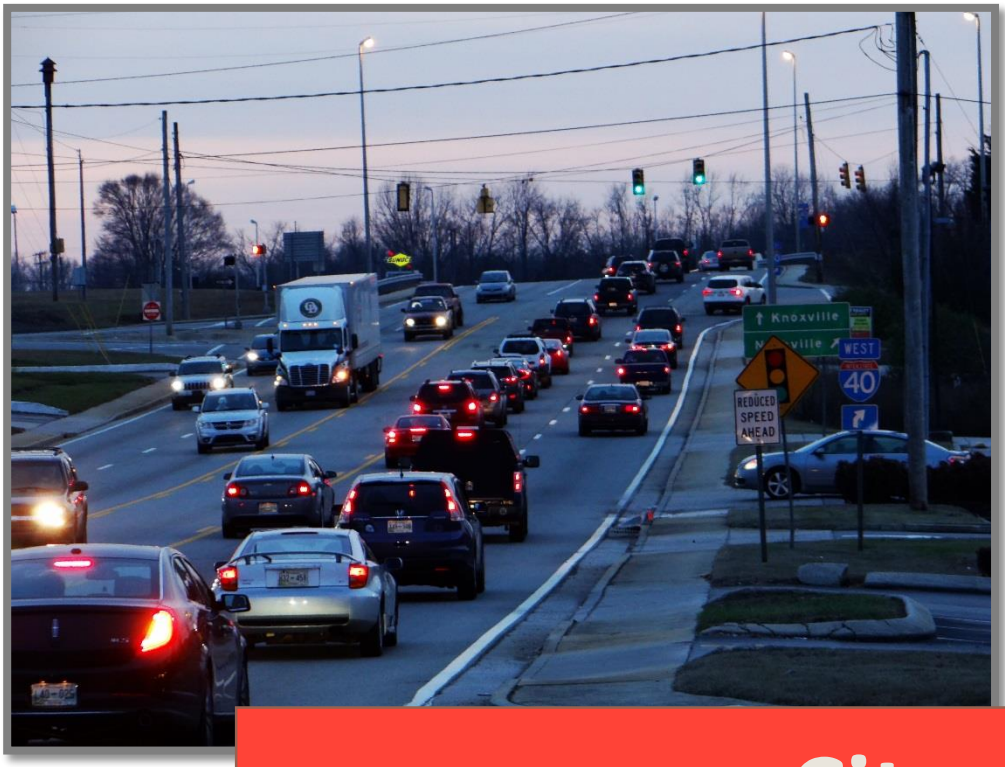

City of Cookeville
Major Street Plan Update

EXISTING ROADWAY LEVEL OF SERVICE

June 2017

TN TDOT Department of Transportation

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1. Introduction

Part of the update to the City's Major Street Plan involves estimating the current level of service (LOS) for each functionally classified road. This technical memo discusses data collection, the analysis method used, and recommends an annual growth rate to be applied to existing traffic volumes to forecast future year traffic. It then presents updated roadway LOS for existing conditions (2015) and compares those values to the LOS projections developed for the 2003 Cookeville Major Route Transportation Plan.

2. Data Collection

Average Annual Daily Traffic (AADT) counts were obtained from Tennessee Department of Transportation (TDOT) traffic history[1] and supplemented with AADT counts performed by the City of Cookeville. The most recent traffic counts are from 2015. Along some segments, data at multiple count locations was available. To be conservative, the highest count available was used. The growth rates assumed for projecting future year AADT (see "Growth Rate Methodology" section below) were applied to any counts that were collected prior to 2015 to grow them to 2015 volumes. This analysis used the highest volume along a segment when more than one AADT count was available.

