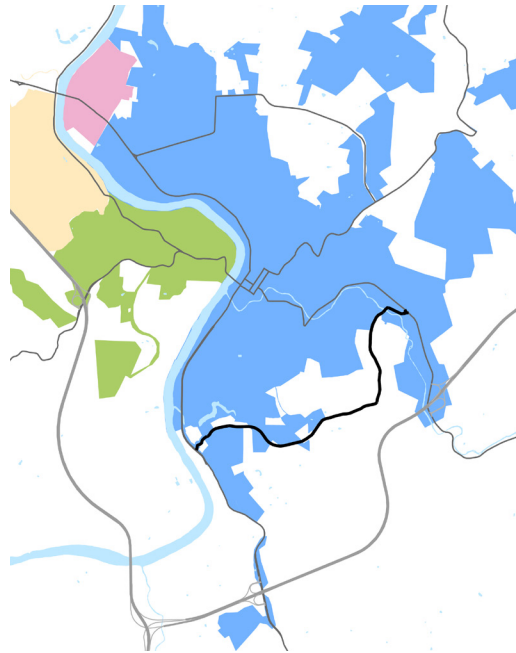


Final Report

Greenbag Road Corridor Study

Adopted by
Morgantown Monongalia MPO Policy Board

March 19, 2015



Morgantown Monongalia
Metropolitan Planning Organization

82 Hart Field Road, Suite 105
Morgantown, WV 26505

www.plantgether.org

Contents

Acknowledgements

1 Executive Summary

Planning Process

Recommendations

4 1. Introduction

Study Purpose

Study Area

Study Timeline

Public Involvement

11 2. What We Found

Process of Confirming Corridor Issues

Constraints and Opportunities

Identified Issues

16 3. Objectives and Evaluation Criteria

Objectives

Evaluation Criteria

18 4. Recommendations

Roadway (thoroughfare) Improvements

Intersection Improvements

Multi-modal Improvements

On-going Monitoring on Safety and Development

25 5. Implementation

List of Figures

1	Figure 1: Planning Process
3	Figure 2: Major Improvement Recommendations
5	Figure 3: Study Area
6	Figure 4: Study Timeline
10	Figure 5: Partner Agencies
11	Figure 6: Process of Confirming Corridor Issues
13	Figure 7: Map of Major Identified Issues
15	Figure 8: Level of Service Illustration
15	Source: TRB Highway Capacity Manual 2010
16	Figure 9: Structure of Planning Elements
18	Figure 10: Improvement Section Map
19	Figure 11: Roadway Widening
20	Figure 12: Intersection Improvements
21	Figure 13: High Intensity Activated Crosswalk
22	Figure 14: Recommended Signages for Multi-modal Improvements
23	Figure 15: Recommended Improvements (East Section)
24	Figure 16: Recommended Improvements (West Section)
27	Figure 16: Improvement Priority Map

List of Tables

7	Table 1: Public Outreach Strategy
8	Table 2: Steering Committee Members
9	Table 3: Public Open House Summary
14	Table 4: Major Corridor Issues
15	Table 5: Major Corridor Issues Locations
20	Table 6: Intersection Improvements
26	Table 7: Implementation

Appendix A: Public Involvement Documentation

Appendix B: Steering Committee/Stakeholders Meeting Packages, Presentations, and Summaries

Appendix C: Summary of the Dorsey Ave and Greenbag Rd Intersection Traffic Study

Appendix D: Synchro Traffic Analysis Report

Appendix E: Existing Condition Analysis Maps

Appendix F: Summary of Related Studies and Policies

Appendix G: Proposed Improvements and Planning Level Cost Estimate

Appendix H: Memorandum on Time Saving Estimate for Near-Term Improvements

ACKNOWLEDGEMENTS

Steering Committee

Eldon Callen

Monongalia County Commissioner

Rich Wood, AICP

Monongalia County Planning Director

Mayor Jennifer Selin

City of Morgantown

Damien Davis, PE

Morgantown City Engineer

Tom Laurita

Morgantown Area Chamber of Commerce

Bill Rice

Chair Citizen Advisory Committee

Brian Carr

WV DOH Planning Division

Fouad Shoukry, PE

WV DOH District Office

Special Thanks To

Frank Gmeindl, LCI

Morgantown Municipal Bicycle Board

Christiaan Abildso, MPH, PH.D

Morgantown Pedestrian Safety Board

Maria Smith

Mountain Line Transit Authority

Christopher Fletcher, AICP

Morgantown Director of Development Services

Chelsi Baker

Morgantown, Public Communications

Ella Belling

Mon River Trails Conservancy

Rick Landenberger, PH. D

Green Space Coalition

Brian Carlson

Friends of Deckers Creek

Project Team

Bill Austin, AICP, Project Director

Executive Director, Morgantown Monongalia MPO

Jing Zhang, AICP, Project Manager

Transportation Planner, Morgantown Monongalia MPO

The Morgantown Monongalia MPO is grateful for the support received in the development of the study. The study would not have been possible without the assistance of stakeholders and members of the community

EXECUTIVE SUMMARY

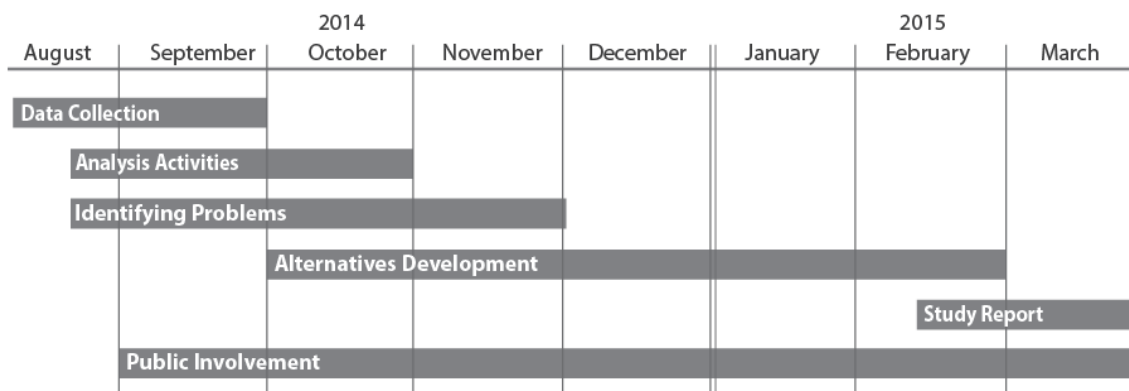
The Greenbag Rd Corridor Study presents an ambitious yet realistic vision for transforming Greenbag Rd into a safe, efficient, and attractive multimodal transportation facility. This report documents the purposes, procedures, findings, and recommendations of the Study. The purpose of the Study is to assist implementation agencies in making transportation investment decisions on Greenbag Rd, with direction on the design concept and scope of projects that best meet the community's needs and interest.

PLANNING PROCESS

The preparation of this study was recommended in the MPO's 2013-2040 Long Range Transportation Plan as a tier 1 project and developed as an in-house project of the MMMPO Unified Working Program (FY2014-2015). The planning process was guided by the Steering Committee, which consisted of representatives from City of Morgantown, Monongalia County, Morgantown Area Chamber of Commerce, WV Division of Highways, and the community.

The public involvement process included three steering committee meetings, two public meetings, and one stakeholder meeting. A project website was created to provide a platform to publicize the study status, advertise events, distribute documents, and gather community comments. Major themes that emerged from the public process included the need to improve traffic flow and road pavement, correct unsafe road alignment, provide multi-modal transportation options, and enhance community cohesion in the corridor area.

Figure 1: Planning Process



RECOMMENDATIONS

The projects proposed in this study are all designed to work together to achieve multiple aims, regardless of whether they are considered in isolation as roadway widening, intersection improvement, or pedestrian facilities. Project recommendations encompassed four topic areas: 1) roadway (thoroughfare) improvements, 2) intersection improvements, 3) multi-modal improvements, and 4) on-going monitoring of safety and development. Major projects include:

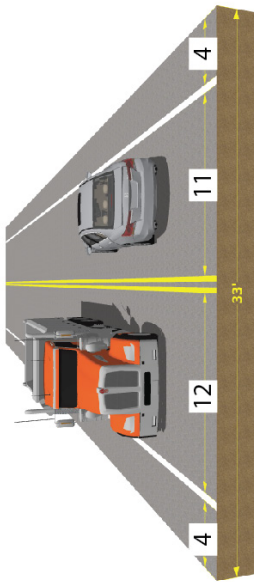
- Widen and resurface Greenbag Rd westbound lane to 12' and eastbound lane to 11', and provide 4' shoulder on both sides of Greenbag Rd. This project is approximately 3 miles long. The planning level cost estimate for this project ranges from 6 million to 10 million.
- At the intersection of Dorsey Ave/Greenbag Rd, add exclusive left-turn lanes and left-turn signal phases on Greenbag Rd (both directions).
- At the intersection of US 119/Greenbag Rd, add an exclusive left-turn lane on Greenbag Rd and optimize traffic signal phases.
- Provide sidewalk on the north side of Greenbag Rd between the Mississippi St and the Mall's western outlet for approximately 3,200 feet.

Major proposed recommendations and their implementation phases are illustrated in Figure 2. Complete project recommendations are included in Section 4. Recommendations. Detailed project description are provided in Appendix G: Proposed Projects and Programs.



