
FEASIBILITY STUDY

**US 23 BUSINESS
US 23 / 74 TO US 276 (PIGEON STREET) IN WAYNESVILLE
HAYWOOD COUNTY
DIVISION 14
TIP PROJECT U-4712**

Prepared For:

North Carolina Department of Transportation



A handwritten signature in black ink, appearing to read "Rasay Abadilla", written over a horizontal line.

**Rasay Abadilla, P.E.
Feasibility Studies Engineer
Program Development Branch
NCDOT**

8/17/12
Date

A handwritten signature in black ink, appearing to read "Derrick Lewis", written over a horizontal line.

**Derrick Lewis, P.E.
Feasibility Studies Unit Head
Program Development Branch
NCDOT**

8/17/12
Date

Prepared By AECOM

A handwritten signature in blue ink, appearing to read "Eddie McFalls", written over a horizontal line.

**Eddie McFalls, P.E.
Project Manager
AECOM**

8/2/2012
Date



A handwritten signature in blue ink, appearing to read "Mark Johnston", written over a horizontal line.

**Mark Johnston, GISP
Deputy Project Manager
AECOM**

AUGUST 02, 2012
Date

I. Introduction

This feasibility study investigates improvements to US 23 Business from US 23 / 74 to US 276 (Pigeon Street) and supersedes the findings of a previous study conducted on the portion of US 23 between SR 1164 (Hyatt Creek Road) and Ninevah Road (approved in 2002). A project vicinity map is included as **Figure 1**. Improvements studied include widening US 23 with a raised median from US 23 / US 74 to Ninevah Road and improving intersections between Ninevah Road and US 276 (Pigeon Street); reconstructing the US 23 / 74 interchange; and realigning the US 23 Business (S. Main Street) / US 23 Business (Hyatt Creek Road) / SR 1243 (Old Balsam Road) intersection to favor the dominant traffic movements. Proposed improvements are illustrated in **Figures 2a, 2b, and 3**.

This study is the initial step in the planning and design process for this project and is not the product of exhaustive environmental or design investigations. The purpose of this study is to describe the proposed project, including order of magnitude costs, and to identify potential problems that may require consideration in the planning and design phases.

II. Executive Summary

The purpose of the proposed project is to improve traffic flow and access along US 23 Business from US 23 / 74 to US 276 (Pigeon Street) in the Town of Waynesville.

Analyses conducted for this feasibility study indicate improvements are needed along US 23 Business, particularly adjacent to the commercial areas in the southwest portion of the project area.

A draft of this study presented two alternatives for consideration, Alternatives 1 and 2. After review by the NCDOT and the Town of Waynesville, it was suggested that a combination of beneficial design elements from each alternative should be use. This concept is represented by Alternative 3, the recommended alternative. Alternative 3 is comprised of three alternative segments: Segment A2, Segment B - Common, and Segment C3. This alternative accommodates traffic patterns and volumes, improves intersection spacing, improves traffic spacing, and enhances bicycle and pedestrian facilities. Alternative 3 is illustrated in **Figure 3**.

Between US 23 / 74 and the Main Street Entrance to the Waynesville Commons Shopping Center, Alternative 2 (Segment A2) is recommended. The alternative realigns the Hyatt Creek Road / Main Street intersection and constructs a Diverging Diamond Interchange at US 23 / 74.

Between the Main Street Entrance to the shopping center and Ninevah Road, US 23 Business should be widened to a four-lane roadway with a 23-foot wide median (Segment B – Common).

Between Ninevah Road and US 276 (Pigeon Street) Alternative 3 (Segment C3) is recommended. This segment proposes a hybrid approach, combining beneficial elements from Segment C - Alternatives 1 and 2. This alternative will widen US 23 Business to three lanes from just north of Ninevah Road to just north of Balsam Drive and includes roundabouts at the intersections of US 23 Business with Virginia Avenue and Hazelwood Avenue. Construction of roundabouts and intersection improvements will improve traffic separations.

A closed loop traffic system should be considered to coordinate the signals, particularly on Sections A and B between the interchange at US 23 / 74 and the business section, which ends approximately at the intersection of US 23 Business and Ninevah Road.

The total cost of the recommended option is \$110,690,000 and includes estimates for construction, right of way, and utilities.

Due to the potential relocation of residences and businesses, and total project costs associated with the 3-lane alternative with roundabouts, as the project develops the NCDOT may consider additional minimization efforts that may otherwise lessen these impacts. Such considerations may include pursuit of other alternatives, a two-lane footprint rather than a three-lane, elimination of roundabouts at either or both recommended locations, and reduction of median widths and/or change of median type. Such minimization efforts will be made at the discretion of the NCDOT in consultation with the Town of Waynesville. Based on these future consultations, the improvements ultimately implemented on the corridor could likely be somewhere between the findings of this feasibility study and the feasibility study prepared for the Town of Waynesville titled, *Development of Alternatives for the US 23B/South Main Street Corridor, Hyatt Creek Road to Ninevah Road (March 9, 2012)*. Therefore, the recommendations contained in this study represent the upper boundary of potential improvements envisioned for the corridor at the present time.

III. Need for Project

A. General Purpose

The purpose and need of the proposed project is to improve US 23 Business to better accommodate projected traffic volumes and improve access in southwest Waynesville.

B. Roadway Functional Classifications

US 23 Business is designated as a principal arterial. In the French Broad River MPO Comprehensive Transportation Plan (adopted 1/10/08), US 23 Business is designated as a boulevard that needs improvement between US 23 / 74 and Hazelwood Avenue. The Comprehensive Transportation Plan includes recommendations for access management and spot intersection improvements for US 23 Business, with widening up to four lanes for the boulevard section between US 23 / 74 and Hazelwood Avenue.

C. Existing Cross Section

Within the proposed project area, US 23 Business is a two-lane road. According to the mileage inventory, the right of way is predominantly 60 feet wide. However, a small section near the Hazelwood Community (formerly incorporated) is shown as 30 feet wide. Turn lanes are present along southbound US 23 Business at Hyatt Creek Road, along US 23 Business at SR 1147 (Allens Creek Road), and northbound US 23 Business at Riverbend Street. There is on-street parking along US 23 Business between Academy Street and US 276 (Pigeon Street).

D. Existing Land Use

At the southwestern end of the project area, between US 23 / 74 and Ninevah Road, development adjacent to the roadway is predominantly commercial. In addition, at the southwestern end of the project, US 23 Business crosses the Norfolk Southern Railroad at-grade. Between Ninevah Road and Legion Drive, residential development is adjacent to the roadway. Between Legion Drive and US 276 (Pigeon Street), office and institutional uses dominate the project area (near downtown).

E. Ongoing Projects

No major projects listed in the 2009-2015 TIP would directly influence or be influenced by this project.

F. Existing Bridge Information

Existing Bridges and structures along US 23 Business are presented in **Table 1**.

Table 1. Bridge and Structure Descriptions

Structure	C14	21	63
Description	3@12x10	2@16.5	2@21
Location	Richland Creek	Allens Creek	Camp Branch
Roadway Width	24'	32'	32.2
Year Built	1955	1939	1939
Sufficiency Rating	97.8 (2007)	93 (2008)	80.8 (2008)
Remaining Life	18 years	14 years	12 years
Length	n/a	33'	42'

G. Existing Rail Information

US 23 Business crosses the Norfolk Southern Railroad at-grade, south of the Waynesville Commons Shopping Center. Also, the eastern entrance to the Waynesville Commons Shopping Center crosses the railroad at-grade and was considered for improvements related to the US 23 Business widening project.

IV. Traffic and Safety

A. Signal Information

The following intersections currently operate under traffic signal control:

- US 23 Business and Waynesville Commons Main Entrance
- US 23 Business (Hyatt Creek Road) and US 23 Business/S. Main Street
- US 23 Business (Main Street) and Waynesville Commons East Entrance
- US 23 Business (Main Street) and Brown Avenue/SR 1147 (Allens Creek Road)
- US 23 Business (Main Street) and Riverbend Street/Ninevah Road
- US 23 Business (Main Street) and Virginia Avenue/Country Club Drive
- US 23 Business (Main Street) and Hazelwood Avenue
- US 23 Business (Main Street) and US 276/Pigeon Street
- US 23 Business (Main Street) and Church Street/East Street

B. Interchange Modifications and Analyses

The existing interchange of US 23 Business (Hyatt Creek Road) and US 23/74 is a standard diamond design with a roundabout at the westbound ramp terminal. The bridges that carry US 23 / 74 over US 23 Business do not provide enough horizontal clearance to allow for additional widening along US 23 Business (Hyatt Creek Road). Therefore, improvements to this interchange have been included in this study. (See **Section E** for Capacity Analysis and **Section V** for a description of alternative improvements).

C. Traffic Data

Existing and projected traffic data on US 23 was obtained from a traffic forecast prepared in 2008. Existing and projected Average Daily Traffic volume (ADT) estimates include traffic generated by the Waynesville Commons shopping center at the corner of Hyatt Creek Road and S. Main Street, which opened to the public in the Fall of 2008.

Existing Average Daily Traffic (ADT) along US 23 Business from its intersection with US 23 / 74 to its intersection with Ninevah Road ranges from 10,700 vehicles per day (vpd) to 18,400 vpd. In the 2035 ADT along this segment of US 23 Business are anticipated to range from 12,600 vehicles per day (vpd) to 22,400 vpd. Along this segment, both existing and 2035 minimum daily traffic volumes occur near the US 23 Business and Allen's Creek Road intersection, while the 2008/2035 maximum daily traffic volume occurs near the Waynesville Commons Entrance in the southwest portion of the project.

