# APPENDIX G:
# TRAFFIC FORECAST SUMMARY

## Future Traffic Scenarios

Traffic forecasts were developed to evaluate the five alternatives that advanced beyond the Level 2 screening process. The alternatives are grouped into three traffic forecast scenarios as shown below in Table 1, because a number of them have similar alignments and functional characteristics (such as travel time and length). Even though they were grouped for forecasting purposes, the traffic operations characteristics (e.g. level of service) for each alternative were evaluated separately when applicable.

**Table 1: Alternative Traffic Forecast Group**

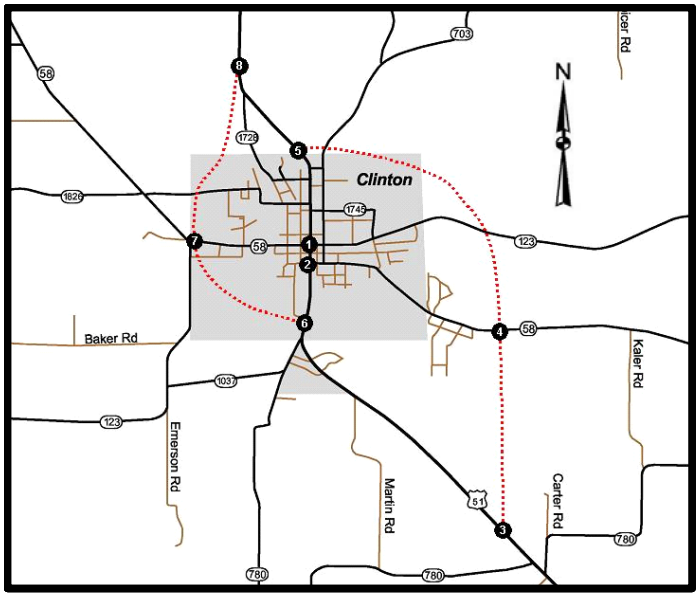
| Traffic Forecast Scenario | Alternatives |
|---|---|
| **Group 1** | Alternative 1 – No-Build<br>Alternative 2 – Spot Improvements<br>Alternative 3 – Reconstruct US 51 as 2-Lane Roadway with Center Two-Way Left Turn Lane |
| **Group 2** | Alternative 6A – Eastern Bypass |
| **Group 3** | Alternative 9 – Western Bypass (West of Railroad) |

For each scenario, average daily traffic (ADT) and design hourly volume (DHV) forecasts were developed for US 51 for the following years: 2002 (the base year), 2010, 2020, and 2030 (the design year). For 2002, the "forecast" is an estimation of traffic volumes assuming the conceptual alternatives were already constructed.

In addition to mainline estimates for US 51, ADT and DHV turning movement forecasts were developed for the intersections listed below and shown on Figure 1.

1. US 51 and Clay St. (KY 123)
2. US 51 and Mayfield Rd. (KY 58)
3. US 51 South and Eastern Bypass *(Alt. 6A only)*
4. KY 58 and Eastern Bypass *(Alt. 6A only)*
5. US 51 North and Eastern Bypass *(Alt. 6A only)*
6. US 51 South and Western Bypass *(Alt. 9 only)*
7. KY 58 and Western Bypass *(Alt. 9 only)*
8. US 51 North and Western Bypass *(Alt. 9 only)*

**Figure 1: Intersection LOS Locations**



## Traffic Forecast Methodology

The traffic forecasts were developed manually, based on historic traffic volumes, growth projections, estimated origin / destination patterns, and travel times. For Alternatives 1, 2, and 3 this meant applying a growth factor to the current 2002 volumes to estimate the future volumes. For the bypass alternatives, a manual gravity diversion analysis was used to estimate the percentage of diverted traffic. Existing turning movements were estimated at major intersections to approximate origins and destinations of vehicles in the study area.

For the bypass alternatives (6A and 9), traffic volumes were diverted based on manual gravity distribution calculations, employing the California diversion curves to determine the percentage of diverted traffic. The forecasts also included a 20% increase to the initial forecasted volumes to reflect induced traffic demand on the bypass. Redevelopment of land within the bypass corridor could serve to attract more traffic on the bypass. However, economic development projections as a result of land use changes along the bypass were not part of the forecasting scope of work.

As discussed for the No-Build traffic forecasts, historic count data for the study area was analyzed to project a future traffic growth rate. Between 1983 and 2002, the annual growth rate at the eight count stations on US 51 ranged from -0.56 percent to 1.52 percent. The average growth rate for the eight stations was 0.74 percent per year. (Traffic on US 51 has actually increased in town and south of town by about 20 percent since 1983, but decreased north of town by about 10 percent since 1983. This decline in traffic volumes north of town could be due in part to traffic shifting to Interstate 55 in Missouri.) The population growth rate for Hickman County is less than the statewide average, with the town of Clinton showing a slight decline in the 2000 Census. For this reason, a conservative growth rate of 1.5 percent per year was used to forecast future traffic volumes.