Figure 2: Major Improvement Recommendations

Roadway Resurfacing and Widening



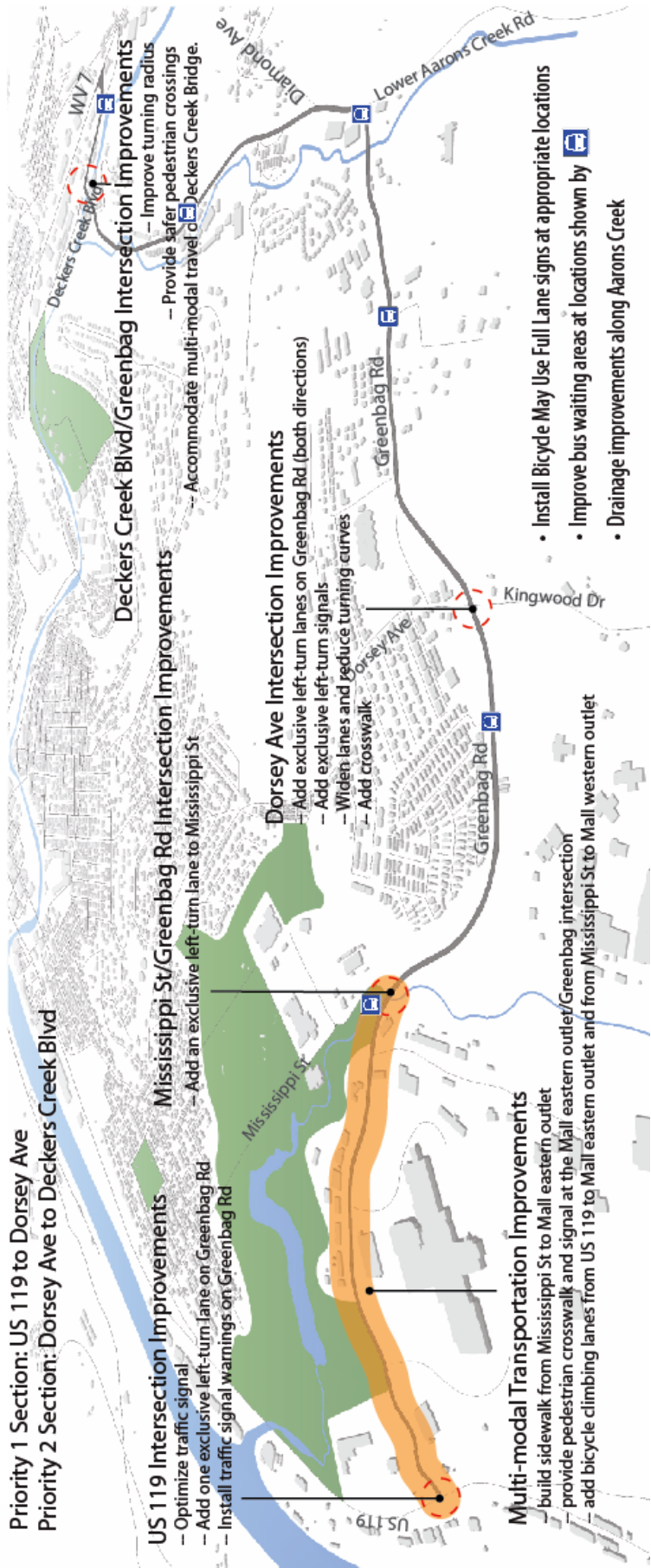
Westbound: 12' lane + 4' shoulder

Eastbound: 11' lane + 4' shoulder

Priority Rank	Project Name
1	Dorsey Ave/Greenbag Rd Intersection Improvements
2	US 119/Greenbag Rd Intersection Improvements
3a	Roadway-throughfare-Improvements (US 119 to Dorsey Ave)
3b	Multi-modal Transportation Improvements (US 119 to Mississippi St)
4	Mississippi St/Greenbag Rd Intersection Improvements
5	Deckers Creek Blvd/Greenbag Intersection Improvements
Transit Waiting Condition Improvements	
Signage Improvements	
Aaron Creek Drainage Improvements	

Priority 1 Section: US 119 to Dorsey Ave

Priority 2 Section: Dorsey Ave to Deckers Creek Blvd



- Install Bicycle May Use Full Lane signs at appropriate locations
- Improve bus waiting areas at locations shown by [bus icon]
- Drainage improvements along Aarons Creek

1. INTRODUCTION

STUDY PURPOSE

The study was developed as an in-house project of the Morgantown Monongalia MPO Unified Working Program (FY2014-2015). The conducting of this study was recommended in the MPO's 2013-2040 Long Range Transportation Plan as a tier 1 project.

The purpose of this study is to make planning level decisions to identify alternatives necessary to improve the safety and mobility, as well as to accommodate anticipated growth and economic vitality along the Greenbag Rd corridor. The Study provides the definition of a preliminary design concept and scope for a set of improvements, to assist implementation agencies in making transportation investment decisions on Greenbag Rd, that best meet the overall community needs and interest.

The planning practices applied in this Study were intended to make as smooth as possible the transition from corridor planning to project development. The course of identifying problems and defining solutions was designed with an understanding that the The National Environmental Policy Act (NEPA) will come into play at a later time and planning and project development should be seen as being part of the decision-making process.

STUDY AREA

Greenbag Rd is classified as a minor arterial in the MPO's 2013-2040 LRTP. The study area extended from the intersection of US 119 to the intersection of Deckers Creek Blvd on Greenbag Rd, covering a distance of approximately 3.4 miles. The intersection of WV 7/Greenbag Rd and the intersection with Deckers Creek Trail/Greenbag Rd were not included in this study. The WV DOH is conducting a study on these two locations. Within the study area, the key intersections are shown in Figure 3.

Roadway type: **undivided two-way two lane highway**

System function: **urban minor arterial**

Study Segment Length: **3.3 mile**

Annual Average Daily Traffic (AADT): **13, 347 (mall area)**



Issues



Needs

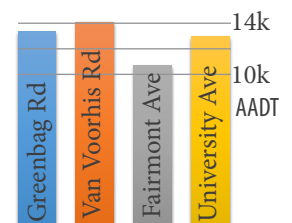


Solutions



Improve




Major Arterial Traffic Volume Comparison

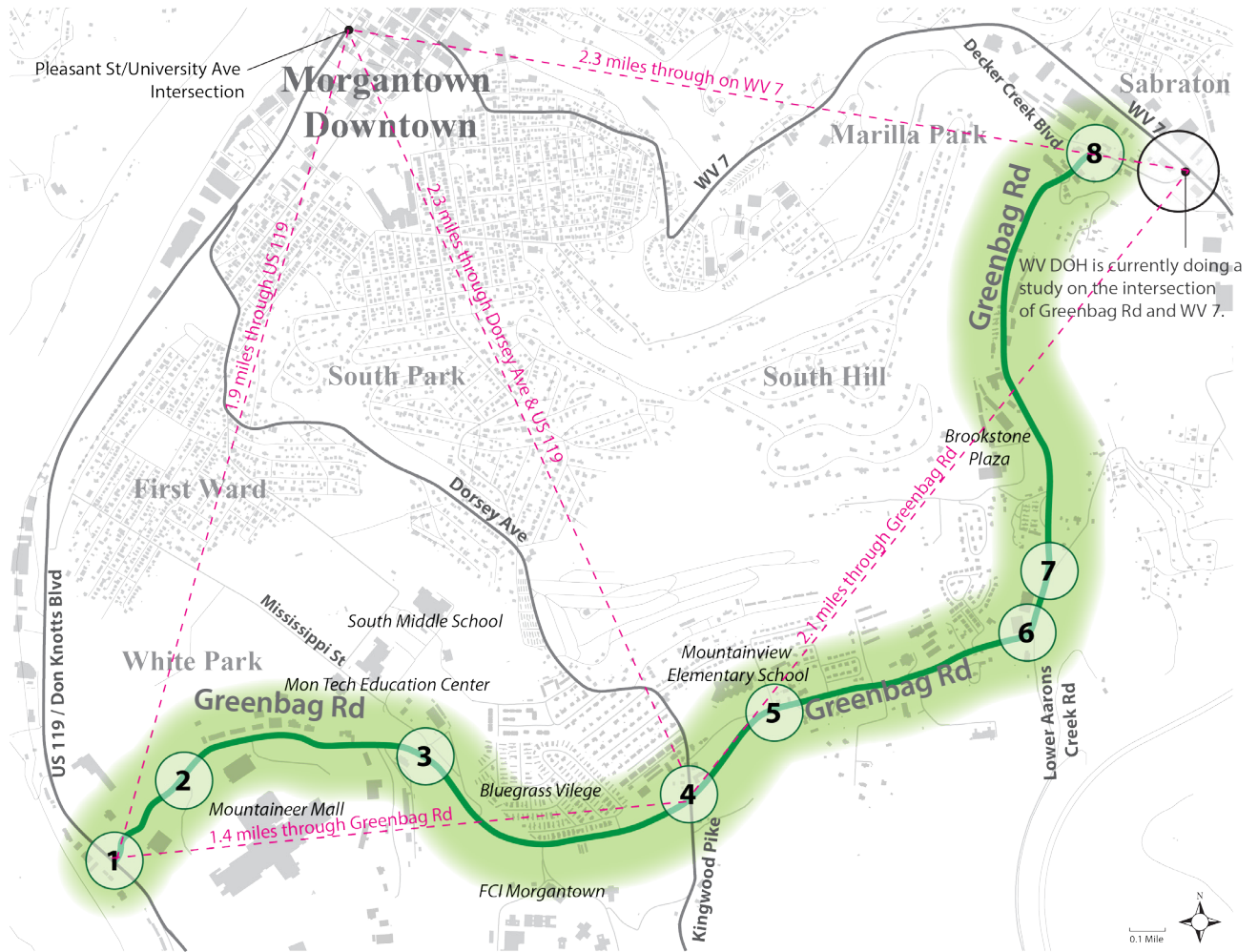


(Details are provided in Existing Condition Presentation in Appendix A)

Figure 3: Study Area

Major Intersections on Greenbag Rd:

- | | | |
|--|---|-----------------------------------|
| 1 Don Knotts Blvd (US 19)  | 2 West outlet of Mountaineer Mall  | 3 East outlet of Mountaineer Mall |
| 4 Dorsey Ave / Kingwood Pike  | 5 Luckey Ln / Richard Ave | 6 Lower Aarons Creek Rd |
| 7 Diamond Ave | 8 Deckers Creek Blvd | |

