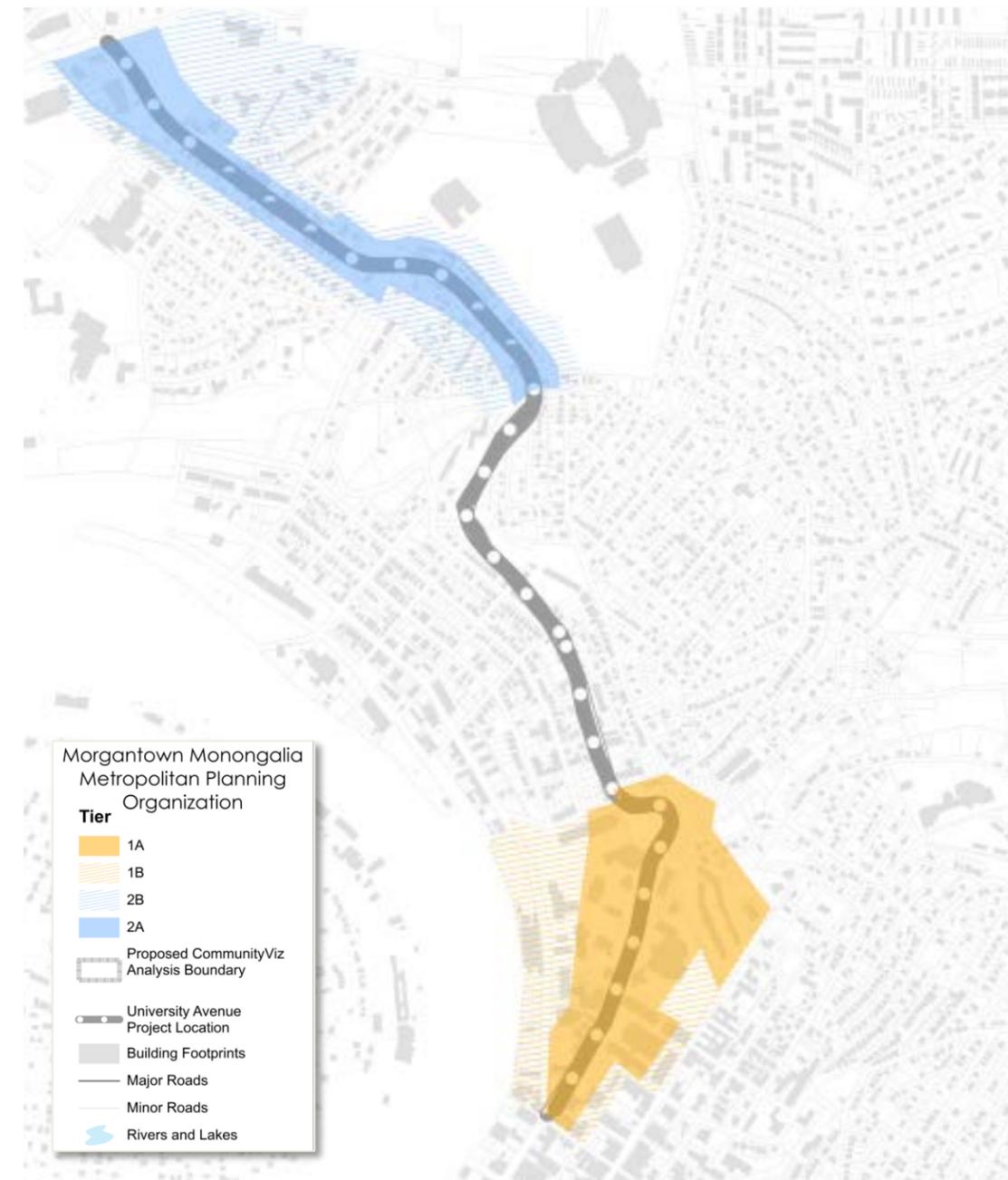
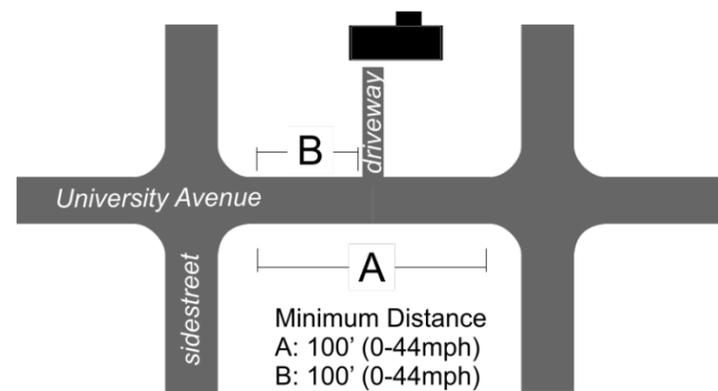