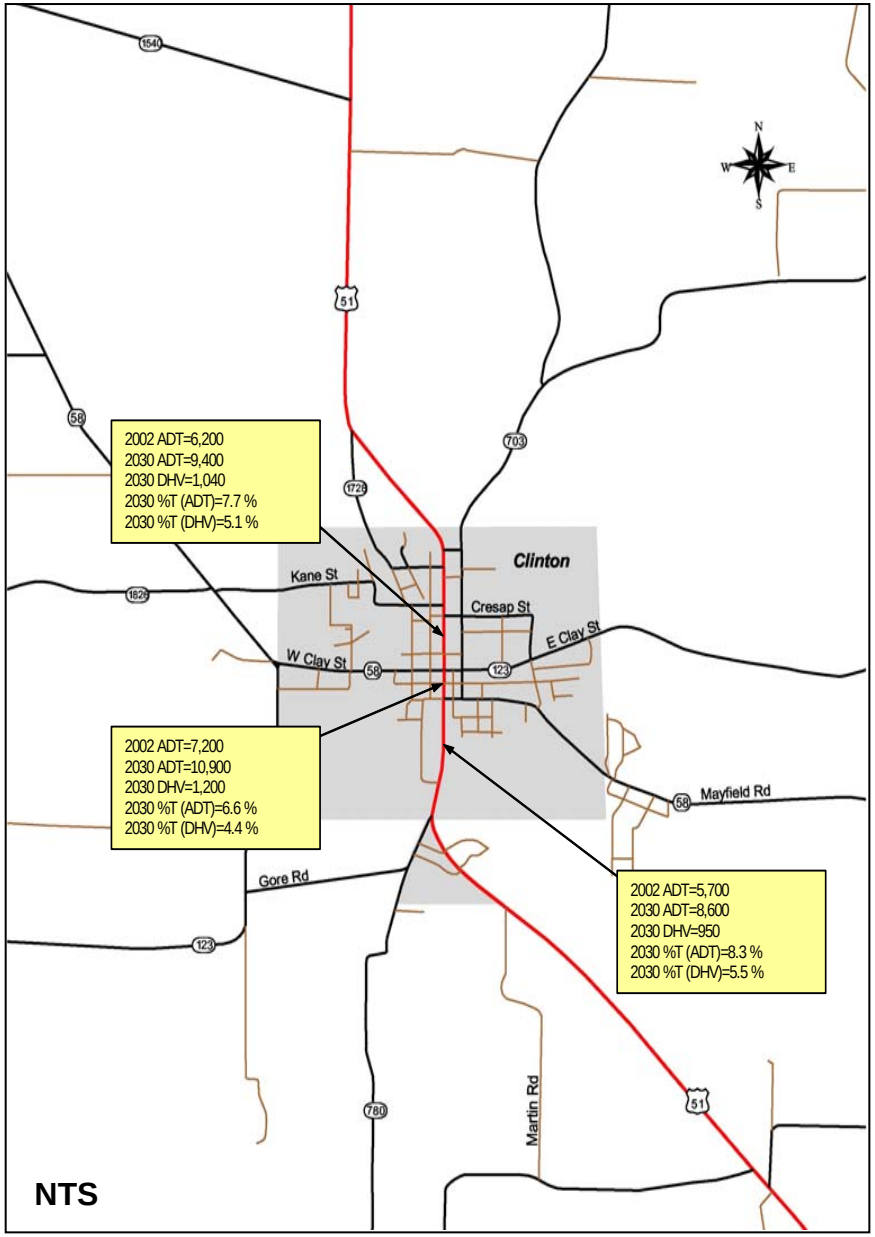
For more information regarding the traffic forecast methodology, please refer to the Traffic Analysis Report for Clinton.