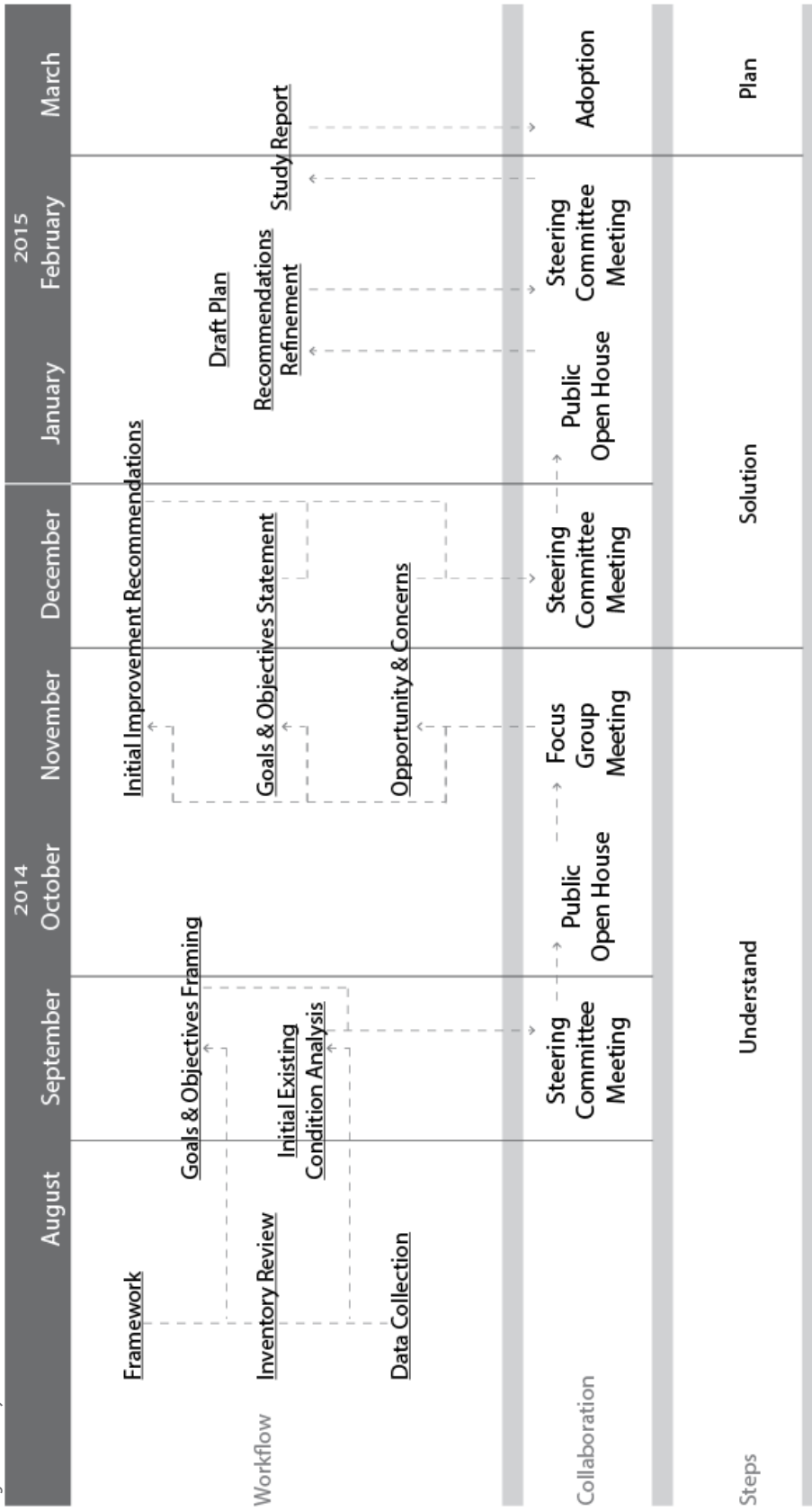


STUDY TIMELINE

The study process included collecting and analyzing data, involving the community, identifying problems and needs, defining objectives, and developing alternatives. It was organized in a way to ensure a logical flow of activities moving from study initiation to the recommendation of a preferred investment strategy.

Figure 4 illustrates the general structure of the study process.

Figure 4: Study Timeline



PUBLIC INVOLVEMENT

Public Outreach Strategy

The process of public involvement was a means of exchanging information and viewpoints with a broad cross-section of the community. It sought to define the overall best interest of the community. Specifically, the public involvement of this study encompassed outreach to five groups: corridor neighbors (residents and businesses in the Greenbag Rd corridor), elected officials, stakeholders, advocacy groups, and the general public. Techniques used in the outreach process and their association with targeted groups are shown in Table 1.

The information collected through the community involvement process was presented to the steering committee members, who balance the needs and concerns of the community to represent the total community’s interest.

Table 1: Public Outreach Strategy

	Corridor Neighbors	Elected Officials	Interest Groups	Advocacy Groups	General Public
Steering Committee Meeting		✓	✓		
MPO Citizens Advisory Committee Meeting				✓	✓
MPO Technical Advisory Committee Meeting			✓		
Truck Industry Stakeholder Meeting			✓		
Project Website	✓	✓	✓	✓	✓
Partner Agencies/Groups Coordination			✓	✓	✓
Social Media (Newspaper, Radio, Facebook)	✓			✓	✓
Grocery Store Information Board	✓				✓
Shopping Mall Information Booth	✓				✓
School Bulletin Board	✓				✓
Flyer Distribution	✓				



Matt Sunday/The Dominion Post



Matt Sunday/The Dominion Post

Project Committees

A steering committee was formed to guide the study through completion. The committee consisted of representatives from the WV DOH, City of Morgantown, Monongalia County, Chamber of Commerce, and the MMMPO's citizen advisory committee (Table 2). Three steering committee meetings were held. A summary of each meeting is included in Appendix A. In addition to the steering committee, the MPO's Transportation Technical Advisory Committee and Citizens Advisory Committee were consulted during the development of this study.

Table 2: Steering Committee Members

Name	Affiliation
Eldon Callen	Monongalia County Commissioner
Rich Wood	Monongalia County Planning Director
Jennifer Selin	Mayor of Morgantown
Damien Davis	City of Morgantown, City Engineer
Tom Laurita	Chamber of Commerce
Bill Rice	Chair of Citizen Advisory Committee
Fouad Shoukry	WV DOH District Office
Brian Carr	WV DOH Planning Division

Trucking Industry Stakeholder Meeting

A stakeholder meeting focusing on the local trucking industry was arranged with the assistance of Tom Laurita. The meeting was held at the Monongalia County Sheriff's Office Building in November, 2014. Five representatives from local trucking firms attended this meeting.

Valuable information was collected from local trucking firms, regarding their travel patterns along the corridor, areas of concern, and comments on how Greenbag Rd could best serve their interests. The summary of this meeting are included in Appendix B.

Identified key factors for a truck-friendly route:

- *constant flow*
- *short travel time*
- *adequate pavement*
- *wide shoulders*
- *sufficient turning radius*



Public Open House

The MPO has hosted two public open houses to gather inputs from the community. Both events were held at the Marilla Park Recreation Center, where is less than a half mile from Greenbag Rd. These open houses were informal public meetings where planning products (such as decisions, maps, and proposals) were exhibited for public comments. During the event, community members talked to agency staff on a one-on-one basis regarding their concerns and recommendations. The two open houses are summarized in the table below. The detail of each open house is provided in Appendix A.

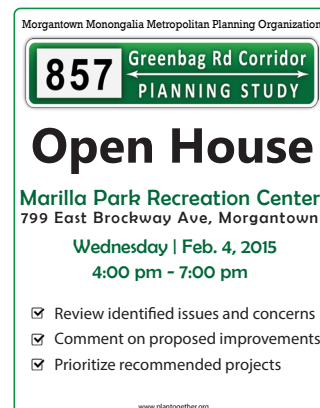


Table 3: Public Open House Summary

	1 st Open House	2 nd Open House
Date/Time	Oct 14 (informal), Oct 15, 2014	February 4, 2015
Participants	22	30
Written Comments	20	15
Survey	65	N/A
Outcomes	<ul style="list-style-type: none"> • Introduce project purpose • Identify concerns and opportunities • Evaluate proposed objectives 	<ul style="list-style-type: none"> • Review identified issues • Comment on proposed improvements • Prioritize recommended projects

~~~~~

#### What people said during the open house:

- *If limited funding is available, concentrate funding on intersection improvements, turning lanes. If total funds are available, widen road, safety berms.*
  - *Quickest, easiest, most impactful changes are to add sidewalks & the multi-use trail through the neighborhoods. That could connect 3 schools, White Park, & Deckers Creek Trail. How great would that be!*
  - *Center turning lanes on Greenbag at Dorsey intersection would be best alternative for improving peak traffic flow. Resurfacing and lane widening should also be a priority.*
  - *I would love to see each and every one of these improvements made. Lots of residents in the area would walk or bike kids to school if there were appropriate facilities.*
  - *If widening lanes makes this attractive truck route then I am for it. Otherwise I believe wider lanes only encourage faster speeds.*
- ~~~~~

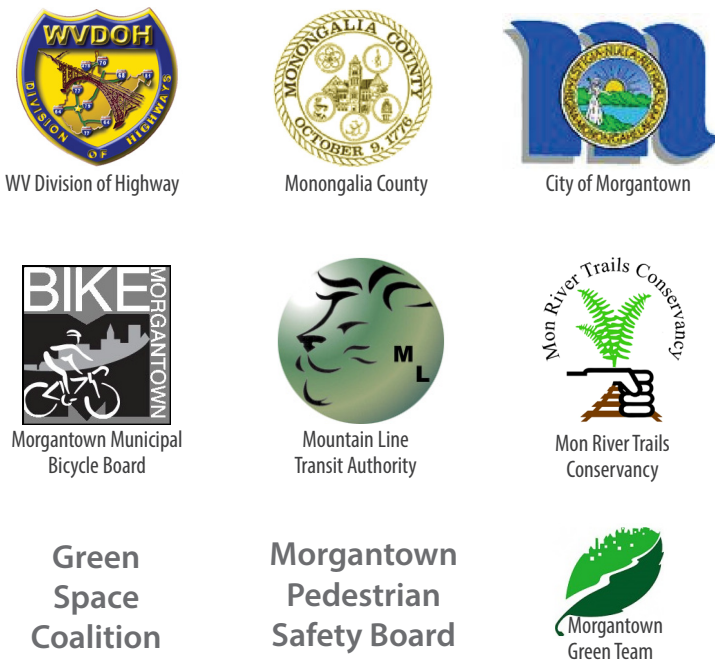
**Project Website**

A project website was made available at [plantogether.wix.com/greenbag](http://plantogether.wix.com/greenbag). Information provided on the website included project description, schedule, upcoming meetings, draft documents, analysis maps, a project survey, a public comment form, and contact information. 20 comments from interested citizens were submitted through the public comment form on the website. The profile of the project website and received comments are provided in Appendix A.

**Partner Agencies/Groups**

MPO staff worked with various partner agencies and groups to expand the scope of outreach. The resources used in this effort included websites, bus slot on buses, email lists, Facebook pages, and community newsletters. Partner agencies and groups are shown below.