Existing traffic along US 23 Business, from its intersection with Ninevah Road to its intersection with US 276 in Waynesville, ranges from 8,900 vehicles per day (vpd) to 9,800 vehicles per day. The 2035 ADT forecast along the same length of US 23 Business ranges from 10,500 vehicles per day (vpd) to 11,400 vpd. The minimum daily traffic for the segment occurs near the US 23 Business and Balsam Drive intersection, while the maximum daily traffic volumes occur near the US 23 Business and Mississippi Avenue intersection. Forecasted traffic volumes along US 23 Business are generally higher in the southwest portion of the project near the US 23 / 74 intersection and the Waynesville Commons Shopping Center and lower near the US 276 (Pigeon Street) intersection and downtown Waynesville.

A detailed illustration of existing and 2035 AADT traffic may be found in the **Appendix**.

D. Truck Traffic

Truck traffic percentages are summarized in **Table 2**.

Table 2. 2008 and 2035 Truck Traffic

Roadway Extent	Duals %	TT-STs %
US 23 Business from 23/74 Interchange to SR 1147 (Allens Creek Road)	6	1
US 23 Business from SR 1147 (Allens Creek Road) to Haywood Street	3	1
US 23 Business from Haywood Street to Church Street	2	1
Legion Drive	8	1
US 276 (Pigeon Street)	5	1

E. Existing and No Build Capacity Analysis

Highway capacity analyses were conducted using traffic forecast data to identify poorly performing intersections along the route and identify potential improvements. Generally, intersections operating at Level of Service (LOS) D or above are considered to be acceptable.

Table 3. Existing and No Build Capacity Analysis

Roadway Extent	2008		2035	
	AM No Build Delay and LOS	PM No Build Delay and LOS	AM No Build Delay and LOS	PM No Build Delay and LOS
Hyatt Creek Road / US 74 SB Ramps Roundabout	42.8 D	23.8 C	123.4 F	79.7 E
Hyatt Creek Road and US 74 / US 23 Northbound Off Ramp	189.3 F	61.6 F	*43.5 D	*29.5 C
Waynesville Commons Driveway / Brendle Street and Hyatt Creek Road	26.3 C	26.4 C	59.4 E	50.1 D
US 23 / SR 1243 (Old Balsam Road) and Hyatt Creek Road	214.9 F	30.0 C	306.0 F	283.8 F
US 23 Business and Waynesville Commons / Old Town Bank Drive	26.0 C	27.5 C	31.2 C	35.4 D
US 23 Business and Brown Avenue / SR 1147 (Allens Creek Road)	27.8 C	25.3 C	81.3 F	83.7 F
US 23 Business and Riverbend Street / Ninevah Road	10.4 B	9.8 A	14.2 B	11.4 B
US 23 Business and Virginia Avenue / Country Club Drive	9.5 A	9.4 A	20.0 C	20.9 C
US 23 Business and Hazelwood Avenue	14.3 B	13.7 B	42.2 D	41.6 D
US 23 Business / US 276 (Main Street) and US 276 (Pigeon Street)	34.9 C	29.9 C	67.7 E	75.3 E
US 23 Business / US 276 (Main Street) and Church Street/East Street	33.1 C	56.5 E	30.2 C	30.3 C

A review of this information indicates that several intersections are anticipated to operate with poor levels of service in 2035, particularly between US 23 / 74 and Hazelwood Avenue.

F. Build Capacity Analysis

Capacity analysis was conducted on several build scenarios. Four lane improvements were analyzed from US 23 /74 to Ninevah Road. A diverging diamond interchange was analyzed at US 23 / 74. Three-lane or intersection improvements were analyzed from Ninevah Road to US 276 (Pigeon Street). These analyses are presented below. Alternative 1 reflects analyses assuming the general configuration of the Hyatt Creek Road / Main Street / SR 1243 (Old Balsam Road) intersection remains the same. Alternative 2 reflects the realignment of the intersection.

Table 4. Build Capacity Analysis

	Intersection	Alternative 1		Alternative 2	
		AM Build	PM Build	AM Build	PM build
		LOS	LOS	LOS	LOS
Segment A	Hyatt Creek Road / US 74 Ramps Roundabout	B	B	B	B
	Hyatt Creek Road and US 74 / US 23 Eastbound Off Ramp	A	A	A	A
	Waynesville Commons Driveway / Brendle Street and Hyatt Creek Road	B	B		
	US 23 Business / SR 1243 (Old Balsam Road) and Hyatt Creek Road	C	C	C	D
	US 23 Business and Waynesville Commons / Old Town Bank Drive	C	C	C	C
Segment B	US 23 Business and Brown Avenue / SR 1147 (Allens Creek Road)	C	D	C	C
Segment C	US 23 Business and Riverbend Street / Ninevah Road	A	A	A	A
	US 23 Business and Virginia Avenue / Country Club Drive	C	C	C	C
	US 23 Business and Hazelwood Avenue	C	C	C	C
	US 23 Business (Main Street) and US 276 (Pigeon Street)	C	C	E	E

With proposed improvements, all ramp terminal intersection approaches operate at level of service B or better in design year 2035. Accordingly, the DDI design concept effectively services design-year traffic with appropriate laneage.

G. Accident Information

The 2007 Annual Average Daily Traffic (AADT) for this section of US 23 Business was estimated at 10,200 vehicles per day, which equates to a total vehicle exposure rate of 25.49 million vehicle miles traveled (MVMT.) The crash rate for US 23 Business within the project limits is 235.4 crashes per 100

million vehicle miles of travel (acc/100mvm.) This crash rate is lower than the 2005 to 2007 statewide rate for undivided two-lane urban US routes (305.79 accidents/100mvm.)

During the three-year period from April 2006 to March 2009, fifty-eight crashes were reported on US 23 Business, from US 23/74 to US 276 (Pigeon Street). Of the fifty-eight crashes, twenty-seven (45%) were rear-end collisions. While no fatalities occurred, twenty-nine non-fatal injuries resulted from these incidents.

V. Description of Design Alternatives

Improvements studied include the widening US 23 Business to a four-lane divided facility with a raised median between US 23 / US 74 to Ninevah Road and improving intersections between Ninevah Road and US 276 (Pigeon Street); realigning the US 23 Business (S. Main Street) / US 23 Business (Hyatt Creek Road) / SR 1243 (Old Balsam Road) intersection to favor the dominant traffic movements; and reconstruction of the US 23 / 74 interchange. Improvements were considered throughout the length of the project in attempt to achieve LOS D or better.

The project lies within the city limits of Waynesville and connects residential and commercial areas. Therefore, bicycle and pedestrian needs are significant within the project area. Proposed roadway improvements provide 14-foot wide roadway travel lanes, thus allowing space for both cyclists and motorists. Currently, sidewalks exist along at least one side of US 23 Business, with the exception of the segment between the Waynesville Commons east entrance and Riverbend Street/Ninevah Drive. Sidewalks will be replaced where disturbed by construction. New sidewalks are proposed for improved connectivity (depending on alternative), and pedestrian crossings should be improved at Legion Dr., Virginia Ave. and Brown Ave. Specific sidewalk conditions and accommodations are explained in each alternative description below.

Project improvements are described within three design alternatives (1, 2 and 3). Each alternative is comprised of three interchangeable segments: Segment A (A1 or A2), Segment B (common), and Segment C (C1, C2 or C3). The design alternatives and their segments are illustrated in **Figures 2a, 2b, and 3** and are described in detail below.

A. Segment A - Alternative 1 Description (A1)

1. Typical Section Improvements

Segment A - Alternative 1 will widen US 23 Business (Hyatt Creek Road) from just west of the US 23/74 interchange to its intersection with US 23 Business (South Main Street) accommodating two through lanes in each direction with a divided median. It will also widen US 23 Business (South Main Street) to the South Main Street entrance to the Waynesville Commons Shopping Center.

Existing bridges at the US 23/74 interchange do not provide adequate horizontal clearance to widen US 23 Business. Due to clearance issues and high volume of turning movements, Alternative 1 replaces the existing interchange at Hyatt Creek Road and US 23/743 with a Diverging Diamond Interchange (DDI), thus providing adequate laneage to effectively service design-year traffic. Existing bridge structures must be replaced to accommodate interchange improvements. The existing culvert on Richland Creek is recommended to be replaced with a bridge to facilitate the widening.

Within this segment, sidewalks are proposed on both sides of US 23 Business. Proposed sidewalks will be five feet wide.

2. Cross Street and Access Improvements

a) Access to Businesses Northwest of Interchange

Just west of the interchange of Hyatt Creek Road and US 23/74, improvements to the interchange impact access to several businesses. A new access road is constructed to provide access to these businesses.

b) Waynesville Common Entrance

Under this alternative, left turns are not allowed out of Waynesville Commons Shopping Center. At the Hyatt Creek Road and Waynesville Commons intersection, the Brendle Street leg of the intersections is removed resulting in a three-legged intersection. Access is provided to businesses on the south side of Hyatt Creek Road by constructing an access road to intersect with SR 1243 (Old Balsam Road) just south of the Hyatt Creek Road and US 23 Business intersection. Further, intersection improvements allow for left turns off of Hyatt Creek Road.

c) Brendle Street

Brendle Street is relocated to intersect with SR 1243 (Old Balsam Road) and provides access to parcels on the south side of Hyatt Creek Road where the intersection of Little Lane to US 23 Business is removed. Further, a new bridge is necessary on Richland Creek to accommodate this access.

d) Hendrix Street

Hendrix Street access to US 23 Business is closed with traffic rerouted to SR 1147 (Allens Creek Road).

B. Segment A – Alternative 2 Description (A2)

1. Typical Section Improvements

Segment A - Alternative 2 will widen US 23 Business (Hyatt Creek Road) from just west of the US 23/74 interchange to its intersection with US 23 Business (South Main Street) accommodating two through-lanes in each direction with a divided median. It will realign the Hyatt Creek Road / South Main Street intersection so that the US 23 Business movements will be through moves (currently, and under Alternative 1, motorists have to turn to stay on US 23 Business) and continue widening US 23 Business (South Main Street) to the South Main Street entrance to the Waynesville Commons Shopping Center. The realignment of the intersection will impact a building on an outparcel of Waynesville Commons that includes a Verizon store, Sally Beauty Supply, Gamestop, and Citi Financial.