## Future Traffic Volumes

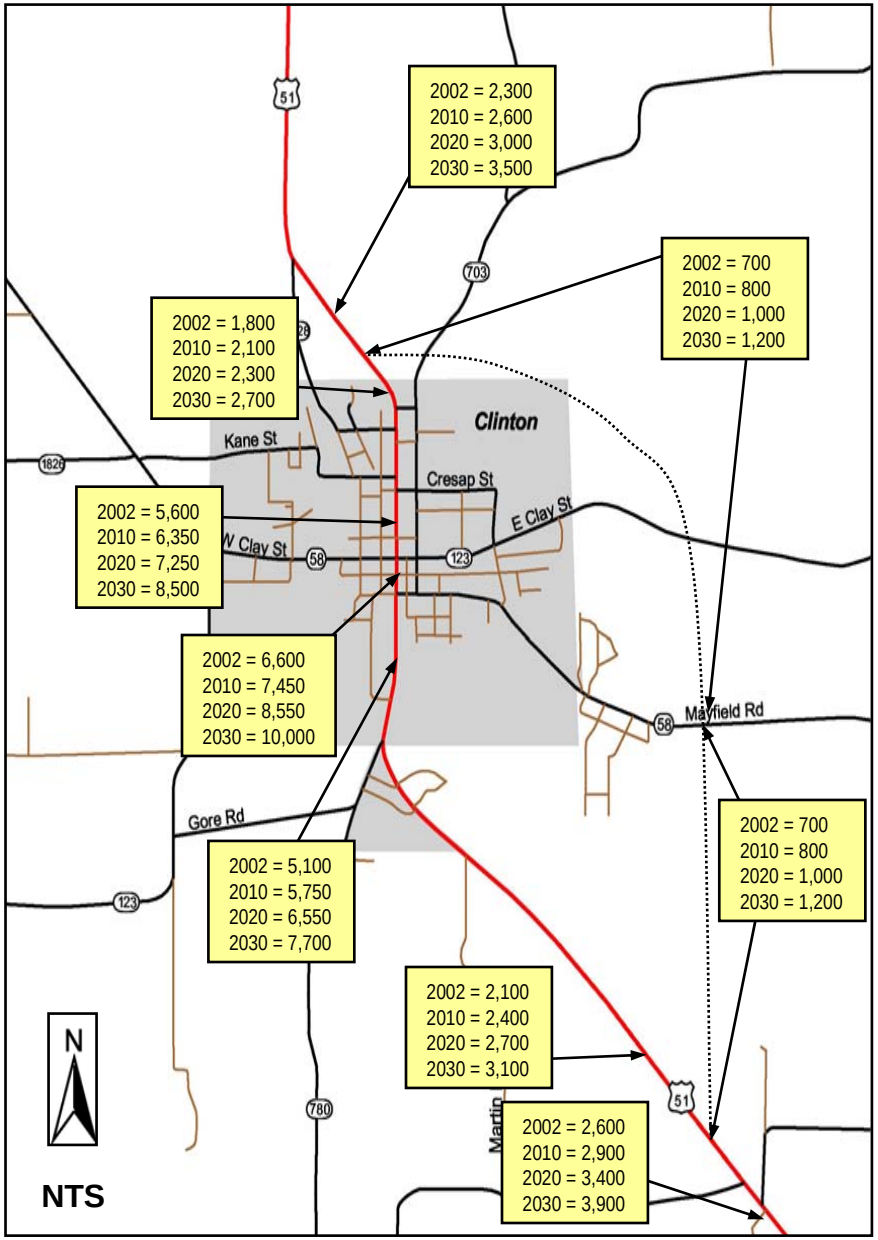
Traffic forecasts are expected to be similar for Alternatives 1, 2, and 3 since the alignment of US 51 does not change. Therefore, the traffic forecasts for Alternative 1 shown in Figure 11 in Appendix B also apply for Alternatives 2 and 3. The traffic projections for 2030 show a peak volume of 10,900 vehicles per day on US 51 just south of KY 58 / KY 123 (Clay Street). Truck traffic percentages for the year 2030 for Alternatives 1, 2, and 3 are shown on Figure 2. Truck traffic in town is estimated at 700 vehicles per day.

For Alternatives 6A and 9, the forecasts are presented in Figures 3 and 5 respectively, with truck percentages for the year 2030 shown in Figures 4 and 6, respectively. The Alternative 6A eastern bypass is estimated to carry approximately 1,200 vehicles