Figure 5: Partner Agencies



## 2. WHAT WE FOUND

A sound understanding of existing conditions provides the foundation for the development of alternatives. This section of the report answers three questions: 1) How do we define corridor issues? 2) What are the opportunities and constraints in the corridor? And 3) What issues were identified?

Existing conditions along the corridor were assessed as the basis for understanding issues in the corridor. This information provided in Appendix B includes land use, crash history, natural resources, demographics, average annual daily traffic volume, intersection turning movement counts and level of service, and anticipated population and economic growth areas.

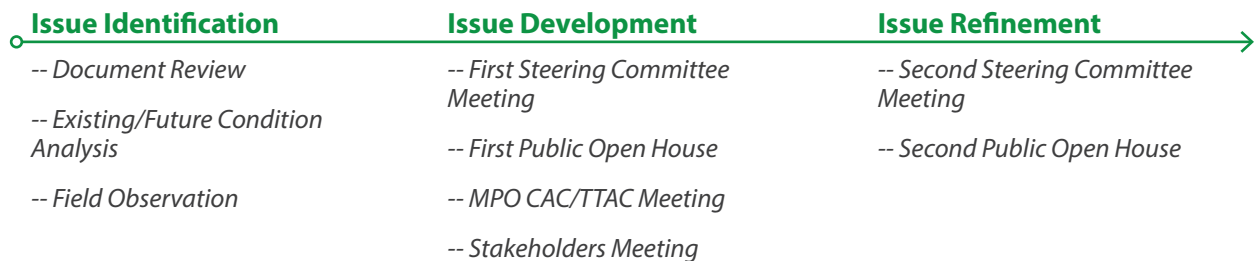
8 types of problems were identified during the planning process, including safety, mobility, environment issues.

### PROCESS OF CONFIRMING CORRIDOR ISSUES

There were several stages to identify and refine corridor issues. (Figure 6). The understanding of existing/future problems came from resources based on four categories: relevant documents, data analysis, field observation, and community perception. Specifically, they are:

- **Document Review:** MPO 2013-2040 LRTP, Morgantown 2013 Comprehensive Plan, Morgantown Pedestrian Safety Plan, Greater Morgantown Bicycle Plan.
- **Data Analysis:** Crash history, Intersection Level of Service (Synchro traffic modeling software), Topography, Land use
- **Field Observation:** “Floating car” field observation, Field trips, Roadway measurement, Photo documentation
- **Community perception:** input from the steering committee, stakeholders, public open houses, and other public involvement efforts.

Figure 6: Process of Confirming Corridor Issues



## CONSTRAINTS AND OPPORTUNITIES

### *Constraints:*

- Terrain, bridges, and built environment do not allow major modifications to roadway/intersection configuration.
- The increase of truck traffic, as well as the overall growth in the metropolitan area, may cause more congestion on Greenbag Rd.
- High prevailing auto traveling speed on Greenbag Rd (50 MPH)
- Motor Vehicle speed and terrain (slopes and curves) make cycling unsafe on Greenbag Rd.

### *Opportunities:*

- Greenbag Rd is a convenient route connecting the east and the south of the Morgantown area
- Existing right-of-way allows for widening (minimum 60' R/W, exception for the segment between Newbroughs Village and Brookstone Plaza where the R/W is 46 feet)
- Greenbag Rd has few traffic lights per mile compared to other roads in the area.
- Greenbag Rd has a lower crash rate than comparable roads in the area.
- Neighborhoods and facilities are closely located within 0.5 mile buffer in the western section of Greenbag Rd, which include White Park, Dorsey's Knob Park, the First Ward, South Middles School, Mountainview Elementary, Mountaineer Mall, Giant Eagle, the Blue Glass Village, and middle-high density residential areas on Dorsey Ave.
- Greenbag Rd connects Decker Creek Trail and is close to Marilla Park and Caperton Trail.
- Based on field observation and community input, there is demand for safer pedestrian and cycling facilities in the area.

### Crash Rate Comparison



(Based on per 100 Million Vehicle-miles of Travel. Details are provided in Existing Condition Presentation in Appendix A)



## IDENTIFIED ISSUES

This study identified eight issues along the Greenbag Rd corridor, including roadway deficiencies, operational inefficiency, community segregation, and environmental concerns. Table 4 contains a list of corridor issues with information on how each issue was identified and why it is occurring. Table 5 describes the location of each issue and other supplemental information. Project-specific issue statements are provided in Appendix G, where the purpose and need of each improvement is defined.

The study adopted an approach in defining problems to ensure that:

- Issues are not framed in terms of a solution.
- Issues include anticipated future problems, as well as current, known problems.
- Issues are stated as specifically and straightforwardly as possible.