As with Alternative 1, existing bridges at the US 23/74 interchange do not provide adequate horizontal clearance to widen US 23 Business. Due to clearance issues and high volume of turning movements, Alternative 2 replaces the existing interchange at Hyatt Creek Road and US 23/74 with a Diverging Diamond Interchange (DDI). Existing bridge structures must be replaced to accommodate interchange improvements. Further, to support new travel lanes,

widening of US 23 Business requires replacement of the existing culvert on Richland Creek with a bridge.

Within this segment, sidewalks are proposed on both sides of US 23 Business. Proposed sidewalks will be five feet wide.

2. Cross Street and Access Improvements

a) Access to Businesses Northwest of Interchange

Just west of the interchange of Hyatt Creek Road and US 23/74, improvements to the interchange impact access to several businesses. A new access road is constructed to provide access to these businesses.

b) Waynesville Common Entrance

With Alternative 2, a new intersection is formed with southbound Waynesville Commons entrance, northbound SR 1243 (Old Balsam Road), southwest bound US 23 Business, and northeast bound Hyatt Creek Road. This alternative improves operations by creating a through movement to and from US 23 Business and Hyatt Creek Road, which is the major movement. It also benefits intersection spacing between the Waynesville Commons entrance and the US 23/74 interchange.

c) Brendle Street and Little Lane

Brendle Street is relocated to intersect with SR 1243 (Old Balsam Road) and provides access to parcels on the south side of Hyatt Creek Road where the intersection of Little Lane to US 23 Business is removed. Further, a new bridge is necessary on Richland Creek to accommodate this access.

d) Hendrix Street

Hendrix Street access to US 23 Business is closed with traffic rerouted to SR 1147 (Allens Creek Road).

C. Segment B – Common Alternative Description (B)

1. Typical Section Improvements

Segment B - Common will widen US 23 Business to four lanes from the South Main Street entrance to Waynesville Commons to just north of Ninevah Road.

Within this segment, sidewalks are proposed on both sides of US 23 Business. Proposed sidewalks will be five feet wide.

2. Cross Street and Access Improvements

a) Eastern Entrance/Access Road to Waynesville Commons

Due to high traffic volumes, the eastern entrance to the Waynesville Commons shopping center (adjacent to Hardees) is expanded to accommodate double rights and double lefts onto US 23 Business.

b) SR 1147 (Allens Creek Road)

The east leg of SR 1147 (Allens Creek Road) will be expanded from two lanes to five at the US 23 Business intersection. The five-lane section consists of two travel lanes, two left-turn lanes, and one right-turn lane onto US 23 Business. The five-lane section tapers to two lanes at the intersection of SR 1147 (Allens Creek Road) and Francis Street.

c) Riverbend Street

The approach angle of Riverbend Street is improved where it intersects with US 23 Business and creates a through movement with Ninevah Road.

d) Epsom Street

Due to the proximity of the Epsom Street and US 23 Business intersection with the Ninevah Road and US 23 Business intersection, access from Epsom Street to US 23 Business is closed. Traffic is rerouted to Swan Street and Ninevah Road.

D. Segment C - Alternative 1 Description (C1)

1. Typical Section Improvements

Segment C - Alternative 1 will widen US 23 Business to three lanes from just north of Ninevah Road to just north of Balsam Drive. The intersection of US 23 Business and Legion Drive is realigned and described in *Cross Street and Access Improvements* below.

Within this segment, sidewalks are proposed on both sides of US 23 Business and will be five feet wide. However, due to steep slopes, no new sidewalks or additional widening are proposed along US 23 Business, just north of Balsam Drive to just south of Legion Drive. However, an existing sidewalk along the west side of US 23 Business provides connectivity for pedestrians within this area.

2. Cross Street and Access Improvements

a) Brooks Street

The approach angle of Brooks Street is improved where it intersects with US 23 Business.

b) Country Club Drive

Access to US 23 Business from Country Club drive is improved from two lanes to a three-lane divided section. The 3 lane divided section consists of two travel lanes and a right-turn lane onto US 23 Business.

c) Kentucky Avenue

The approach angle of Kentucky Avenue is improved where it intersects with US 23 Business.

d) Coniferhedge Drive

Access from Coniferhedge Drive to US 23 Business is removed and traffic is rerouted to Glendale Drive/Auburn Road.

e) Waynewood Drive

Due to its proximity to the Hazelwood Avenue traffic signal, the Waynewood Drive access to US 23 Business will be closed with traffic rerouted to Auburn Road.

f) Hazelwood Avenue

The approach angle of Hazelwood Avenue is improved where it intersects with US 23 Business and an additional turn lane is added.

g) Grimball Drive

Access from Grimball Drive to US 23 Business is removed and traffic is rerouted to Hazelwood Avenue.

h) Legion Drive

At the intersect with US 23 Business, Legion Drive is realigned to the north, forming a four-leg intersection with Haywood Street, thus improving operations and spacing. Where it intersects with Pigeon Street, Legion Drive is realigned to the south and becomes a through-movement onto US 276 (Pigeon Street). Improvements to Legion Drive may encourage motorists traveling on US 276 to avoid the US 23 Business / US 276 (Pigeon Street) intersection.

i) Pigeon Street

A right turn lane is added to Pigeon Street where it intersects with S. Main Street. Addition of the new lane removes access from S Wall Street to Pigeon Street.

Where Legion Drive becomes the through movement onto US 276, a three-legged intersection is formed. Pigeon Street becomes a two lane section with left and right turns onto US 276 and Legion Drive.

E. Segment C - Alternative 2 Description (C2)

1. Typical Section Improvements

Segment A - Alternative 1 improves South Main Street's intersection with Legion Drive and provides roundabouts at the intersections of US 23 Business with Virginia Avenue and Hazelwood Avenue. Also, as described below in the **Cross Street and Access Improvements** description, a roundabout is provided at the intersection of Legion Drive and US 276 (Pigeon Street).

A roundabout was considered at the US 276 (Pigeon Street) & US 23 Business intersection. However, since southbound queues were projected to extend into the signalized intersections at Church Street and US 23, this did not perform as an ideal location for a roundabout. Further, there is a steep grade on the US 276/Pigeon Street approach.

Within this segment, sidewalk improvements are only provided within the construction limits of each roundabout. However, existing sidewalks on either the west or east side of this segment provide connectivity for the extents of this segment. Proposed sidewalks will be five feet wide.

2. Cross Street and Access Improvements

a) Waynewood Drive/Brimball Drive

Due to the proximity of roundabout improvements to US 23 Business and Hazelwood Avenue, access from Waynewood Drive and Grimball Drive to US 23 Business is removed. Traffic is rerouted from Waynewood Drive to Auburn Road and from Grimball Drive to Hazelwood Avenue.

b) Legion Drive

Legion Drive is realigned to the north where it intersects with US 23 Business, and forms a four-leg intersection with Haywood Street, thus improving operations and spacing. Further, a roundabout is provided at the current intersection of Legion Drive and US 276 (Pigeon Street).

c) S Welch Street

As a result of the new roundabout on Legion Drive and US 276 (Pigeon Street), access from S Welch Street to Pigeon Street is removed.

d) Pigeon Street

A right turn lane is added where Pigeon Street intersects with S. Main Street.

F. Segment C - Alternative 3 Description (C3)

1. Typical Section Improvements

Segment C - Alternative 3 proposes a hybrid approach, combining elements from Segment C - Alternatives 1 and 2. As with Segment C - Alternative 1, this alternative will widen US 23 Business to three lanes from just north of Ninevah Road to just north of Balsam Drive. Further, as with Segment C - Alternative 2, this alternative includes roundabouts at the intersections of US 23 Business with Virginia Avenue and Hazelwood Avenue. The intersection of US 23 Business and Legion Drive is realigned and described in ***Cross Street and Access Improvements*** below.

Within this segment, sidewalks are proposed on both sides of US 23 Business and will be five feet wide. Though, due to steep slopes, no new sidewalks or additional widening are proposed along US 23 Business, just north of Balsam Drive to just south of Legion Drive. However, an existing sidewalk along the west side of US 23 Business provides connectivity for pedestrians within this area.

2. Cross Street and Access Improvements

a) Brooks Street

The approach angle of Brooks Street is improved where it intersects with US 23 Business.

b) Country Club Drive

Access to US 23 Business from Country Club drive is improved from two lanes to a three-lane divided section. The 3 lane divided section consists of two travel lanes and a right-turn lane onto US 23 Business.

c) Kentucky Avenue

The approach angle of Kentucky Avenue is improved where it intersects with US 23 Business.

d) Coniferhedge Drive

Access from Coniferhedge Drive to US 23 Business is removed and traffic is rerouted to Glendale Drive/Auburn Road.

e) Waynewood Drive

Due to close proximity to the US 23 Business and Hazelwood Avenue roundabout, Waynewood Drive access to US 23 Business will be closed with traffic rerouted to Auburn Road.

f) Hazelwood Avenue

The approach angle of Hazelwood Avenue is improved where it intersects with US 23 Business and an additional turn lane is added.

g) Grimball Drive

Access from Grimball Drive to US 23 Business is removed and traffic is rerouted to Hazelwood Avenue.

h) Legion Drive

At the intersect with US 23 Business, Legion Drive is realigned to the north, forming a four-leg intersection with Haywood Street, thus improving operations and spacing. Where it intersects with Pigeon Street, Legion Drive is realigned to the south and becomes a through-movement onto US 276 (Pigeon Street). Improvements to Legion Drive may encourage motorists traveling on US 276 to avoid the US 23 Business / US 276 (Pigeon Street) intersection.

i) Pigeon Street

A right turn lane is added to Pigeon Street where it intersects with S. Main Street. Addition of the new lane removes access from S Wall Street to Pigeon Street.

