Lynchburg, Virginia

Campbell Avenue Access Management Study

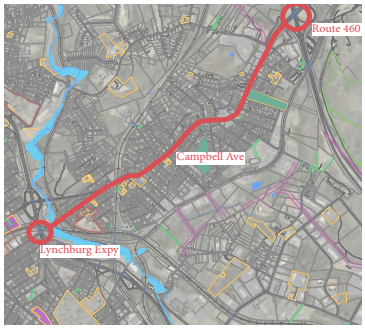
Prepared for

Planning Division, City of Lynchburg

900 Church Street

Lynchburg, VA 24504

(434)455-3900



PARPARED BY

June 2012

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I. Introduction

The City of Lynchburg, through its Comprehensive Plan's transportation element, has identified access management as a critically important tool to preserve and enhance its circulation system. Following through on this intent, the City of Lynchburg is in the process of working through assessments of corridor access management along several key corridors, including Lakeside Drive, Old Forest Road, and now the Campbell Avenue corridor. The Lakeside Drive and Old Forest Road studies were completed in 2011 and addressed connectivity, access modifications, CIP recommendations, and policies to support the implementation of the specific recommendations.

The goal of this study is to carefully examine existing conditions for access management and related corridor operations, and then provide specific recommendations, in terms of physical improvements, policies, and implementation strategies to guide future CIP spending and corridor planning. This corridor plan will help to inform efforts for preserving overall safety, capacity and operations along the corridor while meeting the needs of the neighborhood, commercial uses, and all users of this roadway facility.

This study addresses corridor operations, mainly in the context of access management and safety, for the Campbell Avenue corridor between Route 460 on the south and Lynchburg Expressway on the north. The discussion of access management is expanded to include an assessment of corridor safety, key intersection operations, multimodal features along the corridor, and conceptual longer term corridor improvements. This corridor study was prepared in coordination with a larger multi-corridor master planning effort for both the Odd Fellows Road and Campbell Avenue Corridors.

"Access management focuses on the location, spacing, and design of entrances, street intersections, median openings, and traffic signals. Each of these creates conflict points where vehicles have to stop or slow down, disrupting the flow of traffic.

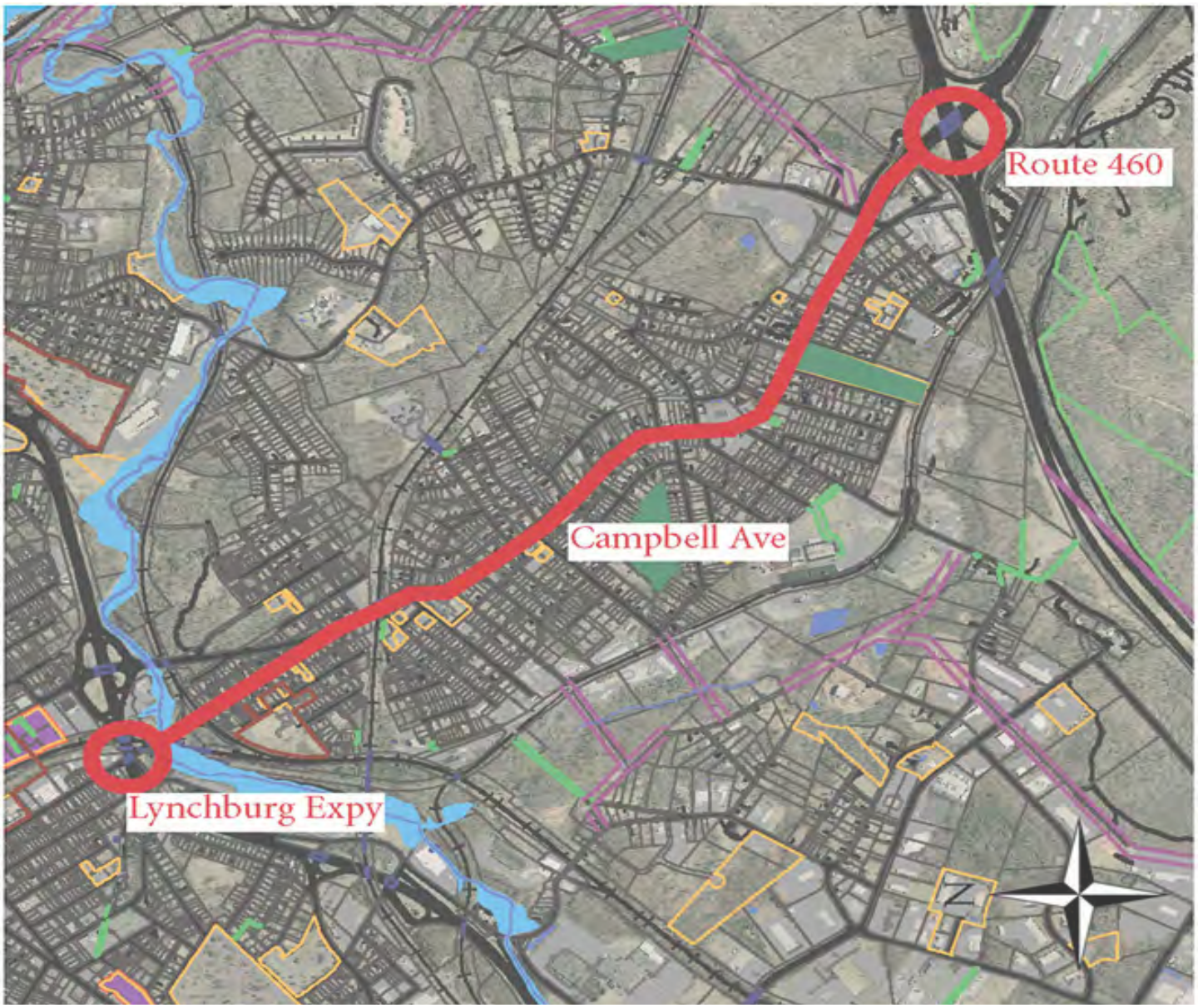
As the number of conflict points increase, so does traffic congestion and crashes. Better management of access to the highway can reduce the number of conflict points and their adverse impact on highway operation and public safety. Roads are a critical public resource and constitute a major investment of the public's money. Access management can maximize this investment."

Goals of Access Management include:

- *Reduce traffic congestion;*
- *Enhance public safety by reducing conflicting traffic movements;*
- *Reduce the need for new highways and road widening by maximizing the performance of existing state highways;*
- *Support economic development by promoting the efficient movement of goods and people;*
- *Preserve the public investment in new and existing highways;*
- *Ensure that private property is entitled to reasonable access to the highways. (Source:VDOT)*

The project public involvement effort included discussion of the Campbell Avenue corridor at the first meeting for the multi-corridor masterplanning study, and then two workshops specifically focused on the Campbell Avenue corridor. A summary of the public process is provided as its own section within this document.

Figure 1: Project Location Map



I.1 Problem Statement

The City of Lynchburg would like to optimize and preserve the safety, traffic flow and character of key corridors, including

the Campbell Road corridor, taking into consideration that the funding for road maintenance and construction has been greatly reduced and that there is little room to widen the road.

I.2 Background

Lynchburg was named for its founder, John Lynch, who at the age of 17 started a ferry service across the James River in 1757. In 1786, the Virginia General Assembly granted Lynch a charter for a town, which took in the 45 acres of land that Lynch owned. Lynchburg was incorporated as a town in 1805, and as a city in 1852[1]. In 2010 the population was estimated at over 75,000 residents and at present the area of the city is approximately 50 square miles.

Several residential roads have grown into minor arterials and commercial corridors as land use has changed and vehicular traffic has increased. These roads have been widened and changed to accommodate increased traffic volumes over the years. Some have grown to the point though, where any further widening would negatively impact, homes, businesses and a number of other land uses that make the corridor vibrant. The City of Lynchburg is also feeling the effects of a significantly reduced level of funding for the construction and maintenance of streets.

In the interest of minimizing future major road construction needs, the City wishes to look at other ways in which to keep the corridors safe and maintain sufficient travel capacity. One proven way to preserve vital corridors is through access management policies and techniques. This study identifies locations along the Campbell Avenue corridor where these techniques may be encouraged or implemented. This study also provides information about access management in order to educate the public about its intent and purpose; and provides sample access management regulations that can be used to preserve and restore the safety and traffic flow on Campbell Avenue and other commercial corridors within the city. Finnally the study also identifies opportunities for longer term improvements at key interections and corridorwide to help provide for safe and efficient multimodal mobility into the future.

I.3 Purpose

The purpose of this study is to highlight opportunities where access management techniques can be implemented along Campbell Avenue to improve the safety, traffic flow, multimodal options, and overall function of the road; to provide information about access management techniques and examples of successful implementation; to provide regulations that can be adopted by the City of Lynchburg to further the use of access management along the Campbell Avenue corridor

[1] Lynchburg Historical Society, June 2010. Address: http://www.lynchburghistoricalfoundation.org/history/index.php.

and other key corridors throughout the City.

I.4 Project Scope

The study area for this project is Campbell Avenue from Route 460 on the south to the Kemper Street / Old Campbell Road intersection on the north. This corridor was chosen for an access management opportunities assessment because Campbell Avenue serves as a vital corridor for Lynchburg, is recognized as an entry corridor to the City, and serves as a regional minor arterial while providing key access to the abutting established neighborhoods and commercial uses. Campbell Avenue is one of several roads within the City where, if traffic volumes were to increase, there would be little room for the road to expand because of existing structures, parcel sizes, and available space for parking at the adjacent businesses, among other constraints.

The proposed access management regulations included in this document reflect the goal of the current Commercial Corridor Overlay regulations that the City has applied to the Timberlake Road Commercial Corridor, Prior to development of this document, the Metropolitan Planning Organization (Region 2000 Local Government), on behalf of the City of Lynchburg, prepared a draft for similar document for the Old Forest Road corridor. This document mirrors, to a large degree, policy intent as developed in that prior [draft] study effort, though additional information is provided relative to multimodal and intersection improvements.

The scope of work for this study was to primarily examine corridor safety and access management along the corridor. Additionally, an effort was undertaken to examine overall corridor mobility and to identify short and long term recommendations for corridor management relative to corridor context and goals of the City as stated in prior plan document and goals as expressed in the three public involvement meetings that were conducted for this study.

For the safety study aspect, crash locations along Campbell Avenue were also mapped for this study. Crash reports from December 2008 through December 2011, that are in the Lynchburg Police Department's Computer System, were examined and each location was marked as closely as possible on aerial mapping. Included in the accident location summary, among other things, is the date of the crash, the time, and the type of accident that occurred. No personal information about the drivers or their passengers was included in crash summary in the interest of privacy.

Crash (accident) information within the corridor is important because it is one way to identify where the access management problems exist. There are two types of accidents that can be potentially associated to access management related

issues. Those are angle crashes that include both left and right turn accidents, and rear-ends. Accidents that occurred due to any kind of turning movement, particularly left hand turns (one of the drivers was turning left, waiting to turn left or stopped in traffic to let someone turning left in ahead of them) are categorized as a "left hand turn" accident. Rear-end accidents are those that have occurred because a vehicle slowed in traffic and the vehicle behind them was not able to compensate for one reason or another. Right turn accidents are not always correctable with changes in access, although they are access related since cars are accessing either an entrance or side sreet.

In order to glean information about potential problems along Campbell Avenue that would not show up through the accident data, community meetings were held on January 30, 2012 and also on May 7th, 2012 at the Fairview Heights Recreation Center. For the January meeting, more than 1000 letters were sent to property owners located within the abutting neighborhoods along Campbell Avenue and in the Odd Fellows Road corridor inviting them to attend the initial meeting. Approximately 50 citizens, residents and business owners came to the January meeting to discuss what they like about the corridor, what they feel are problems along the corridor and to discuss how they would suggest changing the corridor to fix these problems.

The issues and opportunities that the citizens identified, along with access management concerns within the corridor were presented at a second neighborhood meeting held on May 7th, 2012. Again, the citizens were given the opportunity to comment on the suggested opportunities and discuss the issues with the attending staff. Nearly 500 letters were sent to property owners and business, along the Campbell Avenue corridor and in the abutting neighborhoods along Campbell Avenue inviting them to attend the meeting. Approximately 20 citizens attended the second meeting.

Additionally, prior to conducting the first meeting for this study, the corridor – in the context of safety, design, and opportunities – was discussed at a public meeting held at the City's Information Technology center on Young Place near Mayflower Drive in November of 2011. This meeting was conducted to introduce a closely related corridor master planning effort for the Odd Fellows Road and Campbell Avenue corridors. With this initial project meeting, the Campbell Avenue study (this study) had a total of three public meetings where corridor issues and opportunities were discussed.

I.5 Access Management on Campbell Avenue

Due to the rolling topography, and smaller size of the parcels on Campbell Avenue, some of the access management techniques may not be practical. In these cases, it is vital for the Technical Review Committee to follow the intent of the regulations and not the letter. It is not the intention of the access management regulations to prevent access to the

parcels along Campbell Avenue. The goal of access management techniques is to increase the safety, flow and capacity of the roadway.

Some of the most common access management "issues" on the Campbell Avenue corridor are driveway spacing, excessive access to one business, corner clearance and driveway throat length. Commonly accepted access management techniques suggest that there be at least 250 feet between driveways for roads with a posted speed of 35 miles per hour (mph) or lower. Of the 92 entrances, 24 un-signalized entrances, and five signalized intersections in the Campbell Avenue study area, there are very few locations with the recommended spacing distances on at least one side of the entrance. Furthermore, changes to access can typically occur when a site plan for new development, or redevelopment, is received by the City. Therefore, until those opportunities arise, unless there is a clearly identifiable safety concern there will be little opportunity to reconfigure non-conforming entrances.

Full implementation of access standards can sometimes be difficult due to a variety of reasons, such as:

1. The topography of the land may not lend itself to the implementation of access management techniques;
2. The adjacent land uses may be different. On Campbell Avenue there are many instances where residential property is adjacent to commercial property, and traffic between the two properties would be inappropriate; or
3. Parcel sizes may not accommodate access management techniques.

There are specific circumstances in which the access management regulations would not apply to a parcel. These circumstances do not normally occur and would not randomly be triggered with the current normal use of the property. For more information, please refer to the Nonconforming Access Features section of the Access Management Regulations section of this document.

I.5.1 Types of Opportunities Identified for Campbell Avenue

Not all access management techniques are viable for every road. For roads where the majority of parcels are already developed some of the access management techniques, such as throat length and the construction of a median, require more land than is available. The opportunities outlined in this document are specific to the topography, available space and character of Campbell Avenue. The types of opportunities identified for Campbell Avenue are grouped by the following terms:

1. Consolidate entrances;
2. Cross access;

3. Construct service road;
4. Reconfigure entrance; and
5. Construct median.

The "consolidate entrances" grouping is used when there are multiple entrances for the same business or adjacent businesses. On Campbell Avenue, this also involves entrances where the minimum recommended driveway spacing or corner clearance is not met, there is no throat length to speak of for entering and exiting vehicles, and often there is no vehicle circulation design within the parking lots. Often these properties have access on side roads as well as on Campbell Avenue. In these instances, the opportunity for access management includes reducing the number of conflict points by closing one or more entrances on Campbell Avenue and making improvements to the entrance on the side streets.

The "cross access" grouping is used when businesses have adjacent parking lots that could be connected, therefore allowing patrons to get from one business to the next without having to get back on Campbell Avenue. Creating a connection between parking areas also opens the businesses up to the possibility for shared parking. In the Access Management Regulations section of this document, shared parking can mean a reduction in the number of required parking spaces for a business. For the smaller parcels along portions of this corridor, this could be very useful for many types of businesses.

The "construct service road" grouping is used for more formal circulation between more than two businesses, such as what exists on the southern end of the corridor in front of the Hardees. Building a service road involves a detailed plan for traffic circulation between businesses. This would be much more involved than joining two adjacent parking lots. In some instances, it could be possible to improve an existing road that runs behind the businesses as needed to provide access.

When the "reconfigure entrance" group is used it means the entrance could be changed to increase safety by narrowing the width of the entrance, making the entrance a "right-in only"[2] or a "right-in, right-out"[3], or adding an entrance feature that better separates entering and exiting traffic. From an access management perspective, excessively wide driveways can be a problem because they may not guide the driver to the best position for entering or exiting. These driveways can also pose a safety threat to pedestrians and bicyclists by increasing the amount of time they spend in the path of vehicles.

[2] A "right-in only" entrance is designed so that vehicles can only enter the property by making a right turn.
[3] A "right-in, right-out only" entrance is designed so that vehicles can both enter and exit the property by making a right turn, though left turn movements are prohibited.

The "construct median" group is used for the commercially oriented area on each side of the Mayflower Drive intersection. Consideration was given to alternative routes for making left turns to and from Campbell Avenue and as shown on graphics within the opportunities summary section of this document.

I.5.2 Implementation

This document identifies the opportunities to improve the safety, function and flow of the Campbell Avenue corridor. Simply identifying these opportunities, however, does not make changes happen. To recognize the opportunities identified in this document, the City also needs to adopt this document, and incorporate text referencing it in the City of Lynchburg Comprehensive Plan. Text that can be used in the Comprehensive Plan has been included in this document in the Comprehensive Plan Text section.

Secondly, in order for the City to implement any access management strategies, policies and regulations need to be adopted and incorporated into the permitting and site plan review process. To assist in the potential establishment of access management regulations within the City of Lynchburg, suggested access management regulations have been included in the appendix to this document. It should be noted that the recommended regulations are consistent with VDOT's current guidelines and requirements. VDOT recently revised their spacing standards for entrances based on the last several years of implementation experience. With the revisions, it appears that their regulations are consistent with the context of City corridors such as Campbell Avenue.

These regulations can be applied within the City in several ways. They can be adopted as part of a corridor overlay and applied to specific roads, or they can be adopted and included with the regulations for all parcels. The City can use all of the suggested regulations or just a few.

It is vital that, if the city is interested in preserving the safety, function, and flow of Campbell Avenue, regulations are put in place that reflect how the City would eventually like the corridor to look and function. The adoption of even one regulation would be a positive step toward that goal. If the city chooses to adopt only a few of the regulations, the Nonconforming Access Features should be included. This is to ensure that existing properties will reflect the City's vision of Campbell Avenue as they are redeveloped.

II. Access Management Overview

I.1 Access Management

Many knowledgeable agencies have produced informative documents about access management. Information from sample documents have been included in the appendix to this document. This section will provide information about the ideas behind access management and why it is considered a useful tool for preserving the safety, flow and capacity of roads. For details about the techniques used please refer to the documents in the appendix.

About Access Management

"Roads serve two primary purposes. One is mobility and the other is access. Mobility is the efficient movement of people and goods. Access is getting those people and goods to specific properties. A roadway designed to maximize mobility typically does so in part by managing access to adjacent properties. A good example is an Interstate Highway. While a motorist could expect to travel quite efficiently over a long distance using an Interstate Highway, the number of access points is restricted to only freeway interchanges every few miles. This type of roadway serves primarily a mobility function. At the other extreme, a local residential street would provide easy and plentiful access to all adjacent properties, but long distance travel on such a roadway would be impossible. This type of roadway serves primarily an access function." [4]

"Access management refers to the design, implementation, and management of entry and exit points (e.g., driveways) between roadways and adjacent properties. The use of access management techniques is designed to increase roadway capacity, manage congestion, and reduce crashes while serving land uses appropriately."[5] The way access management does this is by limiting or reducing the number of conflict points on a road."

A conflict point is an area where intersecting traffic merges, diverges, or crosses. Conflict points slow and sometimes stop traffic, increase the likelihood of accidents and lower road capacity. It is at these locations where a driver has the highest potential to get into an accident. A single driveway on a two way road produces high conflict points (Figure 2. Conflict Points and Flow of Traffic). Conflict points can be limited by creating separate turn lanes, constructing a median, limiting direct access on higher speed road, and locating traffic signals at appropriate intervals to facilitate movement. They can also be limited by creating joint access (shared driveways), cross access (access between parking lots) and service roads.

Illustrated below, Figure 3, Level of Access and Roadway Function shows how the level of access relates to the movement

[4] Access Management Balancing Access and Mobility, Answers to your questions. Florida Department of Transportation, FDOT, Frank Broen, Gary Sokolow, 2002.
[5] Transportation Research Board. Access Management Manual. National Academy of Sciences, Washington, DC, 2003.

of people and goods. Campbell Avenue serves the dual function of serving through traffic and providing access to properties, both residential and commercial. Providing excessive or inappropriate access to abutting property on arterial roads can lead to crashes, delays and traffic congestion.

Figure 2: Confilict Points and Flow of Traffic

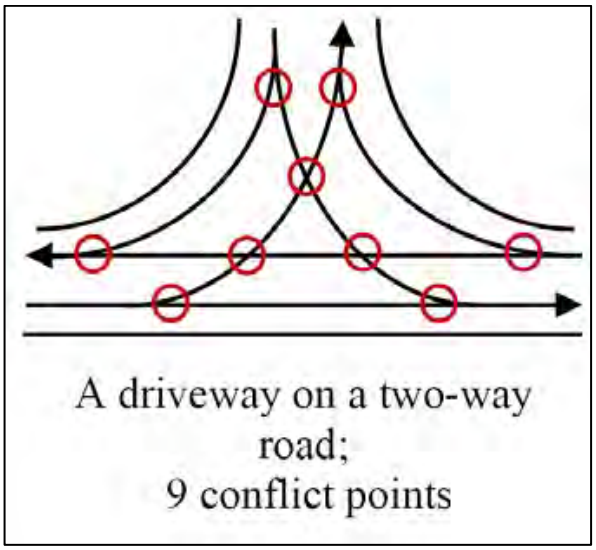
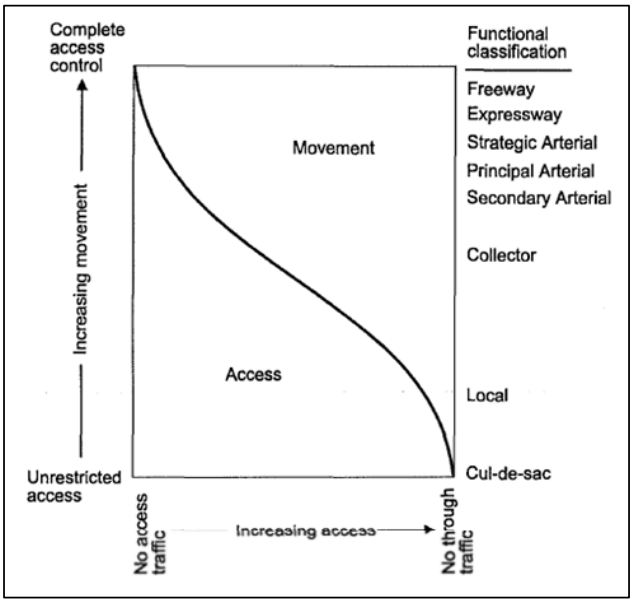


Figure 3: Level of Access and Roadway Function



Historically most properties are developed individually and as a result, the impact of allowing a site access and creating an entrance was ignored. Every connection made to a road has an impact on roadway capacity, travel speeds, and increases the potential for accidents and delays. As the function and character of a road changes the access points to that road should also change.

Poor access management often results in increased accident rates due to unfocused vehicle movements (there is not a single location where vehicles turn left across traffic, there are many points at which vehicles can turn left across traffic). Uncontrolled left turns result in traffic congestion and unpredictable traffic flow when vehicles have to stop in the travel lane and wait to turn left at entrances or signalized roads. Every entrance that provides access onto a major roadway slows the traffic traveling on that roadway and creates more opportunities for accidents to happen.

Strip development is also associated with poor access management, typically due to the numerous driveways and poorly managed parking lots that result in delays on the roadway. The Campbell Avenue corridor presently has very little "strip development", though there are commercial properties near the Mayflower Drive segment that could ultimately be redeveloped.

II.2 Access Management Used Within Lynchburg and Virginia

The Virginia Department of Transportation recently adopted access management regulations for use on the state maintained roads. Many localities within Virginia also have access management regulations in place. These localities include, among others, the Cities of Arlington, Charlottesville, Roanoke, Richmond, as well as Accomack County, Campbell County, Orange County, and Powhatan County. This means that access management regulations can be adopted and implemented within Virginia, and that large populated cities as well as rural counties find these regulations useful for their specific needs.

Successful uses of access management in Lynchburg include:

1. The newly reconfigured portion of Old Forest Road in front of the WalMart;
2. A directional left median modification recently constructed for the new commercial center just north of Wards Ferry Road on Wards Road.
3. The cross access on Wards Road from Atlanta Avenue to Wards Ferry Road;
4. The cross access on Wards Road from Wards Ferry Road to Leesville Road;
5. Cross access frontage road along Wards Road between the Hilton Garden Inn and the Golden Corral Restaurant.
6. Cross access on Wards Road from the Sheetz and the Rock Castle Commercial Development;

7. There is cross access between the businesses on the corner of Wards Road and Fort Avenue;
8. Cross access on Fort Avenue between the former Blockbuster, Walgreens, Waffle House and a number of businesses north.

There are also numerous places in Lynchburg where joint access and service roads are used to provide access to a business or parcel. Access management techniques have also been implemented in Madison Heights, Route 29 in Campbell County, and Route 221 in Bedford County.

III. Assessment of Existing Conditions

An important part of the study process is to understand how Campbell Avenue is currently utilized and how it is performing relative to safety, congestion, and its continued ability to serve commercial/residential/institutional uses. Also, multimodal mobility along the corridor is important. The ability to safely and comfortably walk to and along the corridor relates closely to the ability to serve the corridor with transit. In terms of "complete street" planning, there should be an ability to safetly use bicycles either on or in close proximity to the corridor.

Campbell Avenue is classified as an urban minor arterial within the study area. The typical roadway section consists of four lanes with no physical median. Most of the corridor has a painted median that is approximately 5-6' in width. The lane widths are generally 11-12' and the posted speed limit is 35 MPH between Old Campbell Avenue on the north to just north of Florida Avenue, and 45 MPH beyond the project limits. The current average daily traffic volumes are 17,000 vehicles per day, and over the past 10 years the traffic has had no net growth in volumes. This is likely due to construction of other connections, such as the Route 29 Bypass and Concord Turnpike improvements. Also, along Campbell Avenue there has been very little change in residential or commercial growth in the past years, thus the local traffic volumes have remained relatively the same.

Table 1: Traffic Growth History

Historical Volume Growth Location \ Year	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	10 yr growth	annual growth rate
Kemper to Campbell	9800	10000	11000	10000	12000	12000	13000	12000	12000	12000	-2200	0
Campbell to Mayflower	17000	17000	18000	17000	20000	19000	19000	18000	18000	18000	-1000	0
Mayflower to Florida	16000	16000	17000	16000	18000	18000	18000	18000	18000	18000	-2000	0

The Campbell Avenue (Route 501 Corridor) serves as an important north/south roadway throughout southside Virginia, extending from the North Carolina state line to the Town of Buena Vista, just south of I-81. Within the Lynchburg region, Route 501 is aligned along several major regional roadways including Campbell Avenue, Lynchburg Expressway, and Boonsboro Road. Langhorne Road and Rivermont Avenue are signed as Business Route 501. Thus the study section of Campbell Avenue is the southern link, within the Lynchburg region, of a significantly important regional connector facility.

Campbell Avenue within the study area also provides access to numerous residential/ neighborhood local roads. In addition, Campbell Avenue currently has pockets of commercial development consisting of general commercial uses and neighborhood scale retail uses. Also, there are numerous churches and a community recreational facility directly on Campbell Avenue. Just off Campbell Avenue is Mountain View School, Bass Elementary School, and also the Virginia University of Lynchburg. These uses generate walking trips along the corridor by adults and children.

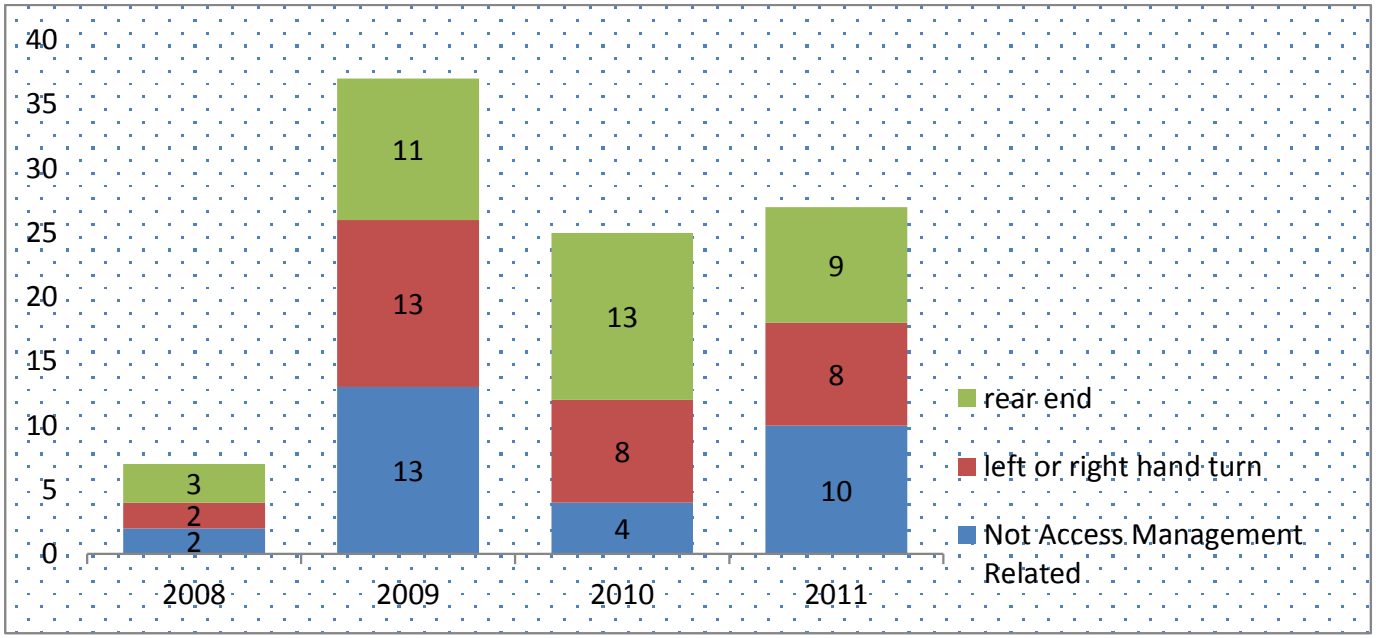
III.1 Corridor Safety

3.1.1 Accident Statistics for Campbell Avenue

A crash study was performed using the most recently available three years of historical crash data (from December 2008

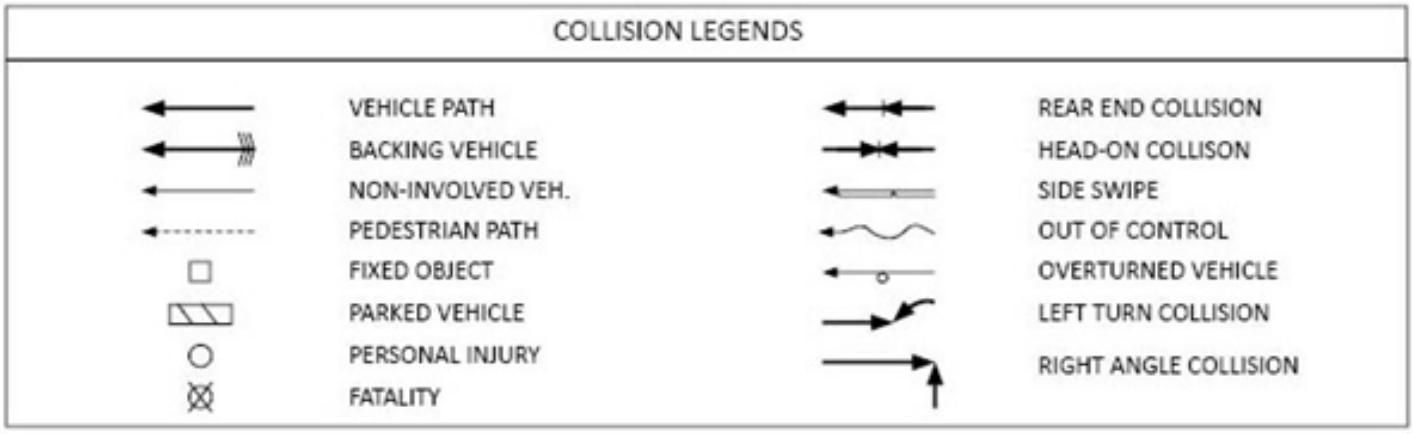
to December 2011) within the study area. It was found that 96 crashes had occurredover the 1.3 miles of Campbell Avenue between Lynchburg Expressway and Route 460. There were no recorded incidences of pedestrian or bicycle crashes over the prior three years. A graphic series is provided at the end of this section that illustrates the crash locations on aerial imagery. Through this method of analysis we are able to also see where the crashes occur relative to commercial entrances and the intersections such that we can begin to determine where we might have concerns with physical roadway or entrance features that could influence the crash patterns. A statistical summary of crashes as shown in Figure 4 and crash diagrams are presented later in this document within the illustrative graphic series.