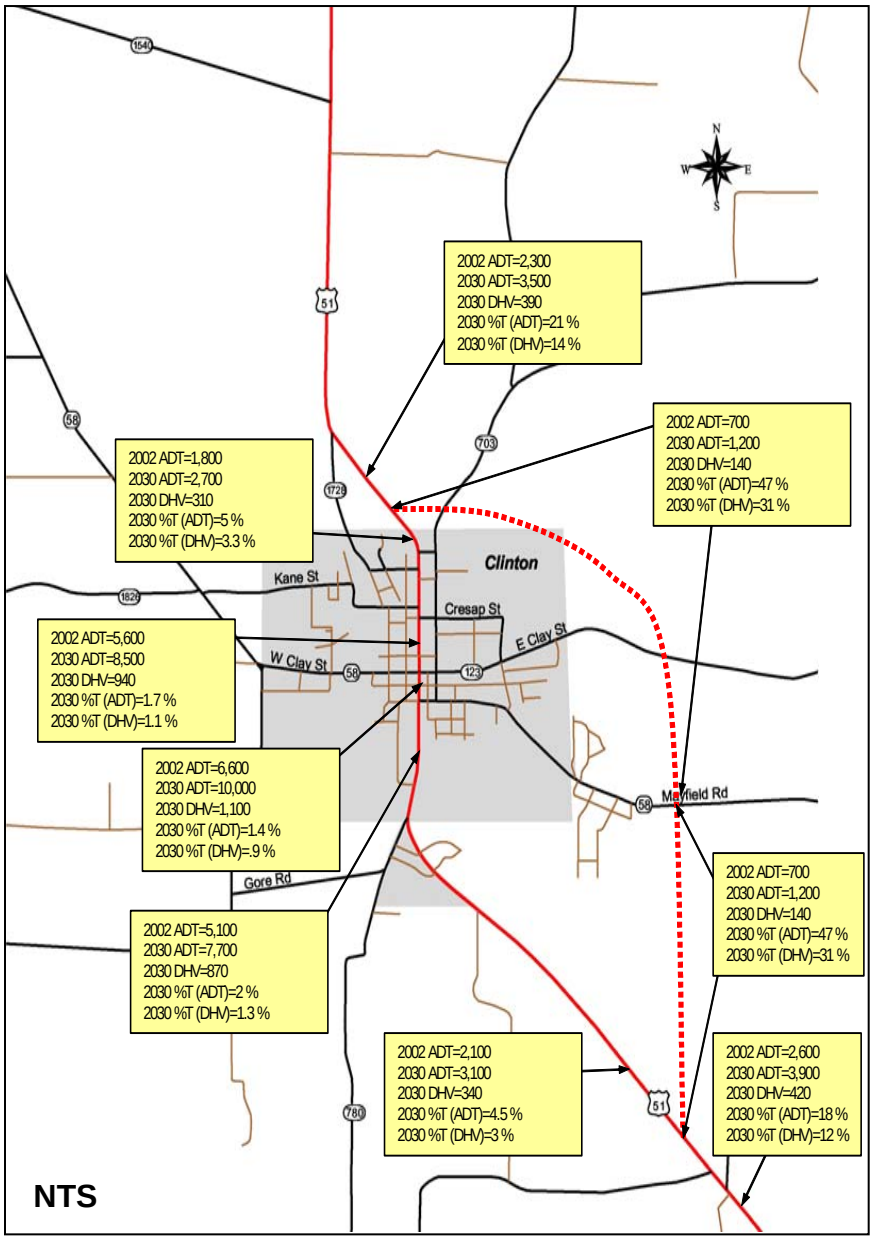
**Figure 2: Year 2030 No-Build and Alternatives 2 and 3**
**Truck Traffic Percentages**