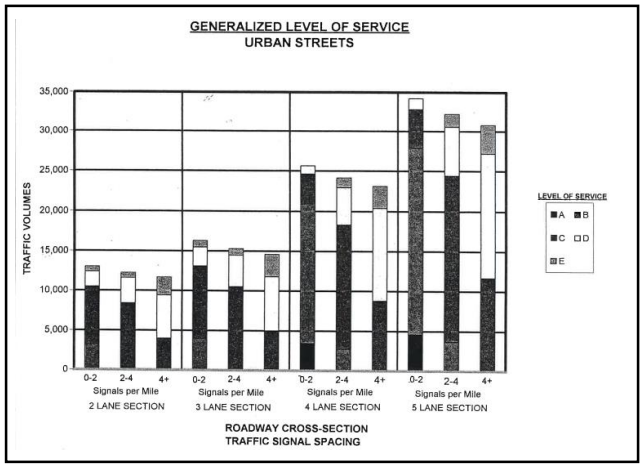
3. Roadway Segment Level of Service Analysis

3.1. Methodology

The methods used to calculate LOS for the 2003 MRTP were reviewed with the goal of using a comparable approach so that values could be compared between the old and new plans.

The 2003 MRTP used 2002 traffic volumes to determine segment LOS values along street and roadway segments throughout Cookeville. The 2002 traffic volumes were projected to what were then future years of 2007 and 2027, and LOS values were determined for each of these two horizon years. Roadway segment LOS was estimated based on using the Florida Department of Transportation (FDOT) generalized planning methodology. The thresholds for the tables referenced in 2003 are shown graphically in **Figure 1.** As shown in the figure, link level of service values were determined using the number of lanes, signal spacing, and the link volume as inputs.

Figure 1: FDOT Generalized Service Volumes (figure referenced in Cookeville 2003 MRTP)



[1] https://www.tdot.tn.gov/APPLICATIONS/traffichistory

To facilitate a reasonable comparison with the 2003 MRTP, this analysis therefore uses the latest (2013) FDOT generalized service planning tables to determine the existing LOS for each roadway functional class, by segment. The LOS volume thresholds in the latest FDOT tables[2] vary based on the following factors:

- Population of surrounding area (Urbanized, Transitioning, Rural)
- Facility Type (signalized arterial, freeway, uninterrupted flow highway)
- Posted speed limit
- Geometry (number of lanes, median type, presence of turn lanes, etc.)

The 2003 MRTP update states that the thresholds in the Class I and Class II Signalized Arterials section of Table 2 of the FDOT tables were used to determine the segment LOS. However, it is not clear how the LOS of *unsignalized* street and roadway segments was determined in the 2003 MRTP, and there is no guidance included with criteria reference shown in Figure 1. The 2013 Florida Quality/Level of Service Handbook[3], which provides guidance for using the current generalized planning tables, also does not include guidance for unsignalized street and roadway segments.

This study therefore used the thresholds for a 2-lane undivided roadway in the Class II Signalized Arterials section of Table 2 of the FDOT tables with a 10% reduction in thresholds for non-state roadways as the base thresholds for unsignalized road segments. This provides a relatively conservative estimate for LOS thresholds for these roadways. Fisk Road, which has three lanes (center lane is reversible), was analyzed as a 2-lane roadway to be conservative.

3.2. Level of Service Results

Figure 2 shows the existing LOS for each functionally classified roadway in the city, by segment. In urban areas, LOS C and D are considered adequate, while LOS F represents undesirable operating conditions.

Table 1 lists each roadway segment and its current LOS, compared to the values from the 2003 MRTP for the years 2002, 2007, and 2027. Three roadway segments currently operate at a failing level of service (LOS E or F):

- E. Spring Street (US 70N/SR 24) from SR 111 to I-40 (LOS E)
- E. 10th Street from Washington Avenue (SR 136) to Chocolate Drive (LOS F)
- E. Spring Street (US 70N/SR 24 from Avery Trace Middle School to Broad Street (LOS F)

E. 10th Street serves as a key corridor for those accessing Cookeville from north and east of the city but has limited capacity (two lanes plus a center turn lane). The relative importance of this segment is evidenced by the AADT, which exceeded 17,000 vehicles per day in 2015. This volume is higher than the traffic volumes on SR 24/US 70N in Cookeville and is high enough to result in an LOS F for this 3-lane facility. In addition to the traffic volumes, several factors along E. 10th Street further exacerbate the congestion issues including uncoordinated traffic signals and close spacing between driveways.