Figure 7: Map of Major Identified Issues

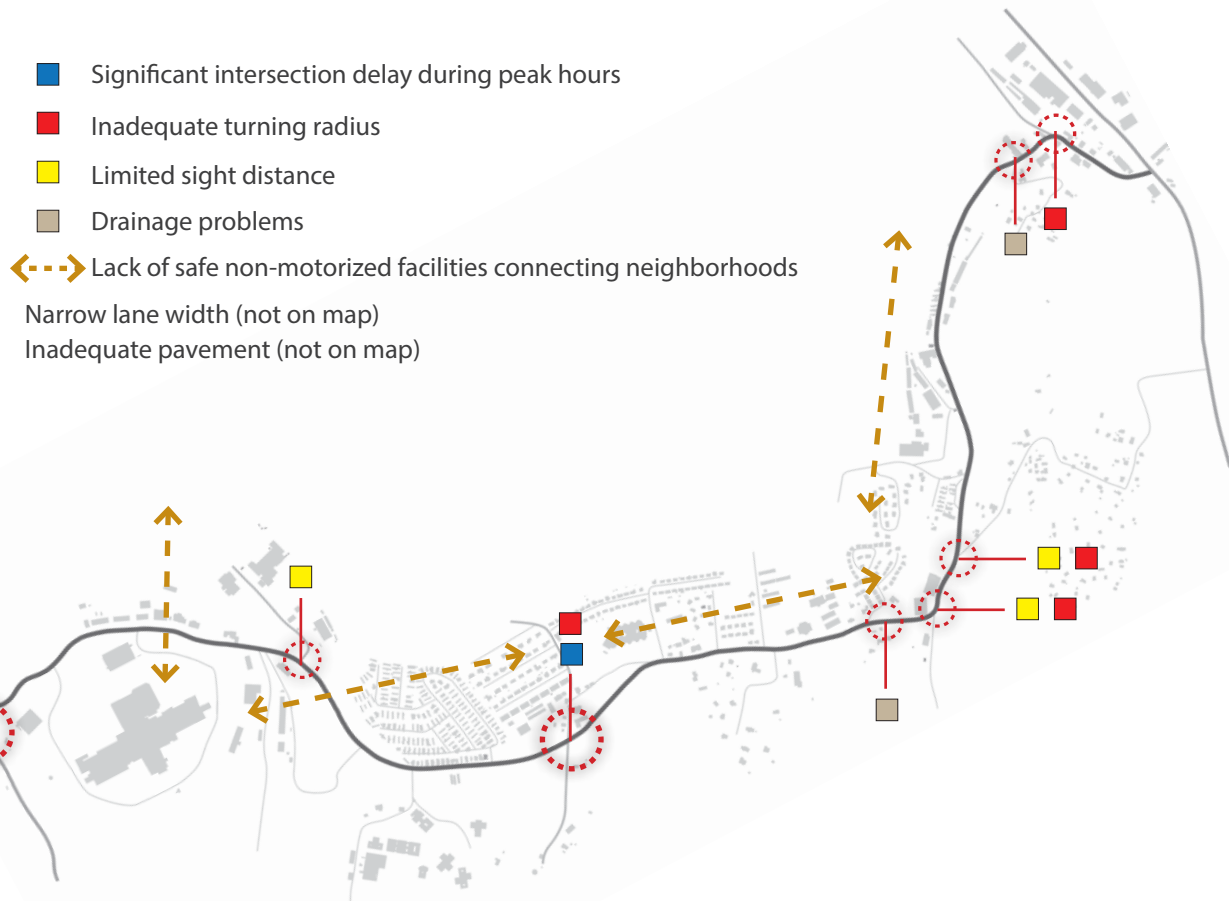


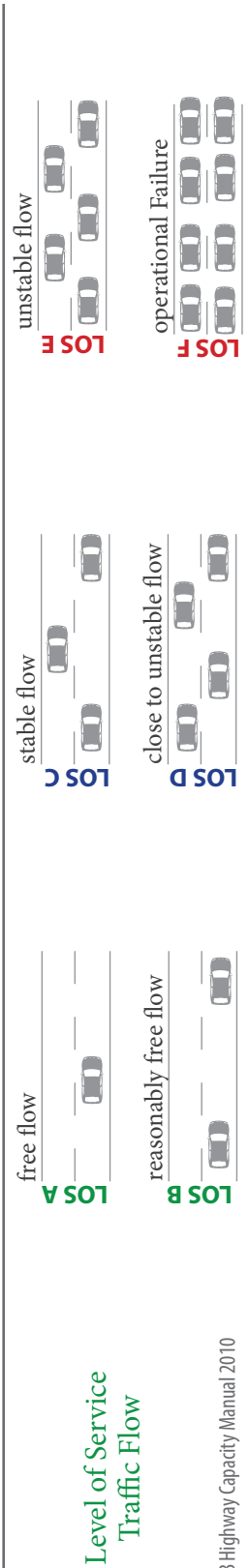
Table 4: Major Corridor Issues

| Major Corridor Issues                     | How it was Identified? |                        |                   |               | Why it occurs?                    |                 |                 |                    |                                       |                    |                           |                                    |                                  |                                      |                           |                                    |                        |                                |                            |                                   |                               |                        |                                |   |
|-------------------------------------------|------------------------|------------------------|-------------------|---------------|-----------------------------------|-----------------|-----------------|--------------------|---------------------------------------|--------------------|---------------------------|------------------------------------|----------------------------------|--------------------------------------|---------------------------|------------------------------------|------------------------|--------------------------------|----------------------------|-----------------------------------|-------------------------------|------------------------|--------------------------------|---|
|                                           | Document Review        | Community Perspectives | Field Observation | Data Analysis | Terrain /landscape along the road | Excessive Slope | Excessive Curve | Adjacency to Creek | High Traffic volume (esp. peak hours) | High traffic speed | High percentage of trucks | Inappropriate traffic signal phase | Inappropriate intersection angle | High percentage of turning movements | No parallel arterial road | No parallel inter-community street | No pedestrian facility | No segregated bicycle facility | Increasing corridor growth | Inappropriate streetside features | Inappropriate driveway access | Inappropriate lighting | Undefined curb / ditch erosion |   |
| Narrow roadway                            | ✓                      | ✓                      | ✓                 |               | X                                 |                 |                 | X                  |                                       |                    |                           |                                    |                                  |                                      | X                         |                                    |                        |                                | X                          |                                   |                               |                        | X                              |   |
| Unsafe street alignment                   | ✓                      | ✓                      | ✓                 | ✓             | X                                 | X               | X               |                    |                                       |                    |                           |                                    |                                  |                                      |                           |                                    |                        |                                |                            |                                   |                               |                        |                                |   |
| Poor pavement                             | ✓                      | ✓                      | ✓                 |               | X                                 | X               | X               |                    |                                       |                    |                           |                                    |                                  |                                      | X                         |                                    |                        |                                |                            |                                   |                               |                        |                                |   |
| Significant intersections delay           | ✓                      | ✓                      | ✓                 | ✓             |                                   |                 |                 |                    | X                                     | X                  | X                         | X                                  | X                                | X                                    | X                         | X                                  | X                      | X                              | X                          | X                                 | X                             | X                      | X                              | X |
| Unsafe travel environment for pedestrians | ✓                      | ✓                      | ✓                 |               | X                                 |                 |                 |                    | X                                     | X                  | X                         | X                                  | X                                | X                                    | X                         | X                                  | X                      | X                              | X                          | X                                 | X                             | X                      | X                              | X |
| Unsafe travel environment for cyclists    | ✓                      | ✓                      | ✓                 |               | X                                 | X               | X               |                    | X                                     | X                  | X                         | X                                  | X                                | X                                    | X                         | X                                  | X                      | X                              | X                          | X                                 | X                             | X                      | X                              | X |
| Drainage issue along Aaron Creek          |                        | ✓                      |                   |               | X                                 |                 | X               | X                  |                                       |                    |                           |                                    |                                  |                                      |                           |                                    |                        |                                |                            |                                   | X                             |                        | X                              | X |
| Unpleasant visual appearance              |                        | ✓                      | ✓                 |               |                                   |                 |                 |                    |                                       |                    |                           |                                    |                                  |                                      |                           |                                    |                        |                                |                            |                                   |                               |                        |                                |   |

Table 5: Major Corridor Issues Locations

| Major Corridor Issues                     | Locations                                                                                                                                                                                                                                                         | Notes                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Narrow roadway                            | For most of the length on Greenbag Rd, travel lane varies from 9' to 10' and shoulders are not provided, particularly from Deckers Creek Bridge to Glen Oaks Dr.                                                                                                  | According to AASHTO Roadway Geometric Criteria, 11' is the recommended minimum width for Greenbag Rd, as a minor arterial with high percentage of truck traffic.                                                                                                                                                                                                                                                  |
| Unsafe street alignment                   | Near Greenbag Rd intersections with US 119, Mississippi St, Dorsey Ave, Longbranch Dr, Lower Aaron Creek Rd, Diamond Ave, and Deckers Creek Blvd.                                                                                                                 | Adverse alignment (horizontal or vertical) that may cause limited sight-distance, road slipperiness, travel time increase, unsafe turning radius, and other operational and safety concerns.                                                                                                                                                                                                                      |
| Poor pavement                             | For most of the length on Greenbag Rd, particularly from Deckers Creek Bridge to Glen Oaks Dr and at the intersection of Greenbag Rd and Dorsey Ave.                                                                                                              | Smoothness of road surface affects the transportation costs of the road user to include vehicle maintenance costs, fuel consumption, speed, passenger comfort, safety, vehicle noise, and corridor aesthetics.                                                                                                                                                                                                    |
| Significant intersections delay           | Greenbag Rd intersections with US 119 and Dorsey Ave.                                                                                                                                                                                                             | Intersection delay is considered significant in this study, if the LOS of at least one approach of that intersection is E or F during peak hours. (Figure 8)                                                                                                                                                                                                                                                      |
| Unsafe travel environment for pedestrians | Entire length on Greenbag Rd, particularly at segments where pedestrian travel demand is high, or potentially high, such as those from Mississippi to Mall, from Longbranch Dr to Luckey Ln, and from Deckers Creek Blvd to Brookstone Plaza.                     | Community survey has shown that high vehicle traveling speed and narrow shoulders are main concerns for pedestrian safety on Greenbag Rd.                                                                                                                                                                                                                                                                         |
| Unsafe travel environment for cyclists    | Entire length on Greenbag Rd, particularly at segments where bicycle travel demand is high and/or adverse roadway conditions exist. Such segments include from the US 119/Greenbag Rd intersection to Mall, from Mississippi St/Greenbag Rd intersection to Mall. | The need for safe bicycling facilities has been identified in community surveys and public meeting comments. Considering the expected high motor vehicle travel speed and heavy truck traffic Greenbag Rd, the American Association of State Highway and Transportation Officials (AASHTO) recommends that a shared travel lane be wider than 14 feet or that a paved shoulder or bike lane be wider than 5 feet. |
| Drainage issue along Aaron Creek          | Aarons Creek Bridge area and the Deckers Creek Bridge area (behind the HomeWarehouse).                                                                                                                                                                            | Drainage improvement should avoid using gabion baskets which could lead to long term erosion problems by increasing scour on the stream bottom and increasing velocity as water travels downstream.                                                                                                                                                                                                               |
| Unpleasant visual appearance              | Entire length on Greenbag Rd                                                                                                                                                                                                                                      | None                                                                                                                                                                                                                                                                                                                                                                                                              |

Figure 8: Level of Service Illustration

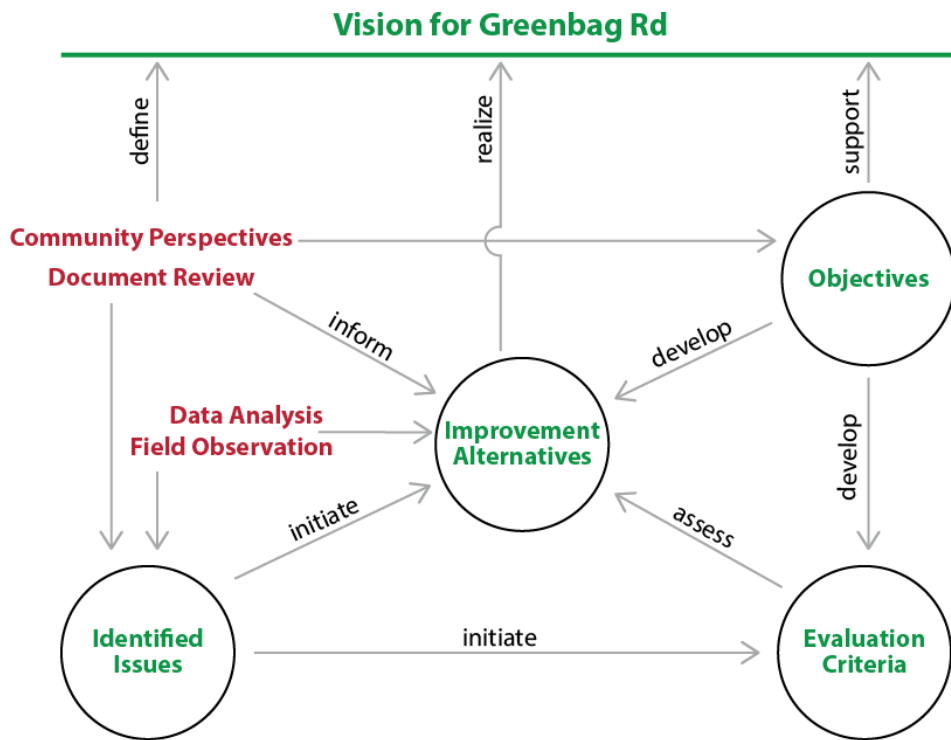


Source: TRB Highway Capacity Manual 2010

### 3. OBJECTIVES AND EVALUATION CRITERIA

This section of the report lays out the broad vision for the future of Greenbag Rd, describes the objectives established throughout the planning process, and defines the criteria used to develop and assess proposed improvements. The structure and relations among those planning elements in this study are illustrated in Figure 9.

Figure 9: Structure of Planning Elements



The vision for Greenbag Rd states that

Greenbag Rd functions as an attractive and effective travel corridor for all users. It provides safe, convenient and inviting travel for all users and support economic development envisioned by the community.

## OBJECTIVES



A safer traveling environment for all users, including motor vehicle drivers, pedestrians, bicyclists, and transit users

Less congestion at major intersections and smoother travel condition throughout the corridor

An enhancement of the health, comfortableness and overall livability of neighbors in the corridor

Consistence with land use patterns and anticipated development. Positive economic impact on business growth.

Supports preservation of natural asset in the corridor, including open space, vegetation, and water.

## EVALUATION CRITERIA

The evaluation criteria of this study assessed the effectiveness of proposed projects to

- Improve safety for motor vehicle drivers, pedestrians, bicyclists, or transit users;
- Reduce traffic congestion at key intersections;
- Improve roadway capacity for vehicles, especially for commercial trucks;
- Enhance the livability of neighborhood along the corridor;
- Support existing business and/or unlock the potential growth along the corridor;
- Conserve natural assets along the corridor; and
- Address identified issues in a cost-effective manner.