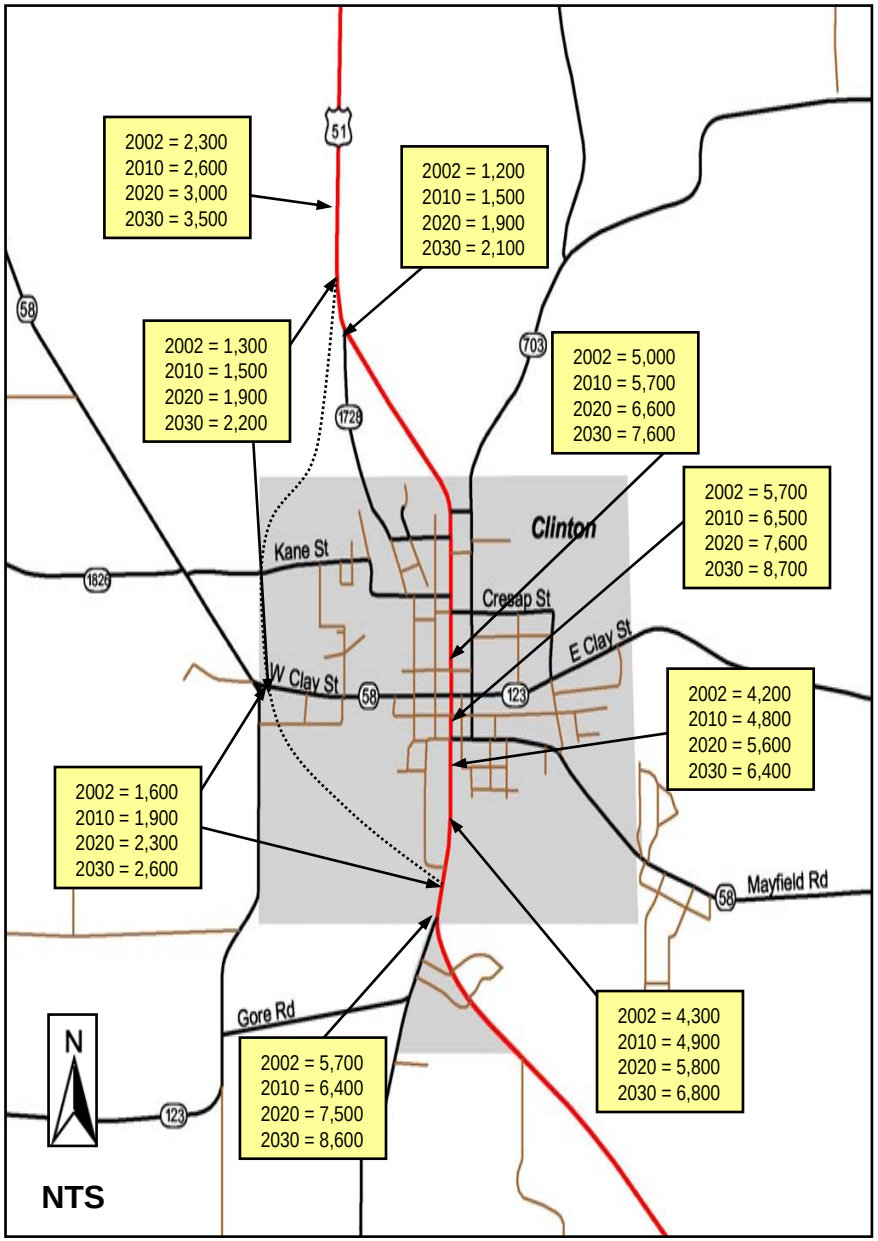
## Figure 3: Alternative 6A Traffic Forecast