Similarly, E. Spring Street (US 70N/SR 24) serves as a key east-west corridor into and out of Cookeville to and from points south and east of the city. The two failing segments are both located east of downtown.

[2] http://www.fdot.gov/planning/systems/programs/sm/los/pdfs/fdot%202012%20generalized%20service%20volume%20tables.pdf
[3] http://www.fdot.gov/planning/systems/programs/SM/los/pdfs/2013%20QLOS%20Handbook.pdf

The segment operating at LOS F, just east of downtown, has seen an increase of 1,800 vehicles per day in traffic volume since the 2003 MRTP report, which also documented this segment as operating at LOS F. Since the 2003 report was completed, this segment has been widened for a short distance to provide a center turn amidst multi-family residential and commercial driveways; however, the analysis still shows the segment operating at LOS F. The segment operating at LOS E is a two-lane segment with limited right or left-turn lanes that serves primarily suburban and semi-rural land uses.

As part of the existing conditions analysis it was noted that a reversible lane operation exists on Fisk Road between E. 10th Street and Shag Rag Road. A safety analysis of this segment determined that there is presently no significant crash history along this segment. However, as traffic on this roadway segment continues to increase this segment should be monitored to ensure that it continues to operate safely. Details of the crash history and safety analysis can be found in the Safety Report.