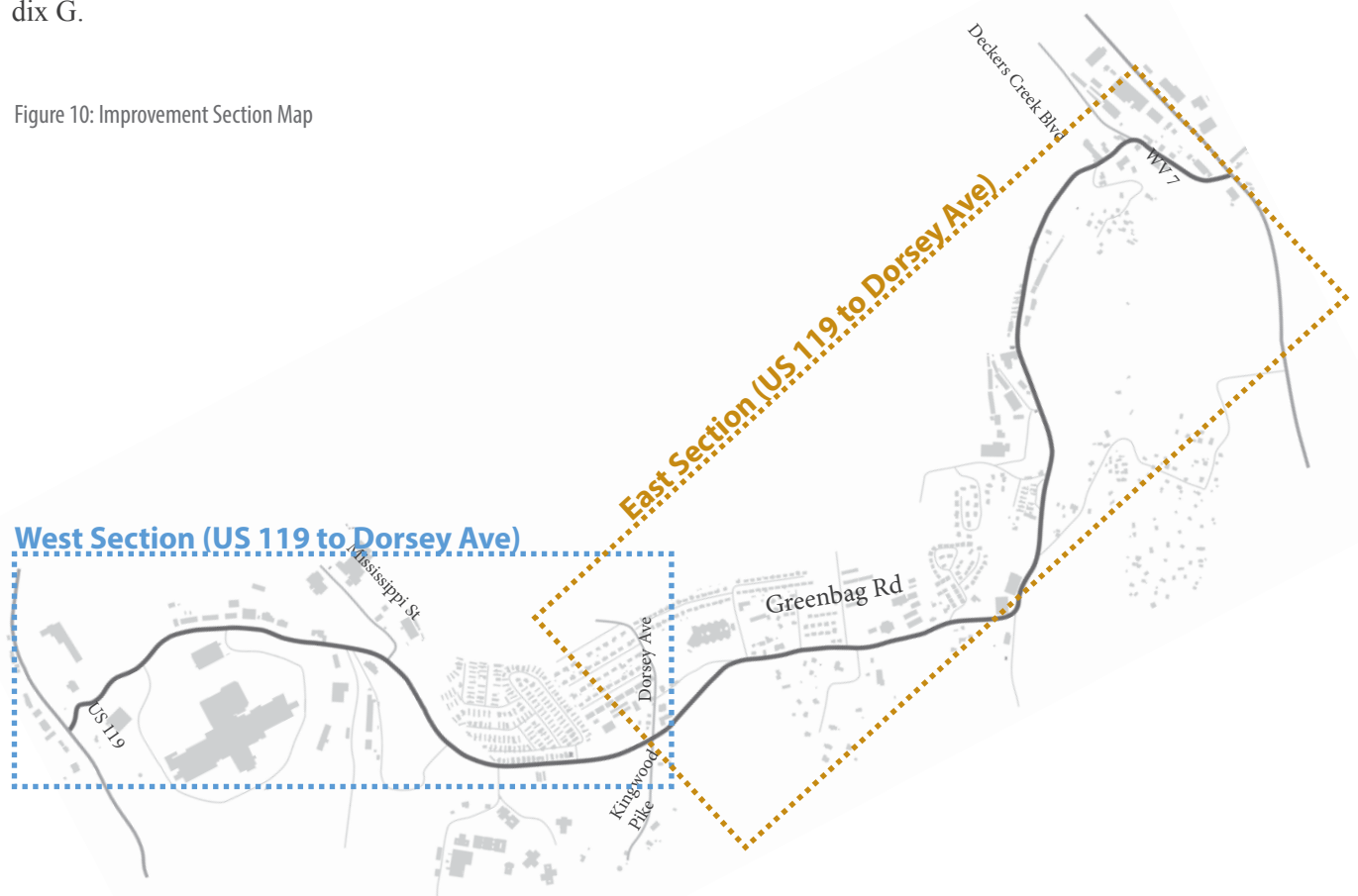
## 4. RECOMMENDATIONS

This section of the report provides a general description of the recommendations to improve the Greenbag Rd Corridor. There are total 15 recommendations, which include both capital investment projects and operational programs. The topic areas for these recommendations are:

- **Roadway (thoroughfare) Improvements**
- **Intersection Improvements**
- **Multi-modal improvements**
- **On-going monitoring of safety and development**

Recommended improvements are grouped in two sections (Figure 10) and illustrated on page 23-24. Details on proposed improvements are provided in Appendix G.

Figure 10: Improvement Section Map



## ROADWAY (THOROUGHFARE) IMPROVEMENTS

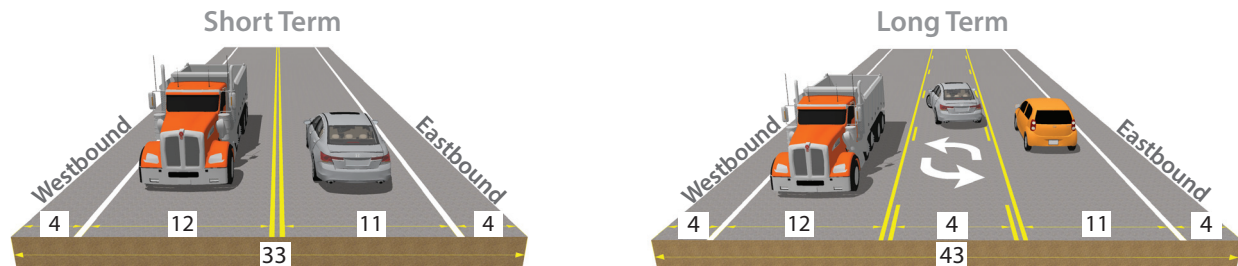
In the short term (5-10 years), roadway improvements will maintain the capacity of Greenbag Rd while improving its flow and safety throughout the corridor. It will keep Greenbag Rd a consistent two-way two-lane undivided highway, except for the segment in the Mountaineer Mall area. The posted speed limit will remain 40 MPH, unless otherwise designated.

Major roadway improvements include:

- Widening and Resurfacing.** Widen and resurface westbound lane to 12' and eastbound lane to 11', and provide 4' shoulder on both sides of Greenbag Rd. The total length of this improvement is approximately 3 miles, which does not include the four-lane segment in the Mountaineer Mall area. The wider westbound lane is to accommodate higher volumes of commercial truck traffic traveling from WV 7 to US 119. Truck route signs as recommended in the Manual on Uniform Traffic Control Devices (MUTCD) are recommended at appropriate locations on Greenbag Rd to show it as a designated route for truck traffic.
- Reconfiguration.** Reconfigure travel lanes between the two outlets of Mountaineer Mall to eliminate left-merges for through traffic.
- Lighting.** Provide appropriate lighting on Greenbag Rd, particularly at locations where pedestrians and bicyclists are expected.
- Pollution Mitigation.** Mitigation strategies should take into consideration eliminating or minimizing adverse effects, such as air and noise pollutions, to adjacent neighbors during and after the construction of the project. The use of No Engine Break signs is recommended at schools and residential areas as a means to mitigate adverse impacts of truck traffic to adjacent neighbors. Other treatments include implementation of variable speed limits, compatible roadside design, signage improvements to heighten driver

The intent of the paved 4' shoulders is to provide safety for motor vehicles and to control roadway erosion. It is not intended as a pedestrian or bicycle facility on Greenbag Rd, due to the prevailing motor vehicle travel speed and heavy truck traffic on Greenbag Rd.

Figure 11: Roadway Widening



The wider westbound lane is to accommodate higher volumes of commercial truck traffic traveling from WV 7 to US 119.

As a long term solution (20-25 years), this study propose a continuous two-way-left-turn-lane for approximately 3 miles on Greenbag Rd. This long term solution necessitate further studies to evaluate its economic, social and environment benefits and impact, and to develop alternative courses of action to address potential capacity and safety issues for future conditions.

### INTERSECTION IMPROVEMENTS

Intersection improvements are key to improving traffic flow on Greenbag Rd, especially during peak hours. Two intersections are identified as of paramount importance: the intersection of US 119/Greenbag Rd, and the intersection of Dorsey Ave/Greenbag Rd. Both intersections are signalized and currently experiencing LOS F at least for one approach during the AM or PM peak hour.

WV DOH is conducting a study to improve the intersection of WV 7 and Greenbag Rd. It is noted that the alternatives for the improvements to the Greenbag Rd/Dorsey Ave intersection are the same as the recommendations from the study approved by the MPO Policy Board.