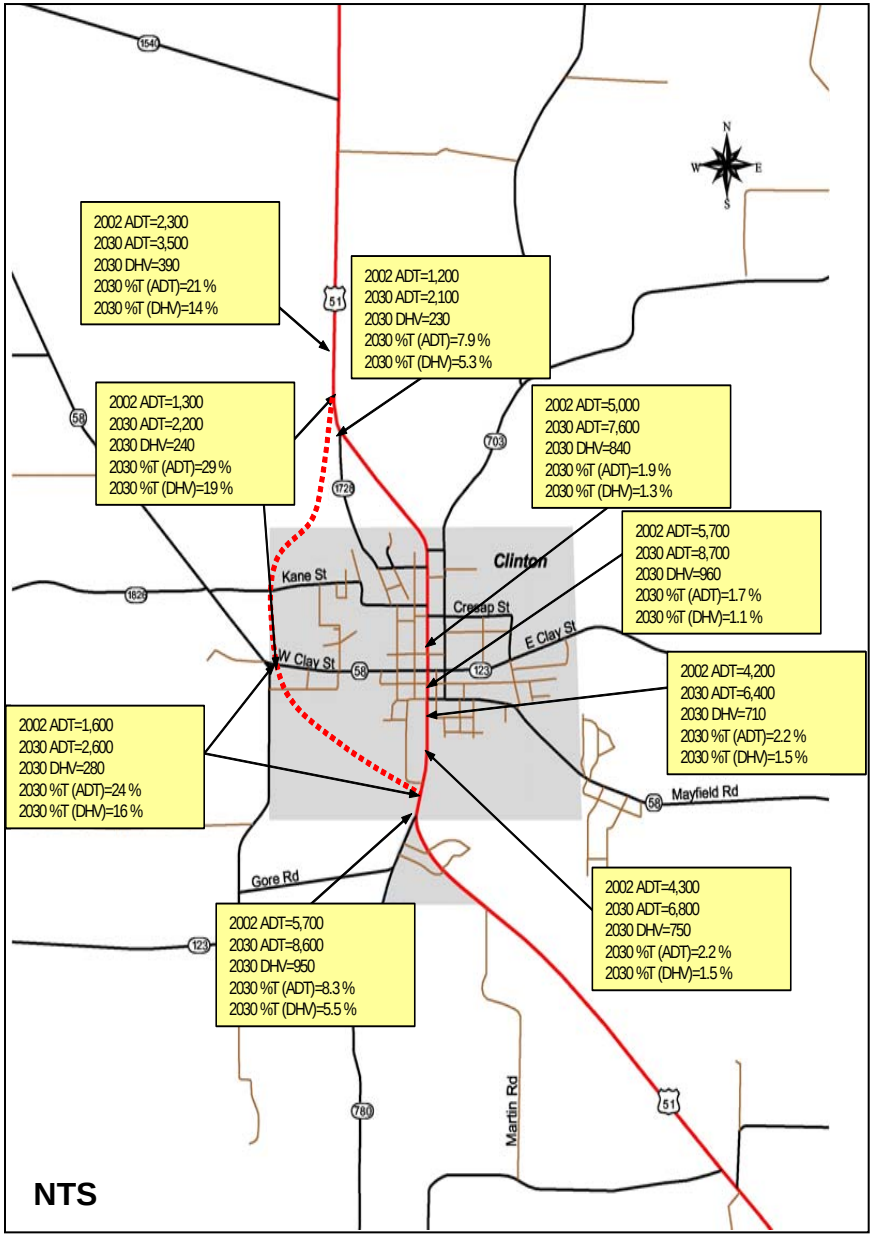

## Figure 4: Year 2030 Alternative 6A Truck Traffic Percentages



## Figure 5: Alternative 9 Traffic Forecast




## Figure 6: Year 2030 Alternative 9 Truck Traffic Percentages



per day in 2030. The 2030 traffic volumes in town range from 2,700 to 10,000 depending on location. The Alternative 9 western bypass is estimated to carry approximately 2,200 to 2,600 vehicles per day in 2030 depending on location. The 2030 traffic volumes in town range from 2,100 to 8,700 depending on location. The reason for the relatively low volume of traffic on the bypasses is due in part to a low through volume on US 51 in general.

**Intersection Levels of Service**

Levels of service (LOS) were evaluated for each of the two study intersections as well as the six new bypass intersections for each of the build alternatives. The analysis years were 2002 (existing conditions only), 2010, 2020, and 2030. The analysis results are shown in Table 2. The table lists the PM peak hour average delay and LOS for each movement at each intersection. Only the PM peak is shown, as it generally represents the highest peak of the day. The levels of service for the No-Build Alternative (Alternative 1) are included in this table for comparison purposes.

Alternative 2

The signalized intersection at US 51 and KY 58 / KY 123 (Clay Street) currently operates at a LOS B on all approaches. In 2010, all approaches operate at an acceptable LOS without improvements. By the year 2020, the addition of an exclusive right turn lane in the eastbound direction is necessary to continue to achieve an acceptable LOS at this intersection. For the year 2030, the addition of northbound and southbound left turn lanes on US 51 are required to achieve an acceptable LOS. The diversion of traffic from US 51 brought about by either of the bypass options (6A or 9) will not have a significant effect on LOS at this intersection.

This unsignalized intersection at US 51 and KY 58 (Mayfield Rd.) is stop-controlled on the side streets. Currently, the US 51 approaches (northbound and southbound) operate at a LOS A, and the side street approaches (eastbound and westbound) operate at LOS B. The US 51 approaches will continue operating at a high LOS through 2030, for all alternatives. By 2010, the side street approaches will drop to LOS E and will continue to degrade to a LOS F by 2030, even with construction of one of the bypass alternatives (6A and 9). To improve the LOS for the minor street approaches, a traffic signal could be installed. The intersection does not meet signal warrants at this time, but is expected to meet them in the future. For now, a do nothing approach may be appropriate since the delay is on the minor streets and US 51 operates at an acceptable LOS.

For the design year of 2030, the intersection levels of service for Alternative 2 are shown on Figure 7.