Figure 2: Existing LOS (2015) by Roadway Segment

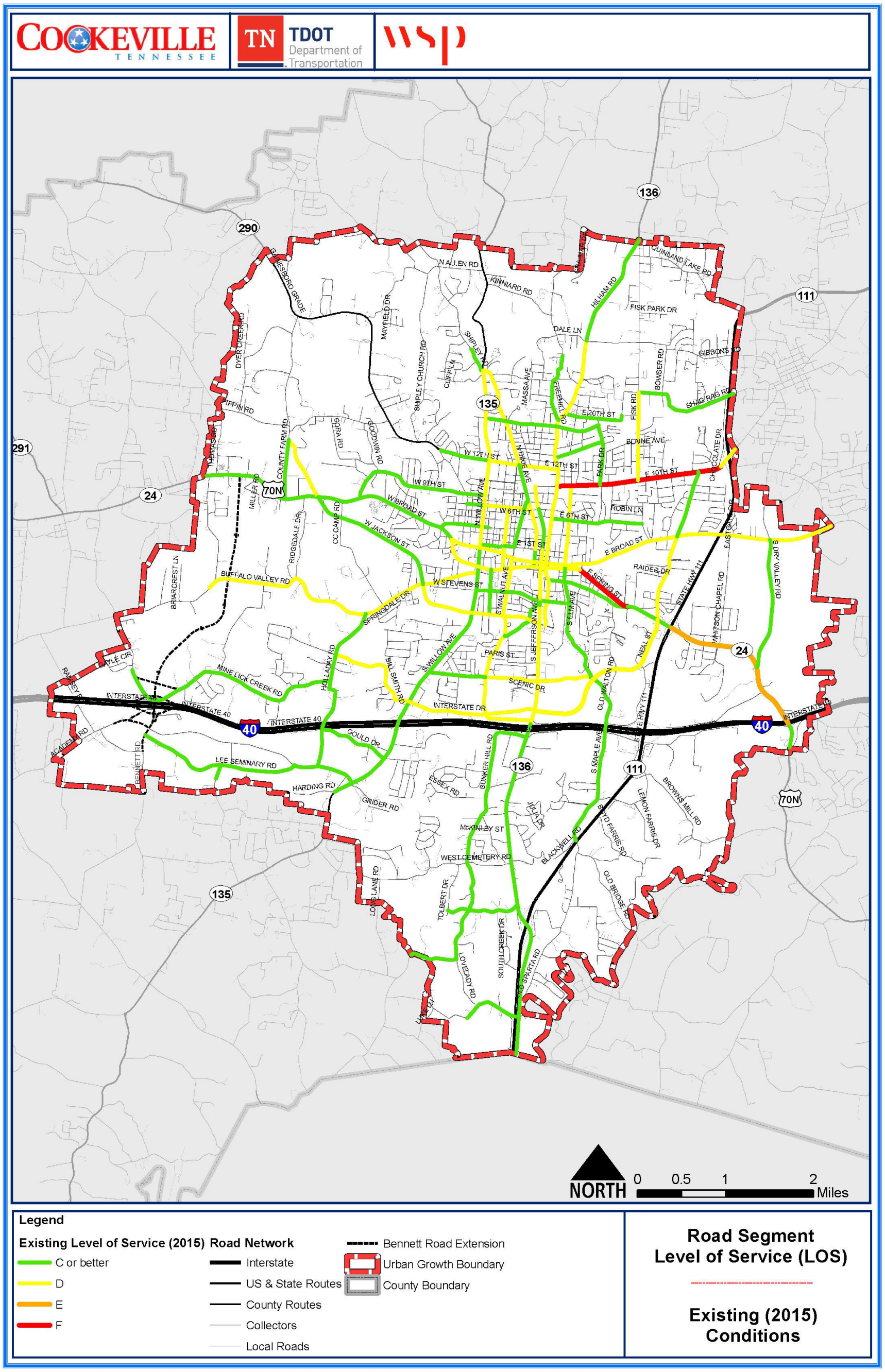


Table 1: Existing LOS (2015) by Roadway Segment, Compared to 2003 MRTP

Street Name	From	To	Class	2015 AADT	2015 LOS	FROM 2003 MRTP			
						2002 AADT	2002 LOS	Projected 2007 LOS	Projected 2027 LOS
1st Street West	Cedar Ave	Walnut Ave	Minor Collector	4,200	C				
1st Street East	Willow Ave	Cedar Ave	Minor Collector	948	C				
4th Street West	Broad St	Whitney Ave	Minor Collector	1,966	C	1,525	B	B	B
6th Street East	Washington Ave	Fisk Rd	Minor Collector	1967*	C	1,334	B	B	B
7th Street	Willow Ave	Dixie Ave	Major Collector	8,414	D	8,711	D	D	F
7th Street West	Franklin Ave	Willow Ave	Minor Collector	3,523	C	2,778	B	B	C
9th Street East	Dixie Ave	Washington Ave	Minor Collector		need counts				
9th Street West/Crescent Drive	Broad St	Willow Ave	Minor Collector	3,083	C	2,360			
10th Street East	Washington Ave	Chocolate	Major Arterial	17,505	F	14,127	D	E	F
10th Street East	Chocolate	City Limits	Major Arterial	13,907	D	12,536	B	B	B
12th Street (SR 290)	City Limits	Franklin Ave	Minor Arterial		need counts	7,500	C	C	D
12th Street (SR 290)	Franklin Ave	Willow Ave	Minor Arterial	9,283	C	8,272	B	B	B
12th Street	Willow Ave	Mississippi Ave	Minor Arterial	13796*	D	7,157	C	C	C
12th Street	Mississippi Ave	Washington Ave	Minor Arterial	10,116	D	5,093	C	C	C
15th Street East	Washington Ave	Brown Ave	Minor Arterial	1,677	C	1,369	B	B	B
20th Street East	Washington Ave	Summerfield Rd	Minor Collector	3,232	C	2,851	B	B	C
Bill Smith Road / Foreman Drive	Holladay Rd	Willow Ave	Major Collector	4,936	D	4,386	C	C	C
Broad Street / US 70N	City Limits	Jackson St	Major Arterial	7,789	C	8,588	C	C	F
Broad Street / US 70N	Jackson St	Spring St	Major Arterial	7,789	C	8,588	C	C	F
Broad Street	Spring St	Cedar Ave	Major Collector	6,687	D	6,171	C	C	C
Broad Street	Cedar Ave	Washington Ave	Major Collector	6992*	D	7,030	D	D	D
Broad Street	Washington Ave	Spring Extension	Major Collector	7941*	D	7,568	C	C	D
Broad Street	Spring Extension	US 111	Major Collector	5,461	D	4,300	C	C	C
Broad Street / Buck Mt. Road	US 111	City Limits	Major Collector	4,750	D	3,248	C	C	C
Brown Avenue	10th St.	Jere Whitson Rd	Minor Collector	2,646	C	2,531	B	B	C