Figure 1. Tiered Overlay Districts

Development Status and Impacts

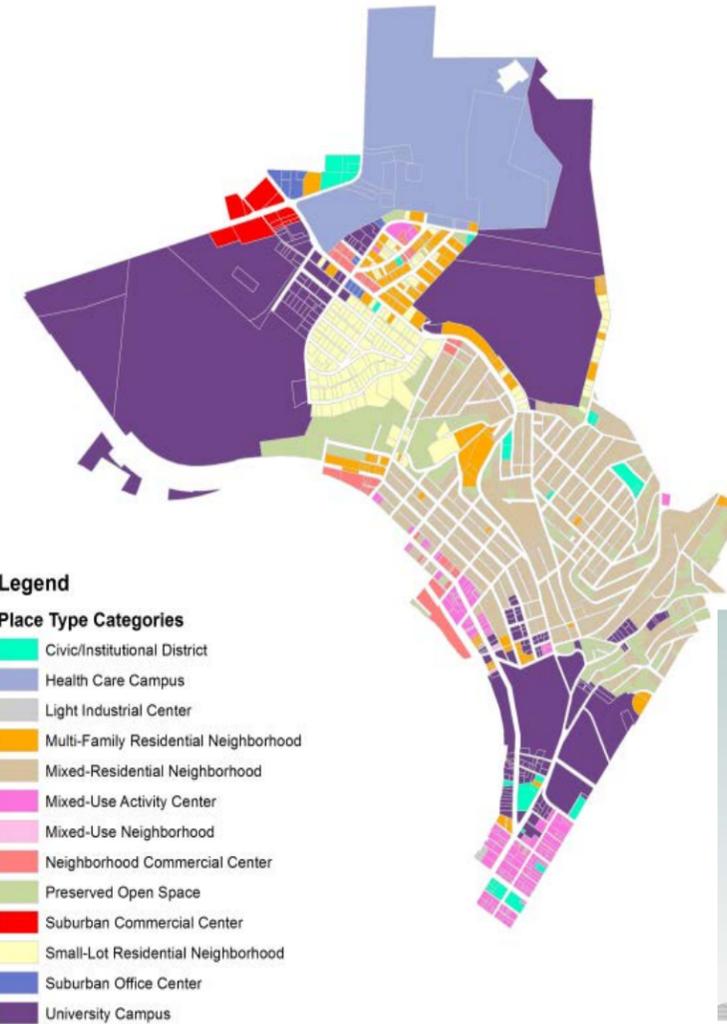
CommunityViz™ scenario planning software used during the development to evaluate impacts related to future development. Based on these results of the scenario planning, the development/redevelopment is expected to have a profound impact to the study area. Population is expected to double within the study area, mainly due to the 150% increase in multifamily dwelling units. Total employment should increase a moderate 15% due to the influx of office, institutional and retail. Impacts to infrastructure may be minimal with the total peak hour trips generation of approximately 3,500 PM trips. Water and sewer demand increases by 2.15 MGD and 1.86 MGD, respectively.

Design Considerations

The development of recommendations for University Avenue begins and, in some respects, ends with the constraints imposed by both the width of the available right-of-way and the often-steep topography. These conditions, coupled with heavy and increasing usage of the corridor, contribute to higher crash rates as well as concerns both on and near the University Avenue Corridor. Overall, this study recommends several laneage improvements to a select number of intersections along University Avenue.



