



Elrod Road / Natcher Parkway Interchange Study Traffic Forecasting Report

Warren County, Kentucky • Item No. 3-130.00
December 2008



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1. Travel Demand Model Refinements

The current Bowling Green/Warren County Travel Demand Model (TDM) was completed in March of 2004 retaining the MINUTP software platform of its August 2000 processor. The current TDM has a base year of 2000 and a future year of 2030. While BLA is in the process of converting the TDM to the TRANSCAD software platform, moving up the base year to 2008 and pushing out the future year to 2040, the updated travel model will not be available until late fall of 2008 under another KYTC contract.

New Travel Analysis Zones

For the Elrod Road/Natcher Parkway Interchange Study, the first refinement to the current TDM involved disaggregating the existing TAZs in the Study Area generally bounded by Campbell Lane (US 231) on the north, Scottsville Road (US 231) and Drakes Creek on the east, the Warren-Simpson County Line on the south, and Russellville Road (US 68/KY 80) on the west. As can be seen in Figure 1, existing TAZs were split along Elrod Road (Natcher Parkway to Smallhouse Road), the Natcher Parkway Extension (I-65 to US 231) and Rich Pond Road (KY 242 from US 31W to KY 622). The new TAZs begin with the number "9" followed by the parent zone number.

FIGURE 1: NEW TRAVEL ANALYSIS ZONES

Having created a new TAZ structure in the Elrod Road Interchange Study Area, the TAZ socio-economic database for the year 2000 was generated by re-aggregating the 2000 Census demographics (population, group quarters, households and housing units) to match the new TAZ geography and re-aggregating the address-specific employment information (Employment Securities 202 database for year 2000) for the new zones.

Next, the population and employment forecasts for the year 2030 were assigned preliminarily to the new TAZ geography based on aerial photography and information from the Kentucky Cabinet of Economic Development on available industrial sites (i.e., South Central Kentucky Industrial Park, Murphy Industrial Property and Berry Industrial Property). The Countywide 2030 forecasts of 142,185 persons and 100,320 non-farm jobs were retained, up from 92,552 persons and 63,044 non-farm jobs in year 2000. Likewise, the Study Area 2030 forecasts of 43,400 persons and 28,048 jobs were retained, up from 21,595 persons and 16,721 jobs in year 2000.

These preliminary population and employment change forecasts by TAZ were reviewed by a group of transportation and development officials on February 7, 2008, with follow-up communications with the City-County Planning Commission of Warren County staff. Based on this input, the TAZ forecasts were finalized as shown in Figure 2-population change and Figure 3-employment change and Table 1.

FIGURE 2: 2000-2030 POPULATION CHANGE

FIGURE 3: 2000-2030 EMPLOYMENT CHANGE

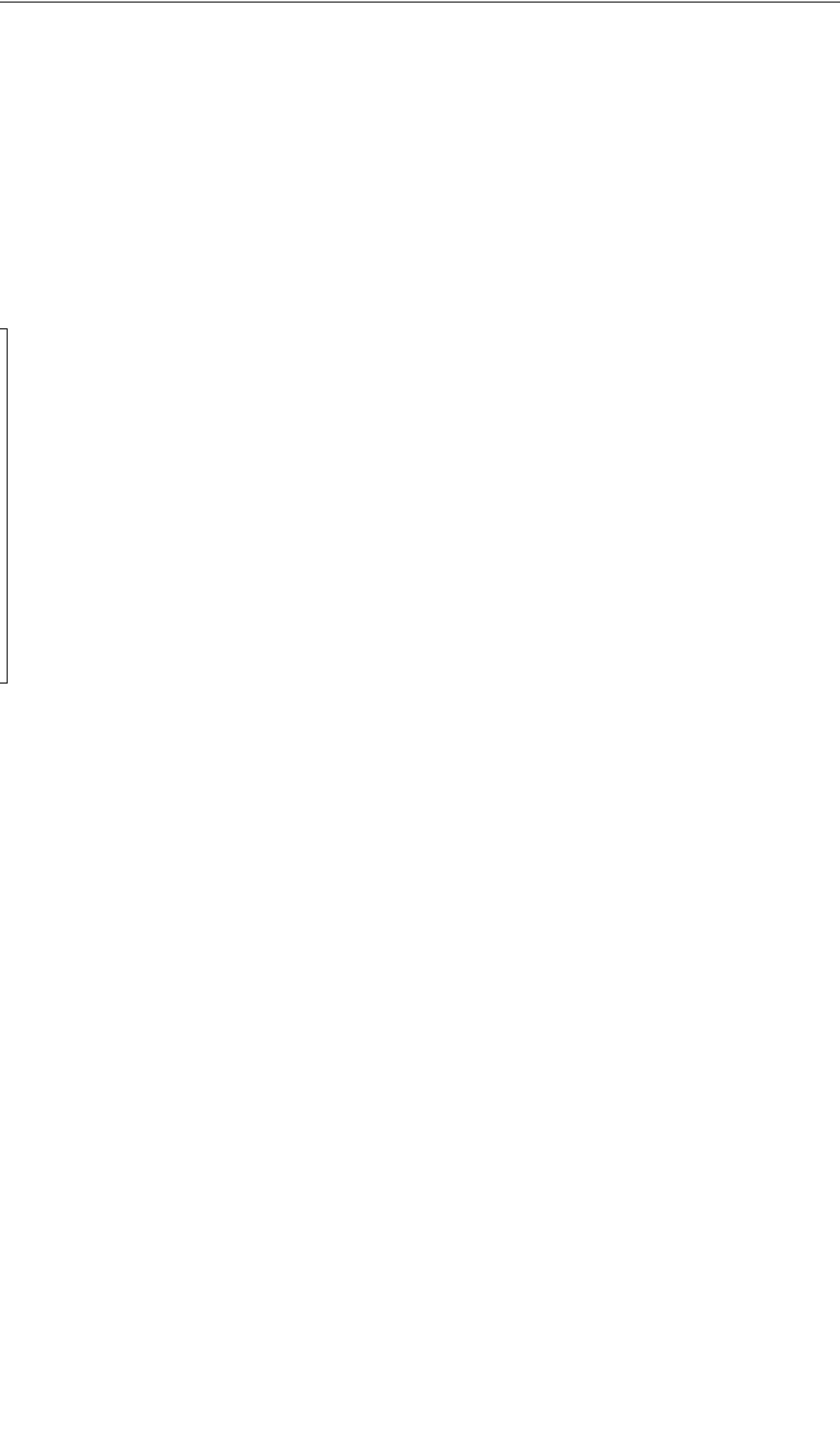


TABLE 1: Population and Employment Forecasts for Years 2000 and 2030



New Base Network

Starting with the year 2000 roadway network of the existing TDM, roadway improvements were identified that added capacity (i.e., “capacity expansion” projects) to the network:

- 1) Ken Bale Boulevard → new 4-lane road from Scottsville Road (US 231)/ Three Springs Road (KY 844) intersection to Shive Lane west of Shire Boulevard
- 2) US 231 → widened to 4 lanes from existing 4-lane segment near Cypress Wood Lane to Allen County Line
- 3) I-65 → widening to 6 lanes from Carter-Sims Road to Natcher Parkway, widening to 8 lanes from Natcher Parkway to Scottsville Road (US 231), and widening to 6 lanes from Scottsville Road(US 231) to Barren County Line
- 4) Lovers Lane (KY 880) → widened to 4 lanes from north of Fruit of the Loom Drive to Fairview Avenue/Cemetery Road (KY 234)
- 5) Veterans Memorial Boulevard (KY 880) → widening to 4 lanes from Russellville Road (US 68/KY 80) to Old Barren River Road
- 6) 6th Street (KY 880) → widening to 4 lanes from Gordon Avenue to Kentucky Street
- 7) 6th Street (KY 234) → change to 2-lanes westbound between Center Street and Kentucky Street
- 8) 6th to 7th Connector (KY 234) → add 2-lane eastbound connector from 6th at Kentucky Street to 7th at Center Street
- 9) Glasgow Road (US 68/KY 80) → widening to 4 lanes from Louisville Road (US 31W) to Cosma Drive (in TransPark)
- 10) Big Red Way (Avenue of Champions) → 1-lane in each direction from University Boulevard (Business US 231) to Center Street
- 11) Morgantown Road (Business US 231) → 4-lanes from Russellville Road (US 68/KY 80) intersection to University Boulevard (coding error)
- 12) Gordon Avenue (KY 185) → 4-lanes from 6th Street to Double Springs Road (coding error)
- 13) Old Louisville Road → 4-lanes from State Street/College Street intersection to Louisville Road (US 31W) (coding error) (KY 3225)
- 14) College Street → add 2-lanes southbound from State Street/College Street to 6th Street
- 15) State Street → 2-lanes northbound from 6th Street to College Street/Old Louisville Road intersection (coding error)

The addition of these major roadway improvements to the year 2000 network established the new base network for the year 2008. Travel demand model runs were made for the new 2008 base network for the years 2000 and 2030 for review purposes only, referring to Figures 4 and 5.