*AADT value was forecasted from 2013 AADT value
**AADT value was forecasted from 2012 AADT value
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Table 1: Existing LOS (2015) by Roadway Segment, Compared to 2003 MRTP

Street Name	From	To	Class	2015 AADT	2015 LOS	FROM 2003 MRTP			
						2002 AADT	2002 LOS	Projected 2007 LOS	Projected 2027 LOS
Brown's Mill Road	US 111	City Limits	Minor Collector		need counts				
Buffalo Valley Road	City Limits	Jackson St	Major Collector	6,508	D	4,651	C	C	C
Buffalo Valley Road	Jackson St	Willow Ave	Minor Collector	5,543	D	4,016	C	C	C
Bunker Hill Road	City Limits	Davis Rd	Major Collector	2516*	C	2,000	B	B	C
Bunker Hill Road	Davis Rd	S Jefferson Ave	Minor Collector	4,482	C	719	B	B	B
Cane Creek Road	City Limits	Lee Seminary Rd	Major Collector	328**	C				
Cedar Avenue	Spring St	7th St	Major Collector	4985*	D	3,784	C	C	C
Dixie Avenue	Spring St	1st St	Major Collector	4,520	C	7,109	D	D	D
Dixie Avenue	1st St	Mahler Ave	Major Collector	4769*	D	7,109	C	C	D
Dixie Avenue	Mahler Ave	12th St	Major Collector	8,353	C	7,308	C	C	D
Dixie Avenue	12th St	Willow Ave	Major Collector	4828*	D	6,606	C	C	D
Dry Valley Road	US 70N	Buck Mountain Rd	Major Collector	2,688	C	2,234	B	B	C
Fairground Street	Willow Ave	Walnut Ave	Major Collector	4124*	C	2,182	B	B	C
Fisk Road	10th St	City Limits	Major Collector	6,116	D	4,118	C	C	C
Foutch Drive	Walnut Ave	Jefferson Ave	Minor Collector	751	C	2,635	B	B	C
Freehill Road	Washington Ave	City Limits	Minor Collector	1275*	C	1,141	B	B	B
Gould Drive	Holladay Rd	Willow Ave	Minor Collector	2254*	C	2,362	B	B	C
Hawkins Crawford Road	City Limits	Mine Lick Creek Rd	Minor Collector	2,000	C				
Holladay Road	Lee Seminary Rd	Buffalo Valley Rd	Minor Collector	889*	C	3,700	C	C	C
Hudgens Street	Lowe Ave	Spring St	Minor Collector	2,854	C	2,944	B	C	C

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Table 1: Existing LOS (2015) by Roadway Segment, Compared to 2003 MRTP