Where Legion Drive becomes the through movement onto US 276, a three-legged intersection is formed. Pigeon Street becomes a two lane section with left and right turns onto US 276 and Legion Drive.

G. Construction Costs

A summary of associated project costs, categorized by alternative and segment, are presented below in **Table 5**.

Table 5. Project Cost Summary

Alternative	Segment	Right of Way	Utility Costs	Sidewalks ¹	Construction Costs ²	Total
Alt 1	A1	\$24,500,000	\$1,000,000	\$100,000	\$3,800,000	\$29,300,000
	Interchange	\$2,600,000		\$50,000	\$13,100,000	\$15,700,000
	B	\$9,100,000	\$1,200,000	\$200,000	\$7,500,000	\$17,800,000
	C1	\$25,000,000	\$2,200,000	\$400,000	\$8,300,000	\$35,500,000
	Total Alt 1:	\$61,200,000	\$4,400,000	\$750,000	\$32,700,000	\$98,300,000
Alt 2	A2	\$30,600,000	\$1,000,000	\$100,000	\$4,000,000	\$35,600,000
	Interchange	\$2,600,000		\$50,000	\$14,000,000	\$16,600,000
	B	\$9,100,000	\$1,200,000	\$200,000	\$7,500,000	\$17,800,000
	C2	\$12,500,000	\$900,000	\$200,000	\$3,900,000	\$17,300,000
	Total Alt 2:	\$54,800,000	\$3,100,000	\$550,000	\$29,400,000	\$87,300,000
Alt 3	A2	\$30,600,000	\$1,000,000	\$100,000	\$4,000,000	\$35,600,000
	Interchange	\$2,600,000		\$50,000	\$14,000,000	\$16,600,000
	B	\$9,100,000	\$1,200,000	\$200,000	\$7,500,000	\$17,800,000
	C3 ³	\$28,750,000	\$2,470,000	\$460,000	\$9,470,000	\$40,690,000
	Total Alt 3:	\$61,200,000	\$4,400,000	\$750,000	\$32,700,000	\$110,690,000

1 Sidewalk costs area include construction costs, though also displayed individually. 45% Misc. & Mob., and 15% E.&C.

2 Construction costs in this column include sidewalk costs.

3 Segment C3 is comprised of the total costs of Segment C1 and addition of 30% of the costs of Segment C2 to approximate the inclusion of roundabouts, as described in Segment C - Alternative 3 Description (C3).

VI. Environmental Concerns

A detailed environmental study was not conducted for this feasibility study. However, an environmental screening was conducted to identify potential issues which will require further investigation during the project development process.

A. Human Environment

Primary impacts to the human environment will be the residential and business relocations required. **Table 6** summarizes the relocations for each alternative and segment.

Table 6. Relocations

Alternative	Segment	Number of Relocations	
		Homes	Businesses
Alt 1	A	11	5
	B	9	22
	C	54	16
	Total Alt 1:	74	43
Alt 2	A	11	10
	B	9	22
	C	26	6
	Total Alt 2:	46	38
Alt 3	A	11	10
	B	9	22
	C	56	16
	Total Alt 3:	76	48

B. Historic Properties

There are currently two properties along the corridor which are included in the National Register of Historic Places. These properties are listed below:

- Charles and Annie Quinlan House (274 South Main Street)
- Dr. J. Howell Way House (123 South Main Street)

In addition to the two National Register of Historic Places properties, the Town of Waynesville maintains an inventory of historic properties. Eligibility for the National Register has not been determined for these properties. These properties are listed below:

- Commercial building (1734 South Main Street)
- Waynesville Country Club (176 Country Club Drive)
- 9 Residences (36, 48, 62, 69, 84, 101, 108, 120, 127 Belle Meade Street) not on corridor
- Hyatt House (1366 South Main Street)
- The Gables (1 Gables Place)
- Atkins House (421 Grimboll Drive)
- Hilltop Tourist Lodge (768 South Main Street)
- Charles Ray House (209 Hill View Circle)
- 6 Residences (26, 58, 62, 84, 94, 106, Pigeon Street) not on corridor

The conceptual designs were developed while trying to minimize impacts to these resources. The presence of historic resources must be considered as the project develops, in accordance with Section 106 of the National Historic Preservation Act. Historic resources are displayed in **Figures 2a, 2b, and 3**.

C. Other Cultural Resources

Operated and maintained by the Town of Waynesville, the Greenhill Cemetery is located along the east side of US 23 Business, just south of Legion Drive. If construction improvements to US 23 Business are proposed adjacent to Greenhill Cemetery, efforts will be made to avoid or minimize impacts to this property.

D. Natural Environment

National Wetland Inventory mapping indicates that this project will not impact any identified wetlands. Additionally, a review of Natural Heritage Program data showed no known populations of federally threatened and endangered species along the route. However, wetland, stream, and threatened and endangered species surveys will be required during subsequent phases of project development.

Some of the proposed improvements will impact streams. Streams within the project area have varying classifications by the Division of Water Quality. Richland Creek is designated as Class B Tr (trout) water. Allen Creek and Browning Branch are both designated Class C Tr waters. Further, Hyatt Creek is designated as Class B water.

US 23 Business/Hyatt's Creek Road currently crosses Richland Creek by culvert; this will be replaced with a bridge to accommodate roadway improvements. The Hydraulics Unit indicated a bridge would better convey Richland Creek. Also, Richland Creek will require a new bridge to accommodate the proposed access connection from Brendle Street to Little Lane. Further, US 23 Business spans both Allen Creek and Camp Branch by bridge; new bridges will replace existing structures at these locations to accommodate roadway improvements.

VII. Additional Comments / Issues

As the project moves through the project development process, the following issues should be considered:

- A feasibility report was prepared for the Town of Waynesville March 9, 2012, titled *Development of Alternatives for the US 23B/South Main Street Corridor, Hyatt Creek Road to Ninevah Road* (Waynesville Study). The report was funded by the French Broad River Metropolitan Planning Organization. The objective of the study is to seek "a 'Complete Street' development that analyzes projected traffic patterns and demands and distills this information into a cohesive design. This design shall address vehicular, pedestrian and bicycle access while also investigating aesthetic improvements that are essential for redevelopment and sustainable growth for Waynesville." The extents of the Waynesville Study overlap the area analyzed in this report (NCDOT Study), from US 23 / 74 to Ninevah Road. However the NCDOT Study examines areas beyond the Waynesville Study, from Ninevah Road to US 74 / Pigeon Street. The Waynesville Study presents conceptual alternatives comprised of a combination of a 2-lane divided and a 4-lane divided facility. Further, it proposes various intersection reconfigurations such as the addition of turning lanes and a roundabout within the study extents. The Waynesville Study addresses current levels of traffic and service, takes into consideration land use objectives, aesthetics and

landscaping, parking, and pedestrian and bicycle traffic. The NCDOT Study examines both existing and future levels of service and traffic demands, and considers pedestrian and bicycle traffic. As the project develops, the NCDOT will take into consideration design concepts from the Waynesville Report. The NCDOT will work in cooperation with the Town of Waynesville to implement beneficial improvements where reasonable and feasible.

- Because US 23 Business extends from the central business district area through a scenic residential area, both the public and local government entities have expressed concern with potential impacts to the “historic feel and character” of the project vicinity. Comments regarding impact to existing residences, businesses and features along this corridor noted during a past public information meeting held in 2009.
- Between Virginia Avenue and Legion Drive, US 23 Business is lined with mature trees, stone walls, and steep side slopes. In this area, any widening, even to widen a berm/sidewalk, may change the character of the area.
- The approach angles of many side streets that intersect with US 23 Business are shown improved as part of this study. While these enhancements provide ideal traffic movements and improve safety, they also contribute to relocations and property impacts. Elimination of these improvements, in various forms, may be considered to minimize impacts and reduce costs without degrading overall level of service to US 23 Business. One technique may be to construct a monolithic island between Virginia Avenue and Hazelwood Avenue to convert side streets to right-in/right-outs.
- Waynesville prides itself in being a pedestrian-oriented community. In a letter to NCDOT, Paul Benson, the Town of Waynesville Planning Director, has expressed the town’s desire to keep this street as an attractive tree-lined entrance to Downtown Waynesville, and to function as a multi-modal corridor encouraging both bicycle and pedestrian users, along with motorists. Based on the Waynesville Comprehensive Pedestrian Plan, the Town of Waynesville has requested the following pedestrian improvements along US 23 Business:
 - Construct sidewalks along both sides of South Main Street from Hyatt Creek Road/SR 1243 (Old Balsam Road) to Pigeon Street. If South Main Street is widened where the existing sections of sidewalk between Riverbend Street and Allen’s Creek Road must be demolished, then the new sidewalks should be constructed for the entire project length. Otherwise, new sidewalks should be constructed to connect the aforementioned existing sidewalk sections.
 - Construct concrete pedestrian crossings, with delineated crosswalks, at the Norfolk-Southern Railroad at-grade crossing
 - Construct decorative crosswalks (possibly stamped pigmented asphalt) with pedestrian signalization (count-down pedestrian heads) at the following major signalized intersections and those additional intersections which meet appropriate signal warrants as outlined in the Manual of Uniform Traffic Control Devices (MUTCD) and approved by NCDOT for signalization:
 - Brown Avenue
 - Riverbend Street
 - Virginia Street/Country Club Drive
 - Legion Drive
 - Hazelwood Avenue
 - Pigeon Street (US 276) The pedestrian signal poles should match in style and color the existing black powder coated traffic signals which currently exist along South Main Street.