Figure 4: Accidents on Campbell Avenue by Year and Type, December 2008 (1 month only) through December 2011



Note that the 2008 data is for only the month of December while the 2009 thru 2011 data are for complete years. Per inspection of the above information we can see that of the crashes that are occurring, the intersection and access related crashes are a high percentage of the overall crash history. There were no bicycle or pedestrian crashes, with exception of one crash that involved a pedestrian who was pushing a stalled car along the roadway near Florida Avenue. Numbers of crashes have ranged from 25/yr to 37/year.

The following graphics provide an illustration of the corridor relative to entrance and intersection locations, the three year crash history, and transit stop locations. A legend is provided as follows:

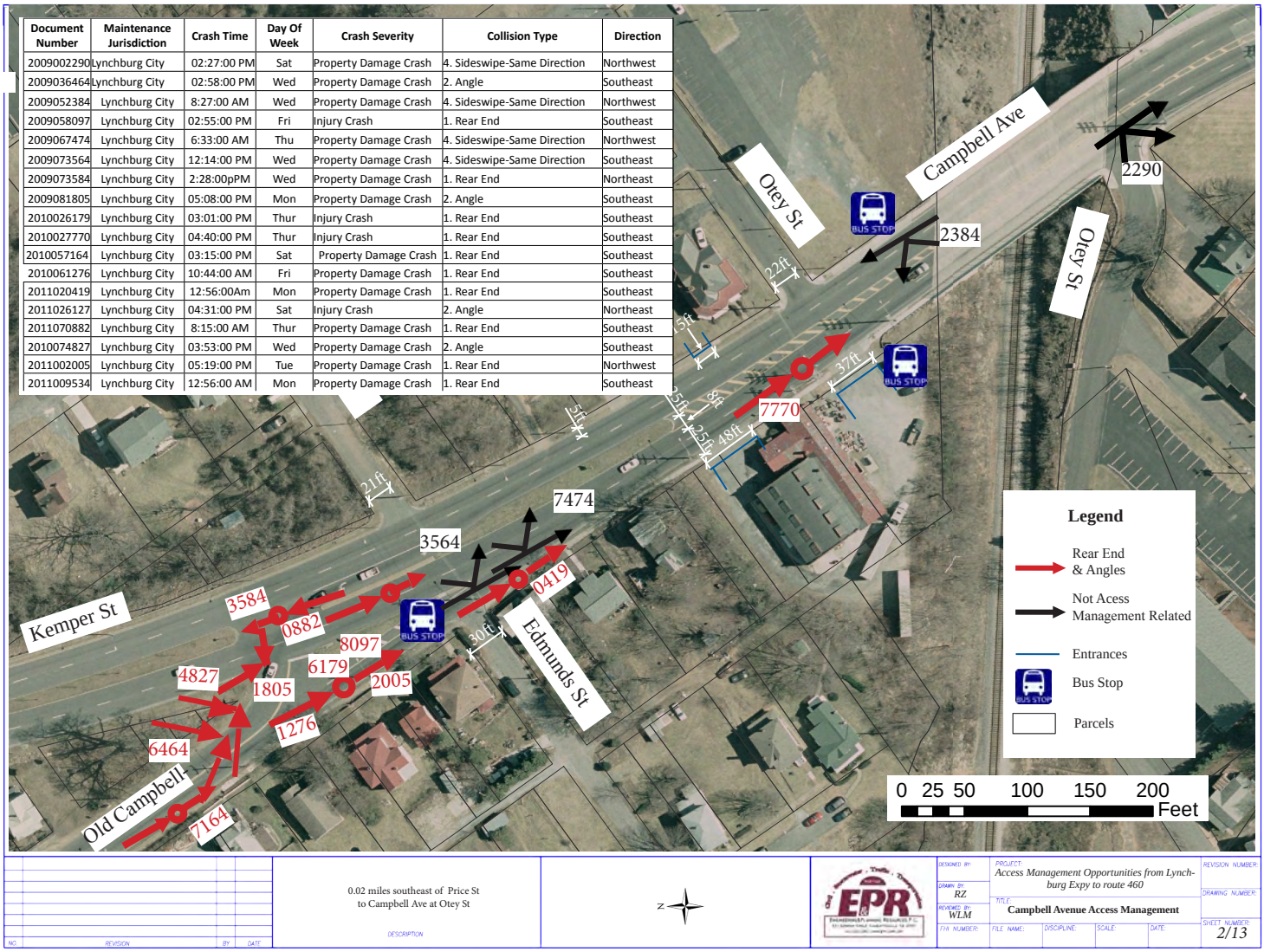


3.1.2 Crash Summary

Beginning on the north end of the project, there were no reported crashes along Old Campbell Avenue and Kemper Street north of the Campbell Avenue intersection.

Moving towards the south along the study corridor, there is a history of rear end and angled crashes at the Old Campbell/ Kemper/Campbell Avenue intersection. The angle crashes are likely due in part to high turning volumes, travel speeds southbound along Kemper Street on the approach to Campbell Avenue, and the unusual geometry of the Campbell/ Kemper intersection. The rear-end crashes could likely be due to a combination of travel speeds along Campbell Avenue and the difficult sight line that results from the skewed "yield" southbound approach to Campbell Avenue.

Document Number	Maintenance Jurisdiction	Crash Time	Day Of Week	Crash Severity	Collision Type	Direction
2009002290	Lynchburg City	02:27:00 PM	Sat	Property Damage Crash	4. Sideswipe-Same Direction	Northwest
2009036464	Lynchburg City	02:58:00 PM	Wed	Property Damage Crash	2. Angle	Southeast
2009052384	Lynchburg City	8:27:00 AM	Wed	Property Damage Crash	4. Sideswipe-Same Direction	Northwest
2009058097	Lynchburg City	02:55:00 PM	Fri	Injury Crash	1. Rear End	Southeast
2009067474	Lynchburg City	6:33:00 AM	Thu	Property Damage Crash	4. Sideswipe-Same Direction	Northwest
2009073564	Lynchburg City	12:14:00 PM	Wed	Property Damage Crash	4. Sideswipe-Same Direction	Southeast
2009073584	Lynchburg City	2:28:00pPM	Wed	Property Damage Crash	1. Rear End	Northeast
2009081805	Lynchburg City	05:08:00 PM	Mon	Property Damage Crash	2. Angle	Southeast
2010026179	Lynchburg City	03:01:00 PM	Thur	Injury Crash	1. Rear End	Southeast
2010027770	Lynchburg City	04:40:00 PM	Thur	Injury Crash	1. Rear End	Southeast
2010057164	Lynchburg City	03:15:00 PM	Sat	Property Damage Crash	1. Rear End	Southeast
2010061276	Lynchburg City	10:44:00 AM	Fri	Property Damage Crash	1. Rear End	Southeast
2011020419	Lynchburg City	12:56:00Am	Mon	Property Damage Crash	1. Rear End	Southeast
2011026127	Lynchburg City	04:31:00 PM	Sat	Injury Crash	2. Angle	Northeast
2011070882	Lynchburg City	8:15:00 AM	Thur	Property Damage Crash	1. Rear End	Southeast
2010074827	Lynchburg City	03:53:00 PM	Wed	Property Damage Crash	2. Angle	Southeast
2011002005	Lynchburg City	05:19:00 PM	Tue	Property Damage Crash	1. Rear End	Northwest
2011009534	Lynchburg City	12:56:00 AM	Mon	Property Damage Crash	1. Rear End	Southeast



0.02 miles southeast of Price St to Campbell Ave at Otey St

DESCRIPTION

PROJECT: Access Management Opportunities from Lynchburg Expy to route 460

TITLE: Campbell Avenue Access Management

DESIGNED BY: RZ

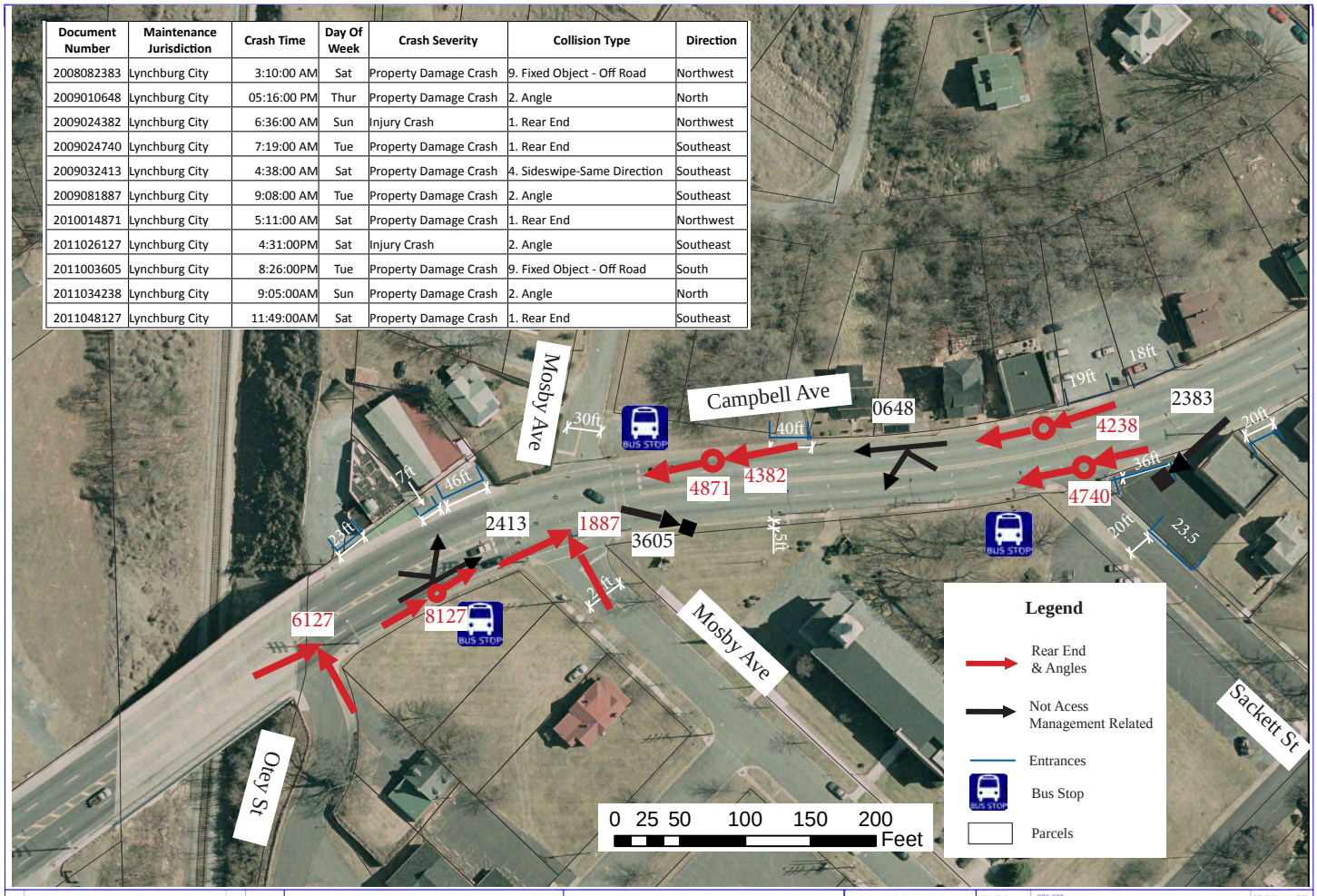
DRAWN BY: RZ

REVIEWED BY: WLM

SHEET NUMBER: 2/13

In the vicinity of Mosby Street (next panel), the crash history indicates a pattern of rear-end crashes and angle crashes related to motorists turning to and from the sidestreets. The rear-end crashes are often caused by vehicles stopping to enter driveways or commercial entrances without having dedicated turn lanes which would otherwise remove them from the through traffic. The angle crashes may be the result of traffic entering onto Campbell Avenue without a sufficient gap in traffic along Campbell Avenue. This can often be a result of having to cross two lanes of travel, relatively high traffic volumes on the mainline, excessive travel speeds, and/or inadequate sight distance.

Document Number	Maintenance Jurisdiction	Crash Time	Day Of Week	Crash Severity	Collision Type	Direction
2008082383	Lynchburg City	3:10:00 AM	Sat	Property Damage Crash	9. Fixed Object - Off Road	Northwest
2009010648	Lynchburg City	05:16:00 PM	Thur	Property Damage Crash	2. Angle	North
2009024382	Lynchburg City	6:36:00 AM	Sun	Injury Crash	1. Rear End	Northwest
2009024740	Lynchburg City	7:19:00 AM	Tue	Property Damage Crash	1. Rear End	Southeast
2009032413	Lynchburg City	4:38:00 AM	Sat	Property Damage Crash	4. Sideswipe-Same Direction	Southeast
2009081887	Lynchburg City	9:08:00 AM	Tue	Property Damage Crash	2. Angle	Southeast
2010014871	Lynchburg City	5:11:00 AM	Sat	Property Damage Crash	1. Rear End	Northwest
2011026127	Lynchburg City	4:31:00PM	Sat	Injury Crash	2. Angle	Southeast
2011003605	Lynchburg City	8:26:00PM	Tue	Property Damage Crash	9. Fixed Object - Off Road	South
2011034238	Lynchburg City	9:05:00AM	Sun	Property Damage Crash	2. Angle	North
2011048127	Lynchburg City	11:49:00AM	Sat	Property Damage Crash	1. Rear End	Southeast



Campbell Ave at Otey St
to 0.02 miles south of Sackett St

DESCRIPTION

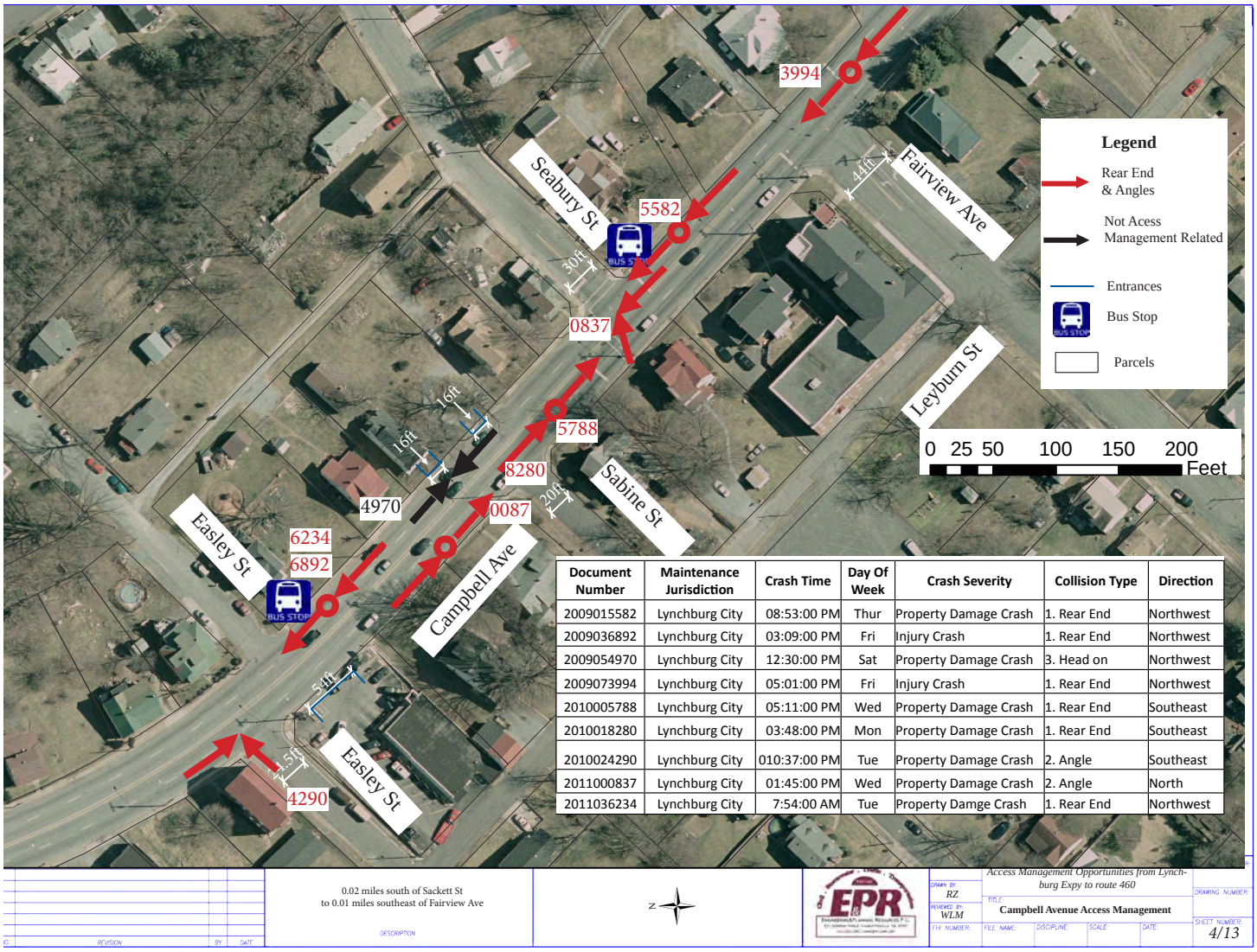
Access Management Opportunities from Lynchburg Expy to route 460

Campbell Avenue Access Management

DESIGNED BY:
DRAWN BY: RZ
REVIEWED BY: WLM

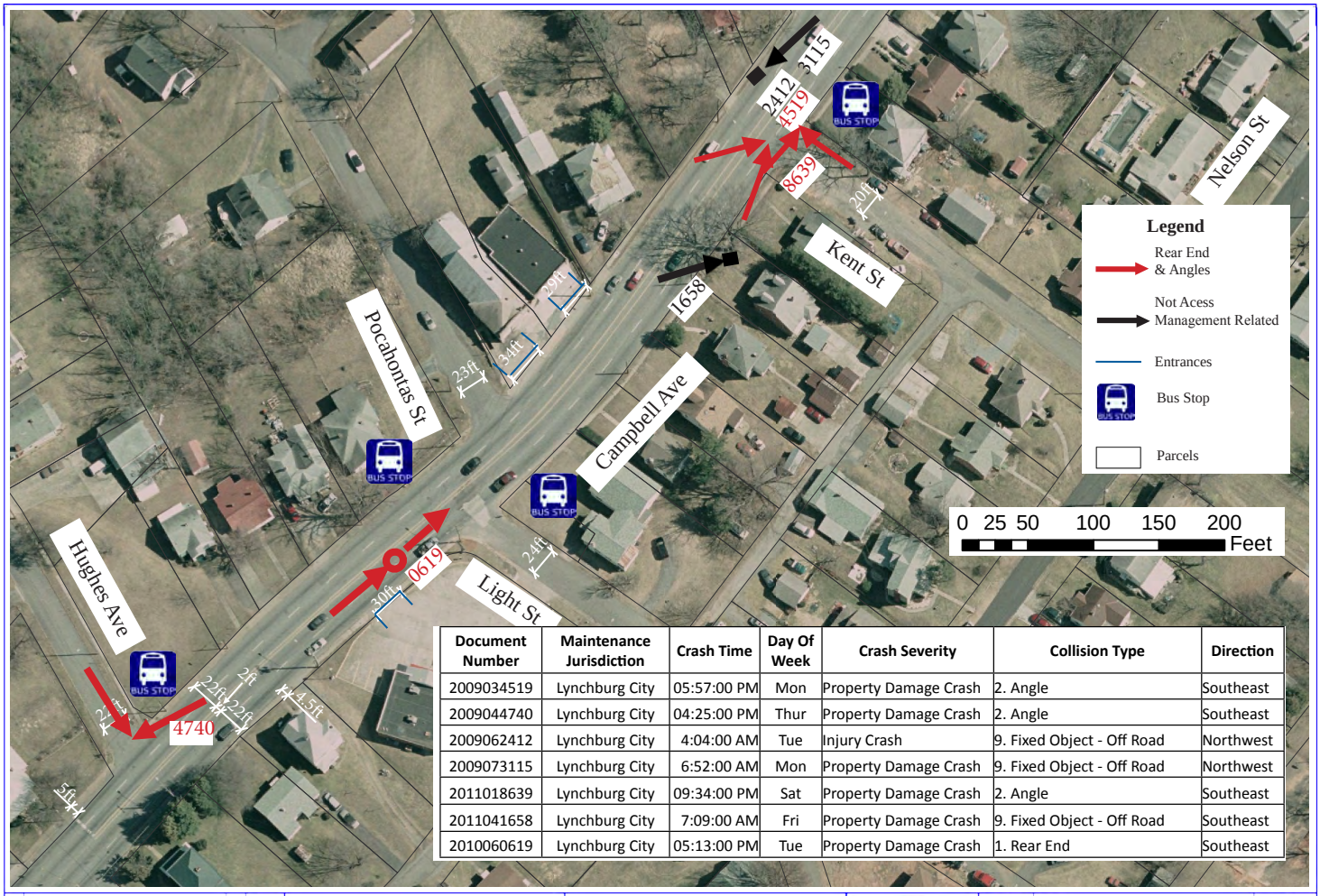
3/13

Moving further to the south in the vicinity of Easley Street to Fairview Avenue, there have been a relatively high number of rear end crashes occurring. This may be the result of frequent driveway connections and the resulting stopping along Campbell Avenue. For the crashes occurring in the vicinity of the signalized intersections, the rear-end crashes are sometimes the result of excessive speeds on the approaches to the signal or sight distance concerns. Additionally, the lack of turn lanes contributes to these types of crashes. Per field inspections, there does not appear to any evidence of sight distance deficiencies.



Document Number	Maintenance Jurisdiction	Crash Time	Day Of Week	Crash Severity	Collision Type	Direction
2009015582	Lynchburg City	08:53:00 PM	Thur	Property Damage Crash	1. Rear End	Northwest
2009036892	Lynchburg City	03:09:00 PM	Fri	Injury Crash	1. Rear End	Northwest
2009054970	Lynchburg City	12:30:00 PM	Sat	Property Damage Crash	3. Head on	Northwest
2009073994	Lynchburg City	05:01:00 PM	Fri	Injury Crash	1. Rear End	Northwest
2010005788	Lynchburg City	05:11:00 PM	Wed	Property Damage Crash	1. Rear End	Southeast
2010018280	Lynchburg City	03:48:00 PM	Mon	Property Damage Crash	1. Rear End	Southeast
2010024290	Lynchburg City	010:37:00 PM	Tue	Property Damage Crash	2. Angle	Southeast
2011000837	Lynchburg City	01:45:00 PM	Wed	Property Damage Crash	2. Angle	North
2011036234	Lynchburg City	7:54:00 AM	Tue	Property Damge Crash	1. Rear End	Northwest

Along the corridor between Hughes Avenue and Kent Street there were three angled crashes within the study time period. The crashes were consistent with vehicles trying to enter onto the mainline without a sufficient gap of traffic, which is often the result of trying to cross multiple lanes of traffic and/or a lack of a median which would make the turning movement a two step process (i.e. find one gap to get to the median, and then find another gap to complete the turning movement).



Document Number	Maintenance Jurisdiction	Crash Time	Day Of Week	Crash Severity	Collision Type	Direction
2009034519	Lynchburg City	05:57:00 PM	Mon	Property Damage Crash	2. Angle	Southeast
2009044740	Lynchburg City	04:25:00 PM	Thur	Property Damage Crash	2. Angle	Southeast
2009062412	Lynchburg City	4:04:00 AM	Tue	Injury Crash	9. Fixed Object - Off Road	Northwest
2009073115	Lynchburg City	6:52:00 AM	Mon	Property Damage Crash	9. Fixed Object - Off Road	Northwest
2011018639	Lynchburg City	09:34:00 PM	Sat	Property Damage Crash	2. Angle	Southeast
2011041658	Lynchburg City	7:09:00 AM	Fri	Property Damage Crash	9. Fixed Object - Off Road	Southeast
2010060619	Lynchburg City	05:13:00 PM	Tue	Property Damage Crash	1. Rear End	Southeast

0.01 miles southeast of Fairview Ave to 0.01 miles souteast of Kent St

DESCRIPTION

DESIGNED BY:
DRAWN BY: RZ
REVIEWED BY: WLM
FHWA NUMBER:

PROJECT: Access Management Opportunities from Lynchburg Expy to route 460

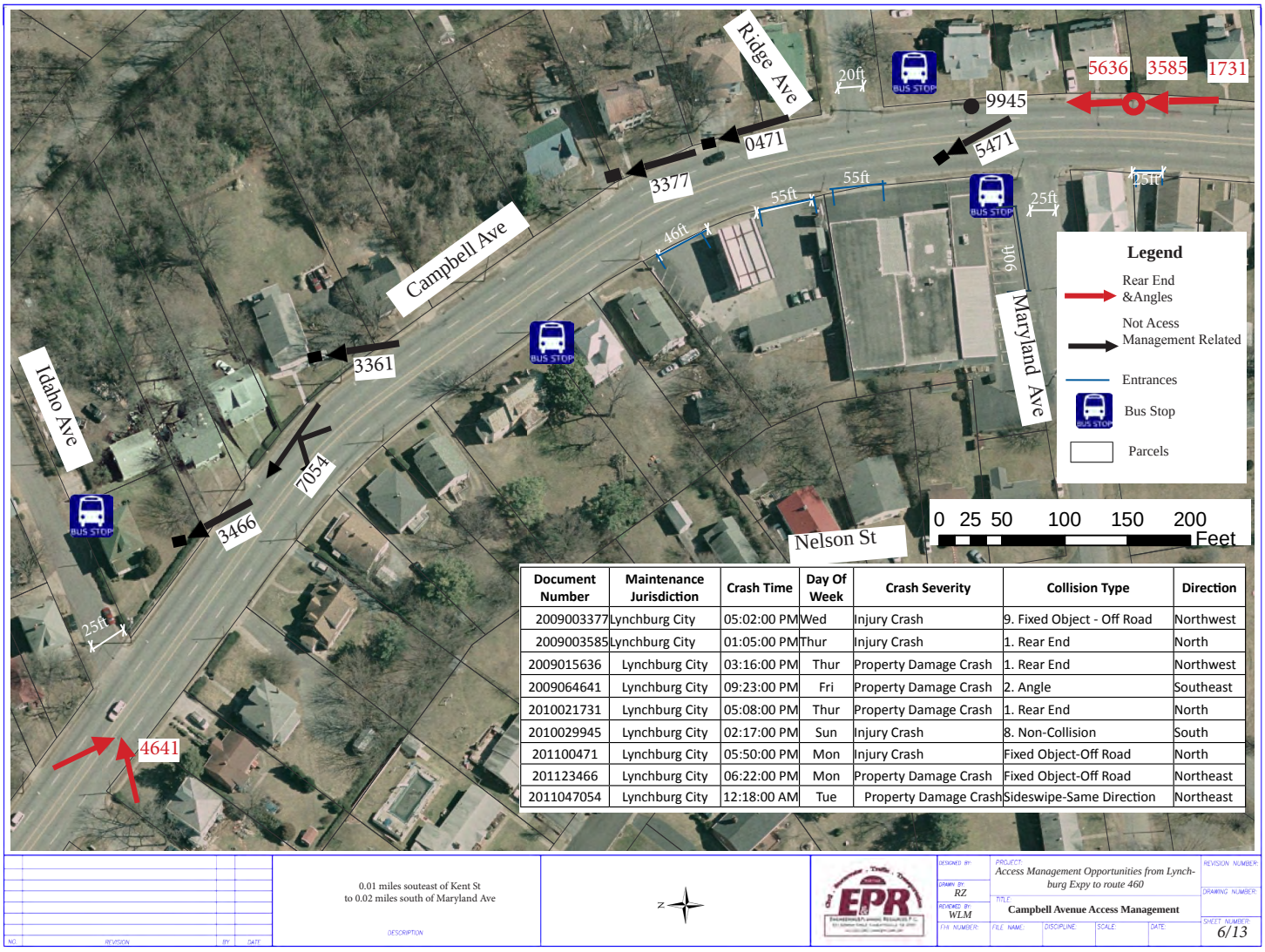
TITLE: Campbell Avenue Access Management

FILE NAME: DISCIPLINE: SCALE: DATE:

REVISION NUMBER:
DRAWING NUMBER:
SHEET NUMBER: 5/13

Between Idaho Avenue to south of Ridge Avenue there was one angled crash from a vehicle departing a driveway and one rear-end crash involving a vehicle entering into a driveway. These crashes may be a result of having an extensive number of residential driveways onto a minor arterial facility. The residential driveways are often narrow and require a longer period to maneuver into or out onto the mainline.