FIGURE 4: Year 2000 Daily Traffic on 2008 Network

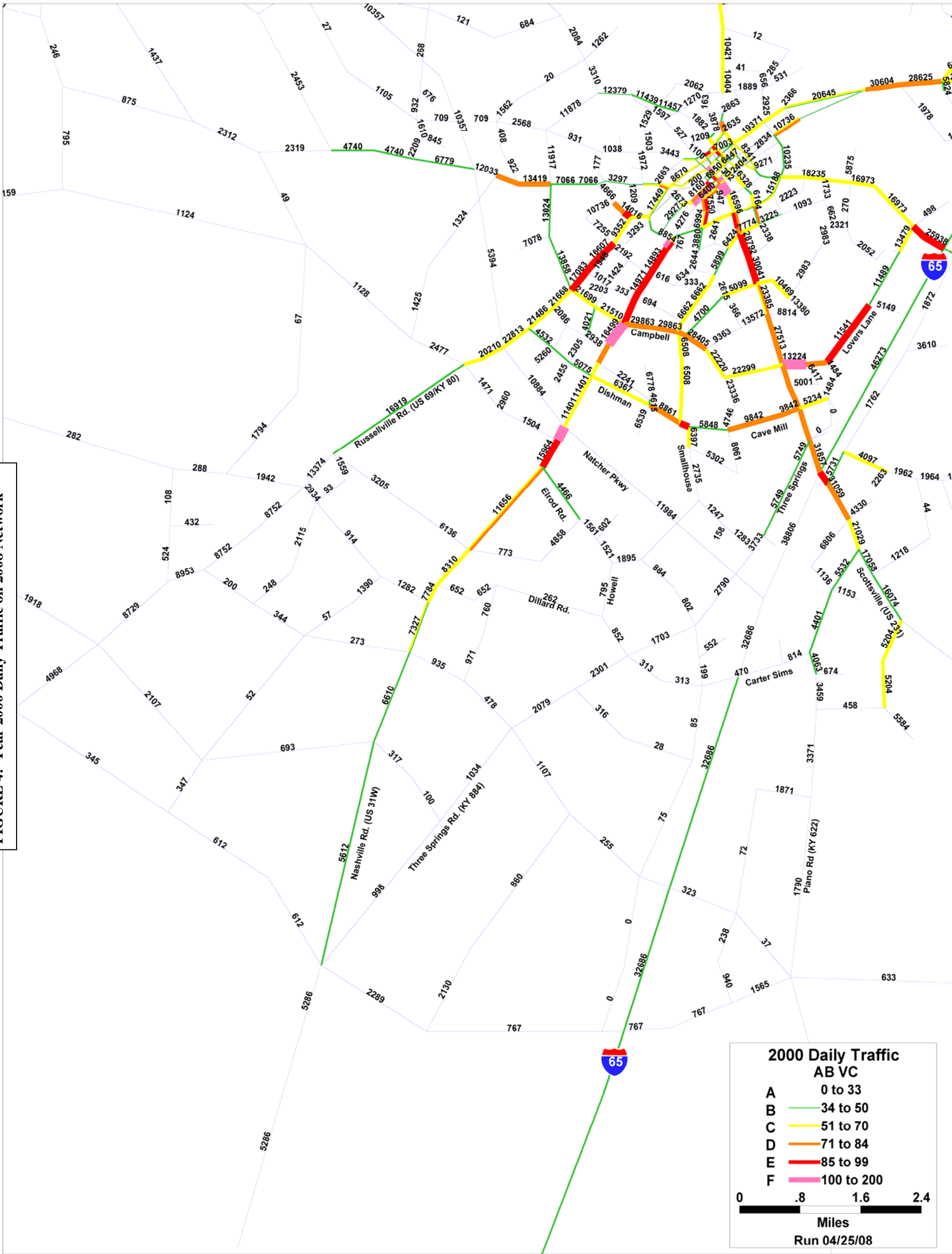
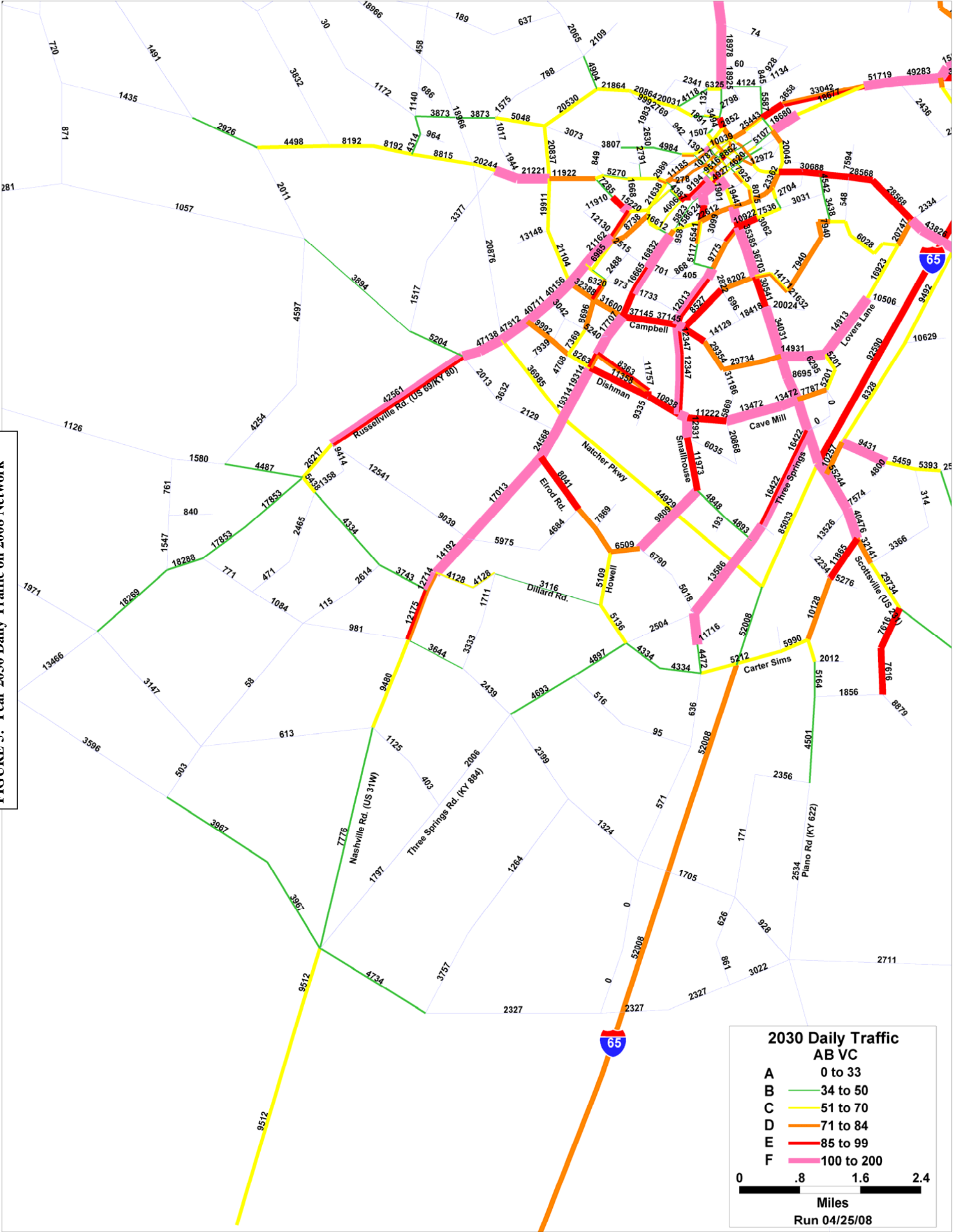


FIGURE 5: Year 2030 Daily Traffic on 2008 Network



2. No Build Alternative

The No Build Alternative consists of the existing network in the year 2008 plus committed projects that are anticipated to be completed accordingly to the Bowling Green/Warren County Metropolitan Planning Organization's adopted Transportation Improvement Program. This Existing-plus-Committed Network establishes the benchmark for the evaluation of the Build Alternatives.