## Table 2: PM Peak Hour Intersection Levels of Service

| Int. # | Intersection | Type (Future) | Approach | 2002 Existing Conditions | | 2010 ALT 1 | | 2010 ALT 2 | | 2010 ALT 3 | | 2010 ALT 6A | | 2010 ALT 9 | | 2020 ALT 1 | | 2020 ALT 2 | | 2020 ALT 3 | | 2020 ALT 6A | | 2020 ALT 9 | | 2030 ALT 1 | | 2030 ALT 2 | | 2030 ALT 3 | | 2030 ALT 6A | | 2030 ALT 9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Ave. Delay | LOS | Ave. Delay | LOS | Ave. Delay | LOS | Ave. Delay | LOS | Ave. Delay | LOS | Ave. Delay | LOS | Ave. Delay | LOS | Ave. Delay | LOS | Ave. Delay | LOS | Ave. Delay | LOS | Ave. Delay | LOS | Ave. Delay | LOS | Ave. Delay | LOS | Ave. Delay | LOS | Ave. Delay | LOS | Ave. Delay | LOS |
| 1 | US 51 / Clay St. (KY 123) | Signal | Eastbound | 13.8 | B | 33.7 | C | 33.7 | C | 20.9 | C | 28.8 | C | 32.3 | C | 62.8 | E | 33.8 | C | 21.7 | C | 54.5 | D | 35.1 | D | 145.5 | F | 23.3 | C | 23.3 | C | 118.6 | F | 56.6 | E |
| | | | Westbound | 12.9 | B | 20.0 | C | 20.0 | C | 18.6 | B | 19.1 | B | 20.9 | C | 26.0 | C | 29.1 | C | 19.0 | B | 23.5 | C | 21.0 | C | 33.3 | C | 19.7 | B | 19.7 | B | 26.4 | C | 24.2 | C |
| | | | Northbound | 17.0 | B | 32.1 | C | 32.1 | C | 11.5 | B | 32.8 | C | 15.5 | B | 53.3 | D | 29.3 | C | 14.0 | B | 33.6 | C | 23.7 | C | 61.5 | E | 18.3 | B | 18.3 | B | 75.6 | E | 39.6 | D |
| | | | Southbound | 15.9 | B | 16.0 | B | 16.0 | B | 12.8 | B | 17.4 | B | 11.8 | B | 16.7 | B | 12.5 | B | 15.8 | B | 14.3 | B | 14.3 | B | 15.1 | B | 17.8 | B | 17.8 | B | 15.5 | B | 17.6 | B |
| | | | Intersection | 15.7 | B | 26.6 | C | 26.6 | C | 14.6 | B | 26.1 | C | 19.1 | B | 41.5 | D | 24.7 | C | 16.7 | B | 32.0 | C | 23.4 | C | 61.6 | E | 19.4 | B | 19.4 | B | 64.0 | E | 36.9 | D |
| 2 | US 51 / Mayfield Rd. (KY 58) | 2-Way STOP | Eastbound | 14.0 | B | 45.3 | E | 45.3 | E | 45.3 | E | 34.5 | D | 29.3 | D | 138.1 | F | 138.1 | F | 138.1 | F | 59.6 | F | 51.3 | F | * | F | * | F | * | F | 301.3 | F | 131.0 | F |
| | | | Westbound | 14.9 | B | 39.8 | E | 39.8 | E | 39.8 | E | 24.8 | C | 23.4 | C | 329.8 | F | 329.8 | F | 329.8 | F | 51.7 | F | 54.4 | F | * | F | * | F | * | F | 524.4 | F | 340.4 | F |
| | | | Northbound | 7.9 | A | 8.0 | A | 7.9 | A | 7.9 | A | 7.8 | A | 7.7 | A | 8.1 | A | 8.1 | A | 8.1 | A | 7.9 | A | 7.7 | A | 8.2 | A | 8.2 | A | 8.2 | A | 8.1 | A | 7.8 | A |
| | | | Southbound | 7.8 | A | 9.1 | A | 9.1 | A | 9.1 | A | 8.6 | A | 8.5 | A | 9.7 | A | 9.7 | A | 9.7 | A | 8.9 | A | 8.8 | A | 10.3 | B | 10.3 | B | 10.3 | B | 9.4 | A | 9.2 | A |
| 3 | US 51S / Alt. 6A | 1-Way STOP | Westbound | - | - | - | - | - | - | - | - | 11.0 | B | - | - | - | - | - | - | - | - | 11.7 | B | - | - | - | - | - | - | - | - | 12.2 | B | - | - |
| | | | Southbound | - | - | - | - | - | - | - | - | 7.7 | A | - | - | - | - | - | - | - | - | 7.8 | A | - | - | - | - | - | - | - | - | 7.8 | A | - | - |
| 4 | KY 58 / Alt. 6A | 2-Way STOP | Eastbound | - | - | - | - | - | - | - | - | 7.4 | A | - | - | - | - | - | - | - | - | 7.5 | A | - | - | - | - | - | - | - | - | 7.5 | A | - | - |
| | | | Westbound | - | - | - | - | - | - | - | - | 7.5 | A | - | - | - | - | - | - | - | - | 7.5 | A | - | - | - | - | - | - | - | - | 7.6 | A | - | - |
| | | | Northbound | - | - | - | - | - | - | - | - | 11.2 | B | - | - | - | - | - | - | - | - | 11.8 | B | - | - | - | - | - | - | - | - | 12.5 | B | - | - |
| | | | Southbound | - | - | - | - | - | - | - | - | 11.2 | B | - | - | - | - | - | - | - | - | 11.7 | B | - | - | - | - | - | - | - | - | 12.4 | B | - | - |
| 5 | US 51N / Alt. 6A | 1-Way STOP | Westbound | - | - | - | - | - | - | - | - | 10.0 | A | - | - | - | - | - | - | - | - | 10.2 | B | - | - | - | - | - | - | - | - | 10.7 | B | - | - |
| | | | Southbound | - | - | - | - | - | - | - | - | 7.7 | A | - | - | - | - | - | - | - | - | 7.8 | A | - | - | - | - | - | - | - | - | 7.9 | A | - | - |
| 6 | US 51S / Alt. 9 | 1-Way STOP | Eastbound | - | - | - | - | - | - | - | - | - | - | 10.4 | B | - | - | - | - | - | - | - | - | 11.9 | B | - | - | - | - | - | - | - | - | 12.7 | B |
| | | | Northbound | - | - | - | - | - | - | - | - | - | - | 8.1 | A | - | - | - | - | - | - | - | - | 8.3 | A | - | - | - | - | - | - | - | - | 8.5 | A |
| 7 | KY 58 / Alt. 9 | 2-Way STOP | Eastbound | - | - | - | - | - | - | - | - | - | - | 7.5 | A | - | - | - | - | - | - | - | - | 7.6 | A | - | - | - | - | - | - | - | - | 7.6 | A |
| | | | Westbound | - | - | - | - | - | - | - | - | - | - | 7.5 | A | - | - | - | - | - | - | - | - | 7.5 | A | - | - | - | - | - | - | - | - | 7.6 | A |
| | | | Northbound | - | - | - | - | - | - | - | - | - | - | 12.4 | B | - | - | - | - | - | - | - | - | 14.1 | B | - | - | - | - | - | - | - | - | 15.6 | C |
| | | | Southbound | - | - | - | - | - | - | - | - | - | - | 12.0 | B | - | - | - | - | - | - | - | - | 13.5 | B | - | - | - | - | - | - | - | - | 14.8 | B |
| 8 | US 51N / Alt. 9 | 1-Way STOP | Eastbound | - | - | - | - | - | - | - | - | - | - | 10.5 | B | - | - | - | - | - | - | - | - | 11.1 | B | - | - | - | - | - | - | - | - | 11.7 | B |
| | | | Northbound | - | - | - | - | - | - | - | - | - | - | 7.6 | A | - | - | - | - | - | - | - | - | 7.6 | A | - | - | - | - | - | - | - | - | 7.7 | A |