There were also a number of single car – run off the road- crashes, that are indicative of speeding or driver distraction



Document Number	Maintenance Jurisdiction	Crash Time	Day Of Week	Crash Severity	Collision Type	Direction
2009003377	Lynchburg City	05:02:00 PM	Wed	Injury Crash	9. Fixed Object - Off Road	Northwest
2009003585	Lynchburg City	01:05:00 PM	Thur	Injury Crash	1. Rear End	North
2009015636	Lynchburg City	03:16:00 PM	Thur	Property Damage Crash	1. Rear End	Northwest
2009064641	Lynchburg City	09:23:00 PM	Fri	Property Damage Crash	2. Angle	Southeast
2010021731	Lynchburg City	05:08:00 PM	Thur	Property Damage Crash	1. Rear End	North
2010029945	Lynchburg City	02:17:00 PM	Sun	Injury Crash	8. Non-Collision	South
201100471	Lynchburg City	05:50:00 PM	Mon	Injury Crash	Fixed Object-Off Road	North
201123466	Lynchburg City	06:22:00 PM	Mon	Property Damage Crash	Fixed Object-Off Road	Northeast
2011047054	Lynchburg City	12:18:00 AM	Tue	Property Damage Crash	Sideswipe-Same Direction	Northeast

0.01 miles souteast of Kent St
to 0.02 miles south of Maryland Ave

Access Management Opportunities from Lynchburg Expy to route 460

Campbell Avenue Access Management

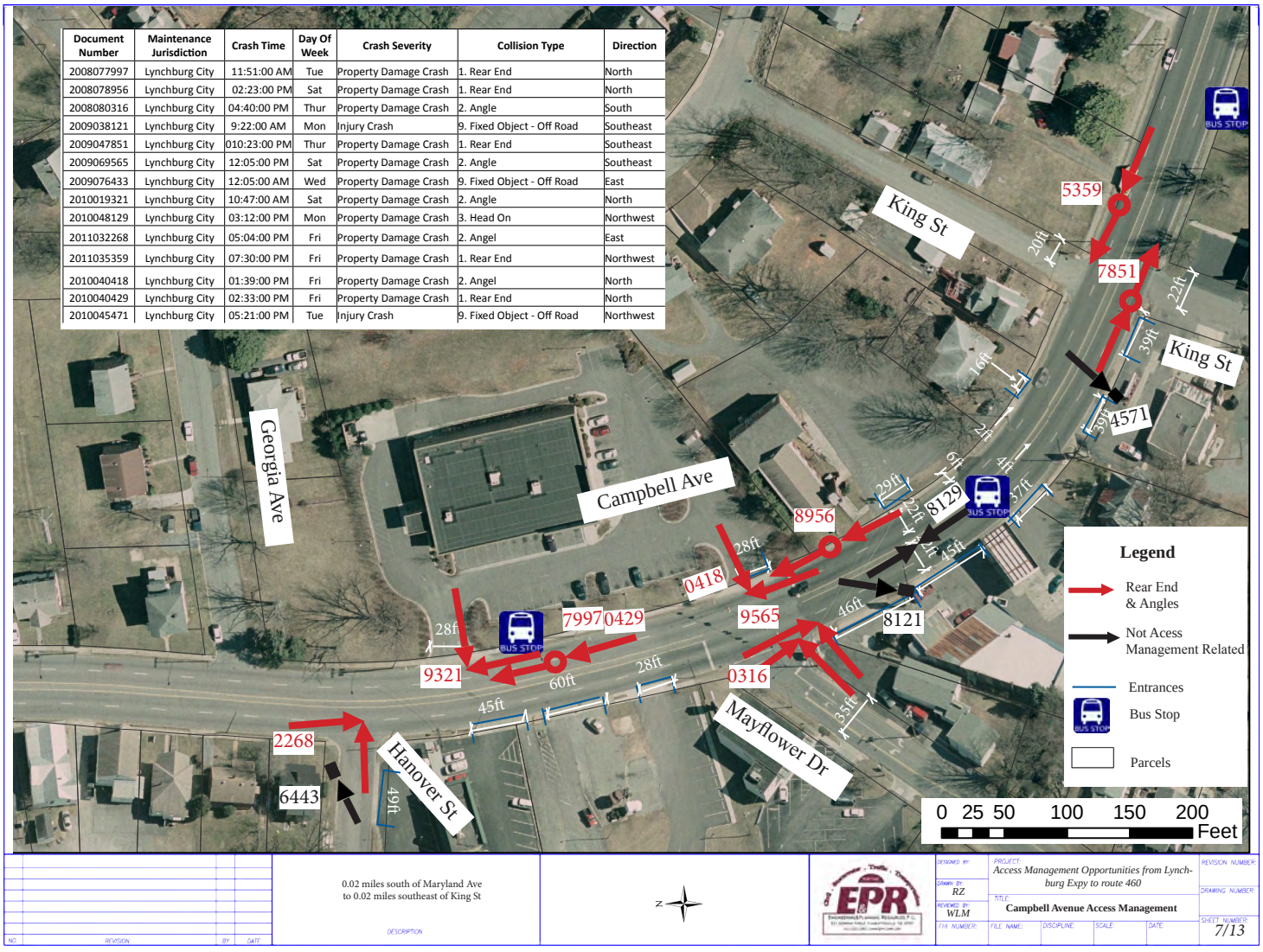
6/13

Between Hanover Street and King Street there is a concentration of crashes around the Mayflower Drive intersection and in proximity to the Dollar General Store. All of the crashes appear to be related to vehicles accessing commercial sites and also attributable to failing to stop for the traffic signal. In this section of Campbell Avenue, there is a curve

south of the Mayflower Drive signal that limits sight distance for northbound traffic.

There was one rear-end crash for the northbound direction that is potentially attributable to some combination of speeds, sight distance, and drivers expectation. Just north of the signalized intersection there were two crashes in proximity to the northern entrance to the Dollar General store. These may also be related to sight distance, or to overall congestion and proximity of the entrance to the signalized intersection

There have also been four crashes that included vehicles leaving the road and striking poles or structures outside of the pavement. Additionally, there was one head-on crash caused by a driver crossing over the double yellow line and into the oncoming traffic.



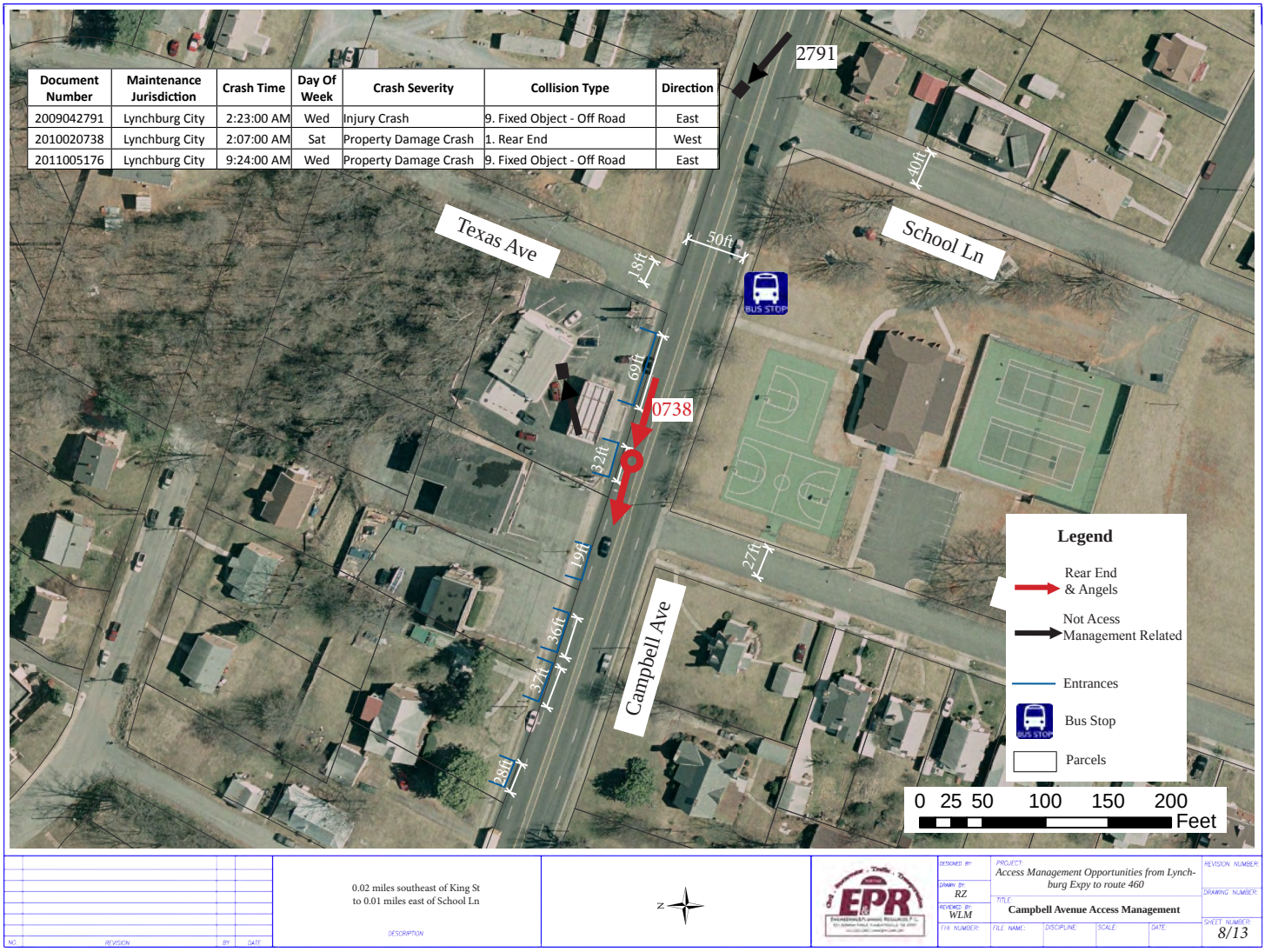
Document Number	Maintenance Jurisdiction	Crash Time	Day Of Week	Crash Severity	Collision Type	Direction
2008077997	Lynchburg City	11:51:00 AM	Tue	Property Damage Crash	1. Rear End	North
2008078956	Lynchburg City	02:23:00 PM	Sat	Property Damage Crash	1. Rear End	North
2008080316	Lynchburg City	04:40:00 PM	Thur	Property Damage Crash	2. Angle	South
2009038121	Lynchburg City	9:22:00 AM	Mon	Injury Crash	9. Fixed Object - Off Road	Southeast
2009047851	Lynchburg City	010:23:00 PM	Thur	Property Damage Crash	1. Rear End	Southeast
2009069565	Lynchburg City	12:05:00 PM	Sat	Property Damage Crash	2. Angle	Southeast
2009076433	Lynchburg City	12:05:00 AM	Wed	Property Damage Crash	9. Fixed Object - Off Road	East
2010019321	Lynchburg City	10:47:00 AM	Sat	Property Damage Crash	2. Angle	North
2010048129	Lynchburg City	03:12:00 PM	Mon	Property Damage Crash	3. Head On	Northwest
2011032268	Lynchburg City	05:04:00 PM	Fri	Property Damage Crash	2. Angel	East
2011035359	Lynchburg City	07:30:00 PM	Fri	Property Damage Crash	1. Rear End	Northwest
2010040418	Lynchburg City	01:39:00 PM	Fri	Property Damage Crash	2. Angel	North
2010040429	Lynchburg City	02:33:00 PM	Fri	Property Damage Crash	1. Rear End	North
2010045471	Lynchburg City	05:21:00 PM	Tue	Injury Crash	9. Fixed Object - Off Road	Northwest

0.02 miles south of Maryland Ave to 0.02 miles southeast of King St

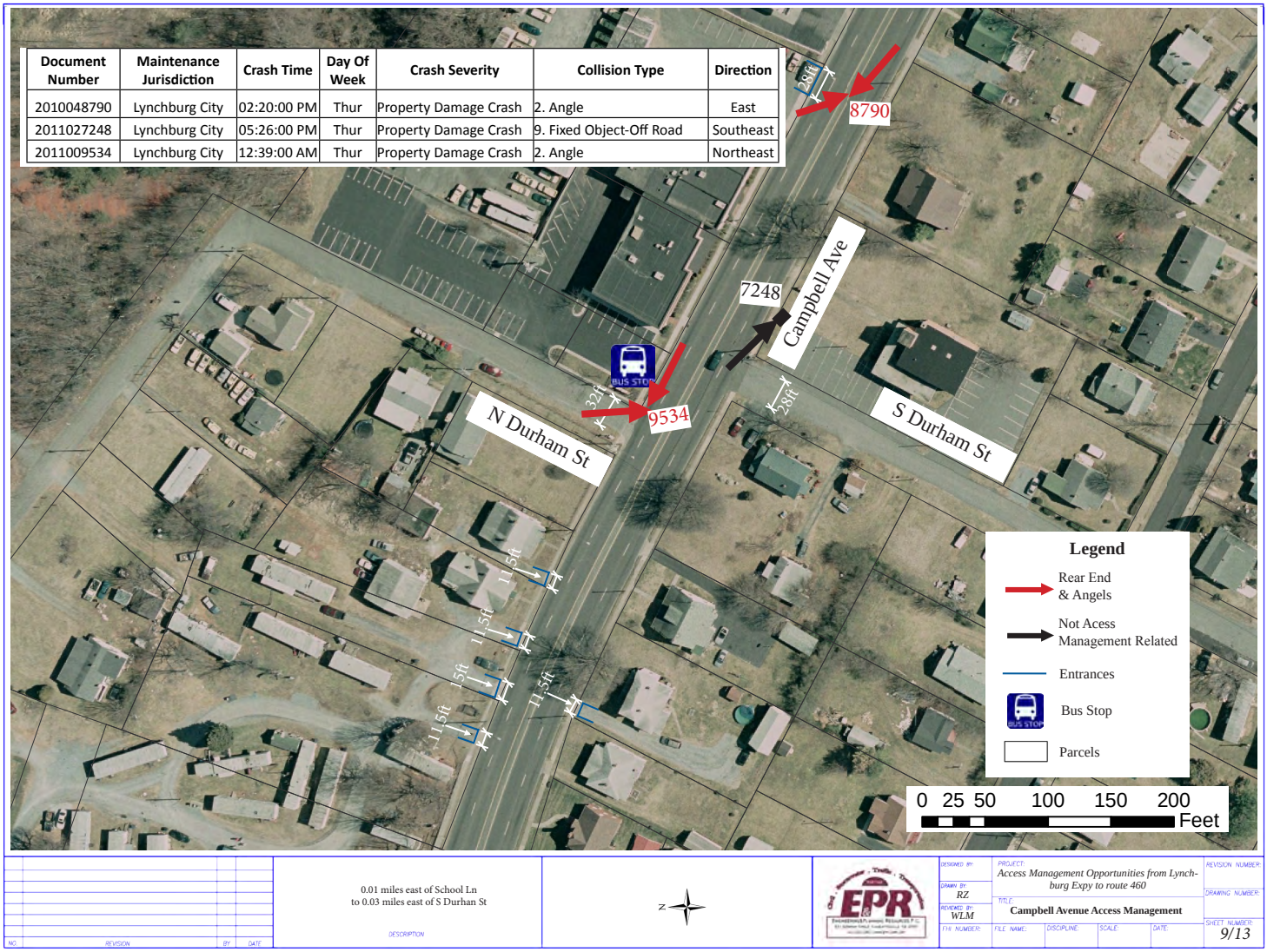
DESIGNED BY: RZ
DRAWN BY: RZ
REVIEWED BY: WLM
PROJECT: Access Management Opportunities from Lynchburg Expy to route 460
TITLE: Campbell Avenue Access Management
SHEET NUMBER: 7/13

South of King Street to School Lane there was one reported crash. The crash location was at a commercial entrance.

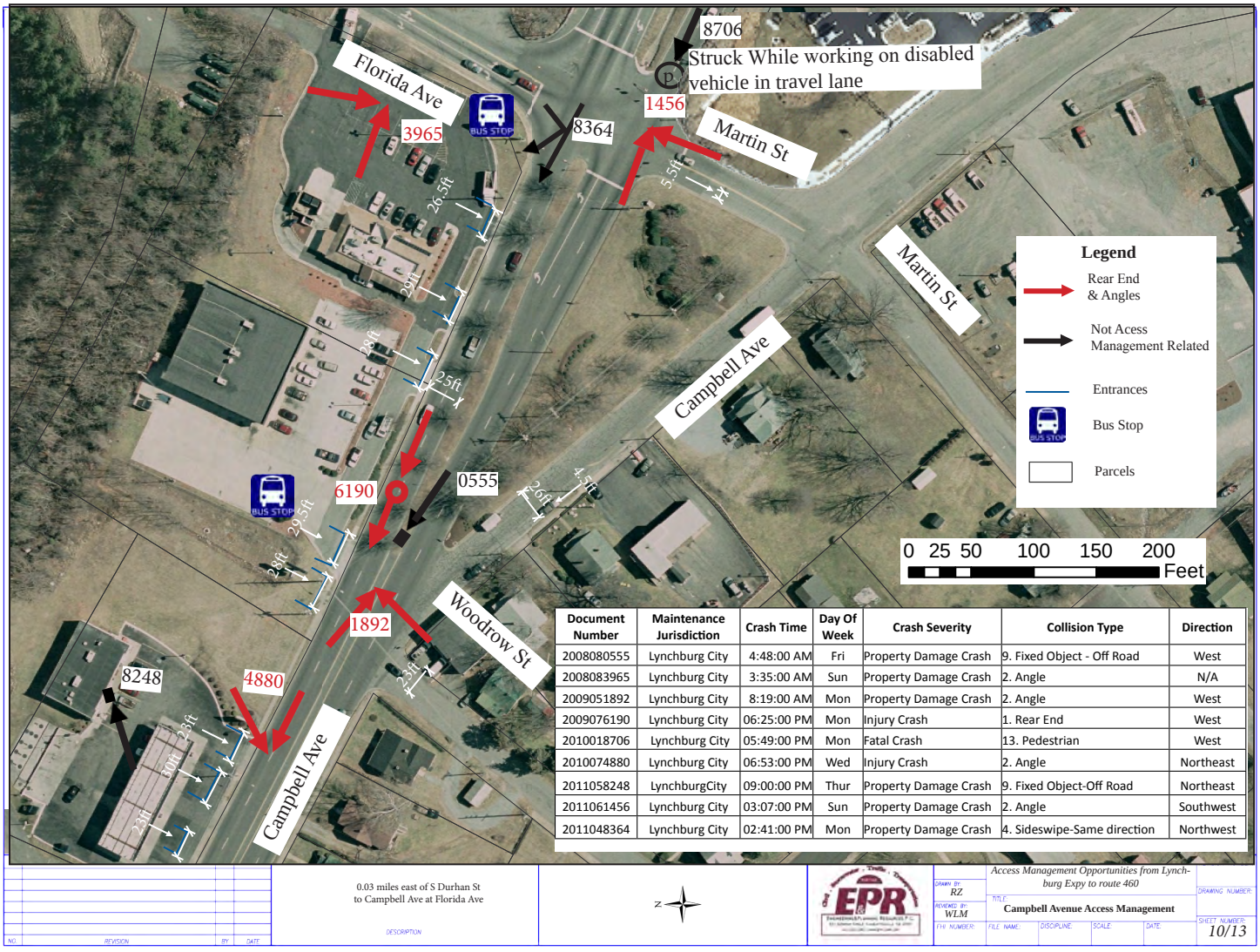
This may be attributable in part to the lack of turn lanes and median per the current roadway typical section.



South of School Lane to south of S. Durham Street there were two angle crashes related to vehicles trying to turn from either a sidestreet of commercial entrance onto Campbell Avenue. There was also a non-access single car crash that left the travel way.



North of Florida Avenue to Woodrow Street there were two access related crashes. An angled crash occurred at the Woodrow Street intersection which could be a result of the angled intersection geometry and an unanticipated right turn movement from the mainline. Additionally, an access related right turn crash and a rear end crash occurred due to vehicles entering or exiting Campbell Avenue commercial businesses. The second crash, a rear end crash, occurred in the northbound direction at the entrance to a commercial business.



Document Number	Maintenance Jurisdiction	Crash Time	Day Of Week	Crash Severity	Collision Type	Direction
2008080555	Lynchburg City	4:48:00 AM	Fri	Property Damage Crash	9. Fixed Object - Off Road	West
2008083965	Lynchburg City	3:35:00 AM	Sun	Property Damage Crash	2. Angle	N/A
2009051892	Lynchburg City	8:19:00 AM	Mon	Property Damage Crash	2. Angle	West
2009076190	Lynchburg City	06:25:00 PM	Mon	Injury Crash	1. Rear End	West
2010018706	Lynchburg City	05:49:00 PM	Mon	Fatal Crash	13. Pedestrian	West
2010074880	Lynchburg City	06:53:00 PM	Wed	Injury Crash	2. Angle	Northeast
2011058248	LynchburgCity	09:00:00 PM	Thur	Property Damage Crash	9. Fixed Object-Off Road	Northeast
2011061456	Lynchburg City	03:07:00 PM	Sun	Property Damage Crash	2. Angle	Southwest
2011048364	Lynchburg City	02:41:00 PM	Mon	Property Damage Crash	4. Sideswipe-Same direction	Northwest

0.03 miles east of S Durhan St to Campbell Ave at Florida Ave

Access Management Opportunities from Lynchburg Expy to route 460

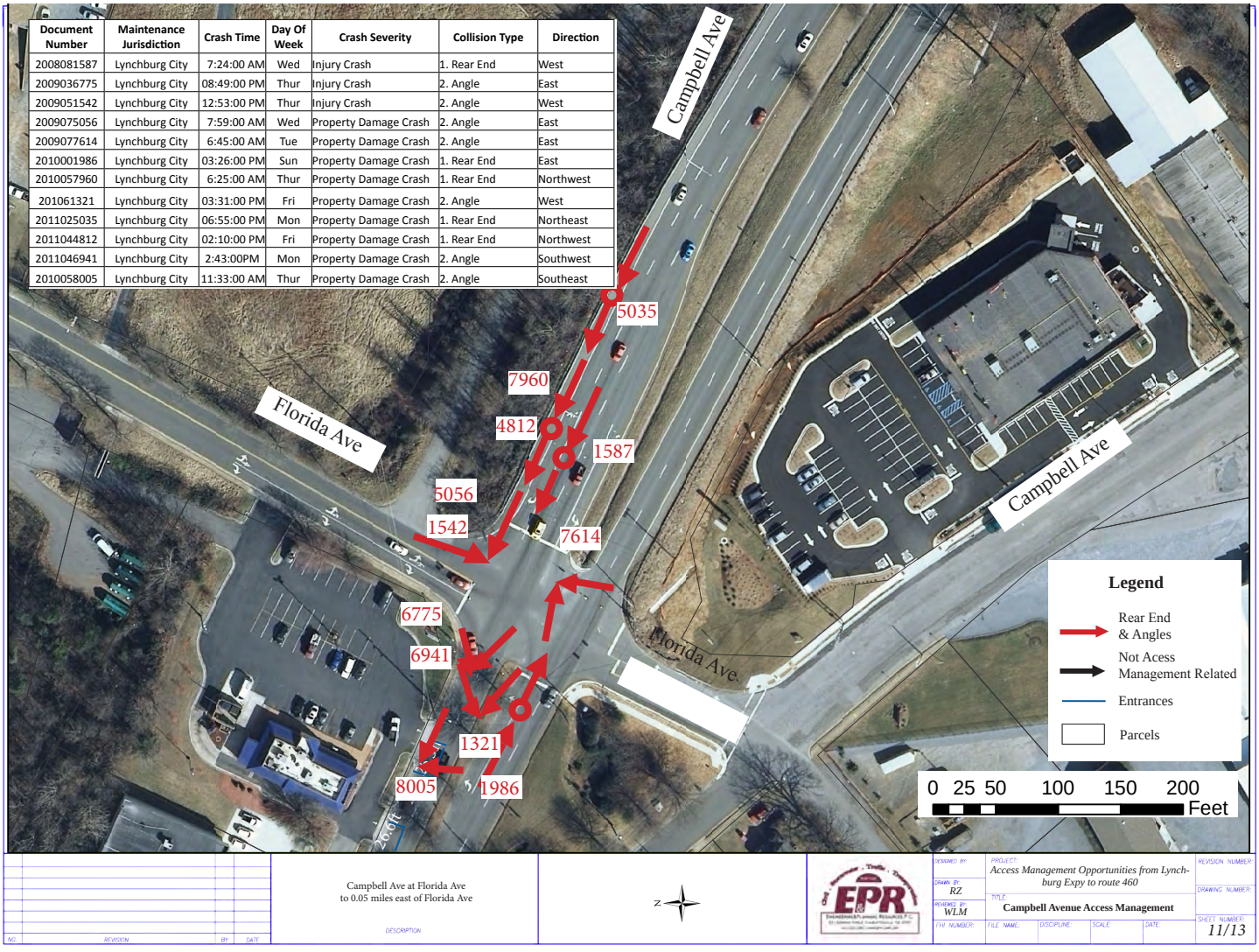
Campbell Avenue Access Management

10/13

At the intersection of Florida Avenue with Campbell Avenue there were five reported crashes that are purely intersection related. There have been numerous rear end crashes on the Campbell Avenue approach. For the northbound direction, some of these are reportedly due to vehicles sitting in the northbound right turn lane waiting to try to switch lanes to the northbound through lane. This could be partially a result of a lack of advance signing and markings for the right turn lane drop.

Angle crashes have occurred when drivers turning from Martin Street collide with right turn on red movements from Florida Avenue. This could potentially be addressed by decreasing the turning radius on Florida Avenue onto Campbell Avenue such that vehicles would have to slow down or stop before making the turning movement.

Additionally, the speed limit at this signalized intersection is currently 45 mph. Reducing the speed posting to 35 mph for this intersection, and as entering into the Campbell Avenue commercial/residential corridor, could help to alleviate rear end and red light runner crashes. A longer term solution could be to construct a roundabout at this location.



Document Number	Maintenance Jurisdiction	Crash Time	Day Of Week	Crash Severity	Collision Type	Direction
2008081587	Lynchburg City	7:24:00 AM	Wed	Injury Crash	1. Rear End	West
2009036775	Lynchburg City	08:49:00 PM	Thur	Injury Crash	2. Angle	East
2009051542	Lynchburg City	12:53:00 PM	Thur	Injury Crash	2. Angle	West
2009075056	Lynchburg City	7:59:00 AM	Wed	Property Damage Crash	2. Angle	East
2009077614	Lynchburg City	6:45:00 AM	Tue	Property Damage Crash	2. Angle	East
2010001986	Lynchburg City	03:26:00 PM	Sun	Property Damage Crash	1. Rear End	East
2010057960	Lynchburg City	6:25:00 AM	Thur	Property Damage Crash	1. Rear End	Northwest
201061321	Lynchburg City	03:31:00 PM	Fri	Property Damage Crash	2. Angle	West
2011025035	Lynchburg City	06:55:00 PM	Mon	Property Damage Crash	1. Rear End	Northeast
2011044812	Lynchburg City	02:10:00 PM	Fri	Property Damage Crash	1. Rear End	Northwest
2011046941	Lynchburg City	2:43:00PM	Mon	Property Damage Crash	2. Angle	Southwest
2010058005	Lynchburg City	11:33:00 AM	Thur	Property Damage Crash	2. Angle	Southeast

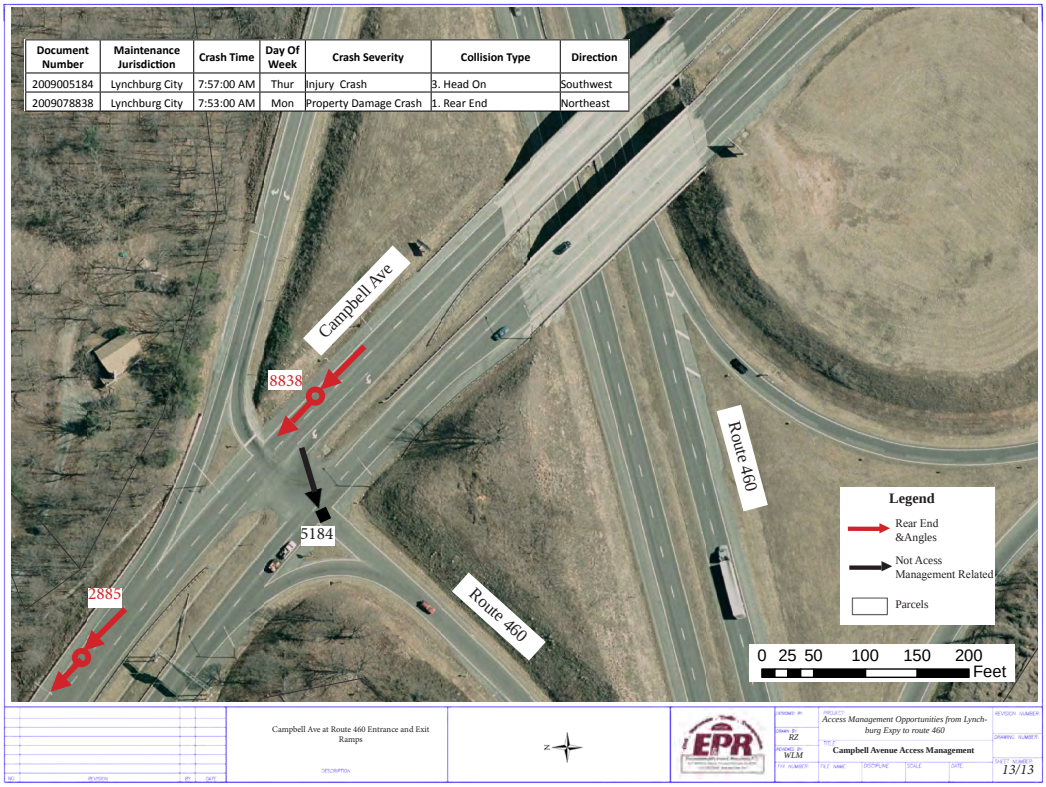
Campbell Ave at Florida Ave
to 0.05 miles east of Florida Ave

DESCRIPTION

DESIGNED BY:
DRAWN BY: RZ
REVIEWED BY: WLM
PROJECT: Access Management Opportunities from Lynchburg Expy to route 460
TITLE: Campbell Avenue Access Management
REVISION NUMBER:
DRAWING NUMBER:
SHEET NUMBER: 11/13

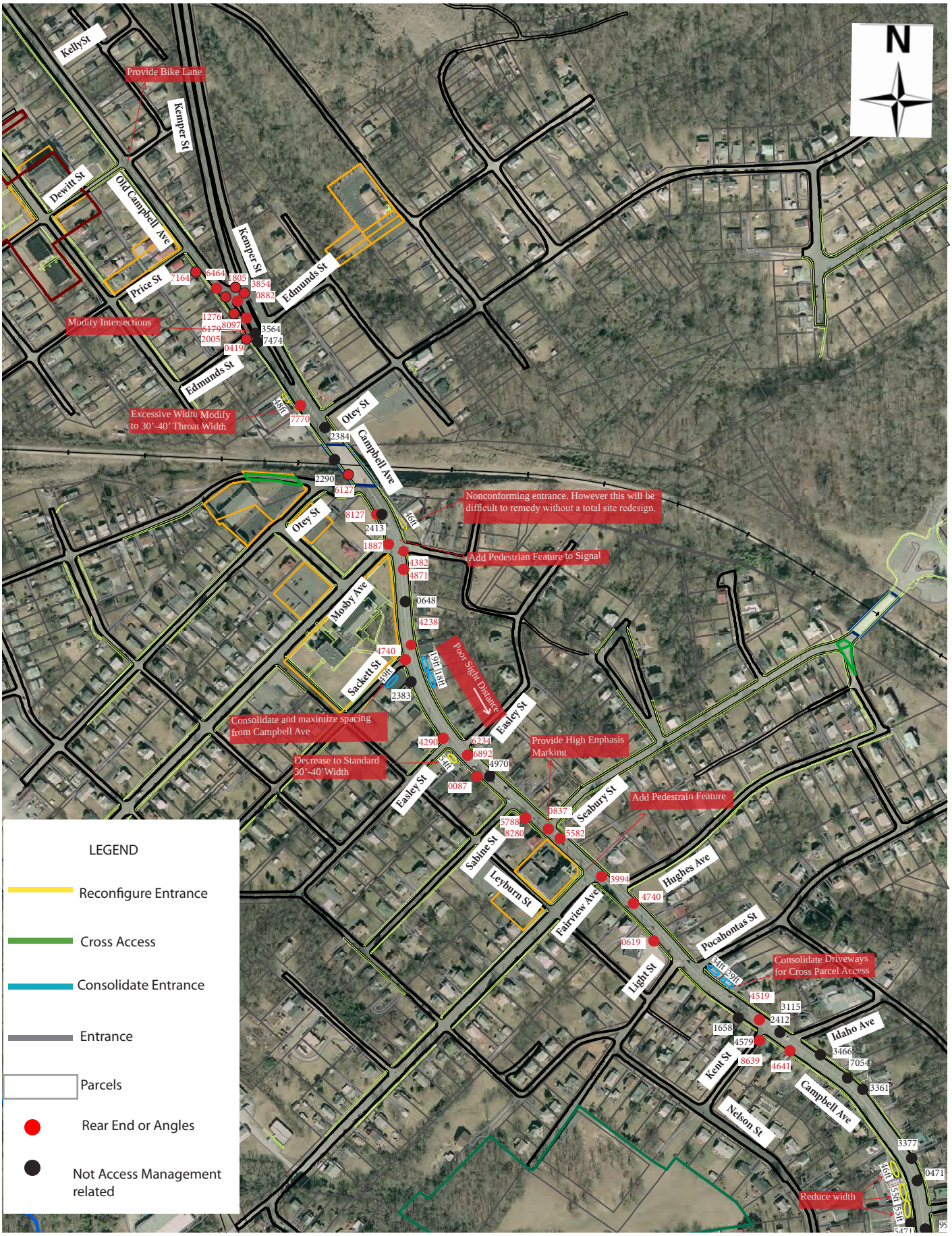
At the interchange ramps, there was one reported rear-end crash and a left turn angle crash at the ramp. Travel speeds through the interchange area could contribute to these types of crashes.