The committed "capacity expansion" projects are:

- 1) Cumberland Trace (KY 2158) → relocation of intersection with Scottsville Road (US 231) at Mel Browning Street to Cherry Farm Lane at Scottsville Road (US 231)
- 2) Natcher Parkway Extension → 4-lane freeway from I-65 to US 231W at Upton Road (east of Dye Ford Road) with interchange at Plano Road (KY 622)
- 3) I-65 → widening to six lanes from Carter-Sims Road southward to Tennessee State Line
- 4) I-65/US 231 interchange reconstruction (replace existing rural diamond interchange with single-point-urban-diamond interchange)
- 5) Lovers Lane (KY 880) → widening to 4 lanes from Cemetery Road (KY 234) to Scottsville Road (US 231)
- 6) Three Springs Road (KY 844) → widening to 4 lanes from Scottsville Road (US 231) to Flea Land Road (south of Sutherland Drive and Fieldstone Boulevard, use TAZ connector)
- 7) Nashville Road (US 31W) → widening to 4 lanes from Campbell Lane (US 231) to Dillard Road

No Build Alternative Conditions

Year 2030 traffic forecasts for the No Build Alternative (Figure 6) show significant congestion on arterial facilities in the northern portion of the Elrod Road Interchange Study Area even with the widening of Nashville Road (US 31W) to four lanes. The daily traffic capacity from the TDM is found below in Table 2, and is based on a K-factor (i.e., ratio of peak-hour to daily traffic) of 10%.

A level-of-service (LOS) of D is generally considered the minimum acceptable level-of-service in urban areas. Thus, facilities with a LOS E (operating at capacity = volume-to-capacity ratio of 0.85 to 0.99) or LOS F (unstable flow = volume-to-capacity of 1.00 or greater) are considered to have significant congestion. These facilities include:

- Russellville Road (US 68/KY 80) from south of Morgantown Road (Business US 231) to north of KY 1083
- Nashville Road (US 31W) from University Drive (Business US 231) to north of Dillard Road
- Elrod Road from Herman Avenue to Smallhouse Road
- Three Springs Road (KY 884) from Matlock Road to north of Smallhouse Road
- Dishman Road-Cave Mill Road from Nashville Road (US 31W) to Scottsville Road (US 231)
- Elrod Road from Nashville Road (US 31W) to Earlston Street

It should be noted that, among the north-south roadways in the Study Area, Three Springs Road (KY 884) is under-utilized as a four-lane roadway from Smallhouse Road to Scottsville Road (US 231).

FIGURE 6: Year 2030 Daily Traffic on No Build Network

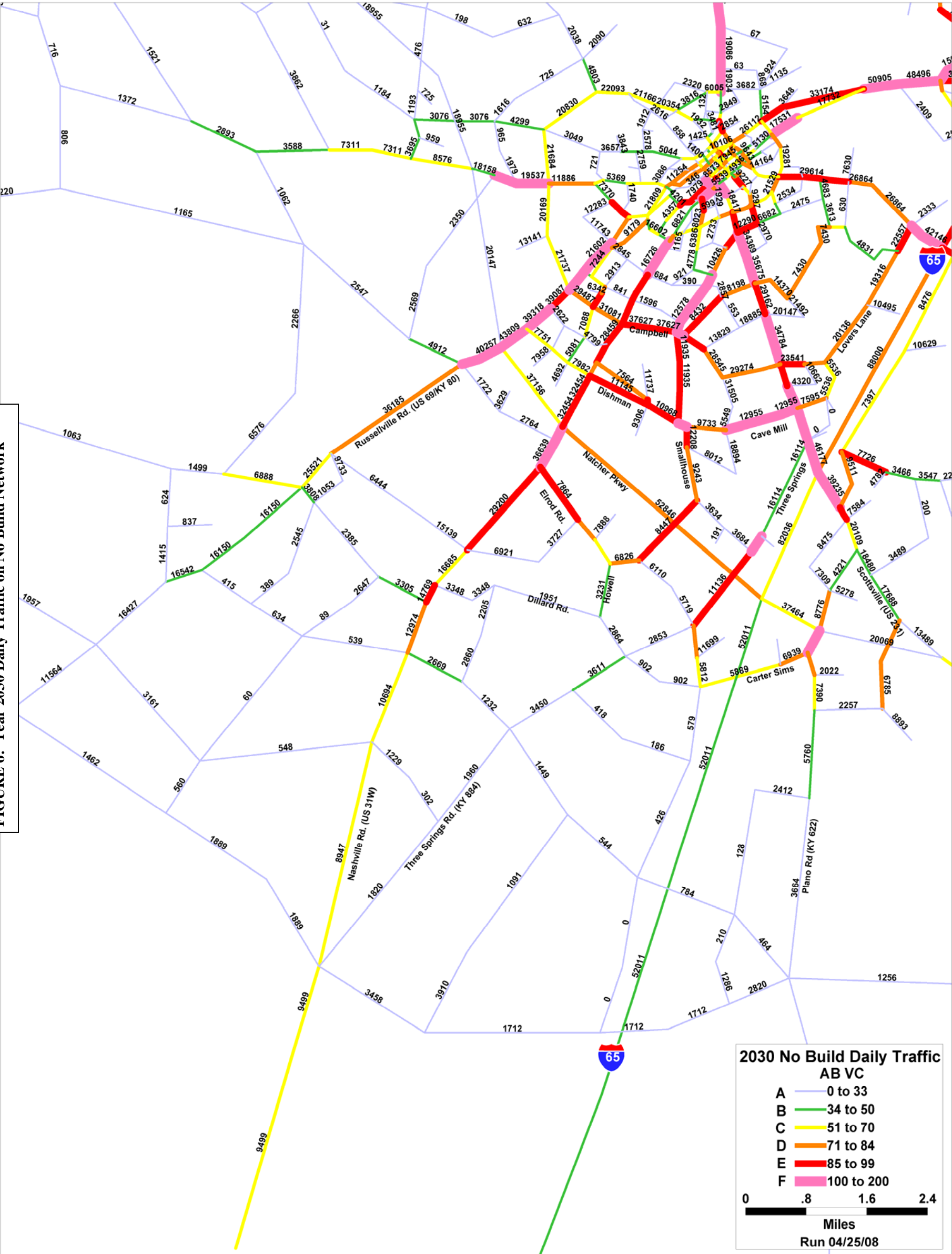


Table 2: Daily Traffic Capacity (LOS = E) by Area Type and Functional Class

Area Type	Lanes	Urban Freeway (FC 11)	Urban Expressway (FC 12)	Urban Major Arterial (FC 14)	Urban Minor Arterial (FC 16)	Urban Collector (FC 17)		Urban Local (FC 19)
Central Business District	Two			15,500	13,000	10,500		8,000
	Four	60,000	56,000	31,000	26,000	21,000		16,000
Center City	Two			17,500	15,000	11,500		9,000
	Four	68,000	64,000	35,000	30,000	23,000		18,000
Suburban	Two			19,500	16,500	12,500		10,000
	Four	72,000	68,000	39,000	33,000	25,000		20,000
		Rural Freeway (FC 1)	Rural Expressway (FC 2)	Rural Major Arterial (FC 4)	Rural Minor Arterial (FC 6)	Rural Major Collector (FC 7)	Rural Minor Collector (FC 8)	Rural Local (FC 9)
Exurban	Two			21,500	18,500	14,000	12,000	9,000
	Four	72,000	68,000	43,000	37,000	28,000	24,000	18,000
Rural	Two			25,000	21,000	16,000	11,500	8,000
	Four	72,000	68,000	50,000	42,000	32,000	23,000	16,000

Source: Bowling Green/Warren County Travel Demand Model "Documentation and User's Guide": prepared by Bernardin • Lochmueller & Associates, Inc. for KYTC; March 25, 2004; page 7.

3. Build Alternatives

Three Build Alternatives have been developed for the proposed Elrod Road interchange with associated “optional improvements” (in blue) and “additional improvements” (in brown), referring to Figures 7 through 9 in the descriptions that follow.

Alternative Descriptions

Alternative A (Figure 7) involves location of a diamond interchange on the Natcher Parkway about ¼-mile northwest of the present Elrod Road grade-separation (which is assumed to be closed for travel modeling purposes). Optional improvements are proposed to several roadways feeding the new interchange, including improvements to Elrod Road from new Elrod Road to Nashville Road, improvements to Smallhouse Road from Elrod Road to Cave Mill Road, the extension of Neal Howell Road to new Elrod Road, and the realignment of Smallhouse Road from Elrod Road to Three Springs Road. The extension of Neal Howell Road to the new alignment of Elrod Road is important in providing access to the south without using the present residentially lined Elrod Road with 90-degree curves. Of even greater importance is the realignment of existing Smallhouse Road from Elrod Road to Three Springs Road to improve the existing vertical and horizontal alignment, particularly the 90-degree curves. This realignment is necessary to improve the operating speed along Smallhouse Road and thereby the use of the programmed four-laning of Three Springs to Scottsville Road (US 231). Additional options are being examined for Alternative A that are labeled:

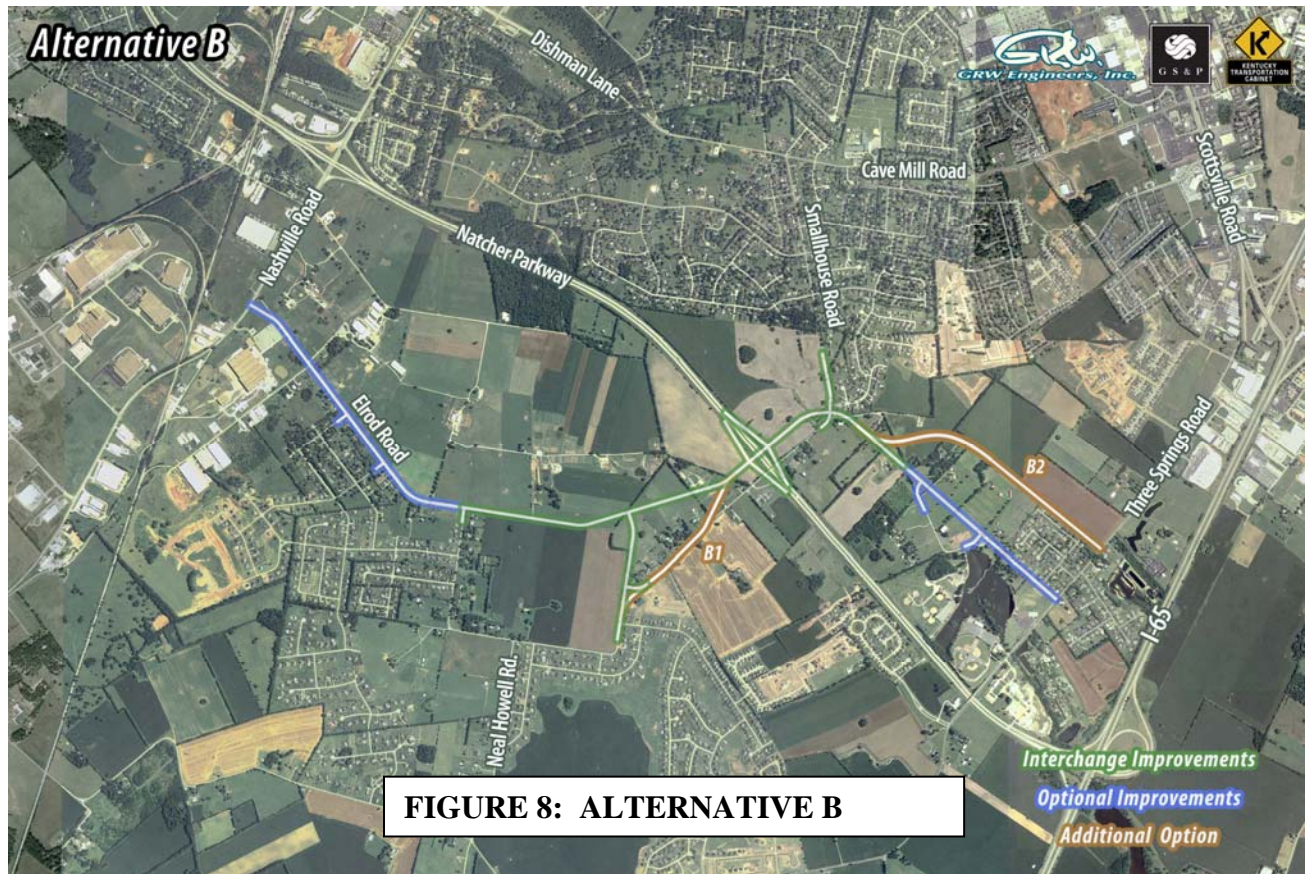
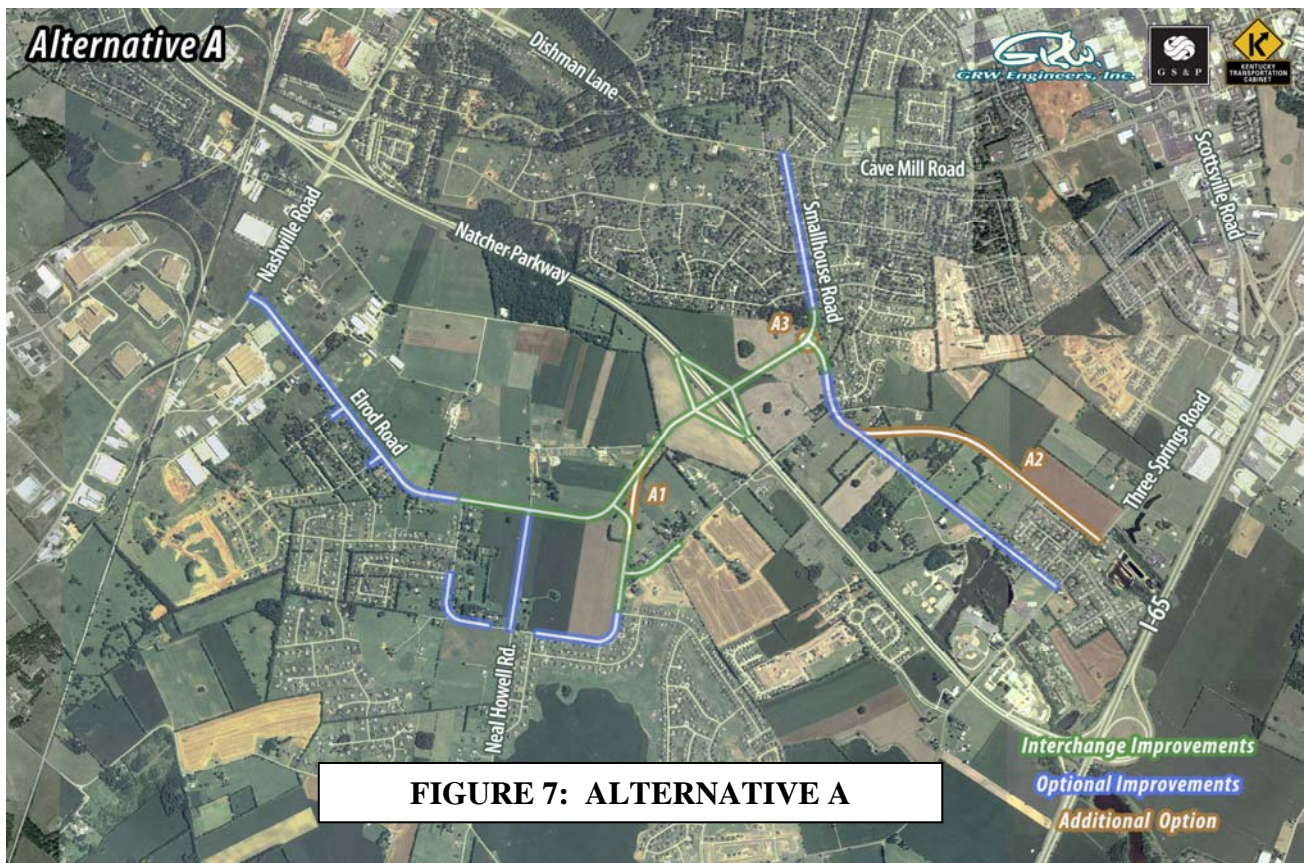
- A1→ a realignment of new Elrod Road to tie into existing Elrod Road.
- A2→ a new alignment for Smallhouse Road from Elrod Road to Three Springs Road.
- A3→ a roundabout at the intersection of Elrod Road with Smallhouse Road.

Of the additional options, only A2 can be replicated in the travel demand model because the TDM is not sensitive to minor alignment changes or intersection configurations.