-
- Construct advanced Pedestrian Crossing Ahead signs in advance of all pedestrian crosswalks and Pedestrian Crosswalk signs at all pedestrian crosswalks in accordance with MUTCD.
 - Provide landscaped areas along South Main Street with amenities such as benches and trash cans to allow rest areas for pedestrians.
 - Provide for bulbouts at the key intersections noted above to reduce the crosswalk lengths.
 - All sidewalks and wheel chair ramps should be constructed in accordance with Americans with Disabilities Act (ADA) standards.

VIII. Public Involvement

A Citizens Informational Workshop was held on July 13, 2009 to discuss plans for proposed improvements to US 23 Business from US 23 / 74 to US 276. The workshop was an informal drop-in style meeting that gave citizens an opportunity to discuss widening alternatives and potential improvements, ask questions, and provide comments.

Approximately 123 people attended the workshop. Thirty nine comment sheets were received at the meeting, while three email responses and six comment sheets were received (by fax) following the meeting. Twenty-five comment sheets either expressed no desire for improvements or were fully opposed to widening the roadway to more than 2-lanes. Three comment sheets expressed a desire for widening to 4-lanes. Four comment sheets expressed a desire for widening to 3-lanes. The remainder of comment sheets suggested a variety of widening approaches combining 2, 3 and 4 lane improvements. The majority of these favored the widening of the southern (business) end of the project or directly opposed widening the northern end (residential area).

Primary concerns identified on more than one comment sheet include the following:

- Historic Feel/Character of Town – Concern regarding impacts to the character and feel of the town, especially between Virginia Avenue/Country Club Drive and Pigeon Street in the northern or residential portion of the study area.
- Commercial Development – Concern regarding possible strip mall development along the improved corridor as a result of the widening.
- Intersection Improvements – Support for left turn lanes, additional traffic signals, and/or better signal timing along the route.
- Medians – Both concern and support regarding the addition of medians to the roadway.
- Impacts to businesses and residences – Concern regarding impacts to businesses, residents, property, associated parking, and sale potential of property as a result of the widening.
- Sidewalks – Support of sidewalk improvements to facilitate pedestrian safety.
- Bike Lanes – Both support and concern expressed regarding the addition of bike lanes along the project.
- Traffic – Concern regarding potentially increased traffic speed and traffic volume along US 23 Business as a result of the widening.
- Roundabouts – Opposition and support of roundabouts along the project length.
- Allens Creek – Support of bridge improvements over Allens Creek to accommodate traffic turning right into the Wal-Mart Shopping Center.

IX. Recommendations

A review of traffic forecasts and capacity analyses conducted for this feasibility study indicate improvements are needed along US 23 Business, particularly adjacent to the commercial areas in the southwest portion of the project area.

A draft study presented two alternatives for consideration, both Alternatives 1 and 2. After review by the NCDOT and the Town of Waynesville, it was suggested that a combination beneficial design elements should be used from both alternatives, such as a 3-lane typical section throughout the majority of the project and the inclusion of roundabouts at several major intersections. This concept is represented by Alternative 3, the recommended alternative. Alternative 3 is comprised of three segments: Segment A2, Segment B - Common, and Segment C3. This alternative accommodates traffic patterns and volumes, improves intersection spacing, improves traffic spacing, and enhances bicycle and pedestrian facilities.

Between US 23 / 74 and the Main Street Entrance to the Waynesville Commons Shopping Center, Alternative 2 (Segment A2) is recommended. The alternative realigns the Hyatt Creek Road / Main Street intersection to better accommodate the traffic pattern and provides better intersection spacing. The Diverging Diamond Interchange will also better accommodate future volumes.

Between the Main Street Entrance to the shopping center and Ninevah Road, US 23 Business should be widened to a four-lane roadway with a 23-foot wide median (Segment B - Common).

Between Ninevah Road and US 276 (Pigeon Street), Alternative C3 (Segment C3) is recommended. It incorporates the three-lane section from Segment C1 and roundabouts at the intersections of US 23 Business with Virginia Avenue and Hazelwood Avenue from Segment C2. The alternative widens portions of US 23 north of Ninevah Road and will improve traffic flows. Construction of roundabouts at the intersections of US 23 Business with Virginia Avenue and Hazelwood Avenue will improve traffic separations and flow. Further, this alternative allows for longitudinal bicycle and pedestrian improvements, improving continuity with existing bicycle and pedestrian facilities. Care should be taken in this segment to minimize impact on homes and the character of the existing tree-lined, residential area.

A closed loop traffic system should be considered to coordinate the signals, particularly on Sections A and B between the interchange at US 23 / 74 and the business section, ending at approximately Ninevah Road.

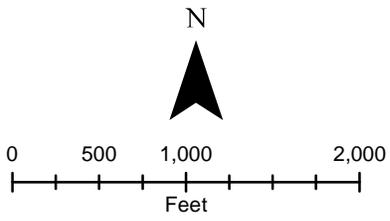
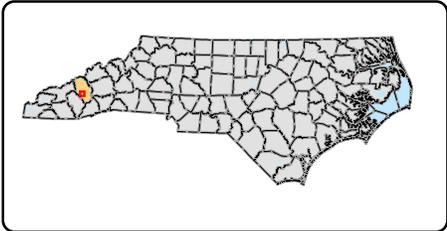
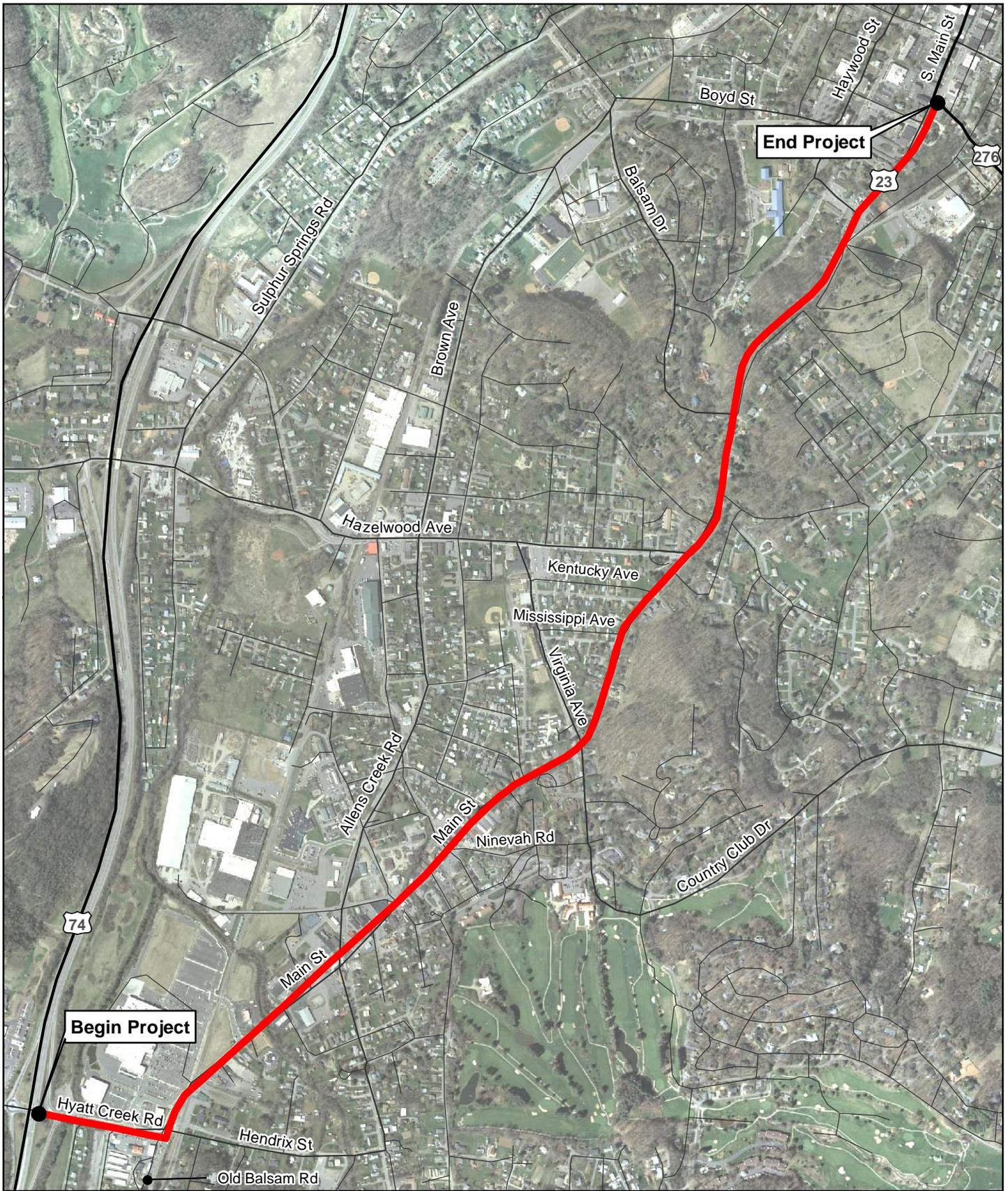
For Alternative 3, recommended improvements yield an approximate total cost of \$110,690,000. The project cost breakdown is as follows:

Table 7. Recommended Project Cost

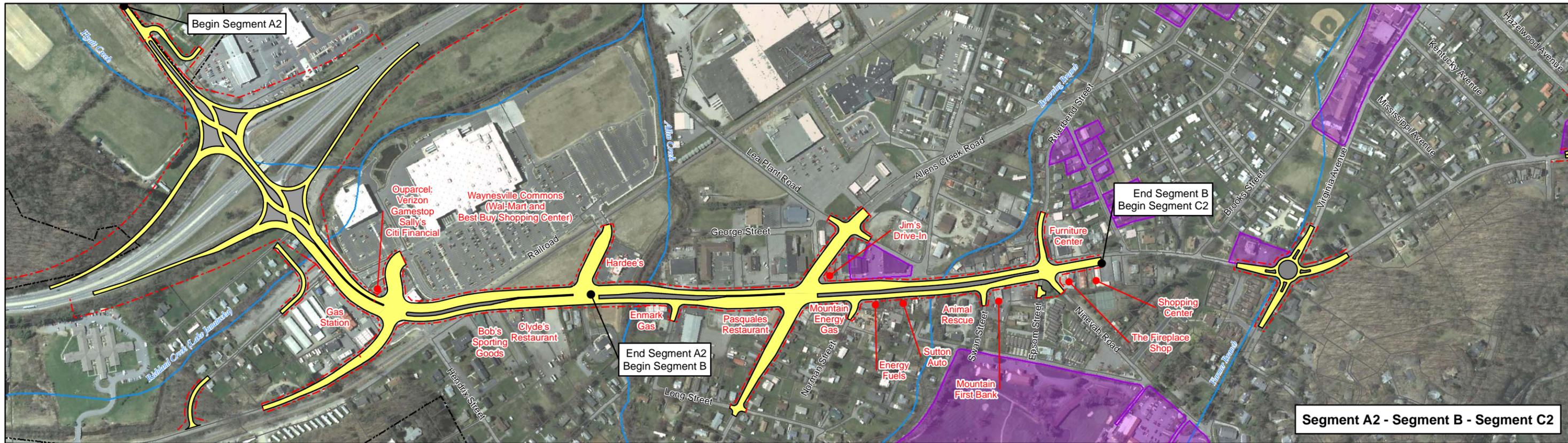
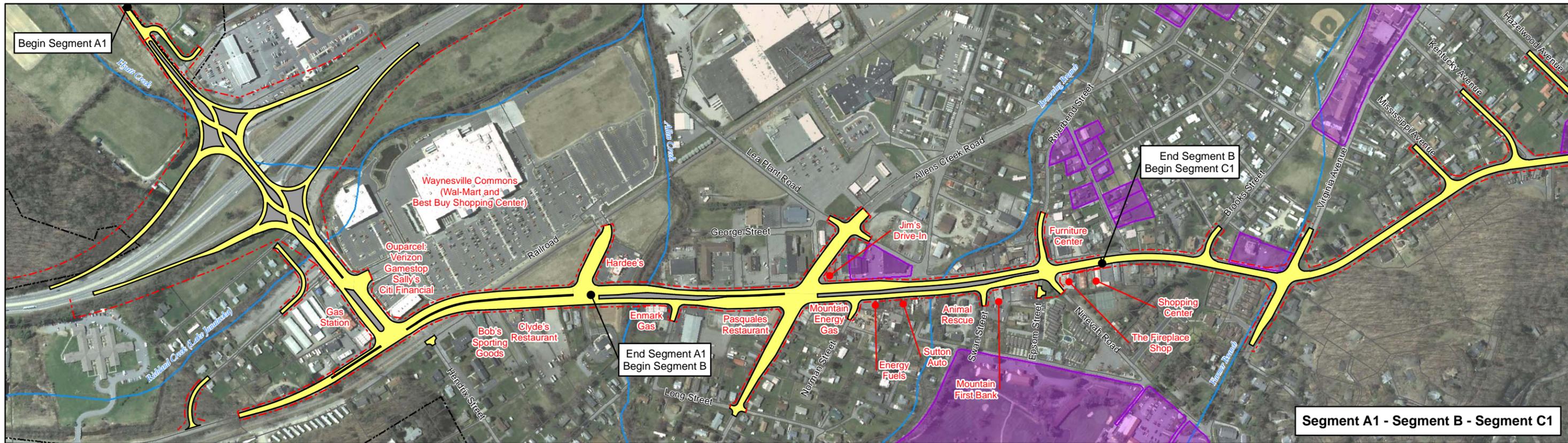
Improvement	Segment A2	Segment B	Segment C3	Total Alternative
Construction	\$18,000,000	\$7,500,000	\$9,470,000	\$34,970,000
Right of Way	\$33,200,000	\$9,100,000	\$28,750,000	\$71,050,000
Utility	\$1,000,000	\$1,200,000	\$2,470,000	\$4,670,000
Total:	\$52,200,000	\$17,800,000	\$40,690,000	\$110,690,000

It is assumed that approximately 30% of Segment C2 is related to the roundabouts at the intersections of US 23 Business with Virginia Avenue and Hazelwood Avenue. Accordingly, Segment C3 costs are derived by combining 30% of Segment C2 with the total cost of Segment C1.

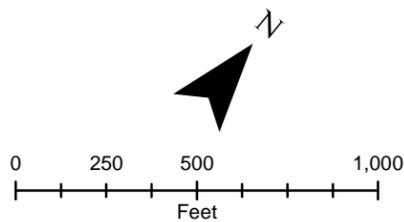
Due to the potential relocation of residences and businesses, and total project costs associated with the 3-lane alternative with roundabouts, as the project develops the NCDOT may consider additional minimization efforts that may otherwise lessen these impacts. Such considerations may include pursuit of other alternatives, a two-lane footprint rather than a three-lane, elimination of roundabouts at either or both recommended locations, and reduction of median widths and/or change of median type. Such minimization efforts will be made at the discretion of the NCDOT in consultation with the Town of Waynesville. Based on these future consultations, the improvements ultimately implemented on the corridor could likely be somewhere between the findings of this feasibility study and the feasibility study prepared for the Town of Waynesville titled, *Development of Alternatives for the US 23B/South Main Street Corridor, Hyatt Creek Road to Ninevah Road (March 9, 2012)*. Therefore, the recommendations contained in this study represent the upper boundary of potential improvements envisioned for the corridor at the present time.



<p>Vicinity Map US 23 between US 23-74 and US 276 (Pigeon St.) Waynesville, NC</p>		
<p>Date: 08/2012</p>		<p>Figure 1</p>

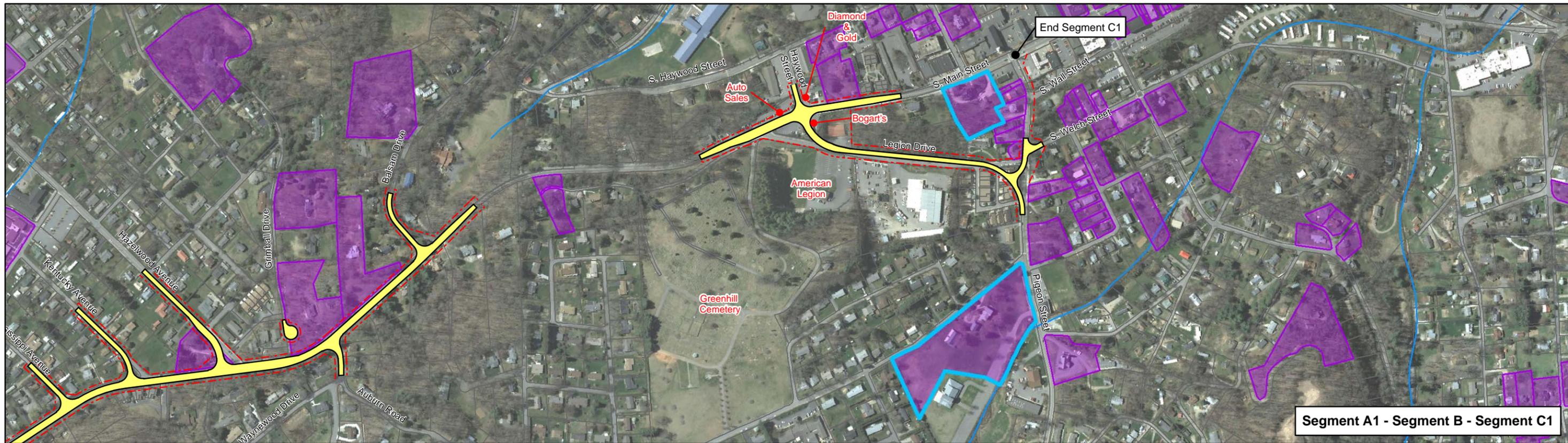


- Legend**
- Proposed Right of Way
 - Proposed Pavement
 - Properties Listed in the National Register of Historic Places
 - City of Waynesville Historic Inventory
 - Municipal Boundary
 - Parcel Boundary

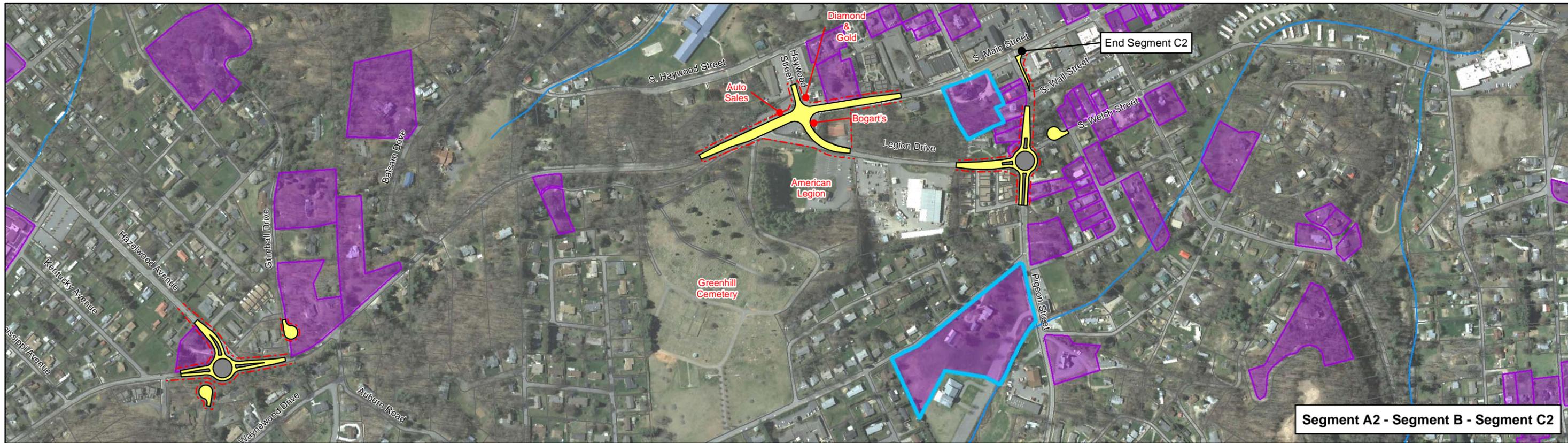


US 23 Business Widening
 US 23 between US 23-74 and US 276 (Pigeon St.)
 Waynesville, NC