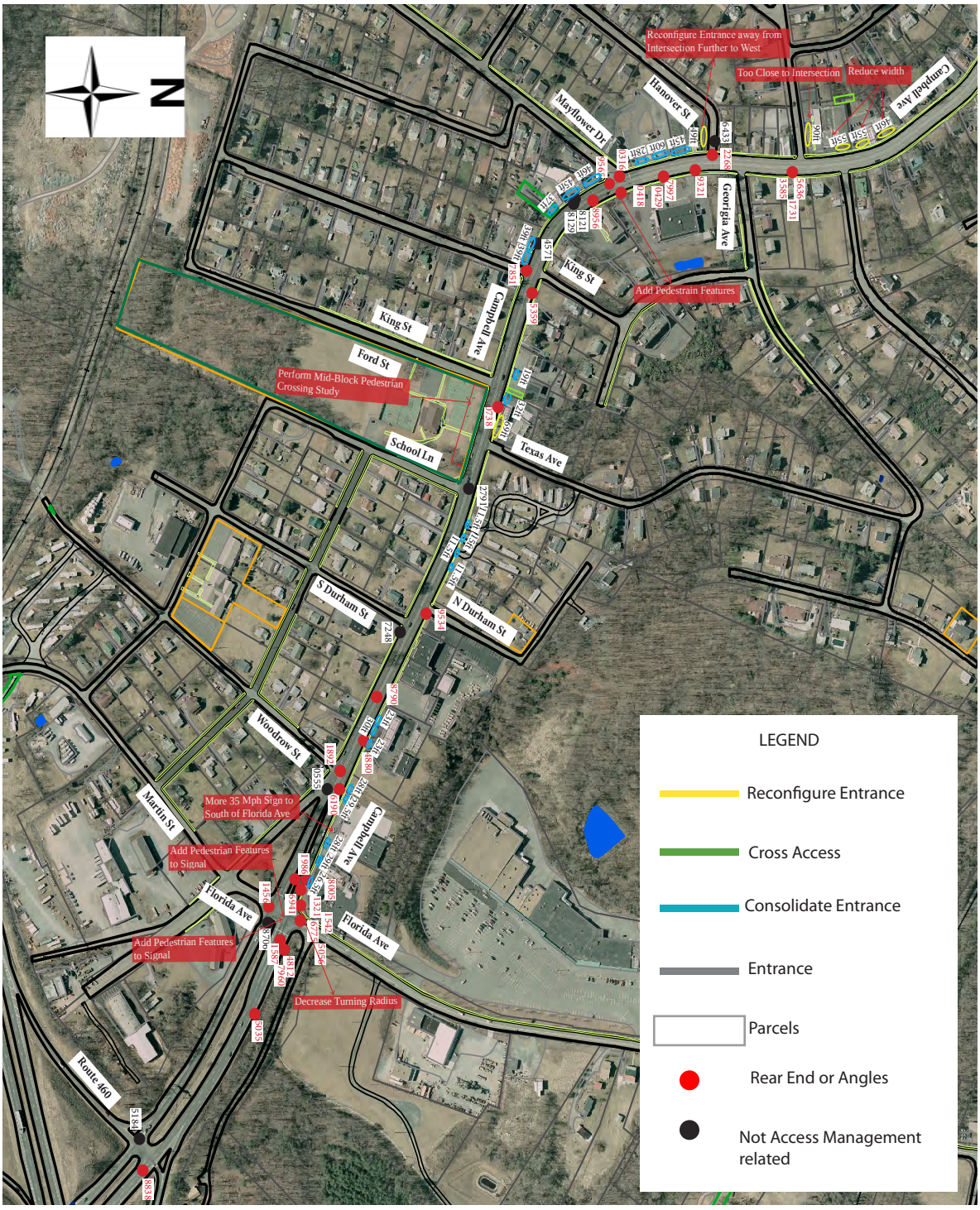
Document Number	Maintenance Jurisdiction	Crash Time	Day Of Week	Crash Severity	Collision Type	Direction
2009005184	Lynchburg City	7:57:00 AM	Thur	Injury Crash	3. Head On	Southwest
2009078838	Lynchburg City	7:53:00 AM	Mon	Property Damage Crash	1. Rear End	Northeast



The following graphic shows where crashes (rear end and angle only) occurred relative to access points, intersections, and signalized intersections. As shown in the graphic and as discussed in the previous pages, the crashes were dispersed along the length of the corridor. The pattern indicates that turning movements to/from sidestreets and driveway may be difficult as there are no turn lanes and motorists have to cross two lanes of travel for the left turn movements. In addition, the extensive number of commercial and private entrances along Campbell Avenue results in a high overall volume of vehicles stopping or slowing to turn into entrances from the mainline.

The graphic on next page illustrates crash locations in proximity to commercial entrances for a portion of the corridor.


N
Kelly St
Provide Bike Lane
Kemper St
Dewitt St
Old Campbell Ave
Price St
Edmunds St
Modify Intersections
Excessive Width Modify to 30'-40' Throat Width
Otey St
Campbell Ave
Nonconforming entrance. However this will be difficult to remedy without a total site redesign.
Add Pedestrian Feature to Signal
Mosby Ave
Sackett St
Poor Sight Distance
Easley St
Consolidate and maximize spacing from Campbell Ave
Decrease to Standard 30'-40' Width
Provide High Enphasis Marking
Add Pedestrain Feature
Seabury St
Sabine St
Leyburn St
Fairview Ave
Hughes Ave
Pocahontas St
Light St
Consolidate Driveways for Cross Parcel Access
Idaho Ave
Kent St
Nelson St
Campbell Ave
Reduce width
LEGEND
Reconfigure Entrance
Cross Access
Consolidate Entrance
Entrance
Parcels
Rear End or Angles
Not Access Management related



III.2 Existing Access

III.2.1 Commercial Access

The Campbell Avenue corridor, within the study area, provides access to the "grid" of neighborhood streets, numerous residential driveways, and also commercial entrances.

Relative to residential driveways, since there is no on-street parking, the vast majority of the abutting residences have

individual driveways directly onto Campbell Avenue. Residential access is considered to generally not be "on the table" for reconfiguration or modifications, except perhaps through the use of rear loading alleys /driveways when the local road system permits.

Managing access to commercial uses is something that can be effectively influenced by policy and implemented through the site plan review process. Generally speaking, unless there is a significant safety risk posed by an existing entrance, there will likely not be a change in driveway geometry, spacing, or location imposed by a locality until a proposal is generated by the site owner to redevelop some or the entire site. However, if there is a major roadway modification project proposed across the site frontage then that could provide an opportunity to reconfigure and entrance. The goal of access management is never to take away the ability to access a site, but instead is to provide access in such a way that helps to preserve safety and overall roadway capacity.

An assessment was made regarding existing conditions for commercial access points, traffic signal spacing, and opportunities to provide new connections to commercial entrances other than directly to Campbell Avenue. It was found that there are several locations along the corridor where commercial access does not currently adhere to the stated VDOT standards, which serve as the basis for the recommendations as provided later in this document. In general, issues were found with driveway spacing, the geometry of the entrances (i.e. excessive widths), numbers of potential redundant access points, and location of the entrances relative to the adjacent intersections.

The findings of this assessment are provided on the series of aerial based graphical images located at the end of this section of the document.

III.2.2 Intersections

Within the 1.3 miles between Florida Avenue and Old Campbell Avenue, there are 18 local road connections from the west and 15 local road intersection from the east. On average, the local roads from the west intersect Campbell Avenue every 380 feet and every 450 feet from the east. The VDOT access management criteria, based on a minor urban arterial road classification, suggests that unsignalized intersections and full access entrances should be spaced a minimum of 470' apart when the posted speed limit is 35 mph. Signalized intersection should be spaced a minimum of 1050' apart.

The study corridor has five signalized intersections and numerous unsignalized side-street intersections. The traffic signals are located at Florida Avenue, Mayflower Drive, Fairview Avenue, Seabury Avenue, and Mosby Avenue. The Seabury and

Fairview locations act as one signalized intersection as they are both connected to the same controller cabinet. At present, there are no crosswalks or pedestrian signals at any of the signalized intersections with exception of Seabury Avenue.

There is one other significant intersection that is not signalized. The Old Campbell/Kemper Street intersection with Campbell Avenue is a high volume intersection and is an intersection of concern per input from the City, project stakeholders, and review of the crash history.

Based on the feedback received at the first citizens meeting, AM and PM peak hour turning movement counts were conducted at the intersections of Florida Avenue, Mayflower Drive, and Old Campbell Avenue/Kemper. The Seabury Avenue intersection, although signalized, is an intersection of concern, though it was determined that the study would address the pedestrian safety concerns without need for conducting traffic counts.

It is interesting to note from inspection of the crash data that the majority of the rear end crashes along the corridor are occurring in proximity to the signalized intersections. Signalized intersections often help to mitigate angle crashes but sometimes result in additional rear-end crashes.

The peak hour counts are provided on the overall project base mapping as contained at the end of Section II of this document. A discussion of intersection analyses is as follows.

Florida Ave

Florida Avenue at Campbell Avenue is the first intersection encountered after the Route 460 intersection (for northbound traffic). South of the intersection there is a noticeable shift in "context" of the corridor from a neighborhood environment to an interchange environment, and then continuing to the south the development is much more rural in nature. Therefore, the Florida Avenue intersection could be considered a gateway for the [entrance] corridor. A shopping center exists along Florida Avenue to the east, and retail and light industrial uses exist on the west side of the intersection. To the north is a combination of fast food, a convenience mart, light industrial, and residential uses. At present there are no pedestrian features, such as crosswalks and pedestrian signals at this intersection. During the traffic counts and field observations it was noted that there are pedestrians present, though they don't always cross at this intersection, instead choosing to cross mid-block where they can stop in the raised median for refuge. The existing level of service, which is a measure of volume versus capacity, indicates that the intersection is functioning satisfactory. The existing level of service at this intersection is C in both the AM and PM peak hours of the day, with no individual movements functioning

worse than LOS C. Furthermore, there is no major queuing on any of the approaches.

Mayflower Drive

Mayflower Drive at Campbell Avenue is a three legged intersection with a fourth leg formed by the entrance to Family Dollar. This intersection functions satisfactorily currently (LOS A) and does not have any major queuing or congestion on any of the approaches. None of the individual movements function below a LOS C. There are currently no pedestrian signal heads or crosswalks at this intersection, though there is a crosswalk across the Mayflower Drive approach.

Seabury Avenue

Seabury Avenue at Campbell Avenue is a "T" intersection and does have pedestrian signalization. Bass Elementary School is located at the end of Seabury Avenue, and hence there are school age kids crossing Campbell Avenue at this intersection. Peak hour traffic counts were not taken at this intersection thus the level of service is not reported. However, the emphasis of the concern at this location was that there are more pedestrian crossing movements here due to the school. There were no observed issues at the adjacent Fairview Avenue intersection, although school bus and school access traffic remains a concern at this location.

Fairview Avenue

Fairview Avenue is also a "T" intersection and is operated on the same signal controller as Seabury Avenue. Sharing a controller among two adjacent "T" intersections is a common practice. There are no pedestrian signalization features or crosswalk markings at this location. Fairview Avenue provides access into the abutting neighborhoods.

Kemper Street/Old Campbell Avenue

Campbell Avenue at Kemper Street/ Old Campbell Avenue is an unsignalized intersection on the north end of the study area. This intersection includes a skewed approach from Old Campbell Avenue for the right turn movement onto Campbell Avenue (southbound). Per the modeling effort, the Campbell Avenue approach does experience some delay and with a level of service of F in the peak hours for the eastbound left turn from Old Campbell Avenue onto Kemper Street. All other movements function at LOS B or better. The right turn volume from Old Campbell Avenue onto Campbell Avenue is in excess of 500 vehicles in the peak hour with a reciprocal left turn volume of over 300 left turns in the peak hour. The primary concern about this intersection is the difficult right turn geometry and the crash history as previously noted. Also, this intersection location is effectively a transition point from the limited access context of the Kemper Street corridor to the neighborhood/small commercial context of Campbell Avenue south of the intersection. This provides an opportunity to create a gateway as typically accomplished through a change in roadway geometry along with aesthetic treatments along the edges of the roadway.

Mosby Avenue

Similar to the Seabury Avenue and Fairview Avenue intersection, field observations were made the intersection of Campbell Avenue and Mosby Avenue. This intersection appears to function satisfactorily from a vehicular perspective. However, there are no pedestrian signalization features though there is a large Church in one quadrant of the intersection.

III.2.3 Multimodal Conditions

A multimodal corridor is one that provides the ability to not only drive a car but also walk, bicycle, and safely access transit. Creation of a fully multimodal environment is the goal of the "complete streets" movement that has developed over the past decade. The Campbell Avenue corridor provides strong vehicular mobility with its four lanes of travel, and it also provides the ability to walk along both sides of the roadway on the sidewalks. However, it can be difficult to cross the road from one sidewalk to the other and there is no dedicated bicycle lane or off-road multiuse path. Given the 35 MPH posted speed, and wide cross section with frequent entrances, on-road bicycling is only comfortable for the more seasoned riders. As heard in the first citizens meeting for this project, there is a prevailing concern about pedestrian safety and lack of ability for kids and others to ride bicycles on and through the corridor.

Sidewalks are provided along both sides of Campbell Avenue. The sidewalk width is typically 5'. In the project field review, it was found that the City has recently upgraded the sidewalk ramps to meet ADA standards. However, it was also observed that there are numerous sections of sidewalks that are in need of maintenance, either due to dirt and foliage restricting the width, or due to uneven sidewalk sections due to differential settlement. At all of the intersections, with the exception of Seabury Avenue, there are no pedestrian signals or crosswalks across Campbell Avenue.

Dedicated bicycle lanes are not currently provided along the corridor. Bicycle travel is possible, to a limited degree, along the side streets as needed for those who may wish to avoid bicycling along Campbell Avenue. However, due largely to the topography, it is not possible to bicycle from one end of the study area to the other using side streets without

having need to use or cross Campbell Avenue.

There are 29 bus stops located along the corridor. Three of the stop locations have amenities that include benches and/or a shelter. These include the bus stop at Florida Avenue in front of the CVS, a bench at Otet Drive, and the bus stop at Mayflower Drive in front of the Dollar General store. There are presently no bus pull-off areas within the corridor.

IV. Community Input

During the time period for the preparation of this study there were a total of three public meetings that offered opportunities for the public to provide input into the project. At each of the three meetings the public was encouraged to express their concerns and ideas and provide input into the issues and opportunities for the study corridor. Also, throughout the study process the study team met with representatives from VDOT, the City and Virginia University of Lynchburg to get their perspectives on this corridor.

Public meetings were held as follows:

- November 15th, 2011 at the City's Information Technology/ Training Center located on Young Place near Mayflower Drive.
- January 30th, 2012 at the Fairview Heights Recreation Center
- May 7th, 2012 at the Fairview Heights Recreation Center

Attendance at each of the meetings included a representative cross section of the residents and business owners within the corridor study area.

The first public meeting, conducted on November 15th, 2011 was advertised as an overall planning study for the VDOT Odd Fellows Road project and the City sponsored project for the overall master planning effort for both the Odd Fellows Road and Campbell Avenue corridors.

This meeting included a presentation that provided a review of the masterplanning project purpose, goals, and timeline. Approximately 25 attendees were present. In this meeting feedback was largely concerned with the lack of ability for pedestrians to cross Campbell Avenue at controlled (signalized) locations, the difficulty in riding bicycles along the corridor, safety, and aesthetics for the City's entry corridor.

In the second overall public meeting, which was the first to focus exclusively on the Campbell Avenue corridor and held on January 30th, 2012 at the Fairview Heights Recreation Center, the public was asked to identify issue and opportunities for the corridor. In this meeting there were approximately 50 attendees representing a diverse and comprehensive cross section of the community, including citizens and business representatives. The format of the meeting included an initial presentation about the goals and purpose of the study, followed by a facilitated workshop session whereby eight

groups of approximately 6-10 participants at each table discussed the corridor and identified their concerns and ideas for improvements. The study team listened to the input and developed initial recommendations based on the identified issues and opportunities.

On May 7th, 2011 the third overall public meeting was held at the Fairview Heights Recreation Center. Approximately 25 citizens and business representatives attended. The attendees were well representative of the adjoining neighborhoods and commercial interests. At this meeting the project team provided a review of the prior meeting(s) and then presented the opportunities that were identified in the study process. The group then broke into three small workgroups to provide commentary on the opportunities, identify additional issues, and review concepts for longer term corridor improvement concepts.

Overview of Feedback from Citizen Stakeholders

In general, the stakeholders considered that there are excessive commercial driveways along Campbell Avenue. Safety and Walking & Biking Capacity were two major concerns. The top three intersections of concern were noted to be: 1) Old Campbell Avenue/ Campbell Avenue/Kemper Street; 2) Campbell Avenue at Florida Avenue; 3) Campbell Avenue at Seabury Avenue, followed with Campbell Avenue at Mayflower Drive. The majority of stakeholders were also concerned about truck traffic. Meeting attendees favored the idea of creating a parallel pedestrian corridor, and were satisfied with the current bus service though easier (crossing) access to the stops and addition of shelters would be preferred. They see Campbell Avenue as an Entrance Corridor to the city of Lynchburg in the future. They would like to see more streetscaping and community businesses to create a sense of place for Campbell Avenue.

- **Access Management Issues:** There are excessive commercial driveways along Campbell Avenue. It is difficult to make left-turns along Campbell Avenue from the side streets. For example, it is hard to get out of Hanover Street because of the heavy traffic along the corridor.
- **Safety Issues:** Poor sight distance, lack of pedestrian-crossing, and speeding are the major contributors to the safety issues along Campbell Avenue. There are sight distance concerns on Pocahontas Street, Mayflower Drive, and School Lane. Pedestrian crossing safety improvement is needed at the intersection of Florida Avenue and Campbell Avenue, and the intersection of Old Campbell Avenue/Kemper Street and Campbell Avenue.
- **Multi-Modal Transportation Planning Issues:** Crosswalk difficulties and poor sidewalks are the top two issues for Multi-Modal Transportation Planning along Campbell Avenue.

- *Pedestrians:* Overall, it is hard to cross Campbell Avenue, but people frequently do so. Especially, people often cross Campbell Avenue at Florida Avenue to CVS where there is neither pedestrian signals nor consistent sidewalks. Other frequently-used crossings are School Lane, Fairview Avenue and Seabury Avenue. In addition, it was recommended to coordinate the locations of pedestrian crossings with bus stops and signals. Also, there is need of a separation between sidewalks and road and better maintenance along the sidewalks. Lastly, people are in favor of creating a parallel pedestrian corridor.

- *Bike Lanes:* It was favored to create a bike path to downtown.

- *Transit:* In general, stakeholders were satisfied with the current bus services along Campbell Avenue though there are concerns about crosswalk safety and bus pull off. People would like to see sheltered bus-stops in the future.

- **Vision:** Stakeholders see Campbell Avenue as an Entrance Corridor to the city of Lynchburg in the future. They embrace more streetscape designs and community businesses to create a sense of place for Campbell Avenue. There are also some discussions on putting a roundabout at the intersection of Campbell Avenue and Florida Avenue. It was suggested to create a new park which is highly visible from Campbell Avenue.

In the Final Campbell Avenue Access study meeting (conducted on May 7th), the draft recommendations were presented back to the public in response to their original input and the findings of the analyses conducted for the study. The draft recommendations were then refined and became the basis for the final recommendations as summarized in section IV of this document.

In this meeting, the attendees reinforced the feedback received in the first meeting, and confirmed the findings of the crash analyses. Furthermore, the attendees concurred with the suggested access modifications and helped to identify potential new locations for parallel connections for interparcel access and reverse business access. Ideas for improved transit access and pedestrian crossings were discussed, and the attendees provided commentary on a proposed longer term road diet with roundabouts concept.

Overall, there were no objections to the identified opportunities and there was a general acceptance of roundabouts at Old Campbell and also at Florida Avenue, under the scenario that the Odd Fellows interchange is constructed and there is adequate draw of traffic and trucks off of the Campbell Avenue corridor as needed for the road diet concept to be effective.

A full summary of the community meetings are provided in the appendix of this document.

V. Corridor & Access Recommendations

Based on field observations, citizen input, and analyses, the following provides a discussion with illustrations of the study recommendations. The recommendations address corridor safety, access management, intersection operations, and multimodal improvements. The discussion of improvement opportunities is organized by links of the roadway per the project mapping. The general assessment of access management is based on the current VDOT criteria, and an understanding of topography and constraints along the corridor. The table below is from VDOT's current access management guidelines. As previously noted, Campbell Avenue is classified as a minor arterial facility and has a posted speed limit of 35 mph along the majority of the study area with exception of just north of Florida Avenue where the speed limit changes to 45 mph.

Minimum Spacing Standards for Commercial Entrances, Intersections, and Crossovers

High Way Functional Classification	Legal Speed Limit	Centerline to Centerline Spacing in Feet			
		Signalized Intersections/ Crossovers	Unsignalized Intersections/ Crossovers	Full Access Entrance	Partial Access One or Two Way Entrance
Principal Arterial	≤30 mph 35 to 45 mph ≥ 50 mph	1,050 1,320 2,640	880 1,050 1,320	440 565 750	250 305 495
Miner Arterial	≤30 mph 35 to 45 mph ≥ 50 mph	880 1,050 1,320	660 660 1,050	355 470 555	220 250 425
Collector	≤30 mph 35 to 45 mph ≥ 50 mph	660 660 1,050	440 440 660	225 335 445	200 250 360
Local Street	Commercial Entrance Spacing: See Figure 4-11.				

Corridor Wide

As previously noted in the document, the current four lane typical roadway design generally does not provide for turning lanes which allow vehicles to slow down and stop, when making a turn, outside of the through travel lanes. Furthermore, when making a left turning movement from a side treet or driveway there is no median refuge. Therefore, the motorist has to wait for a gap in traffic for both travel directions and then cross two lanes to enter onto Campbell Avenue in their

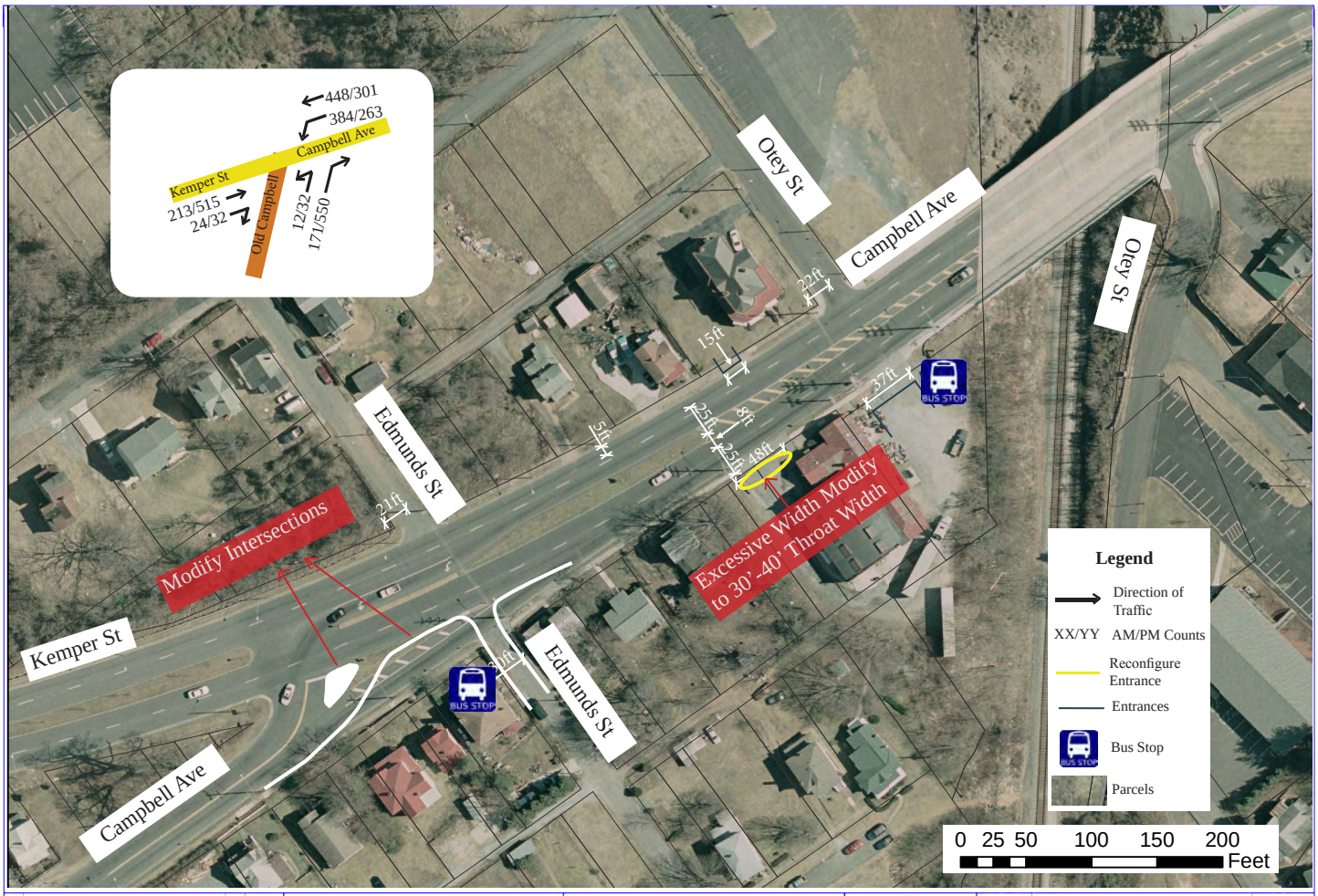
desired direction of travel. Per inspection of the crash data which include primarily rear end and angle crashes, it is the lack of turning lanes and the current configuration of the roadway that contributes to the crash patterns. Additionally, given the frequency of side street connections and the number of both private and commercial driveways along this roadway, there are a relatively high percentage of stops and turns occurring. There are some longer term solutions that could be considered to help mitigate the prevailing crash patterns along the corridor that would also allow for corridor multimodal mobility. Concepts for a corridor "re-design" are addressed at the end of this section as discussed under a longer term alternative scenario.

Corridor Segments

As shown in the crash summary, there is a relatively high frequency of crashes occurring at the intersection of Old Campbell/Kemper Street/Campbell Avenue. At this location, there is an opportunity to improve intersection safety through a realignment of the southbound right turn movement. The concept on the following page shows conceptually how this could be constructed. The road modification would affect the configuration of Edmunds Street. This modification could result in either a bus-bay at the current stop location adjacent to Edmunds Street, or an improved area with bus shelter amenities.

As shown on the following graphics, the right turn movement from Old Campbell onto Campbell Avenue has a volume of over 550 vehicles per hour in the PM peak hour of the day. Changing from a yield condition to a stop condition results in some additional queuing and delay, however the movement would still function at level of service D though we would expect an increase in the eastbound queuing from about 75' to over approximately 250'.

Presently, the city has a partially funded project for this intersection identified in the capital improvement program.