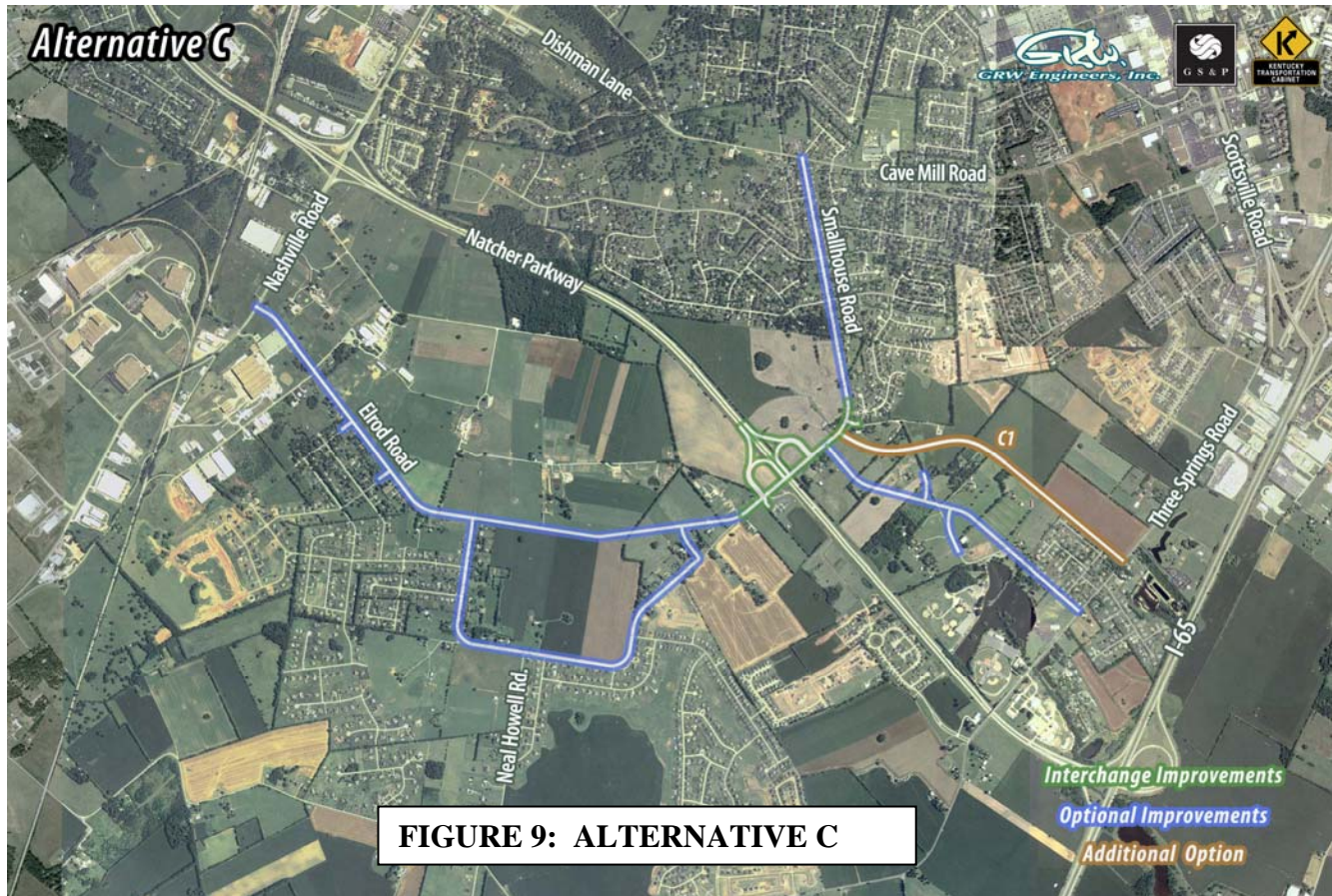
Alternative B involves location of a diamond interchange on the Natcher Parkway about 500 feet northwest of the present Elrod Road grade separation and closure of the existing grade separation. Optional improvements include improving Elrod Road from Nashville Road to the new alignment portion of Elrod Road and realignment of Smallhouse Road from Elrod Road to Three Spring Road to remove two 90-degree curves. Additional options are being examined for Alternative B that are labeled:

- B1 → a connection from new Elrod Road to existing Elrod Road immediately south of the interchange dropping the extension of Neal Howell Road to new Elrod Road.
- B2 → a new alignment for Smallhouse Road from Elrod Road to Three Springs Road.

Of the additional options, only B2 can be replicated in the travel demand model because the TDM is not sensitive to minor alignment changes and cannot assign traffic to parallel roadways that are very close to one another (i.e., B1 option).



Alternative C involves placing a folded diamond interchange on the alignment of the existing Elrod Road grade separation of Natcher Parkway. Optional improvements are proposed to several roadways feeding the new interchange, including improvements to Elrod Road from the interchange to Nashville Road, improvements to existing Elrod Road as it makes two 90-degree bends, improvements to Smallhouse Road from Elrod Road to Cave Mill Road, and the realignment of Smallhouse Road from Elrod Road to Three Springs Road. The additional option (C1) involves a new alignment for Smallhouse Road from Elrod Road to Three Springs Road, similar to options A2 and B2.



Alternatives Modeled

The MINUTP version of the Bowling Green/Warren Travel Demand Model (TDM) must be carefully applied in making traffic forecasts for geometric alternatives. Foremost, the computerized roadway network in the MINUTP TDM is a gross representation of the actual roadway network because of the lack of geographic coordinates. (In other words, the roadway network does not match the road alignments of aerial photographs.) Thus, minor differences, adjustments and changes to roadway alignment in roadway design cannot be represented in the travel model to yield meaningful results.

With due consideration to the travel model limitations of this MINUTP TDM, travel model forecasts were generated for the following Building Alternatives:

- 1) Alternative A with the realignment of existing Smallhouse Road from Elrod Road to Three Springs Road (represented in the TDM by increasing the operating speed from 27 mph to 42 mph) and the improvement of Elrod Road from new Elrod Road to Nashville Road (represented in the TDM by increasing the operating speed from 27 mph to 35 mph). To reflect the new interchange with the Natcher Parkway, the existing alignment of Elrod Road was shifted ¼-mile to the northwest, was connected to Natcher Parkway, and was

assigned an operating speed of 42 mph with a higher daily two-lane capacity than the existing Elrod Road grade separation.

- 2) Alternative A2 with Smallhouse Road on new alignment from Elrod Road to Three Springs Road with an operating speed of 42 mph.
- 3) Alternative C with the realignment of existing Smallhouse Road from Elrod Road to Three Springs Road (represented in the TDM by increasing the operating speed from 27 mph to 42 mph). The new interchange with the Natcher Parkway is placed on the alignment of the existing grade separation, and the operating speed has been improved on Elrod Road between Smallhouse Road and Nashville Road like Alternative A.

Thus, the three options examine two major geometric features:

- The location of the interchange on the Natcher Parkway northwest of the existing Elrod Road grade separation (Alternative A) versus on the alignment of the existing Elrod Road grade separation (Alternative C).
- The traffic attraction to Smallhouse Road between Elrod Road to Three Springs Road comparing road realignment (Alternative A) to new location (Alternative A2).

Build Alternative Results

Comparing the daily traffic assignment for the Build Alternatives (Figures 10, 11 and 12) to the No Build Alternative (Figure 6) and Table 3, the observations are made for the year 2030:

- 1) The LOS improves on →
 - a. Russellville Road (US 68/KY 80) south of the Natcher Parkway.
 - b. Three Springs Road (KY 884) between Matlock Road and Smallhouse Road.
 - c. Dishman Road from Nashville Road (US 31W) to Cave Mill Road.
 - d. Cave Mill Road from Grinder Pond Road to Scottsville Road (US 231).
 - e. Smallhouse Road from Campbell Lane (US 231) to Cave Mill Road.
 - f. Elrod Road from Nashville Road (US 31W) to west of Howell Road (due to the proposed Improvement of two-lane Elrod Road).
- 2) The LOS deteriorates on →
 - a. Smallhouse Road from Cave Mill Road to Elrod Road (due to increased traffic assessing the new Interchange).
 - b. Elrod Road from east of Howell Road through the Natcher Parkway interchange area to Smallhouse Road.

Because the proposed three-lane section of Elrod Road through the interchange area has insufficient capacity to handle forecasted Natcher Parkway interchange traffic, the LOS deteriorates on Elrod Road at the Natcher Parkway for all Build Alternatives.

The off-set intersection of Smallhouse Road at Cave Mill Road is already a serious congestion point in the roadway network. With increased traffic passing through these two close intersections on Cave Mill Road to assess the proposed interchange, this congestion point is exacerbated by all Build Alternatives.

Alternative A Results

Comparing the daily traffic assignment for Alternative A (Figure 10) to the No Build Alternative (Figure 6) and Table 3, the following occurs:

- 1) A 3% reduction in daily traffic volumes on Nashville Road (US 31W) north of the Natcher Parkway.
- 2) A 5% reduction in daily traffic volumes on Russellville Road (US 68/KY 80) and an 8% reduction in daily traffic volumes on Nashville Road (US 31W), south of the Natcher Parkway.