Figure 12: Intersection Improvements

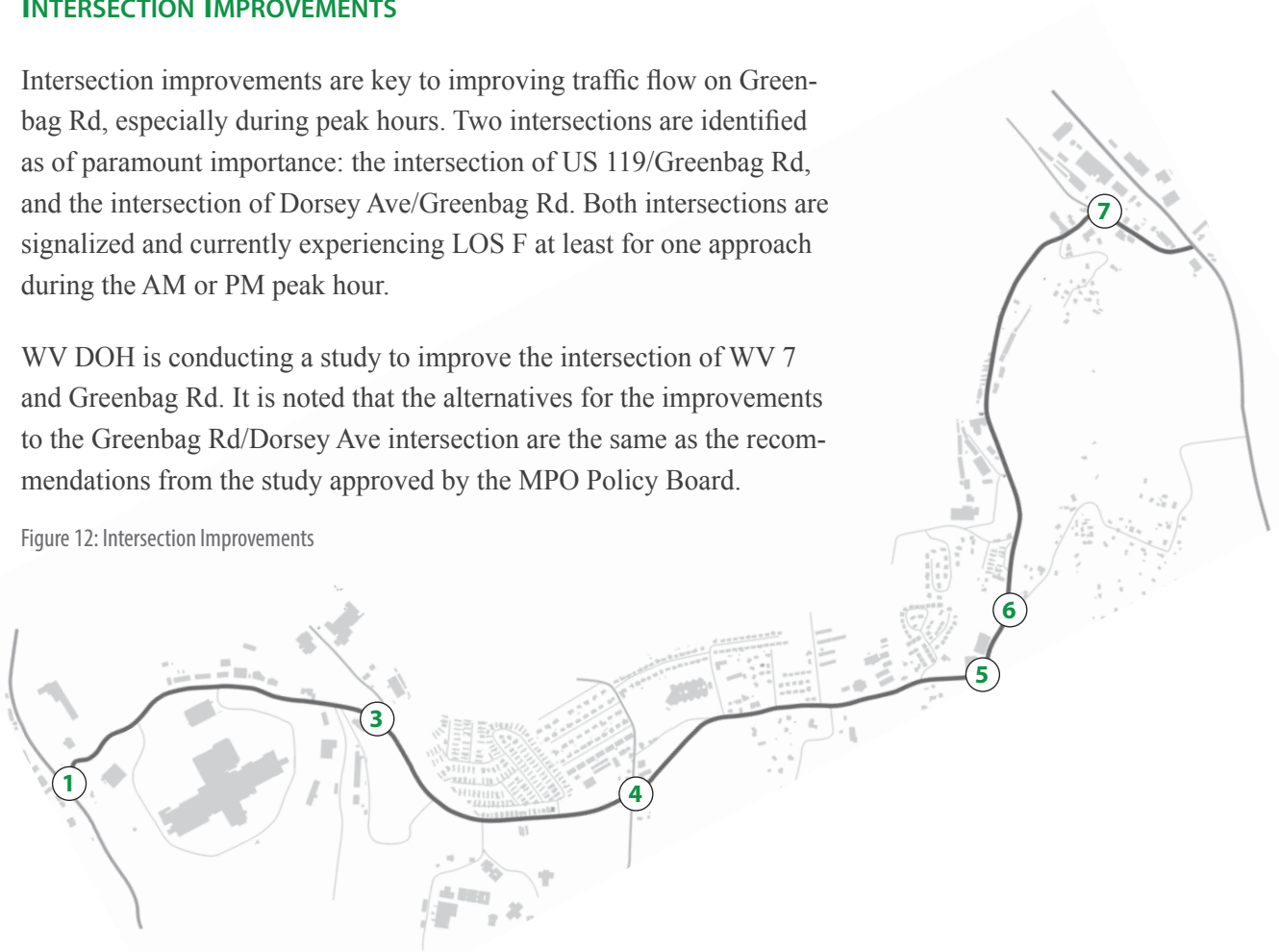


Table 6: Intersection Improvements

| Project # | Intersection on Greenbag Rd | Major Improvements    |                        |                        |                                        |
|-----------|-----------------------------|-----------------------|------------------------|------------------------|----------------------------------------|
|           |                             | Add left-turn lane(s) | Optimize signal phases | Improve turning radius | Install appropriate signs <sup>1</sup> |
| 1         | US 119                      | ✓                     | ✓                      | ✓                      | ✓                                      |
| 3         | Mississippi St              | ✓                     | --                     | ✓                      | ✓                                      |
| 4         | Dorsey Ave                  | ✓                     | ✓                      | ✓                      | ✓                                      |
| 5         | Lower Aarons Creek Rd       | --                    | --                     | ✓                      | ✓                                      |
| 6         | Diamond Ave                 | --                    | --                     | ✓                      | ✓                                      |
| 7         | Deckers Creek Blvd          | --                    | --                     | ✓                      | ✓                                      |

1. Include warning and/or regulatory signs on speed, curve, signal, bicycle, pedestrian, and etc.



## MULTI-MODAL IMPROVEMENTS

This study adopted a multi-modal approach to address issues and concerns in the corridor. As an integrated part of corridor improvements, non-motorized travel modes such as bicycling and walking are expected to reduce vehicle travel, support economic growth, improve community health, address potential social justice issues, and enhance the overall livability of the community in the corridor area. Recommended signages are shown in figure 14.

Short term major multi-modal improvements include:

- **Sidewalk.** Provide sidewalk on the north side of Greenbag Rd between the Mississippi St and the Mall west outlet (approximately 3,200 feet)
- **Crosswalk.** Provide crosswalk and pedestrian signal phase at the intersection of Greenbag Rd and the Mall west outlet.
- **Bicycle Climbing Lane.** Provide a westbound bicycle climbing lane on the north side of Greenbag Rd between the Mississippi St and the Mall east outlet (approximately 1,100 feet) and an eastbound bicycle climbing lane on the south side of Greenbag Rd between US 119 and Mall east outlet (approximately 1,00 feet)
- **Signage Improvement.** Install Bicycle May Use Full Lane signs, MUTCD R4-11, at appropriate locations as recommended by relevant MUTCD guidelines.
- **Transit Waiting Area.** Provide bus shelters at appropriate locations. At shelter locations, install appropriate passenger protection from passing traffic lighting and pedestrian crossing road signs (MUTCD W11-2) to improve pedestrian safety.

Long term recommendations include building a multi-use path connecting schools, businesses, residential areas, and other community facilities along the corridor. It is also include high intensity activated crosswalks (HAWK) at the intersection of the multi-use path with Dorsey Ave and Mississippi St.

Figure 13: High Intensity Activated Crosswalk



bloomington.in.gov

As an alternative to multi-use path, sidewalk on Greenbag Rd from Mississippi Street to Longbranch Dr was originally proposed for public comments. The community showed strong preference for a multi-use path as a non-motorized transportation facility serving the neighbors in the corridor. Further study is recommended to identify potential routes for the multi-use path and to evaluate feasibility and cost-effectiveness, as well as to estimate economic, social and environment benefits and impacts.

Figure 14: Recommended Signages for Multi-modal Improvements



## ON-GOING MONITORING ON SAFETY AND DEVELOPMENT

Greenbag Rd is one of the most visible and important transportation corridors in the Morgantown metropolitan area. Economic growth, residential development along the corridor will require Greenbag Rd to serve more pedestrians, bicyclists, and transit users, as well as to carry more cars and trucks, including induced traffic. Hence, the study proposes on-going efforts to monitor the safety for all mode of travelers and the development which increases the demand of transportation facilities for pedestrians and bicyclists as well as auto travel.

Proposed programs in this study are:

- **Safety Monitoring Program.** Collect and analyze crash/accident data on Greenbag Rd, and assess the need for further mitigation actions improving safety on Greenbag Rd in future conditions. Data include all mode of travelers.
- **Access Management Program.** The actions of regulatory authorities in planning, reviewing, and approving land development can significantly impact function of Greenbag Rd as a regional arterial. MPO staff are expected to coordinate with land-use regulatory agencies to address access management during the site plan review process of proposed development occurring along Greenbag Rd.

**Access management** is the systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway.

-- TRB Access Management Manual

Figure 15: Recommended Improvements (East Section)

**1 US 119/Greenbag Rd Intersection Improvements**

- Add an exclusive **left-turn lane** on Greenbag Rd
- Optimize traffic **signal phases**
- Install **traffic signal warnings** on Greenbag Rd
- Improve **turning radius**
- Provide a two-stage **left turn bicycle box** on the gas station leg

**2 Multi-modal Transportation Improvements**

- Provide **sidewalk** on the north side of Greenbag Rd between the Mississippi St and the Mall west outlet (approximately 3,200 feet)
- Provide **crosswalk and pedestrian signal phase** at the intersection of Greenbag Rd and the Mall west outlet
- Provide a westbound **bicycle climbing lane** on the north side of Greenbag Rd between the Mississippi St and the Mall east outlet (approximately 1,100 feet) and an eastbound bicycle climbing lane on the south side of Greenbag Rd between US 119 and Mall east outlet (approximately 1,00 feet)

**3 Mississippi St/Greenbag Rd Intersection Improvements**

- Add an eastbound exclusive **left-turn lane** to Mississippi St
- Provide appropriate **warning signage**
- Reduce **speed limit** for the eastbound traffic on Greenbag Rd between the Mall outlet (east) and Mississippi St.

**4 Dorsey Ave/Greenbag Rd Intersection Improvements**

- Add exclusive **left-turn lanes** on Greenbag Rd (both directions)
- Provide exclusive **left-turn signal phases** on Greenbag Rd (both directions)
- **Widen travel lanes** and adjust intersection **approaching angles**
- Provide **Bicycle May Use Full Lane** (MUTCD R4-11) signs at an appropriate distance to the intersection to increase bicycle safety

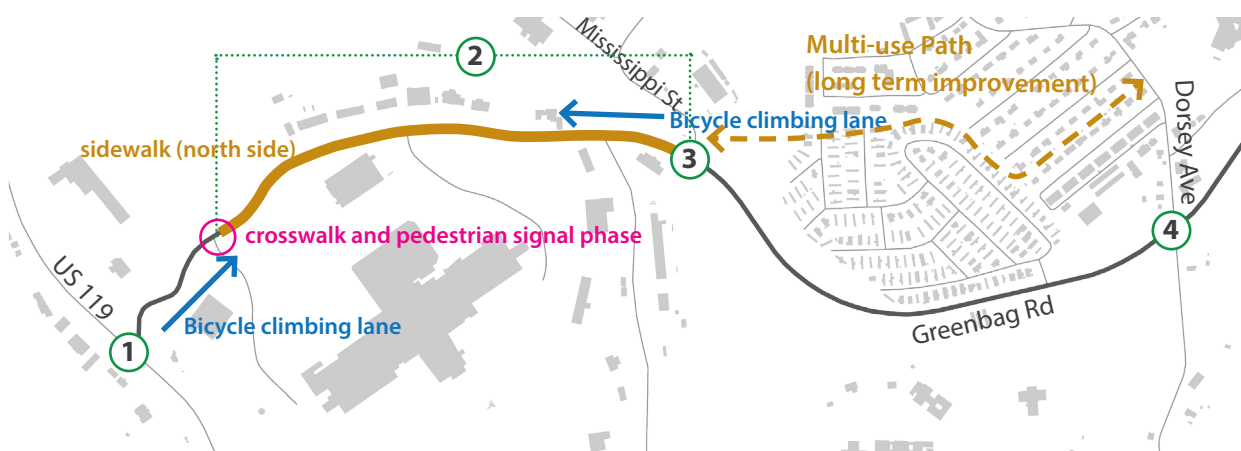


Figure 16: Recommended Improvements (West Section)

**5 Lower Aarons Creek Rd Intersection Improvements**

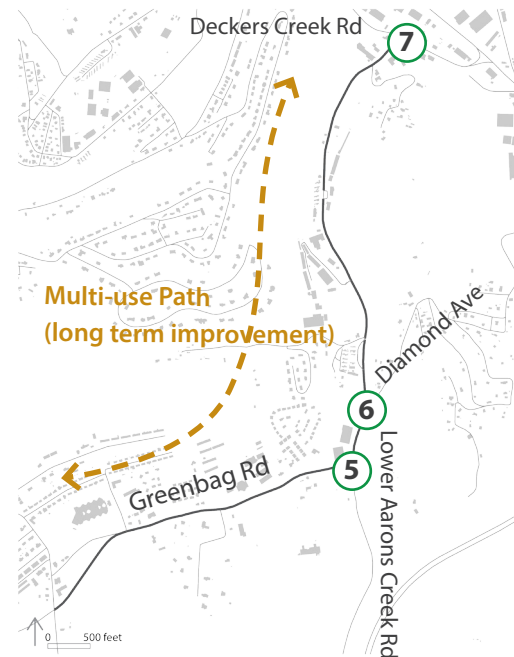
- Adjust **road alignment** to improve turning radius, including consideration of super elevation in horizontal curve design
- Provide appropriate **warning signs** for approaching traffic

**6 Diamond Ave Intersection Improvements**

- provide appropriate **warning signs** for approaching traffic
- improve **turning radius** for right-turn traffic from Diamond Ave

**7 Deckers Creek Blvd Intersection Improvements**

- Improve **turning radius**, especially for through-movement traffic on Greenbag Rd
- Provide **better signage** for approaching traffic
- Provide safer **pedestrian crossings**
- Improve **Deckers Creek Bridge** on Greenbag Rd to accommodate multi-modal travels

**8 Greenbag Rd Roadway (thoroughfare) Improvements (not on map)**

- **Widen and resurface** westbound lane to 12' and eastbound lane to 11', and provide 4' shoulder on both sides of Greenbag Rd (approximately 3.4 miles)
- **Re-configure travel lanes** between the two outlets of Mountaineer Mall to eliminate left-merges for through traffic
- Provide appropriate **lighting** on Greenbag Rd, particularly at locations where pedestrians and bicyclists are expected
- **Mitigation** strategies should take into consideration eliminating or minimizing adverse effects, such as air and noise pollution, to adjacent neighbors during and after the construction of the project.