NO.	REVISION	BY	DATE

0.02 miles southeast of Price St to Campbell Ave at Otey St

DESCRIPTION

N

EPR

DESIGNED BY:
DRAWN BY: RZ
REVIEWED BY: WLM
P.M. NUMBER:

PROJECT: *Access Management Opportunities from Lynchburg Expy to route 460*

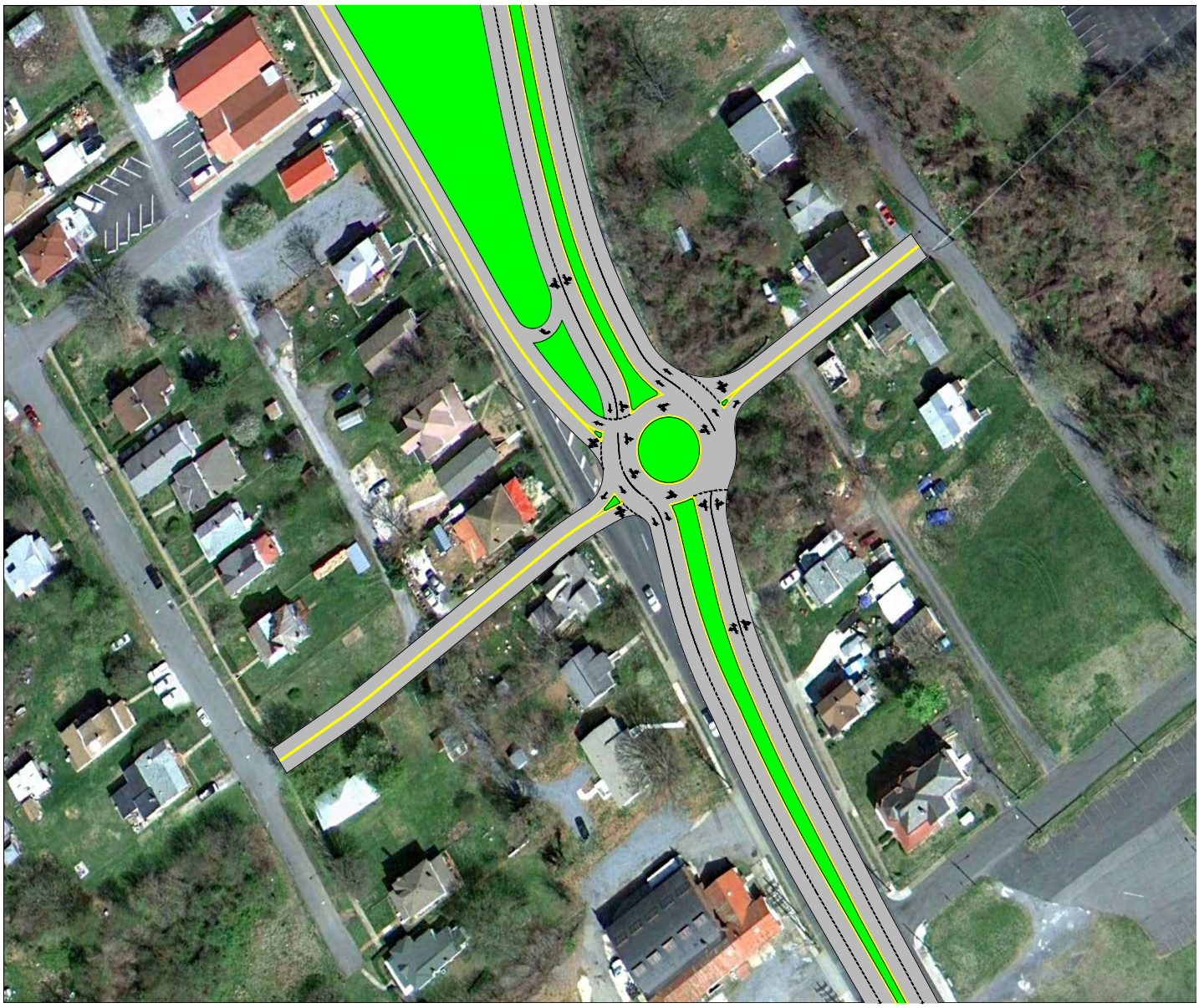
TITLE: **Campbell Avenue Access Management**

FILE NAME: DISCIPLINE: SCALE: DATE:

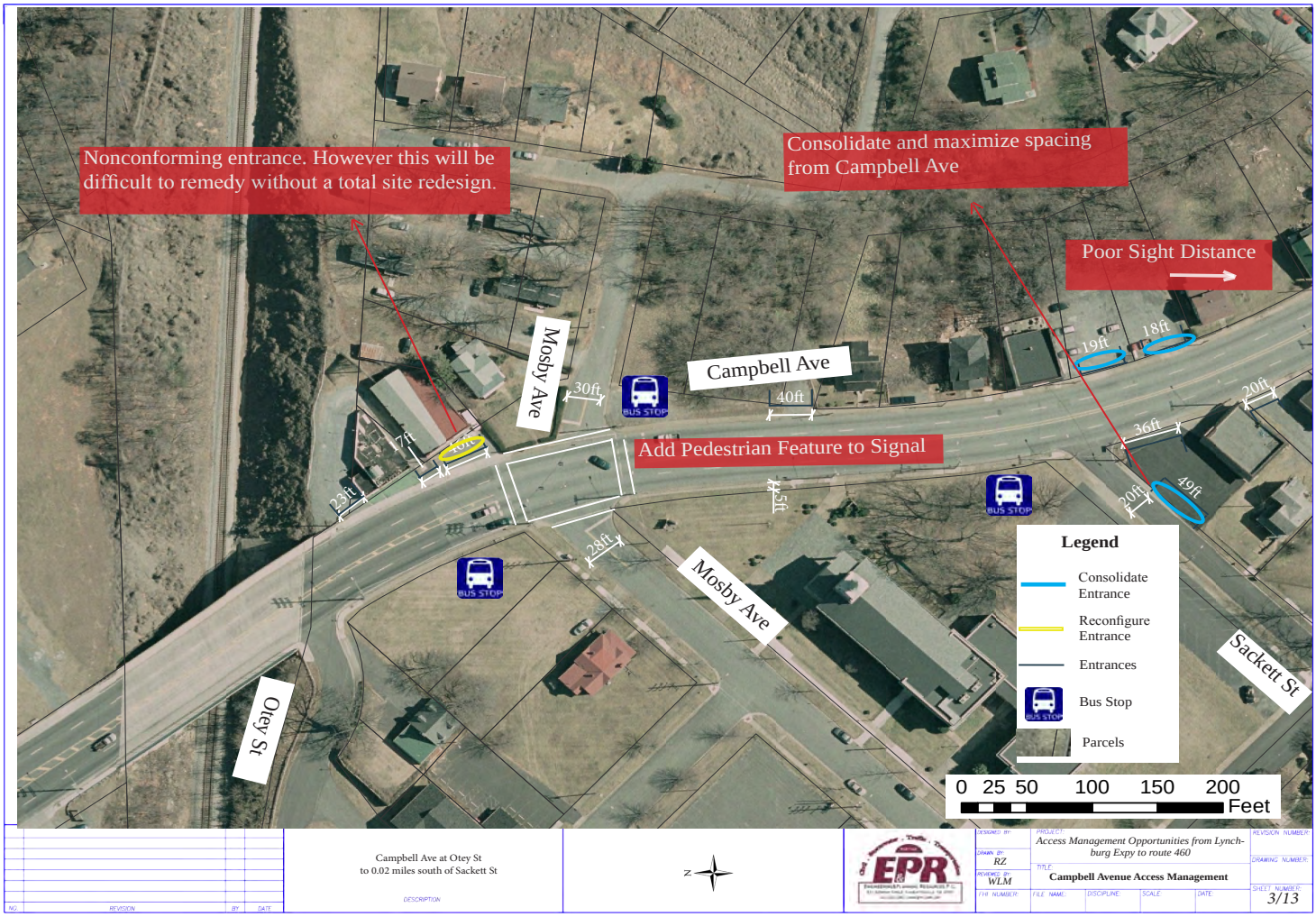
REVISION NUMBER:
DRAWING NUMBER:
SHEET NUMBER: 2/13

A roundabout was considered as an alternative intersection configuration, however the roundabout option was not recommended at this time, but could be considered in conjunction with a future road diet concept. It has been well established that roundabouts are significantly safer intersection configurations, thus construction of a roundabout at this location would be a method to mitigate the history of rear end and angle crashes that have been occurring at this intersection. It should be noted that the concept serves as a rough sketch and actual location and alignment could be determined in future study efforts.

Relative to site access, minor modifications to commercial entrances, as shown by the yellow oval, could be accomplished in the future should the commercial site undergo redevelopment.

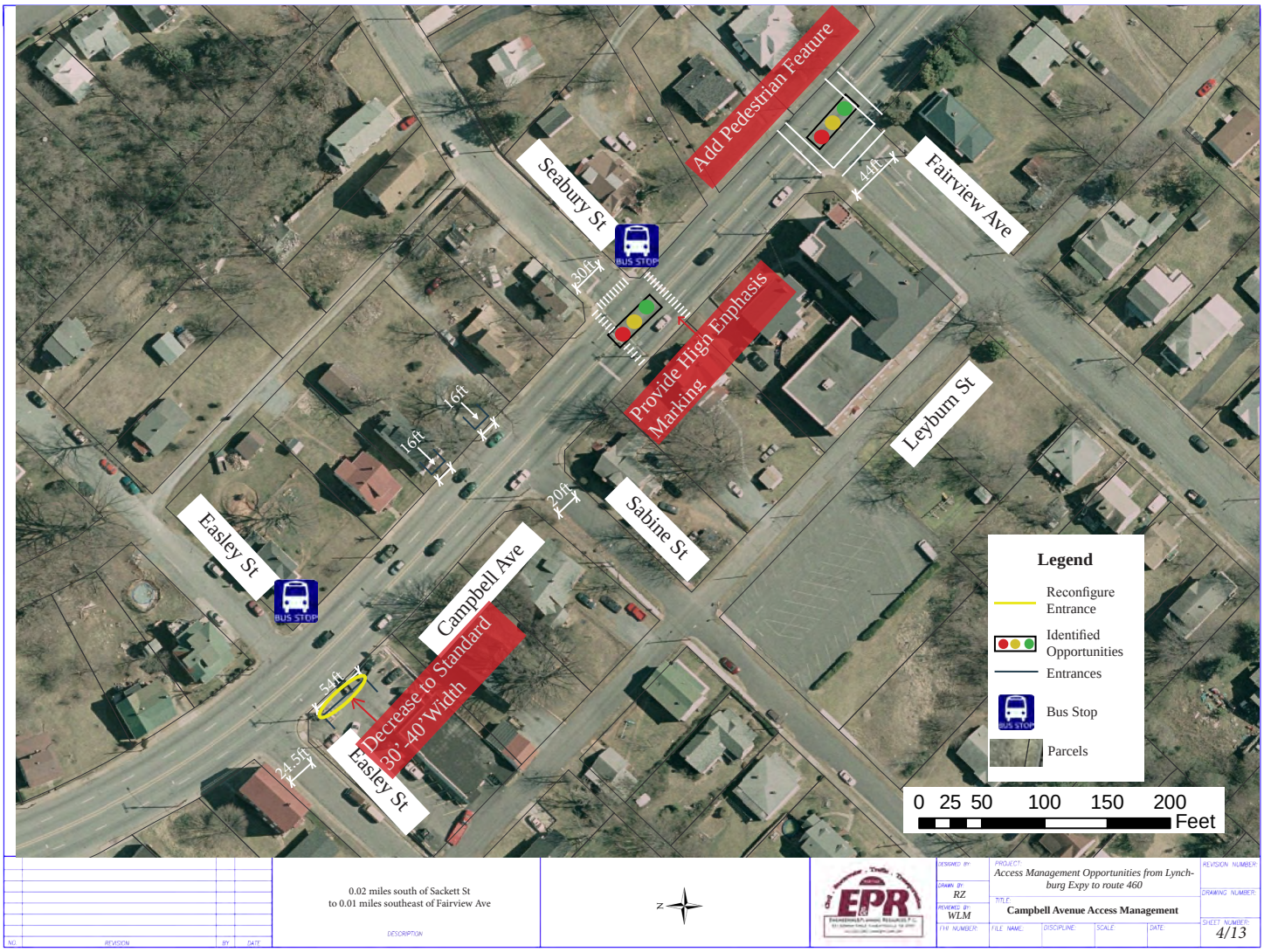


Moving to the south along Campbell Avenue, consideration should be given to providing improved pedestrian markings and pedestrian signalization features at the Mosby Avenue signalized intersection. Additionally, as shown in the yellow and blue ovals there are suggested improvements to the commercial entrances that could be pursued if/when the opportunity arises.

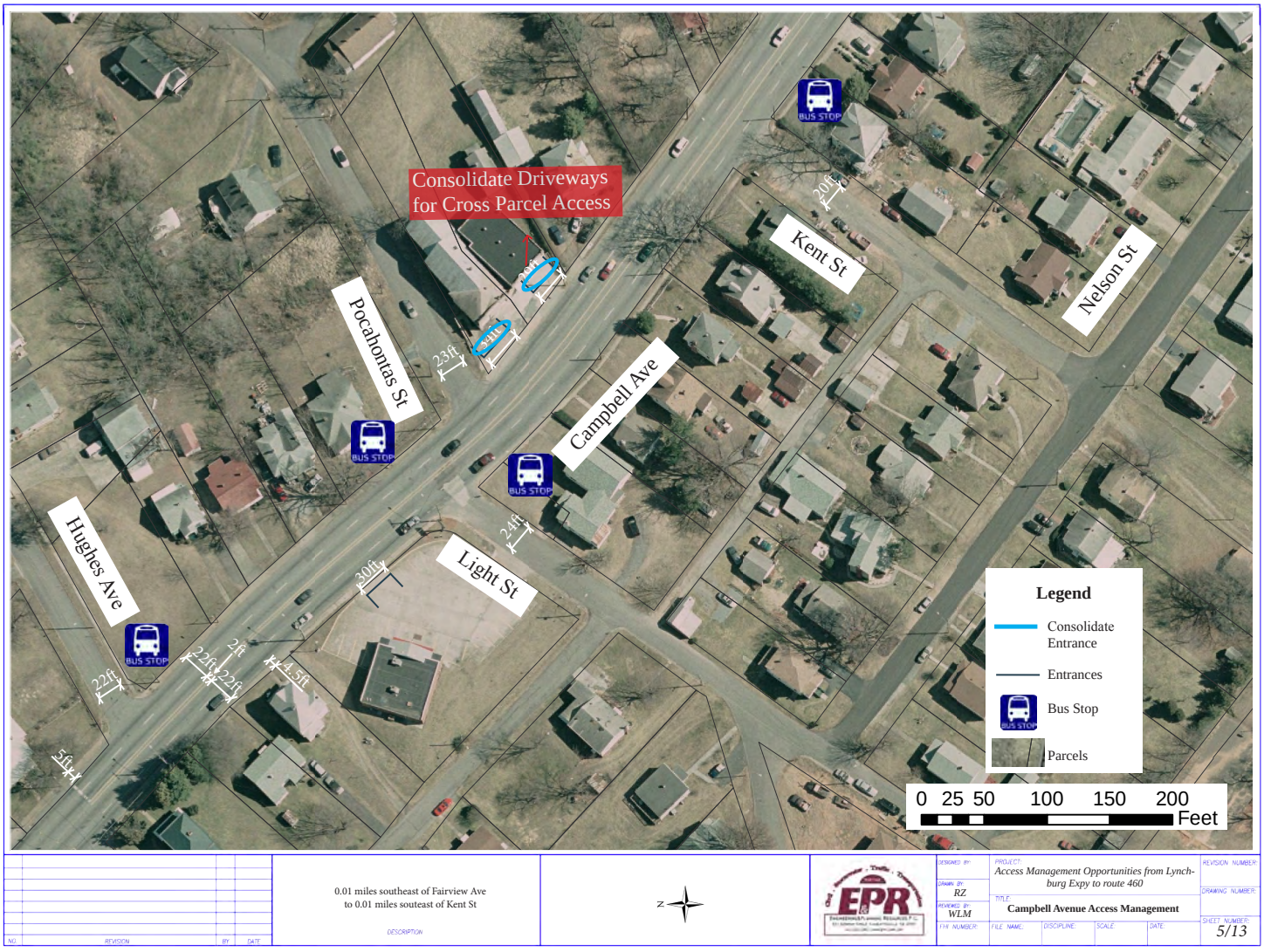


At both Seabury and Fairview Avenues consideration should be given to improving the pedestrian crossing environment. This should include providing high emphasis pavement markings at Seabury Street and standard crosswalk markings at Fairview Avenue. Pedestrian signalization presently exists at the one crossing of Campbell Avenue at Seabury Street. Pedestrian signalization should be provided across at least one leg of the intersection at Fairview, and preferably both crossings of Campbell Avenue. In addition, consideration can be given to providing school zone signage with additional fines for speeding in the vicinity of the Seabury Street intersection during school hours.

Relative to access, the commercial entrance at Easley Street is wider than the prescribed throat width of 30-40', thus should be modified if the opportunity arises.

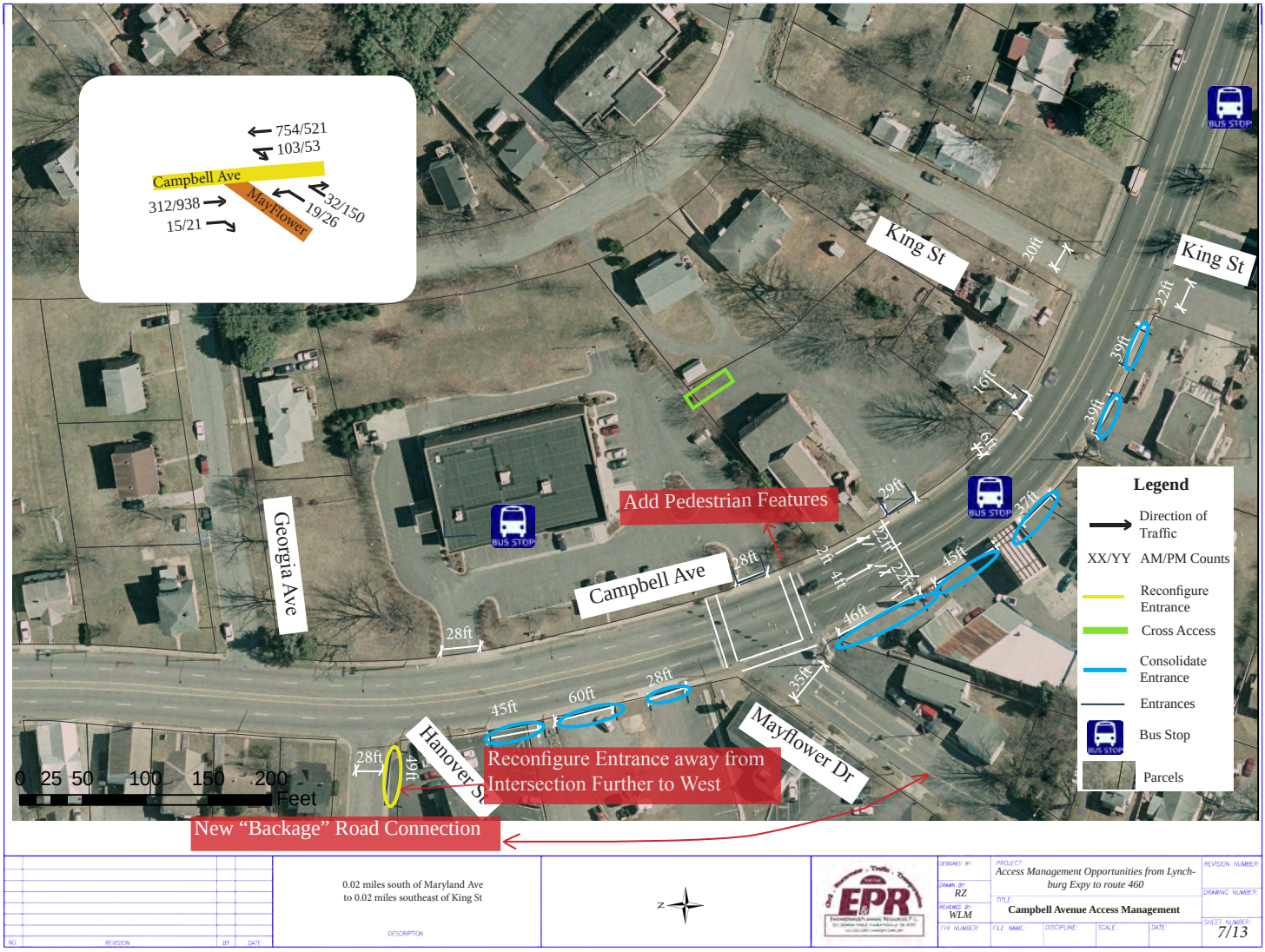


As shown in the other graphics along the corridor, there are opportunities to reconfigure commercial site entrances and create cross parcel access within the commercial development pockets along the corridor. As shown below, this principal could be applied at the adjacent commercial businesses, and preferably in the future, with redevelopment, the buildings could be re-oriented to provide parking at the back of the buildings in a shared parking lot.



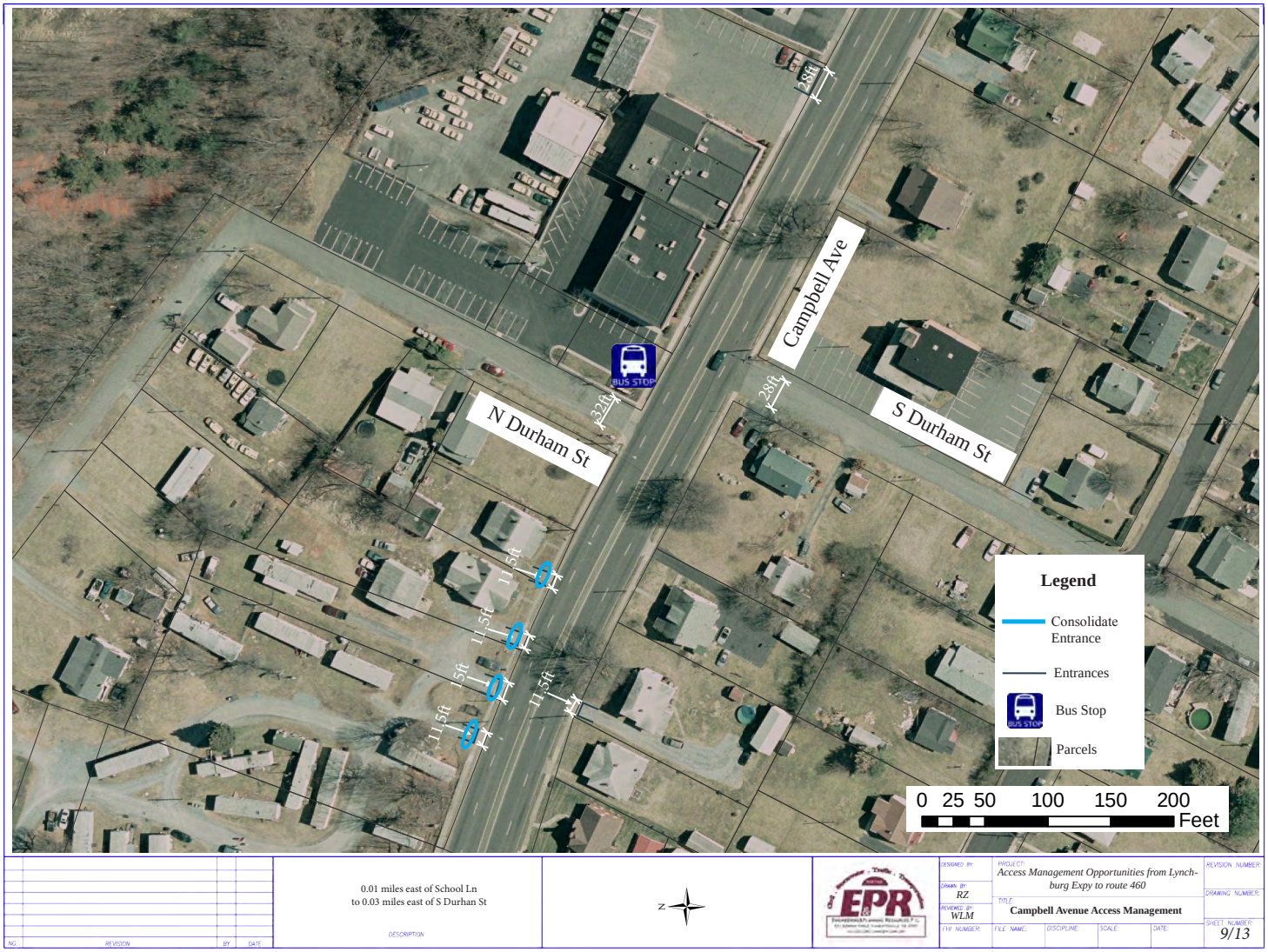
Between Idaho Avenue to south of Ridge Avenue there are opportunities to reconfigure commercial entrances. Recommendations include both modifying the existing entrances to standard entry widths, consolidating the access point when possible, and moving entrances away from intersections.

In the vicinity of Mayflower Drive, there are numerous locations where commercial entrances are excessively wide or where consolidation of entrances could occur. At Campbell Avenue full pedestrian markings and signalization should be provided. Furthermore, the current bus stop location should be moved closer to the pedestrian crossings once they are signalized. The crash history in this section of the corridor should be monitored in the future as a check to see if the speed limit should be further reduced or if advance signal warning, via a sign with a flashing beacon when the signal is red, should be installed. Due to the curvature of the Campbell Avenue alignment just south of mayflower, the potential for conflicts at entrances and rear-end crashes at the traffic signal are increased. Finally, a new parellel connection could be constructed from Mayflower Drive to Hanover Street that would also serve as a "backage" road.



Along the section of Campbell Avenue near Texas Avenue and the Community Center, there are a couple of opportunities for reconfiguring, consolidating, and providing cross parcel access. As expressed in the community meeting, there is concern about residents crossing Campbell Avenue to access the community center facilities. As such, a pedestrian crossing study should be performed to identify if a mid-block crossing would be warranted somewhere within this section of Campbell Avenue. The study would include an assessment of travel speeds and length of gaps along Campbell Avenue and also pedestrian crossing counts along this section of Campbell Avenue.

South of Texas Avenue there are four curb cuts along the east side of Campbell Avenue for the abutting parcels. It appears that these curb cuts were put in place perhaps when the sidewalks were constructed. Depending on how the adjacent parcels are eventually utilized, there could be an opportunity to consolidate the entrances.

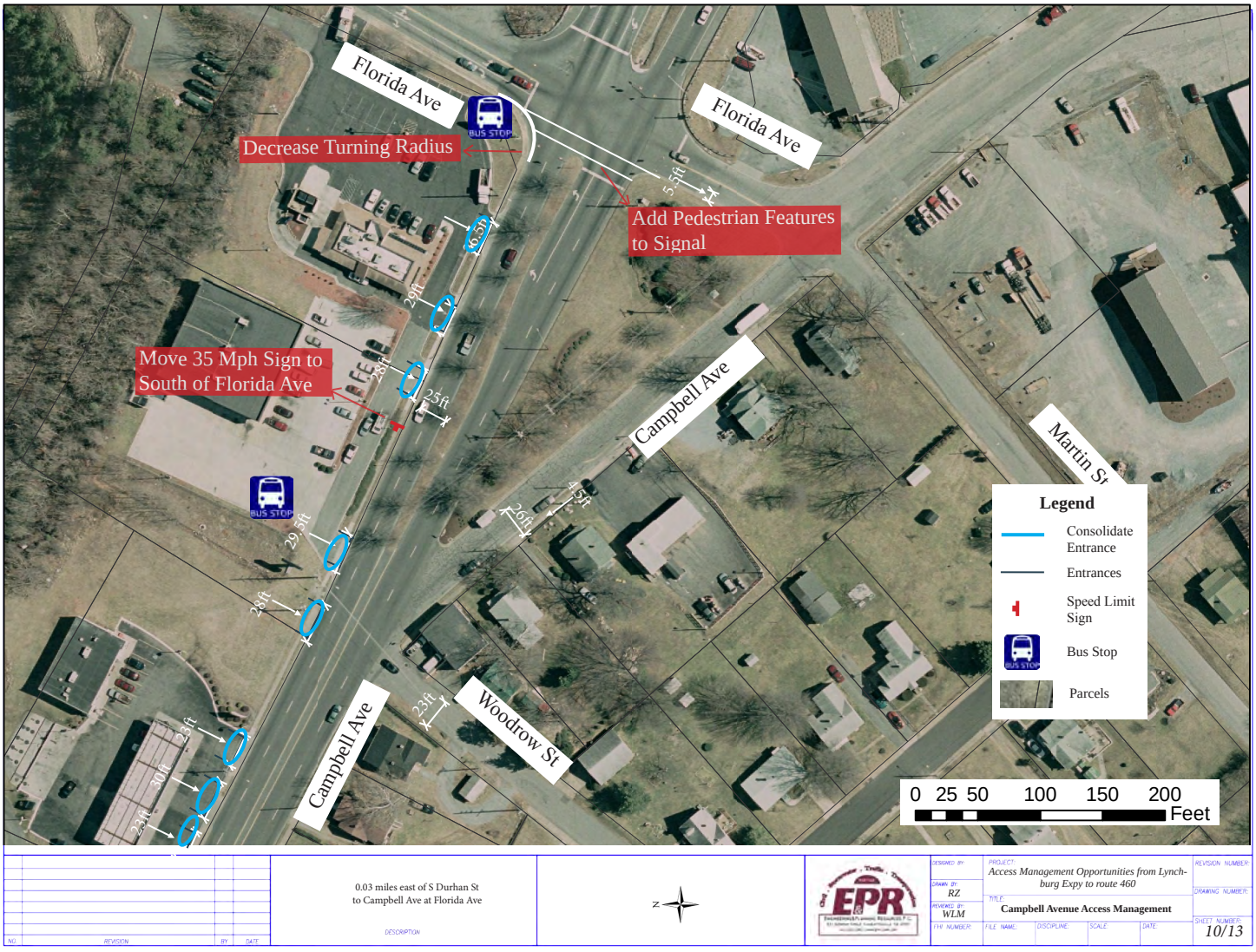


0.01 miles east of School Ln
to 0.03 miles east of S Durhan St

DESCRIPTION

DESIGNED BY:
DRAWN BY: RZ
REVIEWED BY: WLM
PROJECT: Access Management Opportunities from Lynchburg Expy to route 460
TITLE: Campbell Avenue Access Management
REVISION NUMBER:
DRAWING NUMBER:
SHEET NUMBER: 9/13

Approaching the Florida Avenue intersection from the north, there are several commercial entrances in close proximity to one another that should eventually be consolidated. Excessive numbers of entrances affect pedestrian safety and also create more conflict points along the corridor, thereby reducing overall safety and roadway capacity. In particular, the southern most curb cut is within the functional area of the Florida Avenue intersection which can present driver confusion and safety concerns downstream of the intersection.