Table 3: Alternatives 2030 Daily Traffic Volumes
(minimum acceptable LOS D)

		Existing	No Build		Alternative A		Alternative A2		Alternative C	
Route	Termini	Daily Traffic Count (date)	ADT	V/C Ratio	ADT	V/C Ratio	ADT	V/C Ratio	ADT	V/C Ratio
Russellville Road (US 68/KY80)	Memphis Junction Rd. to Natcher Pkwy	22643 ('04)	40257	F	38113	E	37895	E	37546	E
Russellville Road (US 68/KY80)	Natcher Pkwy to Dishman Rd.	23584 ('04)	43809	F	43701	F	42294	F	44192	F
Nashville Road (US 31W)	Memphis Junction Rd. to Natcher Pkwy	11005 ('04)	37860	F	34696	F	34905	F	35661	F
Nashville Road (US 31W)	Natcher Pkwy to Dishman Rd.	18910 ('01)	32454	E	31710	E	31706	E	31763	E
Three Springs Road (KY 884)	Matlock Rd. to Old Smallhouse Road	5193 ('01)	11136	E	9285	D	8862	D	8848	D
Three Springs Road (KY 884)	Old Smallhouse Rd. to New Smallhouse Rd.		12197	F	9084	D	8945	D	10687	E
Three Springs Road (KY 884)	New Smallhouse Rd. to Scottsville Rd. (US 231)	6829 ('01)	16114	B	10510	A	12466	B	10778	A
Dishman Road	Russellville Rd.(US 68) to Nashville Rd. US 31W)	10917 ('03)	8341	C	8187	C	8050	C	8173	C
Dishman Road	Nashville Rd. US 31W) to Cave Mill Rd.	8311 ('04)	11145	E	8407	C	8548	C	8866	D
Cave Mill Road	Dishman Rd. to Smallhouse Rd.	13660 ('02)	10968	E	10908	E	10589	D	10178	D
Cave Mill Road	Smallhouse Rd. to Grinder Pond Rd.	10526 ('03)	9733	D	10784	E	10548	D	10175	D
Cave Mill Road	Grinder Pond Rd. to Scottsville Rd. (US 231)	12569 ('04)	12955	F	11287	E	11708	E	11891	E
Smallhouse Road	Campbell Ln. (US 231) to Cave Mill Rd.	12270 ('03)	11935	E	10160	D	10171	D	10372	D
Smallhouse Road	Cave Mill Rd. to Elrod Road	5951 ('07)	12208	E	15109	F	13835	F	12498	F
Smallhouse Road	Elrod Rd. to Three Springs Rd.	2333 ('07)	3634	A	6129	A	92	A	8955	B
New Smallhouse	Elrod Rd. to Three Springs Rd..						7093	B		

Road (A2)										
Natcher Parkway	Russellville Rd. (US 68) to Nashville Rd. (US 31W)	16804 ('04)	37156	C	3955 4	C	3972 9	C	4020 8	C
Natcher Parkway	Nashville Rd. (US 31W) to Elrod Road	17341 ('04)	52846	D	5182 9	D	5208 2	D	5243 7	D
Natcher Parkway	Elrod Rd. to I-65	17341 ('04)	52846	D	5794 5	E	5640 1	D	5654 6	D
Natcher Parkway	I-65 to Plano Rd. (KY 662)		37464	C	3670 5	D	3562 5	C	3644 6	C
Natcher Parkway	Plano Rd. (KY 662) to Scottsville Rd. (US 231)		20069	A	1927 9	A	1857 5	A	1920 4	A
Neal Howell Road	Elrod Rd. to Dillard Rd.	2360 ('07)	3231	B	4071	B	4051	B	3563	B
Elrod Road	Nashville Rd. to New Elrod Rd (west of Howell Rd.)	5350 ('07)	7864	E	9226	C	9355	C	9148	C
New Elrod Road.	West of Howell Rd. to East of Howell Road		6826	D	1199 6	D	1204 5	D	1131 8	D
New Elrod Road	East of Howell Rd. to Natcher Parkway	3363 ('07)	8447	E	2070 7	F	2129 7	F	2106 9	F
New Elrod Road	Natcher Parkway to Smallhouse Road	3363 ('07)	8447	E	1799 3	E	1727 2	E	1848 5	F
I-65	Natcher Parkway to Scottsville Rd. (US 231)	43800 ('04)	82036	C	7985 9	C	7732 0	C	7796 5	C
Scottsville Road (US 231)	Three Springs Rd. (KY 884) to I-65	37114 ('04)	46177	F	4117 1	-F	4247 3	F	4181 8	F
I-65	Scottsville Rd. (US 231) to Cemetery Rd. (KY 234)	45676 ('04)	88000	D	8820 3	D	8800 7	D	8800 4	D
Scottsville Road (US 231)	I-65 to Cumberland Trace (KY 2158)	23938 ('04)	39235	F	3831 9	E	3941 1	F	3878 5	F

- 3) A 17% reduction in daily traffic volumes on Three Springs Road (KY 884) south of Smallhouse Road.
- 4) A 35% reduction in traffic on Three Springs Road between Smallhouse Road and Scottsville Road as traffic from the area bounded by Smallhouse, Cave Mill and Three Springs uses the new interchange rather than traveling Three Springs Road to the Scottsville Road /I-65 interchange.
- 5) A 213% increase in traffic on new Elrod Road north of the Natcher Parkway (increasing from 8400 vpd to 18000 vpd) and a 245% increase in traffic on new Elrod Road south of the Natcher Parkway (increasing from 8400 vpd to 20700 vpd).
- 6) A 24% increase in traffic on Smallhouse Road between Elrod Road and Cave Mill Road as traffic from the area bounded by Smallhouse, Cave Mill and Three Springs uses the new interchange rather than traveling along Cave Mill Road and Dishman Road to the existing Natcher Parkway/Nashville Road interchange. This pushes the LOS on this section of Smallhouse Road to LOS F.

- 7) A 26% increase in traffic on Howell Road south of Elrod Road, yet LOS B is retained.
- 8) A 17% increase in traffic on Elrod Road from Nashville Road to Howell Road although a LOS C is attained through reconstruction of the road.
- 9) A 3.1% reduction in daily traffic volumes passing through the I-65/US 231 interchange, including a 11% reduction in daily traffic on US 231 immediately north of I-65.

The placement of the new interchange with Natcher Parkway about ¼-mile northwest of the existing Elrod Road grade separation emphasizes Smallhouse Road northward to Cave Mill Road over Three Springs Road as the primary access route for existing and future development located north of the Natcher Parkway. Of the three Build Alternatives examined, Alternative A results in the greatest increase in daily traffic on Smallhouse Road to Cave Mill Road and the least daily traffic on Three Springs Road (programmed to be widened to five lanes) to Scottsville Road. If Alternative A becomes the preferred alternative, the provision of outlets to Three Springs Road and Smallhouse Road (east of Elrod Road) from the forecasted residential development in the area bounded by Smallhouse Road, Cave Mill Road and Three Springs Road is important to provide relief to Smallhouse Road south of Cave Mill Road as the primary access route to the new Elrod Road interchange.

Alternative A2 Results

Comparing the daily traffic assignment for Alternative A2 (Figure 11) to the No Build Alternative (Figure 6) and Table 3, the following occurs:

- 1) A 3% to 4% reduction in daily traffic volumes on Russellville Road (US 68/KY 80) and Nashville Road (US 31W), north of the Natcher Parkway.
- 2) An 8% to 9% reduction in daily traffic volumes on Russellville Road (US 68/KY 80) and Nashville Road (US 31W), south of the Natcher Parkway.
- 3) A 20% reduction in daily traffic volumes on Three Springs Road (KY 884) south of Smallhouse Road.
- 4) A diversion of most of the 3600 vpd on Smallhouse Road between Elrod Road and Three Springs Road, and a total of 7100 vpd on relocated Smallhouse Road (A3) from Elrod Road to Three Springs Road.
- 5) A 23% reduction in traffic on Three Springs Road between Smallhouse Road and Scottsville Road as traffic from the area bounded by Smallhouse, Cave Mill and Three Springs uses the new interchange rather than traveling Three Springs Road to the Scottsville Road /I-65 interchange.
- 6) A 204% increase in traffic on new Elrod Road north of the Natcher Parkway (increasing from 8400 vpd to 17300 vpd) and a 252% increase in traffic on new Elrod Road south of the Natcher Parkway (increasing from 8400 vpd to 21300 vpd).
- 7) A 13% increase in traffic on Smallhouse Road between Elrod Road and Cave Mill Road as traffic from the area bounded by Smallhouse, Cave Mill and Three Springs uses the new interchange rather than traveling along Cave Mill/Dishman to the existing Natcher Parkway/Nashville Road interchange.
- 8) A 25% increase in traffic on Howell Road south of Elrod Road, yet LOS B is retained.
- 9) A 19% increase in traffic on Elrod Road from Nashville Road to Howell Road. although a LOS C is attained through reconstruction of the road.
- 10) A 3.3% reduction in daily traffic volumes passing through the I-65/US 231 interchange, including an 8% reduction in daily traffic on US 231 immediately north of I-65.