Profile (Grade) on University Avenue West to East



- Legend**
- Place Type Categories**
- Civic/Institutional District
 - Health Care Campus
 - Light Industrial Center
 - Multi-Family Residential Neighborhood
 - Mixed-Residential Neighborhood
 - Mixed-Use Activity Center
 - Mixed-Use Neighborhood
 - Neighborhood Commercial Center
 - Preserved Open Space
 - Suburban Commercial Center
 - Small-Lot Residential Neighborhood
 - Suburban Office Center
 - University Campus

Land Use Place Types



Grumbein's Island

This area of University Avenue in front of Mountainlair Plaza, has been a continual frustration for all local stakeholders. WVDOH owns and operates this section of the roadway. Over 18,000 vehicles per day conflict with thousands of pedestrians crossing the street to reach the Mountainlair student center. Many previous planning studies have been completed in the past on this area. Three design options were reviewed in the Plan. Two of the options are from previous feasibility studies and the third is a new design for consideration. The three options considered for this area include:



Option #1: Pedestrian Plaza Bridge/Tunnel Separation. A feasibility study was conducted by Alpha Associates in 2011. The study was commissioned by WVU and the Morgantown Monongalia Metropolitan Planning Organization (MMMPO). The analysis included several options for a grade separation for the plaza that would essentially separate pedestrian and bicycle flow from vehicular traffic. The study includes pedestrian and traffic data collection, seven grade-separation alternatives and cost estimates. Average construction cost is \$10.4 million.



Option #2: Pedestrian "Open Space" Intersection. The WVU commissioned another study in 2014 to evaluate a less costly alternative for addressing the problems at Grumbein's Island. This alternative concept is called an "Open Space" intersection, much like the European style intersection that allows free movement by all modes. The premise is simple. Grumbein's Island would be redesigned to act like a large courtyard, free of obstructions, signage and barriers. Vehicles, pedestrians, bicyclists and buses would interact freely. Right of way would not be dictated by a traffic signal, sign or barrier. That said, travelers, whether by four wheels, two wheels or by foot would pass through the area on a first come, first serve basis. Average construction cost is \$5 million.



Option #3: Pedestrian "Raised Intersection" Gateway (Preferred)

A third option was developed as a part of the public design workshops conducted in September 2015. Instead of allowing pedestrians and bicyclists to cross anytime and anywhere, this option dictates the timing and location of pedestrian crossings. It utilizes a raised plant-able median to channelize pedestrians to the preferred crossing location in front of the Mountainlair. A two-phase traffic signal would be installed at this location, actuated by pedestrians or bicyclists that desire to cross this redesigned, wide intersection. During peak periods (class turnover), the pedestrian phase would get adequate time (e.g., 45 seconds) to allow the desired amount of pedestrian crossing. Traffic would receive a comparable time (two minutes) of green phase to allow the queue to dissipate. During off-peak periods (i.e., between classes and after school hours), the green time for the pedestrian phase would be less. The opinion of probable cost is approximately \$3 million.

The Loop

The Loop project is an initiative sponsored by WVU and is currently ongoing. It is the section of University Avenue represented by the sharp horizontal curve around WVU School of Business near Falling Run Road. The purpose of the Loop project is to enable the university to expand walking conditions through the campus to better utilize the campus footprint, ultimately, to improve the connection of all modes. WVU is considering an expansion of the campus and to enhance pedestrian, bicycle and roadway connections. In essence, this improvement will open up the Quad and create a sense of place. Total construction costs for The Loop is \$24,930,000.



Campus Connector

The connector is a natural landscape and gravel multiuse path provides an alternative route for bicyclists and pedestrians between the residential area south of University Avenue and the Evansdale Campus and boasts one of the best views of the river in the City. More so, it provides a recreational amenity in an area that is well defined by development and steep slopes. The issue with the Campus Connector is that its path has never been defined very well. The existing grade along this gravel path is typically greater than 20%. Total construction costs for the project is \$2,556,000.



Transit Integration Strategies

Three public transportation options are discussed in the Complete Streets Corridor Report. Those options include:

- **Fixed Bus Route (Mountain Line Transit Authority).** This system provides fixed bus route services to the Morgantown region, WVU as well as University Avenue. Three routes provide service along University Avenue between Beechurst Avenue and WV 705. The Transit Administration identified the need for high quality bus shelters along the corridor to provide a safe haven for riders as well as bus information and schedules.
- **Personal Rapid Transit.** This system is currently available to citizens in the study area. Powered by electric motors, the computer-driven cars arrive at your station within five minutes after you push a button. The system now connects the main downtown campus with the Morgantown central business district and the two suburban campuses along a linear alignment. A Master Plan for updating and expanding the system was completed in 2009. Based on this plan, the system is currently undergoing a major upgrade at a cost of approximately \$125 million spread over approximately 5 years. The upgrade includes the technology control system, the power system, and the cars. The cars will be the last phase performed. The infrastructure improvements are primarily focused on the track heating system.
- **Bus Rapid Transit.** The concept of a BRT line within the study area was introduced by staff members of the Mountain Line Transit Authority. The premise is to implement a BRT service that connects both campuses and the PRT, operating as a PRT Extension. This new service would provide needed relief to University Avenue as well as Beechurst Avenue. In effect, this service would operate with five-minute frequencies over a 10-minute trip from one end to the other. The new BRT service is estimated to cost \$4.1 million (startup cost), annual operating cost of \$500,000. A future study should be commissioned that addresses the following outstanding issues relative to BRT feasibility.
 - Roadway infrastructure improvements (constructability and cost) including retrofit of existing facilities and new location
 - Vehicle displacement impacts along specific routes utilizing bus only lanes
 - Right of way and access requirements for vehicular mobility and property
 - Return on Investment, including loss of existing fixed-route ridership
 - Passenger facilities and information technology improvements

Complete Streets Design Theme

The input from the public, technical analysis of the project team members, and the physical realities of University Avenue all dictated the elements that were incorporated into the final corridor concept design.

Preferred Concept Plan

When developing the concept designs for University Avenue Complete Streets Corridor Study, several design considerations were assumed to create the highest value facility while minimizing construction and traffic control impacts. Because this is a built environment and a retrofit of an urban arterial, challenges were great. Traditional design practices may be impractical and limited by the existing rights of way and challenging terrain. However, redesigning University Avenue to accommodate a higher level of bicycle and pedestrian activity, mobility and safety is paramount.

The following design criteria were used when designing the University Avenue improvements.

- Terrain: mountainous
- Design Speed: 30 MPH
- Lane widths: 11-foot wide preferred, 10-foot minimum (matches existing based on existing geometry from Campus Drive to Third Street/ Beverly Avenue)
- Cross slope: 2%
- Shoulder widths: 2 feet wide, curb and gutter
- Bicycle lanes: 5-foot wide bike lanes preferred, 4-foot minimum
- Sidewalks: 5-foot wide sidewalk preferred, 4-foot minimum (from back of curb), wider sidewalks desirable where space allows
- Grades: Maximum 10% grade (matches existing based on existing geometry from Campus Drive to Third Street/ Beverly Avenue)



New sidewalks, context-sensitive bicycle treatments, and a University Connector route are some of the suggested used in the corridor recommendations.



TREAT WALKING AS THE MOST IMPORTANT ISSUE TO ADDRESS



The addition of street trees and better lighting, as well as recommendations to replace crumbling pavement and sidewalk, are integral to our project.



PRESENT A GREAT IMAGE TO RESIDENTS, VISITORS, AND BUSINESSES



Proposed crossing improvements at a number of locations, and a complete re-design of Grumbein's Island and "the Loop" area, are key recommendations.



REDUCE CRASHES AND CRASH-RELATED DELAYS



Anticipating traffic impacts from new development and proposing design standards that ensure cost-effective construction were two important points.



BETTER INTEGRATE THE ROAD WITH THE ADJACENT COMMUNITY

How the Design Team Addressed the Major Project Themes



Intersection Hot Spot

"The Loop" Section

Preferred Access Plan, Showing Intersection Hot Spots and Typical Cross-Sections

Concept Designs

The Concept Designs (as illustrated by the figure to the right) represent approximately 20% design plans for the entire University Avenue corridor. All multimodal elements for vehicular, bicycle, pedestrian and transit have been integrated into the Concept Designs. Intersection treatments and laneage improvements are included in these design plans. See full report for a complete set of the Concept Designs.

Construction Costs & Phasing

The ultimate success of the University Avenue Complete Streets Corridor Study rests on the ability of local and state officials and leaders to carry out the recommendations of the plan. This effort is made easier by describing a series of defined steps — or action items — to move the process forward. However, defining the cost and potential funding mechanisms will allow a framework or “blueprint” for implementation. From the outset of the study, a key objective was to develop cost-effective recommendations (at a variety of scales) that set the stage for additional improvements to University Avenue in the future. With a diminishing return on the dollar, all efforts should focus on creating an environment conducive to change along the University Avenue corridor.

The opinion of probable cost for constructing the 1.9 miles of improvements is approximately \$35.7 million.