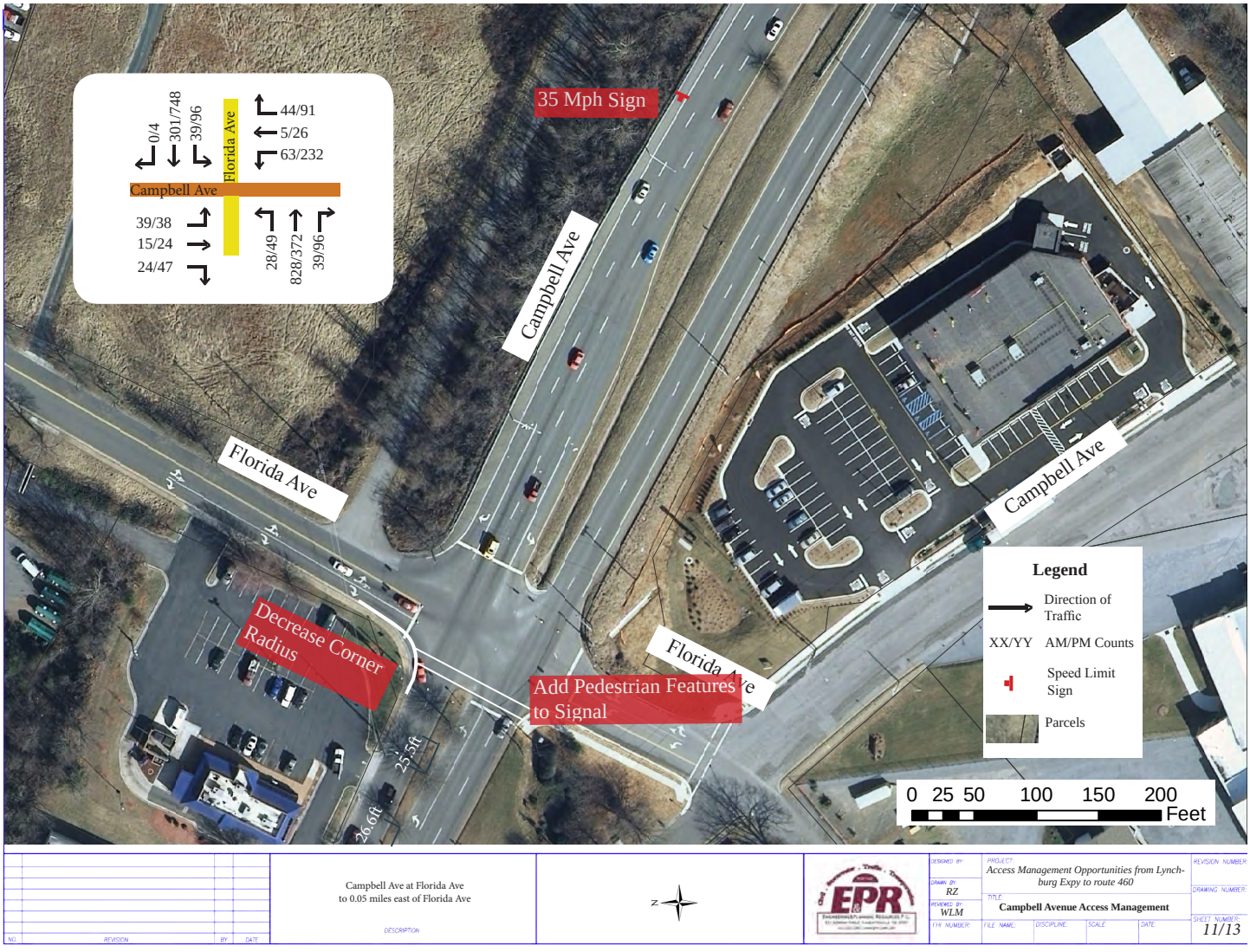
At the intersection of Florida Avenue with Campbell Avenue,there is a crosswalk across the northern leg of the intersection. The curb line in the northeast corner is constructed as a long radius, which results in a longer pedestrian crossing movement and increased right turn speeds. As shown below, consideration should be given in the future to reconstructing the corner to decrease the turn radius which would help to shorten the crossing distance and slow down the right turn vehicles. This could also help mitigate the minor history of the right turn movement crashes with

the opposing left turn movement.

In the southwest quadrant, it is difficult for pedestrians to walk south from the bus stop in front of CVS to points south of the interchange. This is due to the configuration of the guardrail. Consideration should be given for modifying the guardrail to provide improved pedestrian access. Relative to pedestrian safety, pedestrian signalization should be provided.

Consideration should be given to relocating the existing speed limit signs such that the 35 mph posting begins to the south of the intersection. At present the 45mph speed limit begins (for southbound vehicles) north of the intersection.

Finally, in order to signal to motorists that north of Florida Avenue has a different design context, consideration should be given to creating more of an entry feature at or near the intersection. This would help to create a sense of "place" such that motorists would expect to see pedestrians and other activity consistent with a more suburban environment.



Campbell Ave at Florida Ave
to 0.05 miles east of Florida Ave

DESIGNED BY:
DRAWN BY: RZ
REVIEWED BY: WLM
PROJECT: Access Management Opportunities from Lynchburg Expy to route 460
TITLE: Campbell Avenue Access Management
SHEET NUMBER: 11/13

A concept for a roundabout at this location was considered as a means of providing a safer intersection while creating an entry feature. The entry feature serves to signal a change in context as Campbell Avenue is both an entry corridor for the City and this intersection is where the abutting development transitions to residential and commercial, versus the interchange area and rural land uses south of the interchange.

Multimodal Improvements

At present, the Campbell Avenue corridor has minimal multimodal features. There are sidewalks along both sides of the corridor and the handicap ramps have recently been improved to the latest design standards. There are sidewalks along both sides of the corridor and the handicap ramps have recently been improved to the latest design standards. There are approximately 26 bus stops along the corridor, though most of them do not have covered shelters.

Per feedback received in the public meetings, there is a desire to enhance pedestrian safety, especially as it relates to crossing Campbell Avenue. There is also a desire to improve the transit environment by providing bus pull-offs at key locations and providing more covered transit shelters. There is also a desire to improve the ability to use bicycles along the corridor.

The overall corridor master planning project for the Campbell Avenue corridor and the Odd Fellow corridor (currently in production as of June 2012) will provide recommendations for off street bicycle paths. In addition, this study initiates a conversation about potentially re-allocating use of the existing pavement to reduce the through lanes to one in each direction while providing turn lanes and bicycle lanes along the corridor. This road diet concept, which would provide a greatly enhanced multimodal environment, is discussed more fully in the following section

Alternative Roadway Typical Section

As alluded to at the beginning of the Corridor Recommendations section of the document and in the preceding section, Campbell Avenue could be considered for a "road diet" typical section modification. The term "road diet" generally refers to decreasing the number of through lanes in order to provide additional turn lanes, bicycle lanes, and median features. For the Campbell Avenue corridor, it appears feasible, and worthy of additional study, to consider a "road diet" modification that could provide for turn lanes and multimodal enhancements.

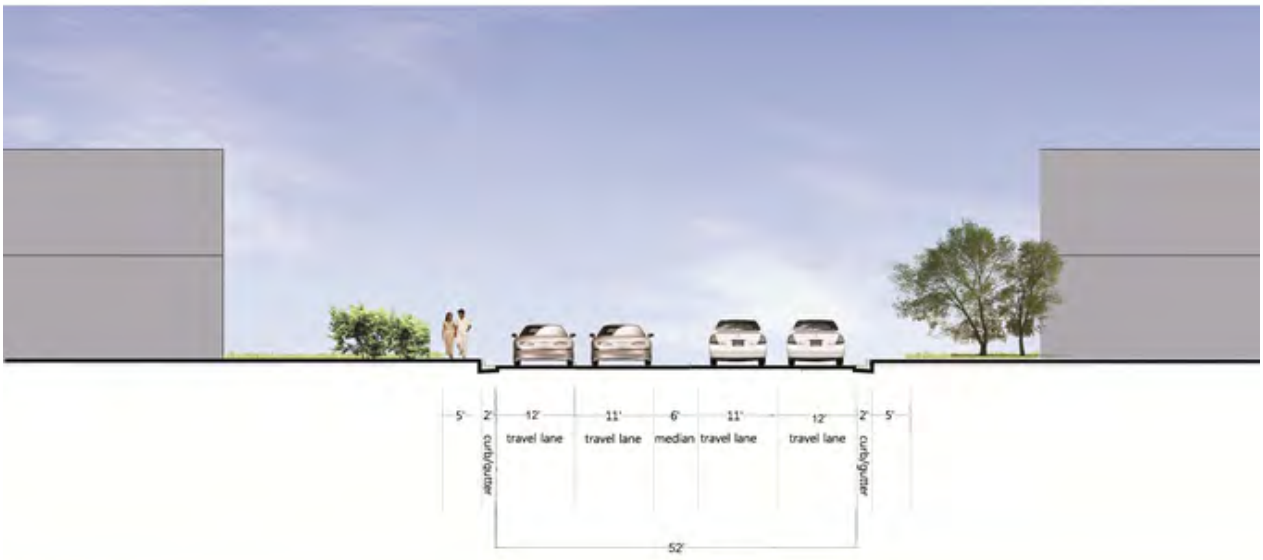
As part of the access management study effort, a cursory feasibility study was conducted that included analysis of the Kemper/Campbell, Mayflower/Campbell, and Florida/Campbell intersections to test if reduction of the through lanes to one in each direction was feasible. Since corridor capacity is largely governed by capacity at the most congested intersections, this approach was used as a first teir test for the Campbell Avenue corridor.

In order to consider future traffic volume levels, coordination with the VDOT Odd Fellows Road interchange traffic study effort was conducted to obtain the future volume projections. A brief technical memorandum is included as an attachment to this document that provides details of the traffic projections and comparisons of future resulting level of service, delay, and queuing at the three intersections. The general findings were that with the Odd Fellows Road interchange on Route 460, the year 2035 traffic volumes on Campbell Avenue are expected to be about the same as they are today. This is due to the new interchange and roadway attracting trips off of Route 460 that would have otherwise used Campbell Avenue. The traffic analysis showed that there will be an increase in queuing and delay in the peak hours of

the day, though there would be no failing level of service or excessive delay expected.

At present there is a larger master planning effort underway for the Campbell Avenue and Odd Fellow Road areas of the City that will provide greater details on this concept. However, as an introduction of the concept, the following graphics are provided to illustrate a comparison of the existing approximate roadway cross section to potential alternative cross sections that could be considered with this "road diet" / complete streets conversion concept.

Implementation of a road diet should be preceded with a technical analysis of alternatives for typical sections, locations where medians would be constructed and the resulting impacts to side streets and businesses. Also, this concept should be discussed with EMS providers and an assessment should be made for where turn lanes would be required to maximize safety and mobility within the corridor.



VI. Summary of Project & Implementatioin Strategies

The following provides a summary of potential projects as identified through this study along with potential strategies for obtaining funding for implementation.

Project	Potential Implementation Strategies
Campbell Avenue/Kemper Street intersection modifications	Revenue sharing program
Pedestrian features at Mosby/Campbell	Transportation general fund / CIP
Pedestrian features at Seabury and Fairview at Campbell	Transportation general fund / CIP, Safe Routes to School grant
Pedestrian features at Mayflower Drive	Transportation general fund / CIP
Construct median at Mayflower, also construct new parallel road connection in the northwest quadrant of the intersection	Public private partnership, development proffers, HSIP, Revenue Share grant
Pedestrian mid-block signalized crossing near recreation center (if warranted by study)	Transportation general fund / CIP
Intersection modifications to Florida/Campbell	Transportation general fund / CIP
Pedestrian features at Florida/Campbell. Also, potentially modify the left turn heads for the side street approach.	Transportation general fund / CIP
Speed limit change at south end of the study area. (study and implementation)	Transportation general fund
Additional Right Turn Must Turn Right signage changes at Florida/Campbell	Transportation general fund
Longer term – roundabout at Campbell/Kemper	Revenue sharing program, CIP, SYIP
Longer term – roundabout at Florida/Campbell	Revenue sharing program, CIP, SYIP
Longer term – road diet roadway modifications	CIP, SYIP. NOTE: The urban road allocation is based on vehicle lane miles of roadway. The road diet project will reduce the yearly urban allocation funding from VDOT.
Bus pull-offs at key locations	Transportation general fund / CIP, or possibly FTA funds (TBD)

VII APPENDIX

APPENDIX A - Defination

Angle (Y) angle of driveway

Complete Street. A roadway that provides a safe environment and adequate travel capacity for vehicles, pedestrians, bicycles, and transit vehicles.

Conflict Point. A conflict point is an area where intersecting traffic merges, diverges, or crosses.

Corner Clearance (C) similar to (D) but measured from a major intersection

Downstream Area. see "intersection"

Driveway. A driveway is a location where a curb-cut has been made that provides vehicular access to a property. This term is used interchangeably with the term "entrance" in this document.

Driveway Distance (D) or spacing between driveways

Driveway Location position of driveway in relation to other traffic features such as intersections, neighboring driveways, and median openings

Driveway Length (also called "throat length") distance between the edge of the street and the first conflict point.

Driveway Traffic Separators/Channeling Islands size and position of barrier separating traffic movements on the driveway

Entrance. An entrance is a location where a curb-cut has been made that provides vehicular access to a property. This term is used interchangeably with the term "driveway" in this document.

Flare (F) size of angled approach/exit of driveway

Formalized. The term formalized is used to mean constructed, installed, painted or otherwise direct vehicular traffic within a property or series of properties.

Functional Area of an Intersection, see "intersection"

Intersection (see Figure 9. Physical and Functional Area of an Intersection on page 69)

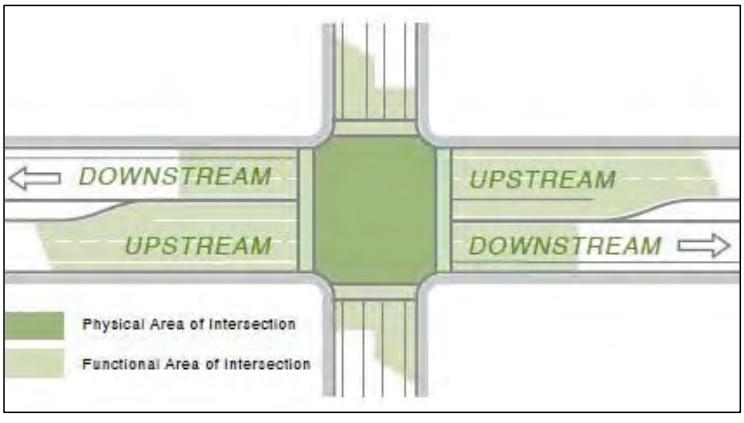
The **physical area of an intersection** is a fixed area that represents the space confined within the corners of the intersection. (U.S. Department of Transportation, Federal Highway Administration, Access Management in the Vicinity of Intersections. FHWA-SA-10-002 (http://safety.fhwa.dot.gov); at (http://safety.fhwa.dot.gov/intersection/resources/fhwasa10002/ppt/))

The **functional area of an intersection** includes areas upstream and downstream of the intersection. (U.S. Department of Transportation, Federal Highway Administration,, Access Management in the Vicinity of Intersections. FHWA-SA-10-002 (http://safety.fhwa.dot.gov); at (http://safety.fhwa.dot.gov/intersection/resources/fhwasa10002/ppt/))

The **upstream area** consists of distance for travel during a perception-reaction time, travel for maneuvering and deceleration, and queue storage. (FHWA. Access Management: A Key to Safety and Mobility. U.S. Department of Transportation, Federal Highway Administration, FHWA-SA-10-005. November 2009 (http://safety.fhwa.dot.gov); at (http://safety.fhwa.dot.gov/intersection/resources/fhwasa10005/brief_13.cfm)

The **downstream area** includes the length of road downstream from the intersection needed to reduce conflicts between through traffic and vehicles entering and exiting a property",FHWA. Access Management: A Key to Safety and Mobility. U.S. Department of Transportation, Federal Highway Administration, FHWA-SA-10-005. November 2009 (http://safety.fhwa.dot.gov); at (http://safety.fhwa.dot.gov/intersection/resources/fhwasa10005/brief_13.cfm))

Figure 5: Physical and Functional Area of an Intersection



Jog Maneuver. When intersecting streets on opposite sides of the study street do not line up each point at which they connect to the study street is an intersection. The term "jog maneuver" is used to describe the way in which these streets are aligned with each other (See Figure 10. Jog Maneuver Example).

Figure 6: Jog Maneuver Example

Physical area of an intersection, see "intersection"

Radius (R) size of curved approach/exit of driveway.

Right Turn Lanes separate lanes on roadway to facilitate right turns into driveway

Structure. Building, Gas Island, Gate, etc.

Throat see Length. see "driveway length" Upstream area. see "intersection"

Width (W). space for vehicles operating on driveway

APPENDIX B - Access Management Guidelines

Proposed Access Management Regulations

The access management regulations presented in this section have been gathered from regulations throughout the

country. They have been adopted and implemented all across the nation. These regulations are based on over 40 years of research done by several states as well as the federal government.

General

1. Traffic signals shall be placed no less than 1/4th (.25) of a mile apart (1,320 feet). Absolute minimum spacing for a minor urban arterial at 35 mph posted speed should be 1050 feet.

2. Median openings on arterial streets shall be directional and located no less than 1/8 of a mile from traffic signals and other median openings.

3. Median openings shall not be located across right turn lanes.

4. Raised medians shall be incorporated into the design of all new multilane arterial roadways, as well as major reconstructions of existing multilane arterial roadways, unless the right of way is inadequate to accommodate such design.

Detailed

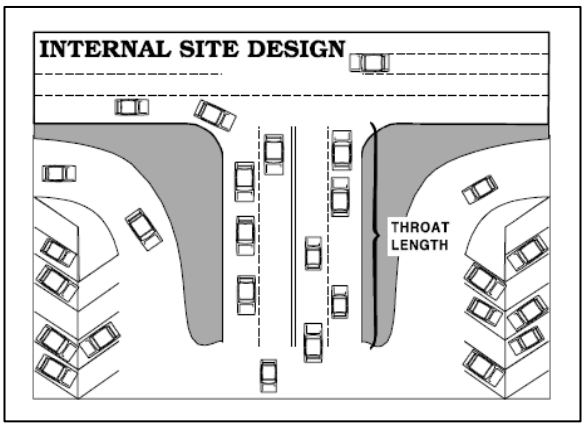
Access Connection and Driveway Design

1. Driveway width shall meet the following guidelines:

   A. If the driveway is a one-way in or one-way out drive, then the driveway shall be a minimum width of fourteen (14) feet of pavement and shall have appropriate signage designating the driveway as a one-way connection.

   B. For two-way access, each lane shall have a width of twelve (12) feet.

Figure 7: Throat Length Illustration



2. Driveway grades, turnout radii, approaches, and lengths shall comform to VDOT's standards.

   A. Driveway approaches must be designed and located to provide an exiting vehicle with an unobstructed view. Construction of driveways along acceleration or deceleration lanes and tapers

B. Driveways shall have sufficient length and size for all vehicular queuing, stacking, maneuvering, standing, and parking to be carried out completely beyond the right of way line. The length of driveways or "throat length" (see Figure 5. Throat Length Illustration) shall be designed in accordance with Table 2: Throat Length Measurements on page 54. These measures generally are acceptable for the principle access to a property and are not intended for any minor supplemental driveways to that same property.

C. Where a site is being redeveloped on a small property with no reasonable alternative access, it may be difficult to get these driveway lengths. In these cases, position the driveway to take advantage of the on-site location with the most depth.

D. Driveways that enter the major thoroughfare at traffic signals must have at least two (2) outbound lanes (one for each turning direction) of at least twelve (12) feet width and one (1) inbound lane with fourteen (14) feet width of pavement.

3. Driveways across from median openings shall be consolidated wherever feasible to coordinate access at the median opening.

Table 2: Throat Length Measurements.

Land Use	Driveway Length (in feet)
Any major entrance to a development with 4 or more total lanes in the driveway. Typically malls and "Super" retail centers.	300 or greater, based on traffic study
Regional Shopping Centers (over 150,000 square feet)	250
Community Shopping Center (100-150,000 square feet) (Supermarket, drug store,	150
Small Strip Shopping Center	50
Smaller Commercial Developments (convenience store with gas pumps)	30

Requirements for Outparcels and Phased Development Plans

1. In the interest of promoting unified access and circulation systems, development sites under the same ownership or consolidated for the purposes of development and comprised of more than one (1) building site shall not be considered separate properties in relation to the access standards and regulations. The number of connections

permitted shall be the minimum number necessary to provide adequate access to these properties, not the maximum available for that frontage. This shall also apply to phased development plans. The owner and all lessees within the affected area are responsible for compliance with the requirements of these access standards and regulations.

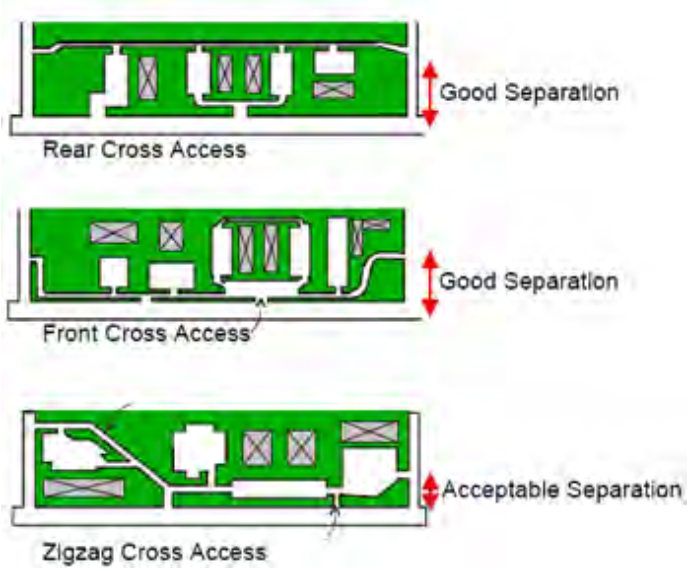
2. All access to outparcels must be internalized using the shared circulation system of the principal development or retail center. This access shall be designed to avoid excessive movement across parking aisles and queuing across surrounding parking and driving aisles.

Subdivision of Land

1. All land in a parcel having a single tax code number, as of (date of adoption), shall be entitled one (1) driveway/ connection per parcel as of right on said public thoroughfare(s). When subsequently subdivided, access to all newly created lots shall be provided via the permitted access connection. This may be achieved through subdivision roads, shared and cross accesses, and service drives (see Figure 6. Cross Access Types below).

2. Parcels in existence as of (date of adoption) with frontages that exceed minimum driveway spacing requirements as shown in the Driveway and Corner Clearance Spacing section may be permitted additional access connections.

Figure 8: Cross Access Types



3. Additional access connections may be allowed where the property owner can demonstrate upon review of a traffic impact analysis of the proposed connection submitted by the applicant that safety and efficiency of travel on the thoroughfare will be improved by providing more than one access to the site.

4. Existing parcels with frontage less than the minimum connection spacing for that corridor may not be permitted a direct connection to the thoroughfare under this Section where the Planning Commission determines alternative reasonable access is available to the site.

[Note: The Technical Review Committee could allow for a temporary driveway as provided in the Access Standards Section with the stipulation that joint and cross access be established as adjacent properties develop.]

Shared and Cross Access

1. Adjacent commercial or office properties classified as major traffic generators (i.e., shopping center, office parks) shall provide cross access, pedestrian access and bicycle access to allow circulation between sites.

2. A system of shared use driveways and cross access easements as shown in Figure 9 Shared and Cross Access Illustration on page 69 shall be established wherever feasible and the building site shall incorporate the following

   A. A continuous service drive or cross access extending the entire length of each block served to provide for driveway separation consistent with the access classification system and standards.

   B. A design speed of ten (10) miles per hour (mph) and sufficient width to accommodate two-way travel aisles designed to accommodate automobiles, service vehicles, and loading vehicles.

   C. Stub roads and other design features to make it visually obvious that the abutting properties may be tied in to provide cross access via a service drive.

   D. A unified access and circulation system plan that includes coordinated or shared parking areas is encouraged.

3. Pursuant to this section, the owner shall:

   A. Record an easement with the deed allowing cross access to and from other properties served by the shared use driveways and cross access or service drives.

   B. Record an agreement with the deed that remaining access rights along the thoroughfare will be dedicated to the City of Lynchburg and pre-existing driveways will be closed and eliminated after construction of the joint-use driveway;

   C. Record a joint maintenance agreement with the deed defining maintenance responsibilities of property owners.

4. Shared parking areas shall be permitted a reduction in required parking spaces if peak demand periods for proposed land uses do not occur at the same time periods.

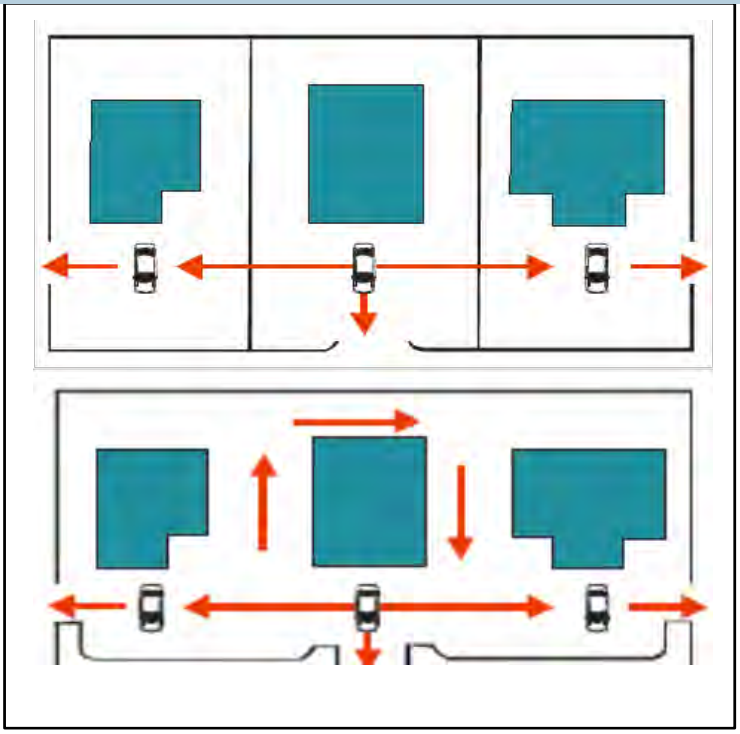
5. Requirement Reduction: The (permitting department) may reduce required separation distance of access points where they prove impractical, provided all of the following requirements are met:

   A. Joint access driveways and cross access easements are provided wherever feasible in accordance with this section.

B. The site plan incorporates a unified access and circulation system in accordance with this section.

C. The property owner shall enter a written agreement with the City of Lynchburg, recorded with the deed, that pre-existing connections on the site will be closed and eliminated after construction of each side of the joint use driveway.

Figure 9: Shared and Cross Access Illustration



Minimum Frontage

1. The minimum lot width for all parcels with frontage on (designated corridor) shall not be less than the minimum connection spacing standards of that thoroughfare, except as otherwise provided in this Section. Flag lots shall not be permitted direct access to the thoroughfare and interior parcels shall be required to obtain access via a public or private access road in accordance with the requirements of this Code

A. Existing parcels with frontage less than the minimum connection spacing for that corridor may not be permitted a direct connection to the thoroughfare under this section where the Technical Review Committee determines alternative reasonable access is available to the site.

[Note: The Technical Review Committee could allow for a temporary driveway with the stipulation that joint and cross access be established as adjacent properties develop.]

B. Additional access connections may be allowed where the property owner demonstrates that safety and efficiency of travel on the thoroughfare will be improved by providing more than one access to the site.

Reverse Frontage

1. Access to double frontage lots on (designated corridor) shall be required on the street with the lower functional classification

2. When a residential subdivision is proposed on (designated corridor) it shall be designed to provide lots fronting the arterial with access from a frontage road or interior or local street.

Driveway and Corner Clearance Spacing

1. Full access connections within the (designated corridor classified as a minor urban arterial) shall maintain a 590 foot separation from any other driveway or intersection where the posted speed limit is above 45 miles per hour (mph), and a 470 foot separation from any other driveway or intersection where the posted speed limit is 45 miles per hour (mph) or below with the exception of access connections for single family residential and agricultural land uses. For right in/out connections, the spacing from adjacent connections shall be 425 when the posted speed is 45 mph or higher, and 250 feet when the posted speed limit is 35 mph to 45 mph.

2. Driveway spacing shall be measured from the closest edge of the pavement to the next closest edge of the pavement (see Figure 8. Measure Details for Corner Clearance and Access Spacing for points of measurements).

3. Corner clearance for connections shall be measured from the closest edge of pavement of the intersection to the next closest edge of pavement of the first access point from the intersection (refer to Figure 8. Measure Details for Corner Clearance and Access Spacing) and shall meet or exceed the minimum connection spacing requirements for that roadway.

4. If the access connection spacing standards listed above cannot be achieved, the Technical Review Committee may reduce required separation distances of access points provided that:

   A. Shared access driveways and cross access easements are provided wherever feasible in accordance with the Shared and Cross Access Section of these regulations; or

   B. The Technical Review Committee determines that the connection does not create a safety or operational problem

upon review of a site specific study of the proposed connection prepared by a registered engineer and submitted by the applicant.; or

C. At an intersection, where no other access to the property is available and shared access driveways and cross access easements are not feasible, the Technical Review Committee may allow construction of an access connection along the property line farthest from the intersection. In such cases, directional connections (i.e., right in/out) may be required.

5. New connections shall not be permitted within the functional area of an intersection or interchange as defined by the connection spacing standards of this code, unless:

A. No other reasonable access to the property is available, and

B. The Technical Review Committee determines that the connection does not create a safety or operational problem upon review of a site specific study of the proposed connection prepared by a registered engineer and submitted by the applicant.

6. Where no other alternatives exist, the Technical Review Committee may allow construction of an access connection along the property line farthest from the intersection. In such cases, directional connections (i.e. right in/out, right in only, or right out only) may be required.

7. In addition to the required minimum lot size, all corner lots shall be of adequate size to provide for required front yard setbacks and corner clearance on street frontage.

Definitions for the terms and symbols used in the Figure 10: Measure Details for Corner Clearance and Access Spacing:

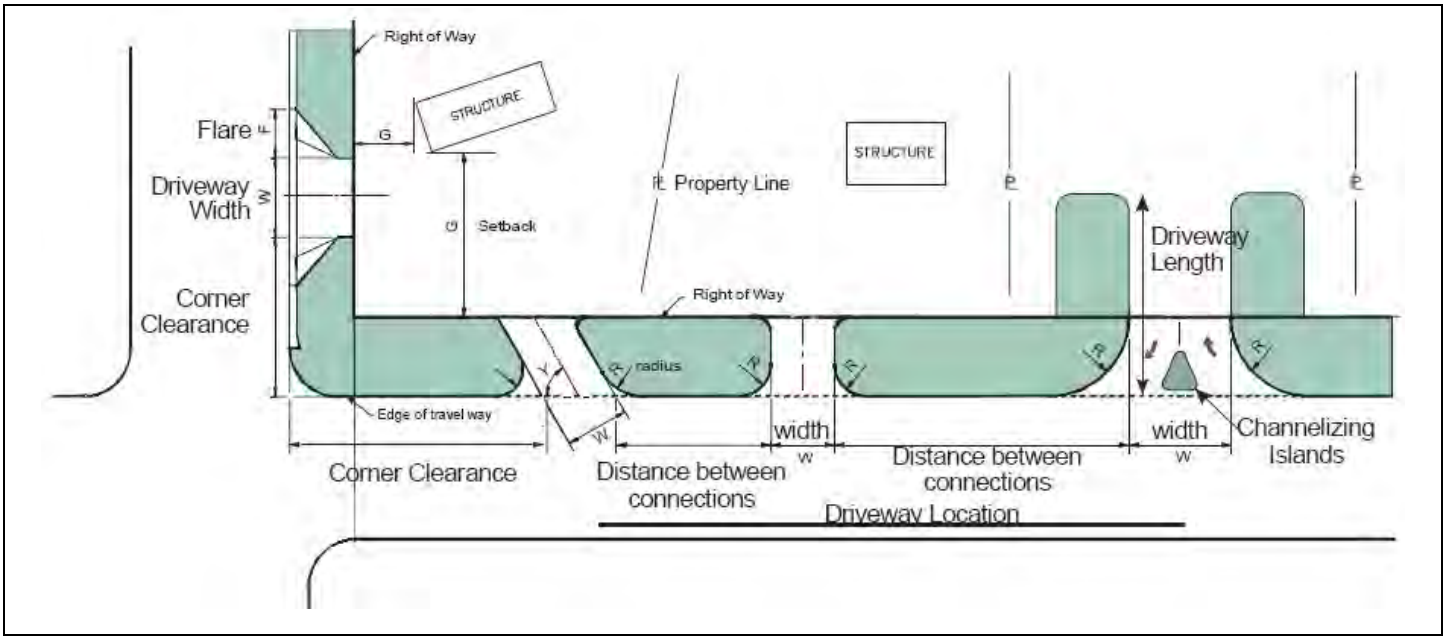
- **Radius (R)** size of curved approach/exit of driveway
- **Flare (F)** size of angled approach/exit of driveway
- **Width (W)** space for vehicles operating on driveway
- **Driveway Distance (D)** or spacing between driveways
- **Corner Clearance (C)** similar to (D) but measured from a major intersection

- **Angle (Y)** angle of driveway
- **Driveway Location** position of driveway in relation to other traffic features such as intersections, neighboring driveways, and median openings
- **Driveway length** (also called "throat length") distance needed into site to transition vehicles to the internal circulation system of the site
- **Driveway Traffic Separators/Channelizing Islands** size and position of barrier separating traffic movements on the driveway
- **Right Turn Lanes** separate lanes on roadway to facilitate right turns into driveway
- **Structure** Building, Gas Island, Gate, etc.