FIGURE 10: Alternative A - Year 2030 Daily Traffic

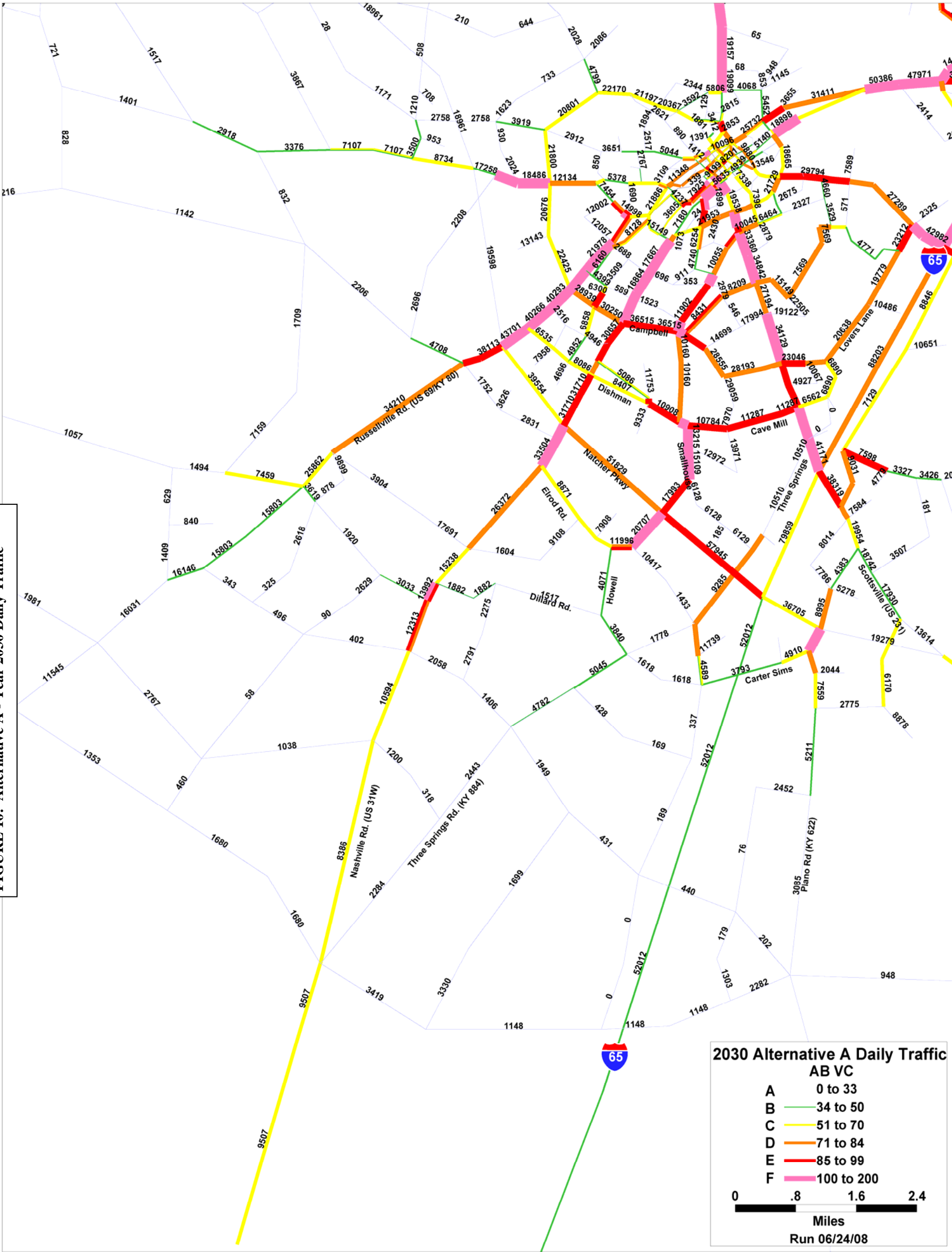
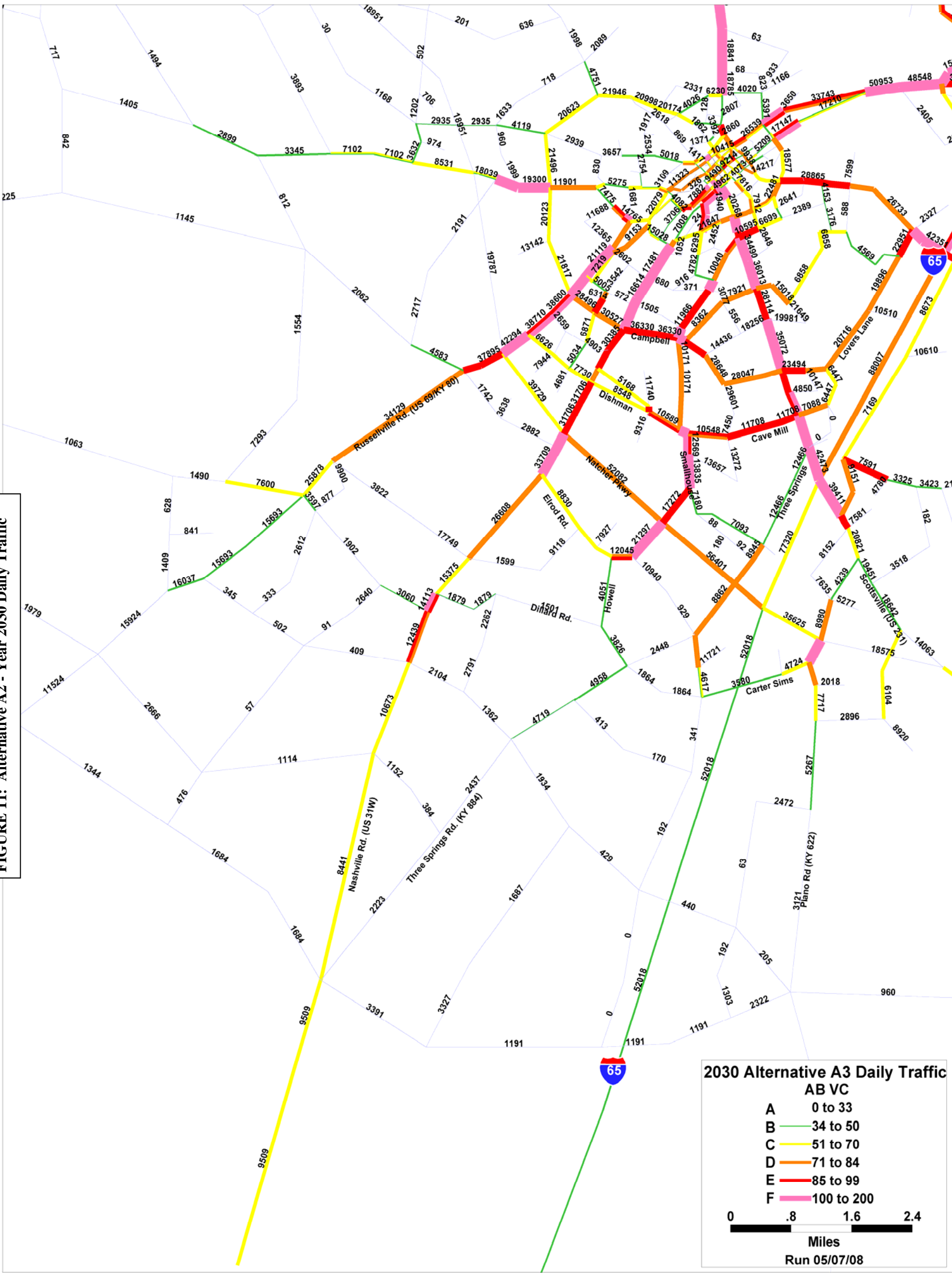


FIGURE 11: Alternative A2 - Year 2030 Daily Traffic



Alternative A2 is slightly more effective than Alternatives A and C are in reducing traffic on Russellville Road (US 68/KY 80) and Nashville Road (US 31W) south of the Natcher Parkway. This alternative results in slightly more traffic on Elrod Road south of the Natcher Parkway and slightly more traffic on Elrod Road north of the Natcher Parkway than Alternatives A and C. **Alternative A2 results in the least reduction in traffic on Three Springs Road north of Smallhouse Road.**

Alternative A2 falls between Alternative A and Alternative C in increasing traffic on Smallhouse Road from Elrod Road to Cave Mill Road. The benefits of Alternative A2 are traffic reductions on Russellville Road, Nashville Road, Three Springs Road (north of Smallhouse) and existing Smallhouse Road from Elrod Road to Three Springs Road. This adverse impact on Smallhouse Road south of Cave Mill Road can be mitigated by providing a connection from relocated Smallhouse Road (and/or from Three Springs Road) to the residential area bounded by Smallhouse Road, Cave Mill Road and Three Springs Road.

A comparison of the geometric differences between Alternatives A and A2 indicates that the relocation of Smallhouse Road on new alignment from Elrod Road to Three Springs Road (per Alternative A2) results in the most effective use of the programmed four-laning of Three Springs Road and reduces the traffic increase on Smallhouse Road south of Cave Mill Road (although not as effective as Alternative C).