Street Name	From	To	Class	2015 AADT	2015 LOS	FROM 2003 MRTP			
						2002 AADT	2002 LOS	Projected 2007 LOS	Projected 2027 LOS
Interstate Drive	Willow Ave	Jefferson Ave	Major Arterial	15,197	D	12,929	B	B	B
Jackson Street	Broad St	Cane Creek Elementary	Major Arterial	10,132	C	8,138	B	B	B
Jackson Street	Cane Creek Eleme	Buffalo Valley Rd	Major Arterial	11,161	C	9,088	C	C	C
Jackson Street	Buffalo Valley Rd	Willow Ave	Major Arterial	18,260	D	11,281	C	C	C
Jackson Street	Willow Ave	Scott Ave	Minor Arterial	13182***	D	13,117	D	D	D
Jackson Street	Scott Ave	Walnut Ave	Minor Arterial	13,048	D	13,117	D	D	E
Jackson Street	Walnut Ave	Jefferson Ave	Minor Arterial	13,246	D	13,117	B	B	B
Jefferson Avenue	City Limits	US 111 NB Ramps	Minor Collector	2,598	C	2,427	B	B	C
Jefferson Avene (SR 136)	US 111 NB Ramps	Davis Rd	Major Arterial	11,270	C	13,331	D	D	F
Jefferson Avene (SR 136)	Davis Rd	Bunker Hill Rd	Major Arterial	14,836	C	13,331	B	B	C
Jefferson Avene (SR 136)	Bunker Hill Rd	I-40	Major Arterial	14,836	C	13,331	D	D	D
Jefferson Avene (SR 136)	I-40	Stevens St	Major Arterial	24,357	D	25,551	D	D	F
Jefferson Avene (SR 136)	Stevens St	Spring St	Major Arterial	15,138	D	15,280	D	D	F
Jefferson Avenue	Spring St	1st St	Minor Collector	7874***	D	1,924	C	C	C
Jefferson Avenue	1st St	7th St	Minor Collector	2221*	C	2,060	B	B	C
Jefferson Avenue	7th St	10th St	Minor Collector	5,870	D	4,828	C	C	C
Jere Whitson Road	Willow Ave	Brown Ave	Minor Collector	4184*	C	4,166	C	C	C
Lee Seminary Road	Bennett Rd	Holladay Rd	Minor Collector	910	C				
Lee Seminary Road	Holladay Rd	Burgess Falls Rd	Minor Collector	1,063	C				
Lovelady Road	City Limits	Jefferson Ave	Minor Collector	441	C	533	B	B	B
Lowe Avenue	Jackson St	Spring St	Minor Arterial	11048***	D	11,870	D	D	D
Mahler Avenue	1st St	6th St	Major Collector	4,209	C	2,702	B	B	C
Mahler Avenue	6th St	Dixie Ave	Major Collector	4,209	C	2,702	B	B	C
Maple Avenue	10th St	Broad St	Major Collector	6154**	D	2,983	B	C	C
Maple Avenue	Broad St	Hudgens St	Major Collector	4602*	C	1,392	B		
Maple Avenue	Hudgens St	Veterans Dr	Major Collector	3,647	C	2,123	B	B	C
Maple Avenue	Veterans Dr	I-40 Overpass	Minor Collector	4,204	C	2,196	B	B	B
Maple Avenue	I-40 Overpass	US 111	Minor Collector	2,626	C	3,517	C	C	C

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Table 1: Existing LOS (2015) by Roadway Segment, Compared to 2003 MRTP