Interchange Areas

The distance to the first full or partial connection shall be at least 750 feet, This distance shall be measured from the end of the taper for that quadrant of the interchange.

Figure 10: Measure Details for Corner Clearnance and Access Spacing



Connectivity

1. The street system of a proposed subdivision shall be designed to coordinate with existing, proposed, and planned streets outside of the subdivision as provided in this section.

2. Wherever a proposed development abuts unplatted land or a future development phase of the same development, street stubs shall be provided as deemed necessary by the City of Lynchburg to provide access to abutting properties or to logically extend the street system into the surrounding area. The restoration and extension of the street shall be the responsibility of any future developer of the abutting land.

Nonconforming Access Features

1. Permitted access connections in place as of (date of adoption) that do not conform with the standards herein shall be designated as nonconforming features and shall be brought into compliance with applicable standards under the following conditions:

   A. When new access connection permits are requested;

   B. Increase in trip generation of 100 or more additional peak hour trips; or

   C. As roadway improvements allow.

2. If the principal activity on a property with nonconforming access features is discontinued for a consecutive period of two (2) years or discontinued for any period of time without a present intention of resuming that activity, then that property must thereafter be brought into conformity with all applicable connection spacing and design requirements, unless otherwise exempted by the permitting authority. If the activity is discontinued and renewed with a different activity, property owner must provide a traffic impact analysis to show that the new activity will not increase the number of trips.

Pedestrian and Bicycle Accommodations

1. Bicycle and pedestrian ways shall be established in new construction and reconstruction projects along (the designated corridor) unless one or more of these conditions are met:

   A. Bicyclists and pedestrians are prohibited by law from using the roadway. In this instance, a greater effort may be

necessary to accommodate bicyclists and pedestrians elsewhere within the right of way or within the same transportation corridor.

B. The cost of establishing bikeways or walkways would be excessively disproportionate to the need or probable use. Excessively disproportionate is defined as exceeding twenty percent of the cost of the larger transportation project.

2. Bicycle and pedestrian facilities shall be provided on any new or reconstructed streets in accordance with VDOT regulations.

3. Bicycle racks shall be located in convenient, visible, well-lit areas, with easy access, near main entrances. The racks should not interfere with pedestrian traffic and should be protected from potential damage by motor vehicles. They may be located within the public right-of- way with City of Lynchburg and VDOT approval. The following requirements shall also apply:

   A. All vehicle parking facilities containing less than ten parking spaces shall provide one bicycle rack with no less than four (4) spaces (two high-quality inverted "U" racks).

   B. For vehicle parking facilities containing more than ten parking spaces the applicant shall provide one bicycle rack with no less than four spaces plus two bicycle parking spaces for each additional ten parking spaces in the lot. No more than twenty (20) bicycle parking spaces shall be required in any one (1) parking facility.

   C. One (1) vehicle parking space may be eliminated for each four (4) spaces of bicycle parking provided.

4. Bicycle and pedestrian facilities shall be designed with security considerations including street lighting, bushes no greater than two (2) feet in height, and tree branches no lower than six (6) feet in height. To provide clear visibility of pedestrians approaching intersection crosswalks at night, the approaches to and all street corners should be well-illuminated. All intersection lighting should illuminate the crossing and waiting areas and/or create backlighting to make the pedestrian silhouette clearly visible on the approach.

5. Pedestrian facilities shall include shade trees where possible.

6. A sidewalk shall be provided between all new building entrances and all streets adjacent to the development site. The sidewalk shall provide a direct connection to existing public right- of-way and public sidewalks or transit stops.

7. A sidewalk shall be provided between any new building entrance and all other new or existing building entrances on the same development site. Entrances used for loading and unloading freight are not subject to this standard. Internal pedestrian paths provided in conformance with this subsection shall provide weather protection features such as awnings or arcades within thirty (30) feet of all customer entrances.

8. A sidewalk shall be provided immediately adjacent to the exterior wall of a new building greater than 100 feet in length when the wall is located next to a street or parking lot. A pedestrian path shall also be provided along the entire length of the wall when the public entrance is located in that area. Exceptions to this standard include:

   A. If the edge of the building is within twenty (20) feet of a public sidewalk and the building entrance is connected to the public sidewalk by an on-site pedestrian facility.

   B. If the edge of the building is bordered by a perimeter of landscaping that does not exceed thirty (30) feet in width and an on-site pedestrian facility is constructed at the edge of the landscaped area.

9. Where needed for purposes of traffic safety or access to nearby schools, playgrounds, public parks, trails, shopping facilities, or other community facilities, new developments may be required to dedicate a public right of way for bicycles and pedestrians, not less than twenty (20) feet in width.

10. Pedestrian access points at property edges and to adjacent lots shall be coordinated with existing development to provide pedestrian circulation between developments.

11. All on-site pedestrian walkways located in vehicle use areas shall be distinguished from driving surfaces through the use of durable, low maintenance smooth surface materials to enhance pedestrian safety and comfort, as well as the attractiveness of the walkways.

APPENDIX C - Comprehensive Plan Model Text

Access Management

The City currently has a commercial overlay district applied to a portion of Timberlake Road. The overlay regulations include access management techniques that have worked to keep Timberlake Road a safe and well developed corridor. In an effort to preserve the safety, capacity and flow of the larger road network, the commercial corridor overlay or access management regulations should be adopted and applied to major corridors such as Old Forest Road, Campbell Avenue, and Lakeside Drive. The opportunities for access management techniques on Campbell Avenue that are identified in "Campbell Avenue Access Management Study" identify new projects and direct new development and redevelopment efforts in making Campbell Avenue viable for future mobility, access, and safety of the citizens. The regulations in that document are included as part of the transportation master plan for the City of Lynchburg.

APPENDIX D - Community Meeting Summary

This appendix provides a summary of the three community meetings that were held for this project. Included in the summary are the advertisements that were used to notify the interested parties.

It should be noted that the attendees represented a diverse cross section of the community.

Advertisement for Meeting #1

VDOT Virginia Department of Transportation

Odd Fellows Road
at Route 460/29
City of Lynchburg
Road Improvement Project
Citizen Information Meeting

Tuesday, November 15, 4 – 6 p.m.
Information Technology Building
City of Lynchburg
3550 Young Place, Lynchburg, VA 24501

Find out about preliminary plans to extend Odd Fellows Road with a new interchange at Route 460/29.

Give your written or oral comments at the meeting or submit them by November 25, 2011, to Mrs. Raina Rosado, P.E., Project Manager, Virginia Department of Transportation, 4219 Campbell Ave., Lynchburg, VA 24501. You may also email your comments to Lynchburginfo@vdot.virginia.gov. Please reference "Odd Fellows Road Interchange Comment" in the subject line.

In compliance with the National Historic Preservation Act, Section 106 and 36 CFR Part 800, information concerning the potential effects of the proposed project on properties listed in or eligible for listing in the National Register of Historic Places will be provided in the environmental documentation.

VDOT ensures nondiscrimination and equal employment in all programs and activities in accordance with Title VI and Title VII of the Civil Rights Act of 1964. If you have questions and concerns about your civil rights in regards to the project or special assistance for persons with disabilities or limited English proficiency, contact the project manager listed above at 434-947-6559 or 800-367-7623.

State Project: 0460-118-217, P101, R201, C501
Federal Project: STP-5118(209)

Campbell Avenue & Odd Fellows Road Study **12/7/11 Final**
Stakeholders' Charrette / Group Input Summaries **Sympoetica**

Charrette Date/Location:

Date: Tuesday, November 15, 2011, from 6:15 PM to 8:15 PM
Location: Information Technology Building, City of Lynchburg, 3550 Young Place, Lynchburg

The advertising method for this meeting was via newspaper advertisement. The meeting had approximately 25 attendees present consisting of representatives of the businesses within the industrial park areas and also citizens from in and around the study area. Overall those present were representative of the diverse and varied interests and citizenry in and around the study area.

Group 1: Tom Martin & Raina Rosada, Facilitators:

Top Comments As Polled:
1. Odd Fellows Road interchange will open economic development; however, an introduction of a service road is essential (Campbell to Candlers Mountain Road – north side).
2. Extend Mayflower Drive through to John Capron Road and add connection near Quarles along Mayflower to protect residences.
3. Provide bike lanes along Campbell Avenue.
4. Improve access for land development along both sides of US 460.
5. Create a gateway atmosphere along Campbell Avenue and improve pedestrian access to allow connectivity (eg school crossings).
6. Provide a timeline, right-of-way needs, and impact to business for the Odd Fellows Road interchange

All Other Comments:
- What is the anticipated future traffic on Odd Fellows Road?
- Odd Fellows Road interchange will alleviate congestion on Mayflower and Candlers.
- Avalon and Mayflower intersection --- sight distance and access issues.
- Reduce speed on Campbell.
- Widen Mayflower to interchange and eliminate horizontal curve at railroad crossing.
- Improve Old Campbell / New Campbell Avenue intersection.

Also noted:
- Access road to US 460 at Odd Fellows.
- Signal timing at Candlers Mountain Road/Mayflower and Candlers Mountain/Mall

Group 2: Bill Wuensch & Bob White, Facilitators:

Top Comments As Polled:
1. On-ramps at Odd Fellows Road/Expressway interchange need access lanes.
2. Improve Odd Fellows Road as needed for new traffic and business access.
3. New interchange is opportunity to stimulate growth in business park.
4. Sidewalks are needed along Odd Fellows Road, due to student foot traffic.
5. Opportunity for new civic center with interchange access.

All Other Comments:
- Campbell Avenue is not safe for emergency vehicles, including the Family Dollar store area.

- Use of service road concept for business in FLUM area.
- Opportunity to open up Liberty University lands.
- Keep safe bus access on Campbell Avenue.
- Can Odd Fellows Road be elevated for through traffic so as not to interfere with local traffic?
- Premature to do planning work for Campbell Avenue: Suggestion that money is being wasted looking at Campbell Avenue at this time. Nothing is happening over there. Ten years down the road the effort may be needed, but not now.
- Put bike lanes on Campbell Avenue.
- Exasperates (sic) issue about Murray Place not connected.

Group 3: Brian Gleason & Kent White, Facilitators:

Top Comments As Polled:

1. Odd Fellows Road should feature 4-lanes with center turn lane.
2. Move interchange further west on US 460 (Extending John Capron Road --- simpler access point, closer to industry.)
3. Need stoplights at Albert Lankford and Bradley.
4. Need sidewalks ("Complete Streets"), but no bicycles on Odd Fellows to Expressway and Mayflower to Candlers Mountain Road.
5. Thorough corridor impact study --- cut-through traffic & environmental issues.

All Other Comments:

- Odd Fellows Road connection to Expressway should be redesigned to accommodate increased tractor-trailer traffic; existing ramps are difficult to navigate.
- US 460 East/West connection improvements to existing corridor; design of interchange.
- Cut-thorough traffic --- potential increase through Bradley Drive.
- Environmental issues/embankment at proposed interchange.
- Change (land) uses near US 460 --- land use/zoning for restaurants.
- Drainage to one creek --- increased runoff; stormwater.
- Traffic pattern through former commercial area --- now mostly residential area, concerning Mayflower drive north of Odd Fellows as Mayflower connects to Campbell Ave through a residential area.
- Grave sites at proposed Odd Fellows Road interchange location.

Group 4: Jo Ann Martin & Kevin Henry, Facilitators:

Top Comments As Polled:

1. Lessens congestion on Mayflower Drive and Candlers Mountain Road.
2. New business development opportunities.
3. Concern over access to existing businesses.
4. Create a more "community-feel" along Campbell. Slow traffic. Stabilize businesses.
5. More options for travel.

All Other Comments:

- Access for trucks. (Odd Fellows?)
- Liberty University's growth should be an integral part of planning for the new interchange.
- The new interchange will allow a variety of opportunities.
- Can the Expressway/Odd Fellows Road interchange handle truck traffic?
- Traffic concerns on Odd Fellows Road.
- What can be done to aid heavy truck traffic expected on Odd Fellows Road?
- Increase property value and tax revenue.
- Pedestrian improvements along Campbell.
- Aesthetics of Odd Fellows Road.
- Opportunity for a frontage road along new Odd Fellows interchange.

- Less accidents at Mayflower/Candlers Mountain.
- Speed limit concerns along Odd Fellows.
- Concern about widening of Odd Fellows and how it affects neighboring uses (i.e., church)

Campbell Avenue Access Management Study

COMMUNITY MEETING

CENTRAL VIRGINIA METROPOLITAN PLANNING ORGANIZATION

The City of Lynchburg invites you to attend a public community meeting to learn about the *CAMPBELL AVENUE ACCESS MANAGEMENT STUDY*.
Your feedback will be used to shape recommendations for the future of Campbell Avenue.

Agenda

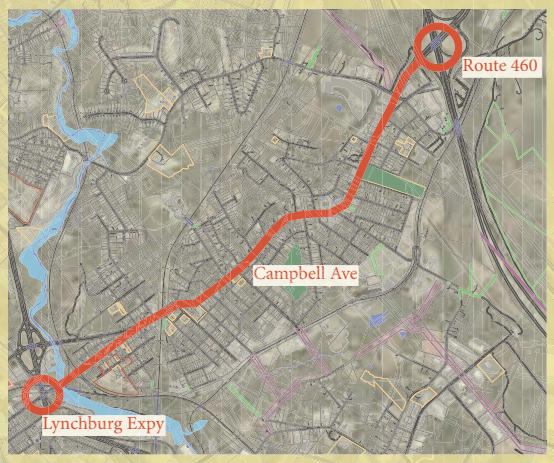
1. **Open House** *7:00-7:10pm*
2. **Presentation** *7:10-7:20pm*
   - **Purpose of the Project**
   - **Benefits of Access Management**
   - **Multi-Modal Transportation**
   - **Corridor Safety**
   - **Workshop Exercise**
3. **Workshop** *7:20-7:50pm*
   - **Issues and Concerns**
   - **Opportunities for Improvements**
4. **Report Back** *7:50-8:00pm*
5. **Next Steps** *8:00-8:05pm*

Meeting Details

Date: 01/30/2012

Time: 7:00-8:15pm

Fairview Heights Recreation Center
3621 Campbell Avenue
Lynchburg, VA 24501



Contact Us

Tom Martin
Planning Division, City of Lynchburg
900 Church Street, Lynchburg, VA 24504
Telephone: (434) 455-3900

EPR Engineering & Planning Resources, P.C.

ENGINEERING & PLANNING RESOURCES, P.C.
637 BERKMAR CIRCLE, CHARLOTTESVILLE, VA 22901

Campbell Avenue Public Meeting Notes & Summary

The January project public meeting was held directly in the Campbell Avenue study corridor at the Fairview Heights Recreation Center on January 30th, 2012 from 7PM and 8:30PM. The City sent out approximately 1000 invitations to business and property owners and residents within the study area that included Campbell Avenue and the Odd Fellows Road sections of the City. The invitations reached a comprehensive representative group of residents and businesses in the corridor study area. Approximately fifty attendees came out for the meeting. The attendees included a diverse mix of residents and representatives from businesses along the corridor. Also, representatives from the City and Region2000 were present.

Meeting Details

Date: 01/30/2012

Time: 7:00-8:30pm

Location: Fairview Heights Recreational Center

3621 Campbell Avenue

Lynchburg, VA 24501

Agenda

1. Open House
2. Presentation
    - Purpose of the Project
    - Benefits of Access Management
    - Multi-Modal Transportation
    - Corridor Safety
    - Workshop Exercise
3. Workshop
    - Issues and Concerns
    - Opportunities for Improvements
4. Report Back

5. Next Steps

Discussion Topics

- Campbell Avenue commercial access issues?
- Safe driving, walking, and biking conditions?
- Access to transit?
- New connections through neighborhoods?
- Truck traffic issues?
- Top 3 intersections of concern?
- Ideas for future "vision" for the corridor?
- Other concerns or ideas?

Meeting Notes:

Table 1

Facilitator: Bill Wuensch

Discussion Notes:

- Sight distance issue at Pocahontas St – very hard to access (Refer to history of crashes)
- Campbell Avenue crossover difficult
- Left turn from side streets very hard
- Dangerous for kids to walk and cross the street
- Crosswalk at Florida Avenue to CVS made it worse for pedestrians
- Crossing and bus stops at Recreation Center are very busy (about 15 drop off)
- A lot of truck traffic
- Improve safety throughout
- Three worst intersections:
    - Florida Avenue
    - Campbell Avenue/ Old Campbell

  - Campbell Avenue/ Seabury Avenue

- Sight distance issues at Pocahontas St
- Crossing road to catch bus is hard
- Sheltered stops would be good
- Cannot make lefts out onto Campbell
- Instances of road rage
- Speeding is a problem
- Locate pedestrian crossings and bus stops at signals
- Overhead walkways
- Create a parallel pedestrian corridor
- More crosswalks
- Better to create a bike path to downtown
- Business:
  - Need restaurants
  - Incentives for businesses
  - Commercial Development
- Need beautification
- Hard to get out of Hanover St
- The stoplights at Seabury Ave and Fairview Ave are too close to each other.
- Streetscape for sense of place
- Main entrance to Lynchburg
- Kids walk at back side of Campbell in the neighborhoods to get to Younger Park

Table 2

Facilitator: Charles Smith

- Reduce Speed Limit

- Sidewalks are too narrow and too close to road
- Near Liberty Gas, landscaping overlaps sidewalks – visibility issues
- Transit
    - Bus pull offs – stop the traffic
    - Large bus with less than 5 people on it
- Improve aesthetics in general
- Florida Ave: If it were improved (too narrow, grades, curves), would be good
- Need future plans for VUL
- Younger Park labeled in a wrong place
- Campbell Avenue itself is just okay
- Three worst intersections:
    - Florida Avenue
    - Campbell Avenue/ Old Campbell
    - Campbell Avenue/ Seabury Avenue

Table 3

Facilitator: Tom Martin

- Campbell Visibility Issues (Color-coded in Yellow)
    - Mayflower Dr/ Campbell Avenue
    - Campbell Avenue/ Old Campbell
    - Campbell Avenue/ Seabury Avenue
- Safe driving, walking, biking (Color-coded in Pink)
    - Need consistent sidewalks
    - Reduce cut-through traffic
    - Vision of Campbell: possible bringing up midtown design
    - Reduce driveways (curves)

  - Separation between sidewalks and road (Campbell)
  - Speed Problem
  - Bus-stops: enough
  - Truck traffic is a problem
  - Walkability is a problem
  - 460-Campbell (gathering) beautification (both ends)
- Different Street Lights
- Landscaping
- Campbell Avenue and Florida Avenue – Possible Roundabout
- Underground Utilities

Table 4

Facilitator: Bob White

- School Lane – Sight Access
- Martin St and Campbell Avenue (CVS)
- Access to Car Wash by Old Campbell Avenue – Need lights
- Maryland Avenue at Campbell by Valley Fasteners
- Bus access is fine
- No concern with trucks
- Concern with lack of business in this area: Good Restaurant
- Paving surface of roads
- Speeding is an issue
- Improve property maintenance

Table 5

Facilitator: Barry Carpenter

- Safety

  - Better street lightings & centerline reflectors
  - Too many commercial driveways on Campbell Avenue
  - Pedestrian Crossing (Safety at Florida Avenue/Campbell Avenue)
  - Speed Issue (need enforcement)
  - No good pedestrian crossing features along Campbell
  - Too many distance signs

- Walking/Biking
  - Lack continuous sidewalks on Florida
- Top 3 Intersections of concern:
  - Campbell Avenue at Florida
  - Old Campbell/ Kemper Street
  - Campbell Avenue and Mayflower Dr
- Vision
  - Possible center turn lane/ landscaped median
  - Beautification
  - New park – highly visible on Campbell
- Other (summarized from maps)
  - Sight distance issue at the intersection of Mayflower Dr and Campbell Avenue
  - Crossing Safety Concern at Florida Avenue and Campbell Avenue
  - Old Campbell Avenue/Kemper Street intersection is dangerous
  - Keep Pedestrian Crossing on Fairview Avenue and Seabury Avenue

<u>Meeting Summary</u>

Repeatedly mentioned issues and opportunities are marked in bold.

- Access Issues:
  - **Too many commercial driveways on Campbell Avenue**

- Left turn from side streets is very hard
- Hard to make lefts out onto Campbell
- Hard to get out of Hanover Street

- Safety:
  - **Sight Distance Issues:**
    1. **Pocahontas Street – very hard to access (Refer to history of crashes)**
    2. Mayflower Drive
    3. School Lane
  - **Crossing Safety Concerns:**
    1. Florida Avenue
    2. Old Campbell Avenue/Kemper Street
  - **Speeding is a problem (Reduce Speed Limit / Need Enforcement)**
  - No good pedestrian crossing features along Campbell
  - Improve safety throughout
  - Better street lightings & centerline reflectors
  - Too many distance signs
- Bike/Walking:
  - **Crosswalk Issues:**
    1. **Difficult to cross Campbell Avenue**
    2. **Crosswalk at Florida Avenue to CVS made it worse for pedestrians**
    3. Crossing at Recreation Center is heavily used
    4. Locate pedestrian crossings and bus stops at signals
    5. Keep Pedestrian Crossing on Fairview Avenue and Seabury Avenue
    6. More crosswalks
  - **Sidewalks:**

1. **Sidewalks are too narrow and too close to road (need separation)**
2. Need consistent sidewalks, and lack continuous sidewalks on Florida
3. Near Liberty Gas Station, landscaping overlaps sidewalks – visibility issues

- Reduce cut-through traffic
- Better to create a bike path to downtown

- Transit Access:
  - **Bus access is fine**
  - Locate pedestrian crossings and bus stops at signals
  - Crossing and bus stops at Recreation Center are very busy (about 15 drop off)
  - Crossing road to catch bus is hard
  - Sheltered stops would be good
  - Bus pull offs – stop the traffic
  - Large bus with less than 5 people on it
- Possible New Connections through Neighborhoods:
  - Create a parallel pedestrian corridor
  - Kids walk at back side of Campbell in the neighborhoods to get to Younger Park
- Top 3 intersections of concern:
  - **Three worst intersections:**
    1. **Florida Avenue**
    2. **Campbell Avenue/ Old Campbell**
    3. **Campbell Avenue/ Seabury Avenue**
  - Top 3 intersections of concern:
    1. Mayflower Dr/ Campbell Avenue
    2. Campbell Avenue/ Old Campbell
    3. Campbell Avenue/ Seabury Avenue

- Top 3 intersections of concern:
    1. School Lane/ Campbell Avenue
    2. Florida Avenue/ Campbell Avenue
    3. Campbell Avenue/ Old Campbell
    4. Maryland Avenue/Campbell Avenue
- Top 3 Intersections of concern:
    1. Campbell Avenue at Florida
    2. Old Campbell/ Kemper Street
    3. Campbell Avenue and Mayflower Drive

- Truck Traffic Issues:
    - **Truck traffic is a problem**
    - No concern with trucks
- Future Vision:
    - **Business:**
        1. **Need restaurants**
        2. **Incentives for businesses**
        3. **Commercial Development**
    - **Need beautification (e.g. different street lights, landscaping)**
    - **Streetscape for sense of place and main entrance to Lynchburg**
    - Possible bringing up midtown design
    - Campbell Avenue and Florida Avenue – Possible Roundabout
    - Underground Utilities
    - Possible center turn lane/ landscaped median
    - New park – highly visible on Campbell
- Other Concerns:

- The stoplights at Seabury Ave and Fairview Ave are too close to each other
- Florida Ave: If it were improved (too narrow, grades, curves), would be good
- Need future plans for VUL
- Younger Park labeled in a wrong place
- Paving surface of roads
- Improve property maintenance

Interpretations

In general, stakeholders consider that there are excessive commercial driveways along Campbell Avenue. Safety and Walking & Biking Capacity are two major concerns. The top three intersections of concern are: 1) Old Campbell Avenue/ Campbell Avenue/Kemper Street; 2) Campbell Avenue at Florida Avenue; 3) Campbell Avenue at Seabury Avenue, followed with Campbell Avenue at Mayflower Drive. The majority of stakeholders also concern about truck traffic. Meeting attendees favor the idea of creating a parallel pedestrian corridor, and are satisfied with the current bus service. They see Campbell Avenue as an Entrance Corridor to the city of Lynchburg in the future. And, they embrace more streetscape designs and community businesses to create a sense of place for Campbell Avenue.

- Access Management Issues:

  There are excessive commercial driveways along Campbell Avenue. And it is difficult to make left-turns along Campbell Avenue or on the side streets. For example, it is hard to get out of Hanover Street because of the heavy traffic along the corridor.

- Safety Issues:

  Poor sight distance, lack of pedestrian-crossing, and speeding are the major contributors to the safety issues along Campbell Avenue. There are sight distance concerns on Pocahontas Street, Mayflower Drive, and School Lane. Pedestrian crossing safety improvement is needed at the intersection of Florida Avenue and Campbell Avenue, and the intersection of Old Campbell Avenue/Kemper Street and Campbell Avenue.

- Multi-Modal Transportation Planning Issues:

  Crosswalk difficulties and poor sidewalks are the top two issues for Multi-Modal Transportation Planning along Campbell Avenue.

  - Pedestrians:

    Overall, it is hard to cross Campbell Avenue, but people frequently do so. Especially, people often cross Campbell Avenue at Florida Avenue to CVS where neither locates pedestrian

signals nor consistent sidewalks. Other frequently-used crossings are School Lane, Fairview Avenue and Seabury Avenue. In addition, it is recommended to coordinate the locations of pedestrian crossings with bus stops and signals. Also, there is in need of a separation between sidewalks and road and better maintenance along the sidewalks. Lastly, people are in favor of creating a parallel pedestrian corridor.

- Bike Lanes:

  It is favored to create a bike path to downtown.

- Transit:

  In general, stakeholders are satisfied with the current bus services along Campbell Avenue. But again, there are concerns on crosswalk safety and bus pull offs. And people would like to see sheltered bus-stops in the future.

- Vision:

  - Stakeholders see Campbell Avenue as an Entrance Corridor to the city of Lynchburg in the future. And, they embrace more streetscape designs and community businesses to create a sense of place for Campbell Avenue. There are also some discussions on putting a roundabout at the intersection of Campbell Avenue and Florida Avenue. And it is suggested to create a new park which is highly visible from Campbell Avenue.

Campbell Avenue Access Management Study

COMMUNITY MEETING

CENTRAL VIRGINIA METROPOLITIAN PLANNING ORGANIZATION

The City of Lynchburg invites you to attend a public community meeting to learn about the *CAMPBELL AVENUE ACCESS MANAGEMENT STUDY*.
Your feedback will be used to shape recommendations for the future of Campbell Avenue.

Agenda

1. Open House
2. Presentation
   - Purpose of the Project
   - (Review) Summary of Crash History
   - Multi-Modal Transportation
   - Draft Recommendations
   - Workshop Exercise
3. Workshop
   - Review Crash Summary &Access Recommendation
   - Opportunities for Improvements
4. Report Back
5. Next Steps

Meeting Details

Date: 05/7/2012
Time: 7:00-8:30pm
Fairview Heights Recreational Center
3621Campbell Avenue
Lynchburg, VA 24501

Contact Us

Tom Martin
Planning Division, City of Lynchburg
900 Church Street, Lynchburg, VA 24504
Telephone: (434) 455-3900

EPR Engineering & Planning Resources, P.C.

May 14, 2012

CAMPBELL AVENUE ACCESS MANAGEMENT STUDY

SUMMARY OF FINAL PUBLIC MEETING, MAY 7TH, 2012

The final project public meeting was held at the Fairview Heights Recreation Center on May 7th, 2012 from 7PM and 8:30PM. The City sent out approximately 475 invitations to a representative group of residents and businesses in the corridor study area and the MPO supplemented the City's outreach by contacting the local bicycle advocacy groups . Approximately twenty five attendees came out for the meeting. The attendees included a diverse mix of residents and representatives from businesses along the corridor. Also, representatives from the City, VDOT, and Region2000 were present.

The meeting format included an initial presentation from EPR and Sympoetica, followed by a 45 minute table-top workshop session with the attendees. The meeting agenda was as shown below:

Public Workshop #2 / May 7th, 2012

Campbell Avenue Corridor

Access Management and Planning Study / Lynchburg, Virginia

Agenda

7:00 to 7:35

- Quick review of study purpose and goals
- Overview of the 1st meeting
- Overview of Overall Masterplanning
  - Study overview
  - Longer term concept for Campbell Avenue
- Crash history overview
- Multimodal features overview
- Opportunities overview
- Instructions for workshop exercise

7:35 to 8:20 **Small Group Sessions**
-Examine crash history/patterns
- Comment on Opportunities Map
- Medians and Connections

8:20 to 8:30 **Share Key Commentary**

May 14, 2012

The overall goal of the meeting was to share with the attendees an update about the progress of the planning study project, present the currently identified improvement opportunities, and then receive feedback about the identified opportunities. The overall feedback on the opportunities and concepts for potential longer term changes in the corridor was favorable. There was some concern at first about the roundabout and road diet concept, however after further discussion and the questions/answer period there appeared to be acceptance of these concepts.

For the facilitated workshop exercise there were three groups of citizens. The feedback from each of the groups (tables) is summarized as follows:

Group 1

- The curved section of Campbell Avenue by Mayflower seems to feel dangerous when entering from sidestreets or entrances.
- Consideration should be given to providing additional connections between parcels so that the left turns onto Campbell Avenue can be made more safely. In particular, consider a connection between the church and the Dollar General store.
- For the roundabout concepts, these should be designed with pedestrian safety and access in mind. For the final report, show the pedestrian crossing locations and features.
- Accident reports – there was a bus crash four years ago north of Mosby. This was a City bus that ran out of the road.
- There was a desire to make this road more like Peakland Place in Lynchburg (adjacent image).
- Left turns are very dangerous without the help of signals.
- Need a safe pedestrian crossing at Mosby.
- Wider medians and better access for crossing the street will generate more connections with Campbell Avenue neighbors.

- Having a bike lane would be wonderful.
- Consider speed reductions if feasible.
- Medians and Connections – It was acknowledged that roundabouts slow traffic. However, there is a concern about pedestrian safety at roundabouts.
- Tree's slow traffic.
- Encourage cars to go to a signal to make a left turn.
- Question about how this project, with the potential longer term opportunities (roundabouts and road diet) would affect property values.
- With a roundabout at Florida Avenue, the recent Ambulance crash and fatality may have been prevented.