Date: 08/2012		Figure 2a
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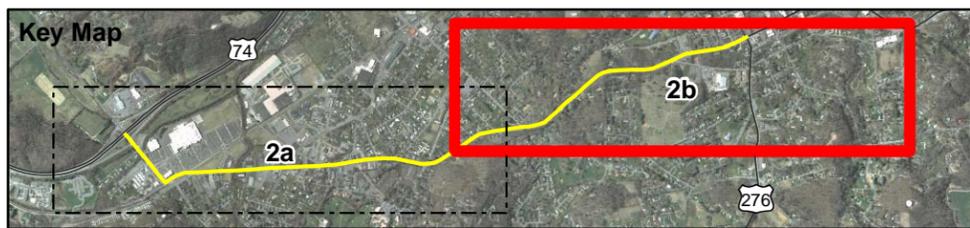
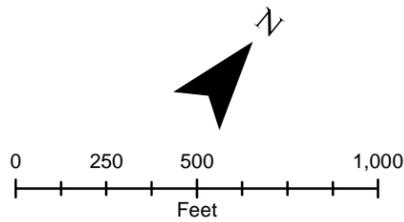


Segment A1 - Segment B - Segment C1



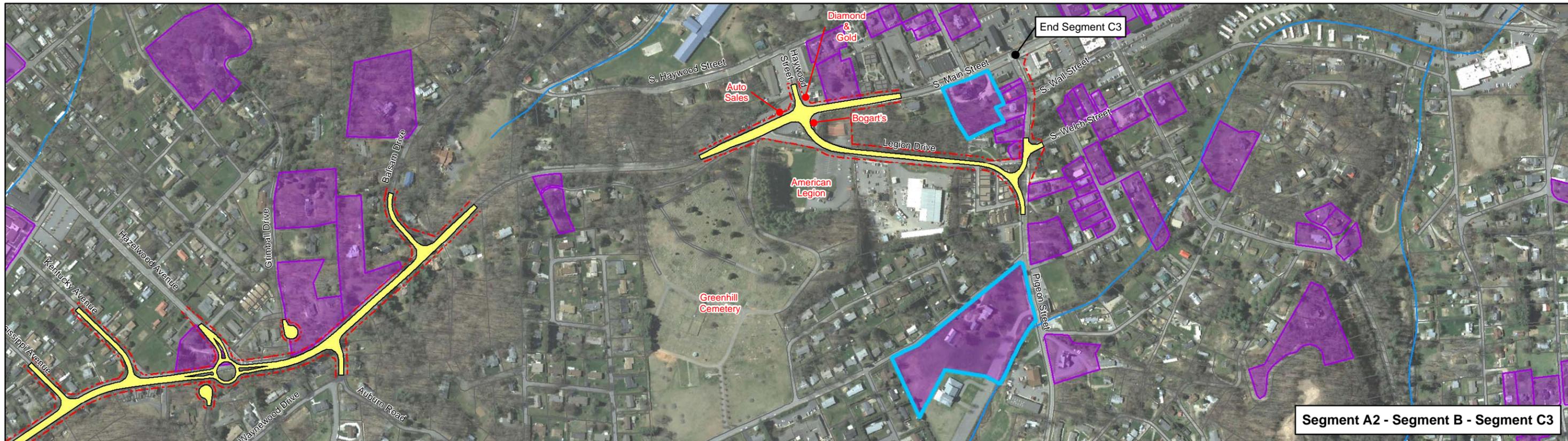
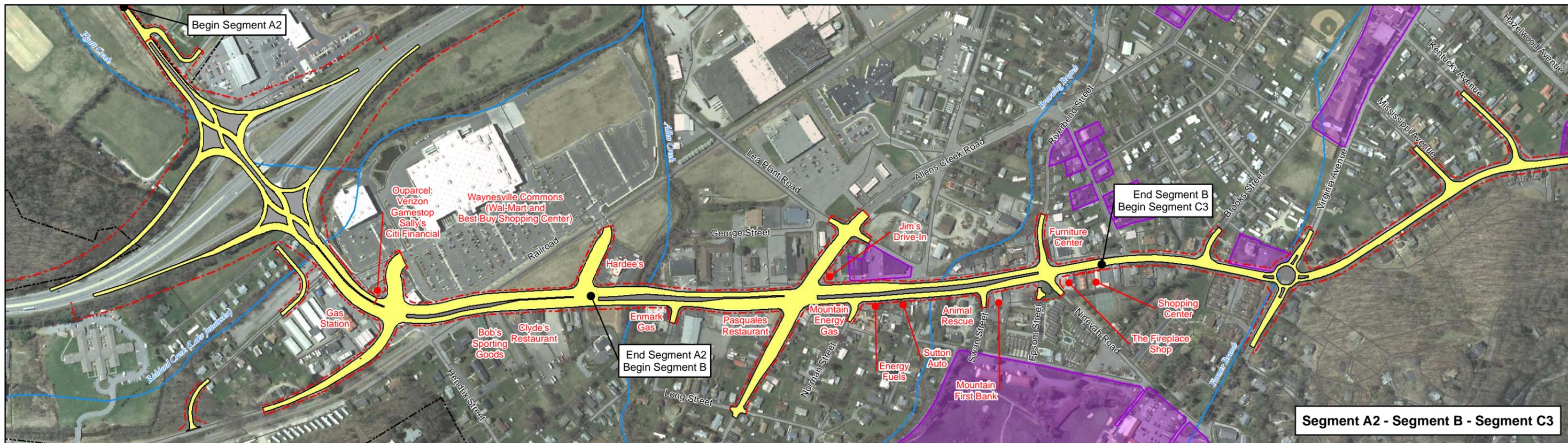
Segment A2 - Segment B - Segment C2

- Legend**
- - - Proposed Right of Way
 - Proposed Pavement
 - Properties Listed in the National Register of Historic Places
 - City of Waynesville Historic Inventory
 - Municipal Boundary
 - Parcel Boundary

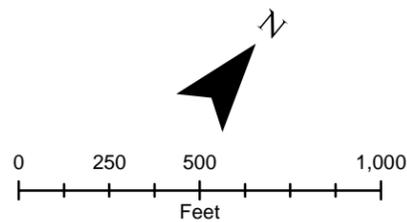


US 23 Business Widening
 US 23 between US 23-74 and US 276 (Pigeon St.)
 Waynesville, NC

Date: 08/2012		Figure 2b
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- Legend**
- Properties Listed in the National Register of Historic Places
 - Municipal Boundary
 - Parcel Boundary

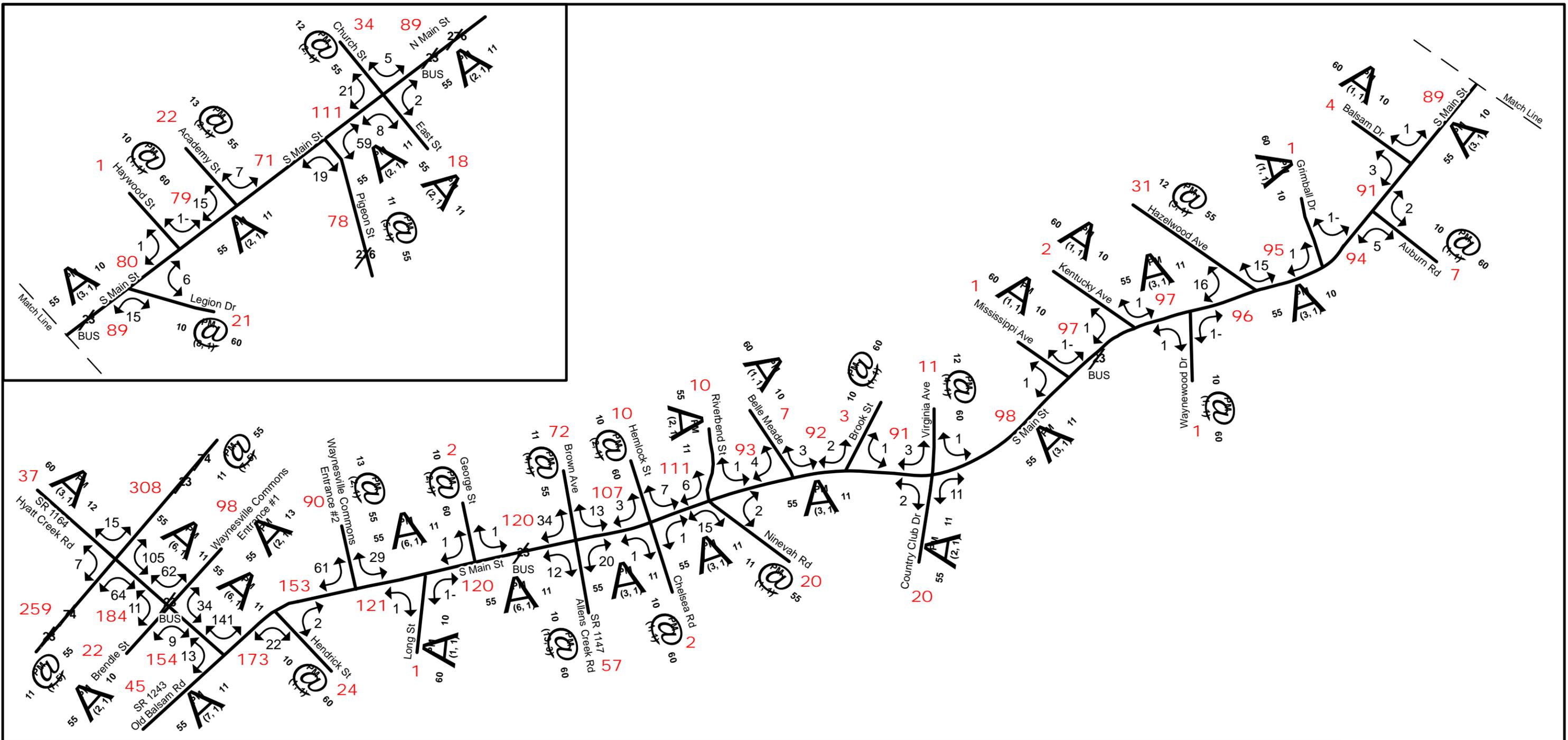


US 23 Business Widening
 US 23 between US 23-74 and US 276 (Pigeon St.)
 Waynesville, NC