Street Name	From	To	Class	2015 AADT	2015 LOS	FROM 2003 MRTP			
						2002 AADT	2002 LOS	Projected 2007 LOS	Projected 2027 LOS
Mine Lick Creek Road	City Limits	Holladay Rd	Minor Collector	1148*	C				
Neal Street	Jefferson Ave	Spring St	Major Arterial	14,630	D	11,269	B	B	B
Old Kentucky Road	Spring St	10th St	Major Collector	7,732	D	5,701	C	C	C
Pigeon Roost Creek Road	City Limits	Jefferson Ave	Minor Collector	1,127	C	1,247	B	B	B
Scott Avenue	Jackson St	Spring St	Minor Collector	3797*	C	2,827	C	C	C
Summerfield Road / Shag Rag Road	Fisk Rd	City Limits	Minor Collector	1,579	C	1,712	B	B	B
Shipley Road	City Limits	Willow Ave	Minor Collector	2382*	C	2,343	B	B	C
Stevens Street	Willow Ave	Maple Avenue	Minor Collector	4,478	C	3,369	C	C	C
Veterans Drive	Walnut Ave	Neal St	Minor Collector	8,255	D	5,068	C	C	C
Walnut Avenue	Broad St	Interstate Dr	Major Collector	8,931	D	4,845	C	C	C
Walnut Avenue	Interstate Dr	Jefferson Ave	Minor Collector	5,879	D	4,056	D	D	D
N Washington Ave (SR 136)	Spring St	Broad Ave	Major Arterial	10301***	D	12,495	E	E	F
N Washington Ave (SR 136)	Broad Ave	1st St	Major Arterial	11,523	D	12,495	C	C	C
N Washington Ave (SR 136)	1st St	10th St	Major Arterial	16,640	D	13,484	D	E	F
N Washington Ave (SR 136)	10th St	15 St/17th*	Major Arterial	15,256	D	9,446	B	B	B
N Washington Ave (SR 136)	15 St/17th	Whitaker Springs	Major Arterial	9660*	D	5,582	D	D	D
N Washington Ave (SR 136)	Whitaker Springs	City Limits	Minor Arterial	4,867	C	5,671	C	C	C
N Willow Ave (SR 135)	Dixie Ave	12th St	Major Arterial	8,495	D	7,711	C	C	E
N Willow Ave (SR 135)	12th St	Broad St	Major Arterial	16,076	D	15,361	C	C	F
S Willow Ave (SR 135)	Broad St	I-40	Major Arterial	24,690	C	23,878	C	D	F
S Willow Ave (SR 135)	I-40	City Limits	Major Arterial	14,925	C	14,943	F	F	F

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Table 1: Existing LOS (2015) by Roadway Segment, Compared to 2003 MRTP

Street Name	From	To	Class	2015 AADT	2015 LOS	FROM 2003 MRTP			
						2002 AADT	2002 LOS	Projected 2007 LOS	Projected 2027 LOS
Spring St East (US 70N)	City Limits	I-40	Major Arterial	8,623	C	8,170	C	C	F
Spring St East (US 70N)	I-40	US 111	Major Arterial	11,256	E				
Spring St East (US 70N)	US 111	Old Kentucky Rd	Major Arterial	17,034	C	12,294	D	D	D
Spring St East (US 70N)	Old Kentucky Rd	School	Major Arterial	13,802	C	13,495	D	D	F
Spring St East (US 70N)	School	Split	Major Arterial	15269*	F	13,495	F	F	F
Spring St East (US 70N)	Split	Walnut Ave	Major Arterial	10,760	D	10,312	D	D	F
Spring St East (US 70N)	Walnut Ave	Broad St	Major Arterial	8,341	D	8,415	C	C	D

*AADT value was forecasted from 2013 AADT value
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4. Growth Rate Methodology

Before projecting future roadway LOS, it is necessary to determine the traffic growth rates to be applied.

Growth rates for the SR 135, SR 136 and SR 24/US 70N corridors have already been proposed and documented separately in the Corridor Analysis Existing Conditions Report. (See Table 9 in that report.)

A 1 percent annual growth rate is recommended for use on the city's other arterial corridors, based on analysis of historical growth rates across all count locations in Cookeville, excluding I-40 and SR 111. As shown in **Table 2**, the average of the 5, 10, and 15-year historical traffic growth rate for these stations is just over 1 percent.

Table 2: Annual Growth Rate Based on Historical Traffic Counts

Count Stations	Annual Growth Rate			
	5-year	10-year	15-year	Average
Cookeville Stations	0.29%	1.28%	1.45%	1.01%

With a conservative assumption that the major arterials will reach saturation, causing motorists to use non-arterial routes, it is reasonable to assume that traffic volumes will grow at a higher rate for non-arterial roadways. Accordingly, a 1.5 percent annual growth rate in traffic volumes is recommended for corridors that are not functionally classified as arterials.