May 14, 2012

Group 2

- Consideration should be given to reconfiguring the bus stop locations. Consider pull-off areas for the buses.
- At Old Campbell Avenue – reposition the bus stops to be away from Edmunds Street a little further to the south. Could combine with the stop across from Otey.
- Potential bus stop pulloffs could be just south of Mosby, along the frontage of Dollar General, at the Fairview Heights Recreation Center.
- At the Fairview Heights Recreation center, consider implementing a mid-block pedestrian crossing.
- A bus stop was missed on the graphics – there is one adjacent to the southbound lanes near Woodrow Street.
- Pedestrian access at Martin Street (in front of new CVS) onto southbound Campbell Avenue is very difficult given the placement of the guardrail.
- Under existing conditions, bicycling can be difficult due to the elevations of the utility tops relative to the pavement.
- Along the frontage road adjacent to Hardees, consider closing the third entrance from the signal.
- For the empty lot adjacent to the Subway shop just north of Mayflower, there is bad vertical geometry at one of the existing curb cut entrances.

Group 3

- Mayflower at Campbell was thought to be a dangerous intersection for pedestrians due to the turning vehicles and sight lines.
- Interparcel connections would be a good idea at Mayflower.
- The group would entertain the use of roundabouts at both old Campbell Ave. and also Florida Ave.
- The group like the idea of safer pedestrian crossing and especially at Mayflower where there is lots of transit rider activity. Also at Seabury for the elementary school students and parents. They liked the idea of the high emphasis crosswalks and enhanced pedestrian crossing features.
- For gateway improvements, the focus should be at Florida Avenue.
- Safety improvements are needed at the Mayflower intersection. There was an ongoing concern about the adjacent curves.

After the group exercise was complete, a representative from each table "reported" to the other groups key findings and suggestions.

Prior to closing out the meeting, a brief summary of "next steps" was provided to the attendees, including mention of the pending 2nd meeting of the larger Odd Fellows Road / Campbell Avenue corridor master planning project.

END of MEMORANDUM

APPENDIX E - Lane Reduction Memorandom

Analysis Methodology

Finding and Conclusion

ENGINEERING & PLANNING RESOURCES, P.C.
637 BERKMAR CIRCLE, CHARLOTTESVILLE, VA 22901

Memorandum

To: Tom Martin,

From: Bill Wuensch

CC: Barry Carpenter, Bob White

Date: 4/12/2012

Re: Campbell Avenue Cursory Lane Reduction Analysis

EPR is conducting a study for Campbell Avenue that is focused primarily on corridor safety and access management. This effort is being conducted in coordination with a larger sub-area master planning effort for the Campbell Avenue and Odd Fellows Road corridor areas. Through the study process, the idea of investigating the feasibility of a "road diet" concept for Campbell Avenue has emerged. This concept would involve reducing the existing four lane typical section to two through lanes and turn lanes at key intersections and locations along the corridor. The concept could also provide space for bike lanes, medians, and curb extensions at certain locations. The "road diet" concept is instrumental for creating a complete street environment while also providing turn lanes along the corridor, which in itself is an access management measure.

The purpose of this memorandum is to document the high-level feasibility analysis conducted by EPR for evaluating this concept.

Analysis methodology

The evaluation process is centered around analysis at three key intersections along the corridor. It is assumed that if the key intersections, including Kemper/Old Campbell/Campbell, Mayflower/Campbell, and Florida/Campbell can function satisfactorily with one through lane in each direction and associated turn lanes, then the larger corridor can function with a reduction in the through lanes. The analysis does not go into any level of detail about other intersections, or where median breaks would be located along the corridor. As such, this analysis should be considered a high level fatal flaw analysis. Prior to implementation of a lane reduction plan, additional analyses should be conducted and concept developed and vetted with the public and stakeholders.

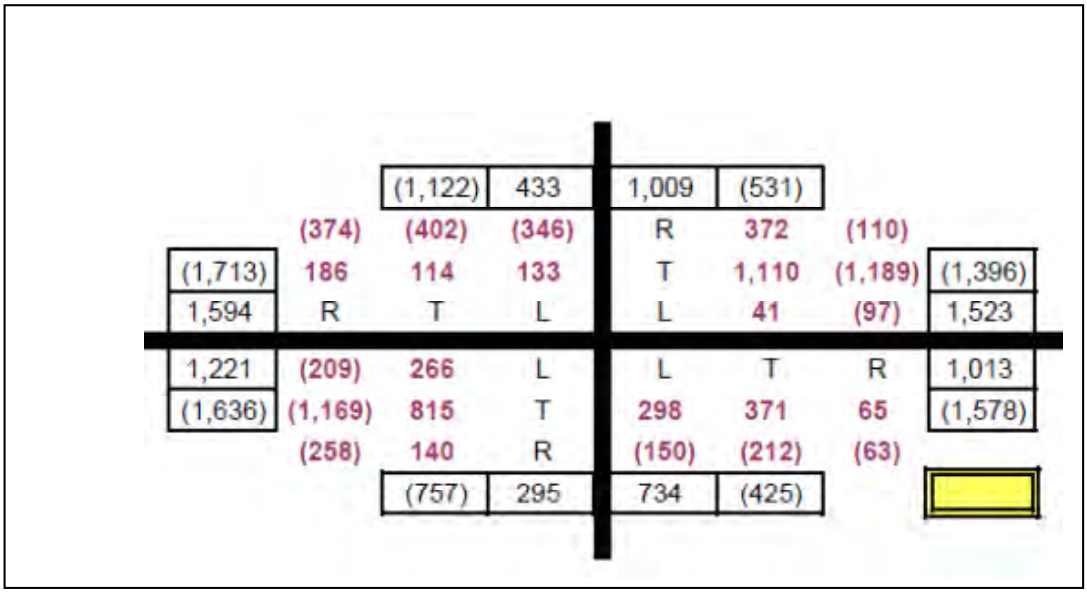
EPR collected AM and PM peak hour turning movement counts at the three key intersections as previously described. An analysis was conducted to evaluate intersection operations under existing conditions, with existing laneage. The existing conditions were then compared to a scenario using current volumes that were grown to a horizon year

(2035) with a reduction in through lanes. Iterations of the analysis were conducted to identify the most advantageous configuration of turn lanes and overall operations. The results for the existing conditions, and then future volumes with reduced laneage are summarized in Table 1 (attached to this memo).

A future horizon year analysis considered projections of traffic into year 2035. For this analysis it is assumed that the Odd Fellows Road interchange would be constructed. To develop the year 2035 traffic projections, consideration was given to the traffic forecast memoranda as developed by RKK for the Odd Fellows Road interchange project. In the memoranda, RKK examined existing conditions, and build versus no-build traffic volumes at the Route 460 ramps onto Campbell Avenue. Per their projections, the construction of the new interchange to the west is expected to remove approximately 20% of the future morning traffic volumes from Campbell Avenue and 15% of the evening future traffic volumes.

To develop a factor for growth between today's volumes and the 2035 volumes along Campbell Avenue, a comparison was made between the existing peak hour volumes just north of the Route 460 interchange and the projected [interchange] build condition year 2035 peak hour volumes. The following figures show the data sets used for comparison.

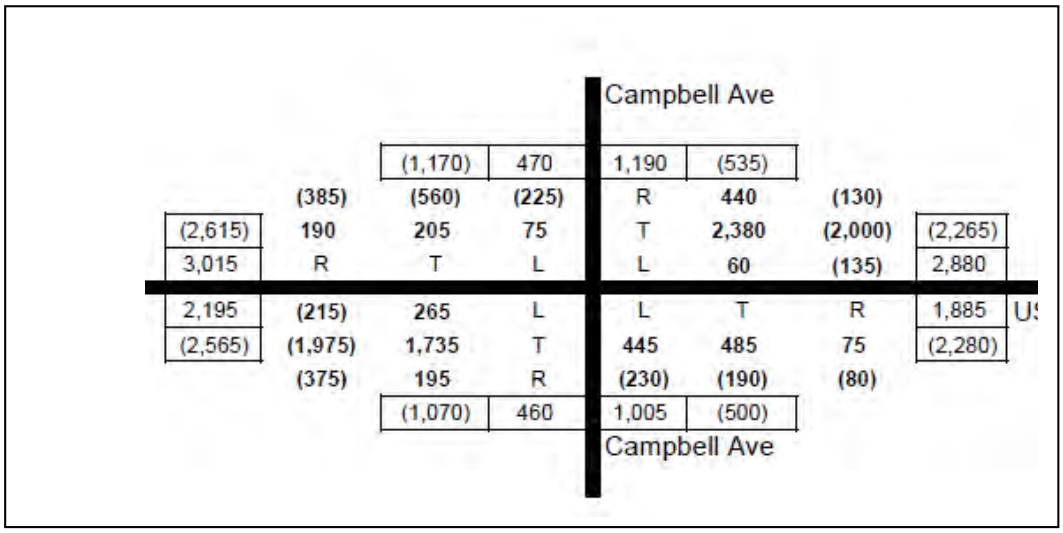
Existing Volumes (Campbell Avenue is the vertical line and Rt 460 is the horizontal line)



Key - AM(PM)

Traffic volumes north of Route 460 are the sum of the southbound traffic, plus the northbound through volume, plus the westbound right turn volume, plus the eastbound left turn volumes. Performing this calculation we see that currently there are 1623 vehicles in the AM and 1653 vehicles per hour (vph) in the PM peak periods north of Route 460

Future [w/Odd Fellow Road interchange] year 2035 Volumes



Under this scenario we see that there are 1660 vph and 1705 vph north of Route 460 along Campbell Avenue in year 2035.

By comparison:

AM 2012 - 1623 vph grows to 1660 vph in year 2035, thus a total growth of about 2% growth
PM 2012 - 1653 vph grows to 1705 vph in year 2035, thus a total growth of about 3% growth.

The growth factors were applied to the existing volumes and various intersection configurations were analyzed under the lane reduction scenario. Through the iterations, it was found that the Kemper/Old Campbell/Campbell intersection will experience excessive delay for the eastbound approach. However, if the intersection is configured such that the eastbound right turn is free flow into a dedicated receiving lane and if signalization is added, all movements function without excessive delay.

Table 1, attached to this document, provides a summary of the various performance measures for the existing and future conditions. Hand sketches of intersection modifications are also provided at the end of the document (before the appendices) showing the assumed geometry for the intersections. Assumptions shown in the sketches include:

Campbell/Kemper – the eastbound right turn lane volume is nearly as high as the southbound volume in the peak hours. Therefore it is assumed that the right turn form "old" Campbell would be free flowing into a dedicated receiving lane. This lane would merge into the through lane downstream. A traffic signal will be required to minimize queuing, and would be useful for allowing pedestrians a signalized crossing. Furthermore, the northbound Campbell Avenue approach would be free flowing towards the expressway and would not be controlled by the traffic signal.

Mayflower/Campbell – southbound left and right turn lanes would be provided.

Florida/Campbell – in the southbound direction the existing two lanes would remain. However, in the northbound direction one of the through lanes would be eliminated south of the signalized intersection. The existing outside through lane just north of the signal could become a right turn lane into the adjacent commercial uses.

Findings and Conclusions

Based on this cursory review, it appears that a lane reduction on Campbell Avenue may be feasible. The major intersections will experience added congestion though no excessive queuing or failing levels of service on the mainline would be anticipated. The lane reduction scenario would allow for construction of turn lanes, medians, and potentially bike lanes along the corridor. Careful consideration will need to be given relative to where turns from Campbell Avenue would be allowed. The adjacent grid system(s) will allow for concentration of left turn movements at certain chosen locations. However, this will also result in additional traffic loading on the sidestreets that have full access onto Campbell Avenue. If a three lane typical section (i.e. two way center left turn lane) is chosen as a preferred option, then access to the side street would be less restrictive.

Prior to moving into the design and implementation phase for a lane reduction project, a formal traffic study should be performed to examine each of the major intersections along the impacted area, identify alternative configurations, examine impacts to adjacent neighborhood circulation and business access, and vet the concepts with the public and stakeholders.

END of MEMORANDUM

Attachments: Table 1 – analysis results
Intersection sketches
Appendix – Synchro / SimTraffic Reports

TABLE 1A
LOS and Delay Summary (Synchro and SimTraffic Results)
Existing and Future Year 2035 Volumes AM and PM

		Existing AM					Existing PM					Future w/Lane Reduction AM					Future w/ Lane Reduction PM					Future w/ Lane Reduction w/signal at Old Campbell PM				
Intersection	**Movement**	Synchro Delay	LOS	Synchro Queue	SimTraffic Delay	SimTraffic Queue	Synchro Delay	LOS	Synchro Queue	SimTraffic Delay	SimTraffic Queue	Synchro Delay	LOS	Synchro Queue	SimTraffic Delay	SimTraffic Queue	Synchro Delay	LOS	Synchro Queue	SimTraffic Delay	SimTraffic Queue	Synchro Delay	LOS	Synchro Queue	SimTraffic Delay	SimTraffic Queue
		(sec/veh		(sec/veh	(s)	(ft)	(sec/veh		(sec/veh)	(s)	(f)	(sec/veh)		(sec/veh)	(s)	(ft)	(sec/veh)		(sec/veh)	(s)	(f)	(sec/veh)		(sec/veh)	(s)	(f)
Campbell/Kemper																										
Old Campbell EB	Left	129.7	F	29.0	21.90	38.0	61.9	F	424	26.8	69	15.7	B	24	23.2	38	221.4	F	908	144.7	258	27.9	C	34	31.2	62
Old Campbell EB	Right	10.8	B	26.0	6.40		4.9	A	32	9.8	57	9.4	A	44	6.1	0	221.4	F	908	11.3	70	0.9	A	0	9.9	0
Campbell NB	Left	10.2	B	58.0	6.80	116.0				7.1	113				9.6	111	10	B	35	35.7	124	7.8	A	77	24.1	124
Campbell NB	Through				2.20	102.0				1.5	15				6.2	91				1.6	364	N/A			1.5	234
Kemper SB	Through				0.90	14.0				1.3	10				3	44				7.8	176	15.9	B	276	21.8	401
Intersection					4.10					5.4					6.7							8.4	A			
Mayflower																										
Mayflower EB	Left/Through	27.0	C	23.0	19.70	61.0	16.4	B	19	20.3	38	27.1	C	21	18.1	10	56.2	E	51	66	98					
Mayflower EB	Right	25.6	C	19.0	3.00	64.0	19.6	B	62	7.1	101	26	C	19	3	52	55.4	E	57	22.4	160					
Entrance WB	LTR	23.6	C	2.0	10.70	15.0	14.4	B	3	12	30	24.1	C	4	0	60	52.2	D	32	64.6	52					
Campbell NB	Left				7.60					16.9		3	A	29	7.4	68	20.1	D	16	21.2	71					
Campbell NB	Through	4.7	A	138.0	4.30	162.0	6.6	A	96	5.6	131	6.9	A	282	4.1	222	4.9	A	246	4.3	228					
Campbell NB	Right				2.50					2.2					3.6											
Campbell SB	Left				1.80					4.5							6.5	A	2	14.5	12					
Campbell SB	Through	2.8	A	39.0	1.80	59.0	8	A	170	5	138	3.2	A	75	2.1	82	14.6	B	722	6.5	447					
Campbell SB	Right				1.20					3.7		2.3	A	5	8	10	3.9	A	8	2.7	73					
Intersection		5.1	A		3.90		8.9	A		5.9		6.5	A		1.1		16.8	B		3.8						
Florida																										
Florida EB	Left	15.8	B	33.0	18.80	79.0	15.3	B	32	18.7	60	29.1	C	51	27.9	76	16	B	33	19.7	57					
Florida EB	Through/Rig	16.7	B	23.0	10.60	70.0	14.5	B	32	12.6	63	27.3	C	35	204	67	15	B	34	14	72					
Florida WB	Left/Through	17.4	B	51.0	15.50	86.0	27.7	C	201	19.8	189	31.3	C	81	25.2	107	25.3	C	218	21.6	222					
Florida WB	Right	15.5	B	21.0	12.40	68.0	14.4	B	28	18.5	51	26.8	C	30	23.2	76	12.4	B	25	20.2	68					
Campbell NB	Left	11.1	B	16.0	12.70	97.0	13.7	B	23	13.5	67	7.5	A	13	12.8	122	22.5	C	23	16.3	103					
Campbell NB	Through	25.8	C	310.0	15.30	235.0	17.3	B	96	13.8	130	36	D	718	14.6	425	26.1	C	200	15.8	242					
Campbell NB	Right	13.1	B	36.0	2.10	64.0	15.3	B	27	2	63	9.5	A	26	1.4	52	14.8	B	27	4.8	86					
Campbell SB	Left	11.6	B	20.0	14.40	73.0	11.4	B	39	14.8	119	16.8	B	16	19.6	79	18	C	38	23.5	127					
Campbell SB	Through/Rig	13.1	B	84.0	11.00	122.0	24.9	C	232	12.9	227	9.7	A	66	7.3	109	20.3	C	178	9.8	182					
Intersection		20.4	C		6.20		21.1	C		13.1		26.5	C				21.1	C		6.6						


Campbell Ave
Edmunds St


128
© 2012 Google


Campbell Ave
Florida Ave

APPENDIX F - Spacing Standard

Minimum Spacing Standards for Commercial Entrances, Intersections, and Crossovers

Spacing Standards for Commercial Entrances/Intersectersections Near Interchange Ramps

Minimum Spacing Standards for Commercial Entrances, Intersections, and Crossovers

Highway Functional Classification	Legal Speed Limit (mph)①	Centerline to Centerline Spacing (Distance) in Feet			
		Signalized Intersections/ Crossovers②	Unsignalized Intersections/ Crossovers③	Full Access Entrances④	Partial Access One or Two Way Entrances⑤
Principal Arterial	≤ 30 mph 35 to 45 mph ≥ 50 mph	1,050 1,320 2,640	880 1,050 1,320	440 565 750	250 305 495
Minor Arterial	≤ 30 mph 35 to 45 mph ≥ 50 mph	880 1,050 1,320	660 660 1,050	355 470 555	200 250 425
Collector	≤ 30 mph 35 to 45 mph ≥ 50 mph	660 660 1,050	440 440 660	225 335 445	200 250 360
Local Street⑥	Commercial entrance spacing: See Figure 4-11.				

TABLE 2-2 MINIMUM SPACING STANDARDS FOR COMMERCIAL ENTRANCES, INTERSECTIONS AND CROSSOVERS ⑦

Notes: **A. Divided/undivided highway -** Spacing distances apply to both divided and undivided highways.

B. Relationship between spacing standards –

- Signalized intersection spacing only applies to other signals.
- The unsignalized intersection/crossover spacing is the minimum distance between such intersections and between signalized intersections.
- The partial entrance spacing separates such entrances from each other and from intersections.

C. **Roundabouts -** Roundabouts are separated from other intersections by the unsignalized intersection spacing standard; from other roundabouts by the partial access entrance spacing.

D. Right Turn Lanes - When a right turn lane will be installed at an entrance, the length of the turn lane needs to be considered when locating the entrance.

Footnotes to Table 2-2

① **Legal Speed Limit** – The speed limit set forth on signs lawfully posted on a highway or in the absence of such signs the speed limit established by Article 8 (§46.2-870 et seq.) of Chapter 8 of Title 46.2 of the Code of Virginia.

② **Signalized Intersection/Crossover Spacing** – Spacing is allocated in fractions of a mile: (1/2 mile, 2,640 ft); (1/3 mile, 1,760 ft); (1/4 mile, 1,320 ft); (1/5 mile, 1,050 ft); (1/6 mile, 880 ft), (1/8 mile, 660 ft). It is based on (i) the Signalized Intersection Spacing section and Table 2-1 and (ii) *Transportation and Land Development* by Vergil Stover and Frank Koepke, Institute of Transportation Engineers: "Traffic signal control applied in a sequential pattern according to specific spacing criteria optimize traffic efficiency" …"to reduce fuel consumption, reduce delay, reduce vehicular emissions and improve safety."

③ **Unsignalized Intersection/Crossover** – Intersections and crossovers need ample spacing to accommodate the complex situations faced by motorists from vehicular deceleration, acceleration, and numerous conflict points associated with vehicular crossing and left and right turning movements. At a four way intersection, these traffic movements' creates 32 conflict (collision) points (see Figure 2-1). Intersections and crossovers also may become signalized over time. Spacing is allocated in fractions of a mile (see footnote 2).

④ **Full Access Entrance Spacing –** Spacing can be less than unsignalized intersection and crossover spacing as there are fewer turning movements and potential conflict points (no entrance on the opposite side of the road so no crossing movements). However, studies have demonstrated that the majority of access related vehicular crashes involve left turns. The spacing is based on intersection sight distance for both four and two lane highways to assure that motorists approaching an entrance and those turning out of the entrance have sufficient time to react to highway and entrance traffic and to merge safely when making right and left turns. Again the purpose is to maintain the capacity and safety of the highway.

⑤ **Partial Access One or Two Way Entrance Spacing** – Left turn movements are limited (right in/right out with or without left in movement). The focus is on making sure motorists have sufficient time to be able to see/react to a vehicle slowing down to turn into the entrance or to a vehicle exiting the entrance, and stop in time to avoid a collision. Stopping sight distance can be used for this purpose. See Figure 4-5 for illustrations of commercial entrance channelization island options for creating a partial access entrance on highways without a restrictive non-traversable median. Also see "Restricting Left Turn Movements at Commercial Entrances" for additional information.

⑥ **Local Street Spacing** – For commercial entrances on local streets (not individual private entrance driveways to homes), a spacing distance of 50 ft between entrance radii is specified to assure a minimum separation between such entrances (illustrated in Figure 4-11).

⑦ **Corner Clearance -** Corner clearance is the minimum distance entrances on a minor side street need to be separated from an intersection to prevent queued vehicles from backing up into the highway or blocking entrances near the intersection. This separation protects the functional area of the intersection. The corner clearance distance will apply where it is greater than the Table 2-2 spacing standard. See the Corner Clearance in Section 4 for more information.

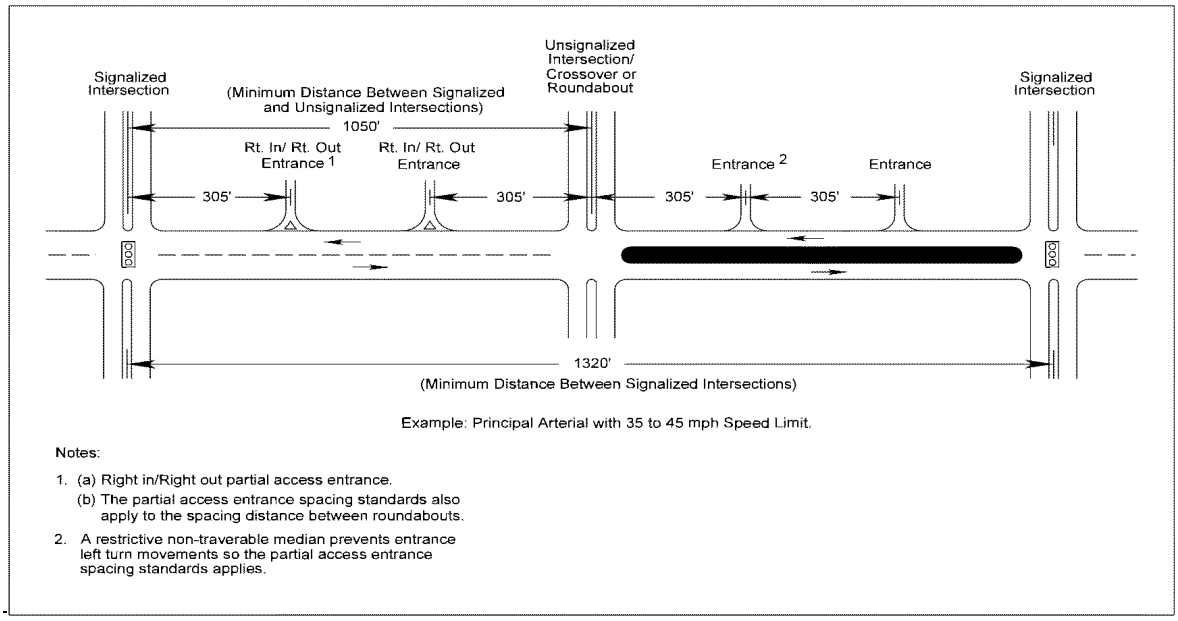


Illustration of the relationship between spacing standards

Spacing Standards for Commercial Entrances/Intersections Near Interchange Ramps

The spacing standards near interchange ramps focus on safe ramp exit and entry movements. Greater separation between ramp terminals and entrances and intersections is necessary for multilane versus two-lane highways because the motorist's maneuvers at multilane roads are more complex, such as crossing through lanes to reach a left turn lane at an intersection. Functional classification is not applied because arterials may be two lane or multilane. Note: If the off and/or on ramp has a full auxiliary lane, the spacing would be determined as if there were a ramp taper.

Spacing Dimension			
X	**Y**	**Z**	**M**
750'	*1320'*	*750'*	990'

TABLE 2-3 MINIMUM SPACING STANDARDS FOR COMMERCIAL ENTRANCES AND INTERSECTIONS NEAR INTERCHANGE AREAS ON MULTILANE CROSSROADS

Source: *Access Control Design on Highway Interchanges, 2008*.
H. Rakha, A. M. Flintsch, M. Arafeh, G. Abdel-Salam, D. Dua, and M. Abbas.
Virginia Tech Transportation Institute, Blacksburg, VA

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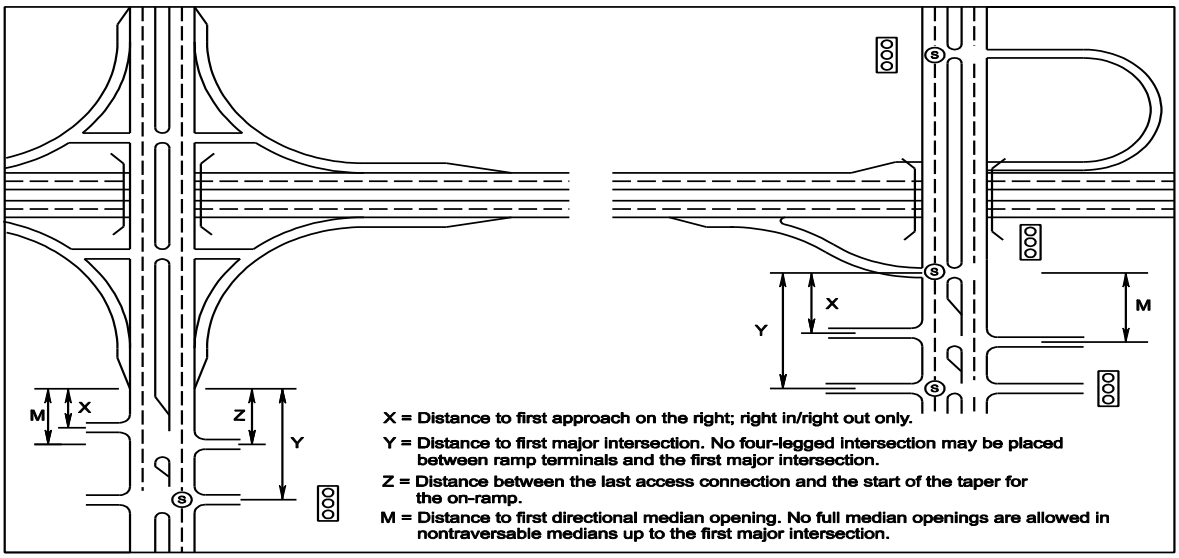

FIGURE 2-9 ACCESS CONTROL ON MULTI LANE HIGHWAYS AT INTERCHANGES

Minimum Spacing Standards for Commercial Entrances and Intersections Near Interchange Areas on Two-Lane Crossroads	
X or Z	**Y**
750’	1320’

TABLE 2-4 MINIMUM SPACING STANDARDS FOR COMMERCIAL ENTRANCES AND INTERSECTIONS NEAR INTERCHANGE AREAS ON TWO-LANE CROSSROADS

Source: *Access Control Design on Highway Interchanges, 2008.*
H. Rakha, A. M. Flintsch, M. Arafeh, G. Abdel-Salam, D. Dua, and M. Abbas.
Virginia Tech Transportation Institute, Blacksburg, VA

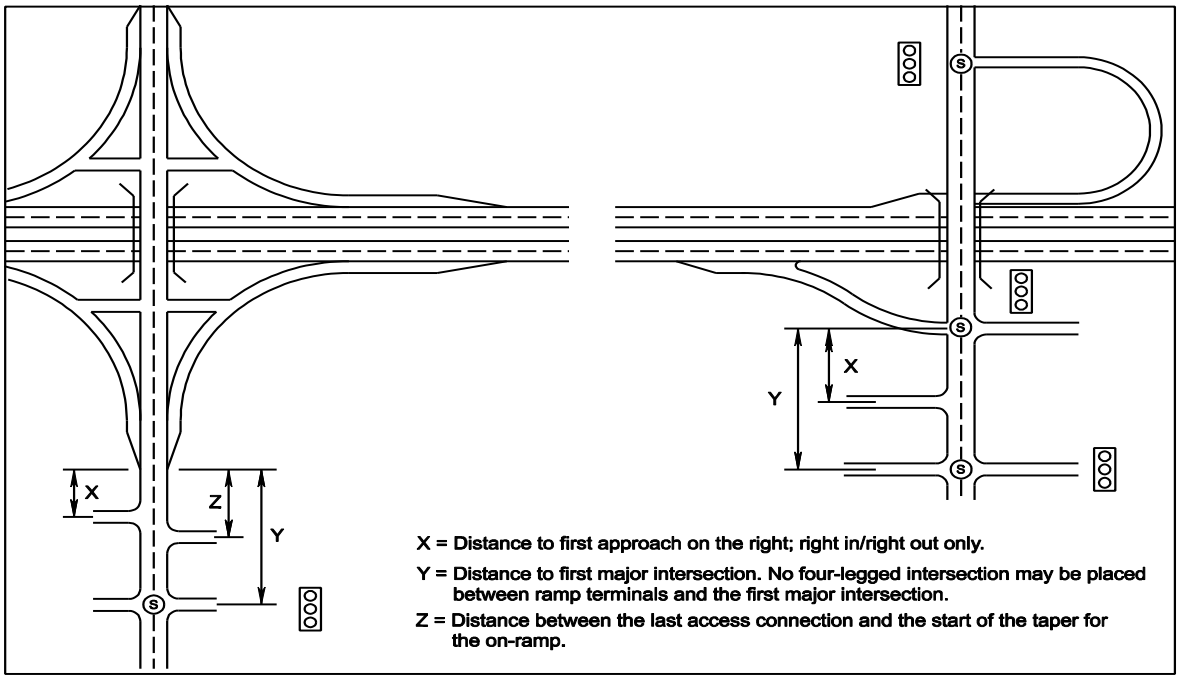

FIGURE 2-10 ACCESS CONTROL ON TWO LANE HIGHWAYS AT INTERCHANGES