Date: 08/2012		Figure 3 Recommended Alternative
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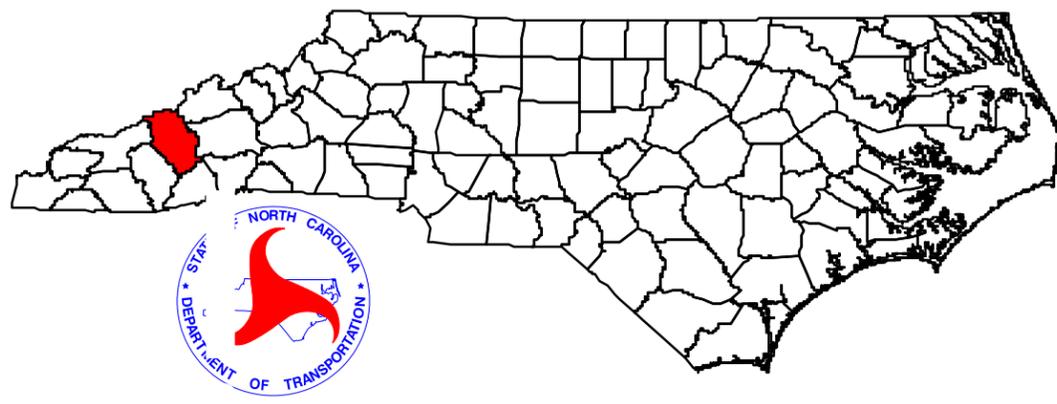
APPENDIX

AVERAGE ANNUAL DAILY TRAFFIC



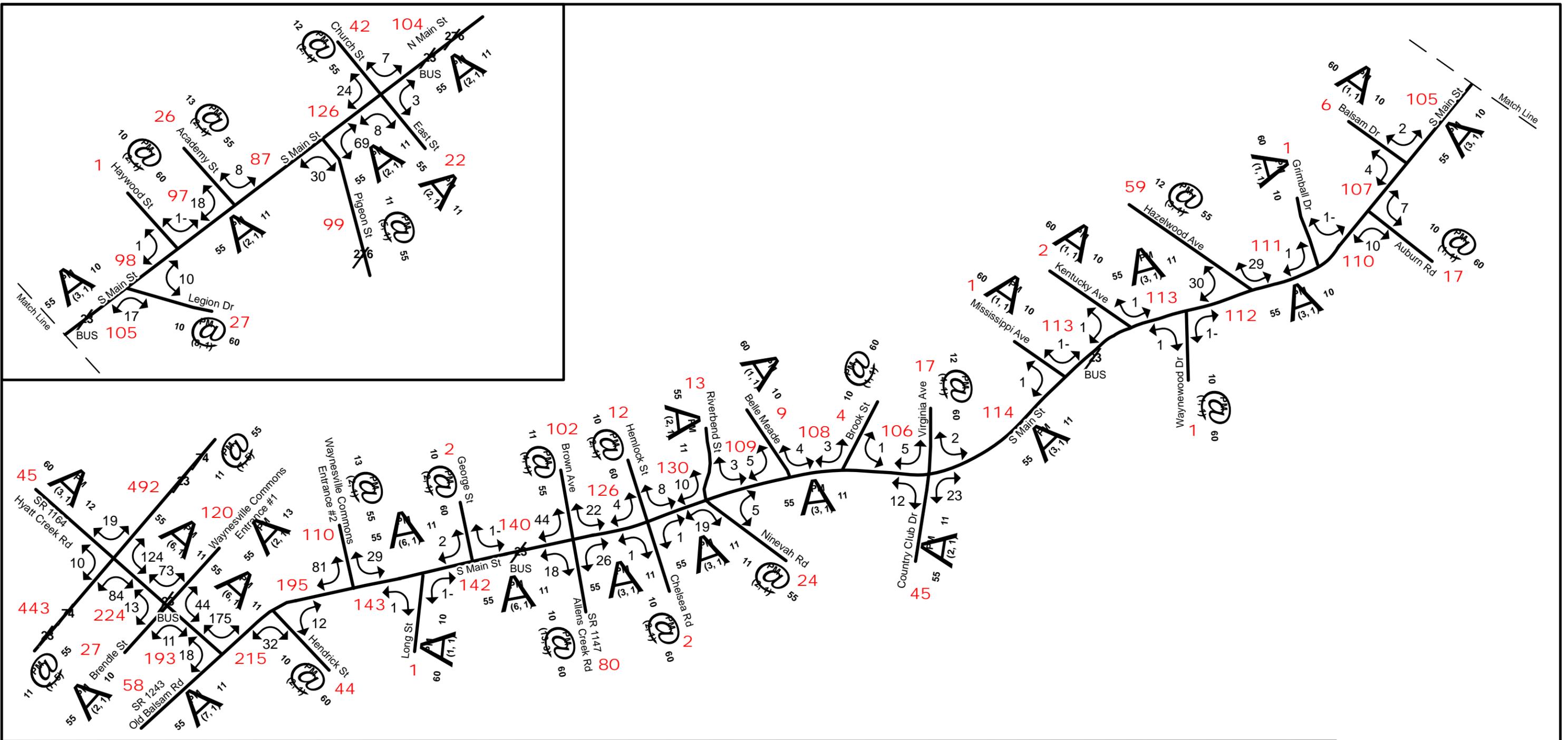
2008 ANNUAL AVERAGE DAILY TRAFFIC
WITH TRUCK, DHV AND DIRECTIONAL PERCENTAGES

COUNTY: Haywood	WBS: 34263.1.1
TIP: U-4712	DIV: 14
DATE: March 25, 2008	
LOCATION: US 23 BUS between US 23-74 and US 276-Pigeon St	
PROJECT: Widen US 23 BUS to Multi-lanes	
PREPARED BY: Keith G. Dixon	



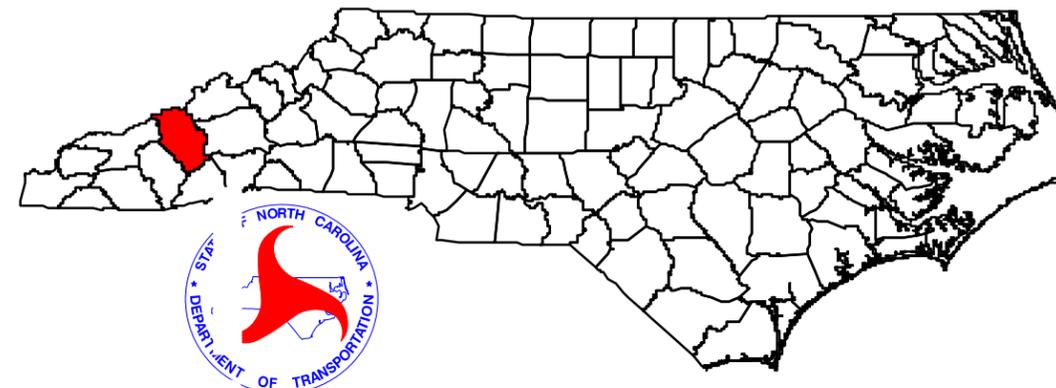
- LEGEND**
- ### Number of Vehicles Per Day in 100s
 - 1- Less Than 50 VPD
 - ### Turning Volume VPD
 - DHV @ D
(d, t)
 - DHV Design Hour Volume % = K30
 - PM PM Peak Period
 - D Peak Hour Directional Split %
 - Direction of D %
 - (d, t) Duals %, TT-STs %
 - X Movement Prohibited
 - ! ! ! Bridge


Diagram Not to Scale



2035 ANNUAL AVERAGE DAILY TRAFFIC
WITH TRUCK, DHV AND DIRECTIONAL PERCENTAGES

COUNTY: Haywood	WBS: 34263.1.1
TIP: U-4712	DIV: 14
DATE: March 25, 2008	
LOCATION: US 23 BUS between US 23-74 and US 276-Pigeon St	
PROJECT: Widen US 23 BUS to Multi-lanes	
PREPARED BY: Keith G. Dixon	



LEGEND

- ### Number of Vehicles Per Day in 100s
- 1- Less Than 50 VPD
- ### Turning Volume VPD
- DHV @ D
(d,t)
- DHV Design Hour Volume % = K30
- PM PM Peak Period
- D Peak Hour Directional Split %
- Direction of D %
- (d, t) Duals %, TT-STs %
- X Movement Prohibited
- ! ! Bridge



Diagram Not to Scale