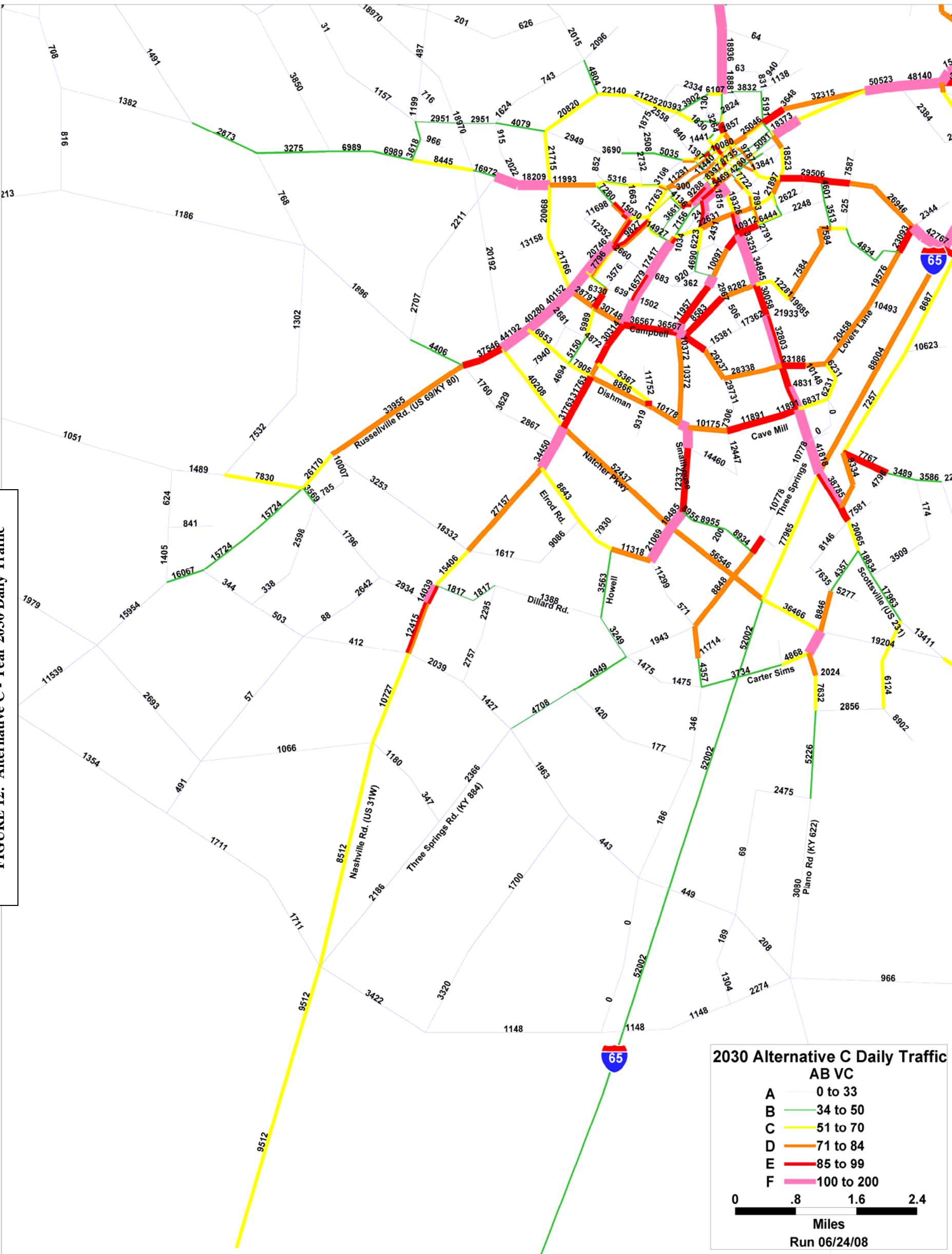
Alternative C Results

Comparing the daily traffic assignment for Alternative C (Figure 12) to the No Build Alternative (Figure 6) and Table 3, the following result:

- 1) A 1% increase in daily traffic volumes on Russellville Road (US 68/KY 80) and a 2% reduction in daily traffic volumes on Nashville Road (US 31W), north of the Natcher Parkway.
- 2) A 6% to 7% reduction in daily traffic volumes on Russellville Road (US 68/KY 80) and Nashville Road (US 31W), south of the Natcher Parkway.
- 3) A 21% reduction in daily traffic volumes on Three Springs Road (KY 884) south of Smallhouse Road.
- 4) A 33% reduction in traffic on Three Springs Road between Smallhouse Road and Scottsville Road as traffic from the area bounded by Smallhouse, Cave Mill and Three Springs uses the new interchange rather than traveling Three Springs Road to the Scottsville Road /I-65 interchange.
- 5) A 218% increase in traffic on new Elrod Road north of the Natcher Parkway (increasing from 8400 vpd to 18500 vpd) and a 249% increase in traffic on new Elrod Road south of the Natcher Parkway (increasing from 8400 vpd to 21100 vpd).
- 6) A 13% increase in traffic on Smallhouse Road between Elrod Road and Cave Mill Road as traffic from the area bounded by Smallhouse, Cave Mill and Three Springs uses the new interchange rather than traveling along Cave Mill/Dishman to the existing Natcher Parkway/Nashville Road interchange.
- 7) A 10% increase in traffic on Howell Road south of Elrod Road.
- 8) A 16% increase in traffic on Elrod Road from Nashville Road to Howell Road.
- 9) A 3.5% reduction in daily traffic volumes passing through the I-65/US 231 interchange, including a 10% reduction in daily traffic on US 231 immediately north of I-65.

Thus, Alternative C is the least effective in reducing traffic at existing Natcher Parkway interchanges at Russellville Road (US 68/KY 80) and Nashville Road (US 31W), but is the most effect in reducing traffic on Three Springs Road south of Smallhouse Road, reducing traffic through the I-65/Scottsville Road (US 231) interchange, and in **minimizing the increase in traffic on Smallhouse Road south of Cave Mill Road**. This alternative falls between Alternatives A and A2 relative to the reduction in traffic on Three Springs Road north of Smallhouse Road. This interchange location results in the highest traffic volumes on Elrod Road north of the Natcher Parkway and falls between the Alternatives A and A2 in the traffic attracted to Elrod Road south of the Natcher Parkway.

FIGURE 12: Alternative C - Year 2030 Daily Traffic



4. Turning Movement Forecasts

Turning movement forecasts are provided at the end of this report for the No Build Alternative and Build Alternatives A, A2 and C to facilitate more in depth intersection capacity analyses for geometric design decisions. Daily turning movement forecasts are provided for the following locations:

- New Elrod Road Interchange at Natcher Parkway
- Natcher Parkway @ US 68 (south)
- Natcher Parkway @ US 31W (south)
- Natcher Parkway @ I-65
- Natcher Parkway @ Plano Road
- Natcher Parkway @ Scottsville Road [US 231 (east)]
- I-65 @ Scottsville Road [US 231 (east)]
- Elrod Road @ Smallhouse Road
- Elrod Road @ Howell Road

5. Conclusions

From an evaluation of Build Alternatives, the following conclusion may be reached:

- 1) Regardless of the alternatives, the off-set intersection of Smallhouse Road with Cave Mill Road is a major congestion point that will be exacerbated with any of the Build Alternatives due to additional traffic assessing the new interchange through the intersection.
- 2) Regardless of the alternatives, outlets to Three Springs Road north of Smallhouse Road and to Smallhouse Road east of Elrod Road are important to relieve Smallhouse Road south of Cave Mill Road as significant residential growth is forecasted in the area bounded by Smallhouse Road, Cave Mill Road and Three Springs Road.
- 3) None of the Build Alternatives results in the sufficient diversion of traffic on Russellville Road (US 68/KY 80) or Nashville Road (US 31W) through the Natcher Parkway interchange areas to achieve an minimum acceptable level-of-service in the year 2030. However, placing the proposed Elrod Road interchange farther northwest from the existing grade separation (i.e., Alternatives A and A2) does provide minor traffic relief to the Natcher Parkway interchanges at Russellville Road and Nashville Road.
- 4) Regardless of the Build Alternative, forecasted traffic for the proposed Elrod Road interchange indicates that the Elrod Road through the interchange area will eventually have to be widened to four through lanes to accommodate year 2030 traffic.
- 5) All Build Alternatives provide relief to Three Springs Road south of Smallhouse Road in the year 2030.
- 6) Alternative A2 results in the most effective use of the programmed four-laning of Three Springs Road north of Smallhouse Road.
- 7) Alternative C results in the least increase in traffic on Smallhouse Road from Elrod Road to Cave Mill Road and provides the most relief to the I-65/US 231 interchange.

In conclusion, except for the impact of increased traffic on Smallhouse Road from Elrod Road to Cave Mill Road (that may be mitigated through additional outlets to Three Springs Road and Smallhouse Road east of Elrod), there are no conclusive differences between the Build Alternatives regarding traffic performance. **Thus, traffic circulation considerations, community and environmental impacts, agency costs (project costs and maintenance costs) and public input are more important in reaching the decision on appropriate action (i.e., choice of a preferred alternative) for this improvement project.**