**9 Greenbag Rd Transit Waiting Condition Improvements (not on map)**

- provide **bus shelters** at appropriate locations
- provide appropriate **passenger protection** from passing traffic
- provide **lighting and pedestrian crossing road signs** (MUTCD W11-2) at the designated transit waiting area

**10 Greenbag Rd Signage Improvements (not on map)**

- Provide **Truck Route signs**, MUTCD R14-1, to mark Greenbag Rd as a designated route for truck traffic
- Provide **Bicycle May Use Full Lane signs**, MUTCD R4-11, at appropriate locations as recommended by relevant MUTCD guidelines
- Provide **Pedestrian Crossing Road signs**, MUTCD W11-2, at the proposed designated transit waiting area (included in the Transit Waiting Condition Improvements)

**11 Aaron Creek Drainage Improvements (not on map)**

- **Re-grade** the Aaron Creek bank to improve drainage conditions and preserve species living in the creek. (avoid using gabion baskets)
- Encourage **up-stream soil conservation** on Aaron Creek

## 5. IMPLEMENTATION

The Greenbag Rd Corridor Study is a planning level effort to identify corridor issues, and outline courses of actions to address those issues in the overall interest of the community. Information presented in previous sections of the report are intended to provide a smooth transition from the planning phase to the project development phase, in which project design, preliminary engineering, and environment assessment are conducted.

The plan will be implemented primarily by WV DOH. Its implementation requires coordination among WV DOH Central Office, WV DOH District Office, Morgantown Monongalia MPO, the City of Morgantown, and Monongalia County.

The study suggests following principles in the implementation process.

- **Efficiency.** The implementation phases should be thought as clusters of related actions, which are coordinated simultaneously to take advantage of opportunities to aggregate funding sources, maximize synergies, and minimize costs and physical disruption.
- **Consistency.** The project development process for each improvement should be closely linked to the planning that precedes it, to ensure consistency between objectives as articulated in this plan and the actual strategies as implemented in the program.
- **Priority.** The established project priority shows the preference based on community perspectives. It does not necessarily determine the actual implementation order of improvements proposed in this plan. The ultimate sequence of performing those improvements is at the discretion of implementing agencies.

The following table provides planning level cost estimation for each proposed project of the plan, organized by phases and priorities. The actual cost of a given project could be significantly higher than the planning level cost estimate for that project, due to unknown circumstances of the physical and social context.

### ● System Level

MPO LRTP  
*develop regional investment strategies to improve the transportation system*

### ● Corridor Level

**Greenbag Rd Corridor Study**  
*identify issues, recommend projects*

### ● Project Level

○ Programming  
*matching available funds*

○ Development  
*preliminary engineering, environment assessment*

○ Construction

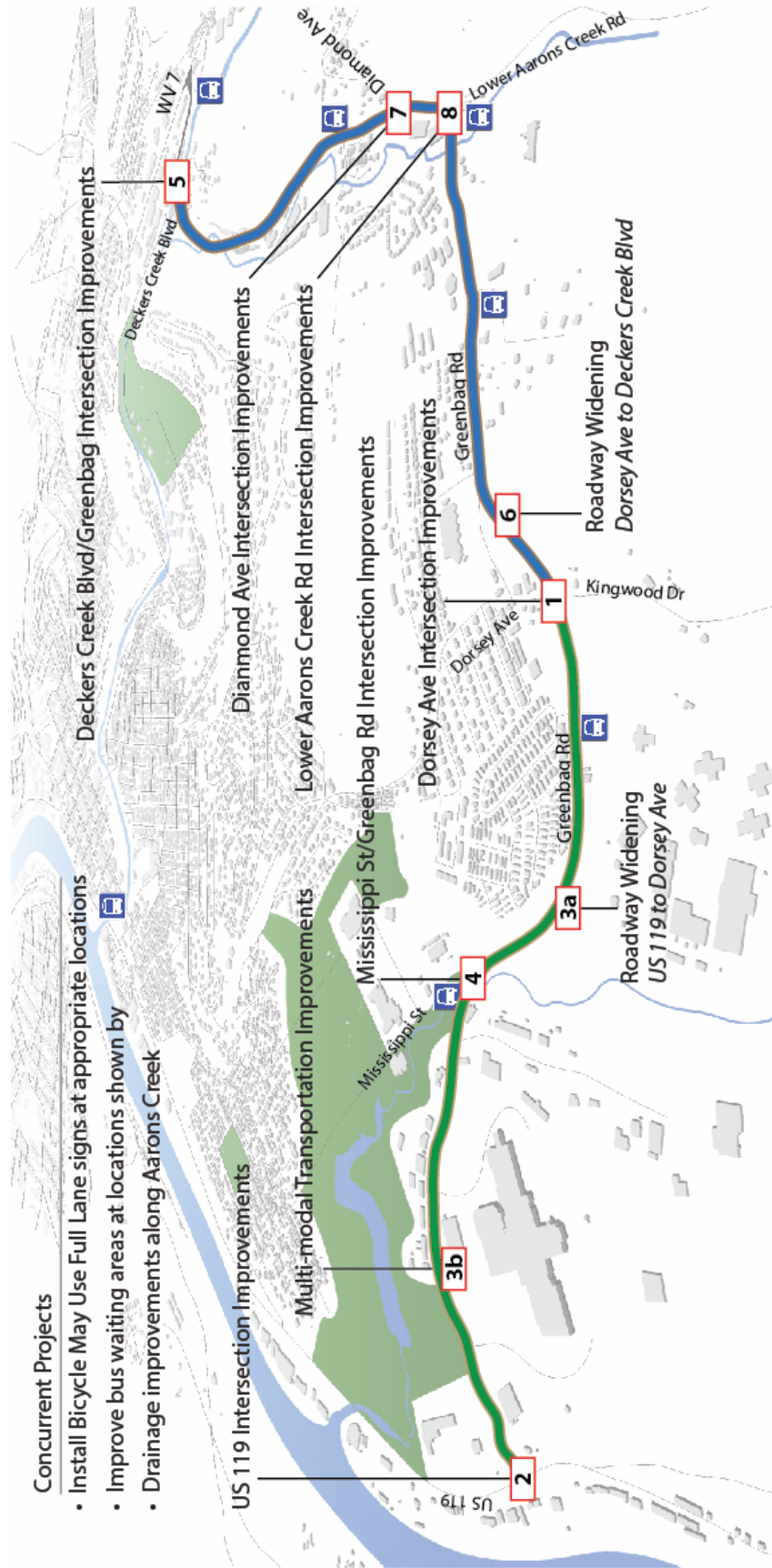
Table 7: Implementation

| Priority Rank                          | Project # | Project Name                                         | Planning Level<br>Cost Estimate |
|----------------------------------------|-----------|------------------------------------------------------|---------------------------------|
| 1                                      | ④         | Dorsey Ave/Greenbag Rd Intersection Improvements     | \$1.1 million to \$2 million    |
| 2                                      | ①         | US 119/Greenbag Rd Intersection Improvements         | \$2 million to \$4 million      |
| 3a                                     | ⑧         | Roadway Widening - US 119 to Dorsey Ave              | \$4 million to \$6 million      |
| 3b                                     | ②         | Multi-modal Transportation Improvements              | \$750,000 to \$804,000          |
| 4                                      | ③         | Mississippi St/Greenbag Rd Intersection Improvements | \$300,000 to \$400,000          |
| 5                                      | ⑦         | Deckers Creek Blvd Intersection Improvements         | \$600,000 to \$700,000          |
| 6                                      | ⑧         | Roadway Widening - Dorsey Ave to Deckers Creek Blvd  | \$2 million to \$4 million      |
| 7                                      | ⑥         | Diamond Ave Intersection Improvements                | \$300,000 to \$400,000          |
| 8                                      | ⑤         | Lower Aarons Creek Rd Intersection Improvements      | \$300,000 to \$400,000          |
|                                        | ⑨         | Transit Waiting Condition Improvements               | \$68,000 to \$88,000            |
| <b>Concurrent Projects<sup>1</sup></b> | ⑩         | Signage Improvements                                 | \$14,000 to \$24,000            |
|                                        | ⑪         | Aaron Creek Drainage Improvements                    | N/A                             |
| <b>programmatic projects</b>           | ⑫         | Greenbag Rd Access Management Program                | N/A                             |
|                                        | ⑬         | Intersection Safety Monitoring Program               | N/A                             |
| <b>Long Term Projects<sup>2</sup></b>  | ⑭         | Multi-use Path Connections                           | \$800,000 to \$850,000          |
|                                        | ⑮         | Roadway widening (Two-way left-turning lane)         | \$6 million to \$10 million     |

<sup>1</sup>The clustered project with related actions to another project. Those projects are coordinated simultaneously to take advantage of opportunities to aggregate funding sources, maximize synergies, and minimize cost and physical disruption.

<sup>2</sup>Long term projects require further studies to evaluate feasibility and cost-effectiveness, as well as to estimate economic, social and environment benefits and impacts.

Figure 16: Improvement Priority Map



**Concurrent Projects**

- Install Bicycle May Use Full Lane signs at appropriate locations
- Improve bus waiting areas at locations shown by
- Drainage improvements along Aarons Creek

# Greenbag Road Corridor Study Report



Morgantown Monongalia  
Metropolitan Planning Organization