Notes: Only the p.m. peak is shown, as it represents the higher of the two peak periods.
2002 LOS analysis employed the peak hour count data collected for the study
2010-230 LOS analysis used projected ADT with design hour and directional distribution factors
For 2010, 2020, and 2030 the signal timing plan has been optimized
Average delay is in seconds per vehicle

Alternative 3

For the intersection of US 51 and KY 58 / KY 123 (Clay Street), all levels of service reflect the construction of northbound and southbound left turn lanes as well as the addition of an exclusive right turn lane in the eastbound direction. As shown in Table 2, the level of service for the intersection becomes LOS B with construction of the additional turn lanes in 2010, and continues to operate at LOS B through the year 2030. The intersection levels of service for Alternative 3 are shown in Figure 8.

Alternative 6A

Construction of an eastern bypass will have little effect on improving intersection levels of service at the two key intersections in town. Improvements will still be necessary at these intersections to improve the level of service to a desirable level in 2030. For the new intersections created by the construction of an eastern bypass, all three intersections are expected to operate at a LOS A or B through 2030. For the design year of 2030, intersection levels of service are shown on Figure 9.

Alternative 9

Construction of a western bypass also will have little effect on improving intersection levels of service at the two key intersections in town. Improvements will still be necessary at these intersections to improve the level of service to a desirable level in 2030. For the new intersections created by the construction of a western bypass, all three intersections are expected to operate at a LOS A or B through 2030. For the design year of 2030, intersection levels of service are shown on Figure 10.

**Two-Lane Level of Service**

The traffic analysis also examined levels of service on US 51 north and south of town and on the proposed 6A and 9 bypasses. For two-lane highways, level of service is a measure of the average travel speed and the percent time, on average, that a driver will spend following another vehicle. The eight analysis segments were:

1. KY 1728 to KY 1540
2. KY 1540 to KY 288
3. KY 1549 to KY 780
4. Fulton Co. Line to KY 1529
5. Alternative 6A bypass from old US 51 (north) to KY 58
6. Alternative 6A bypass from KY 58 to old US 51 (south)
7. Alternative 9 bypass from old US 51 (north) to KY 58
8. Alternative 9 bypass from KY 58 to old US 51 (south)

Similar to the intersection analysis, there are similarities between many of the build alternatives. In fact, Alternatives 1, 2, and 3 have all been grouped together because they have similar traffic volumes and operating characteristics north and south of Clinton. The bypass alternatives, however, were examined separately because of the substantially different alignments. The two-lane LOS results are summarized in Table 3 and Figures 7 through 10.

**Figure 7: Alternative 2 2030**
**Intersection and Segment LOS**

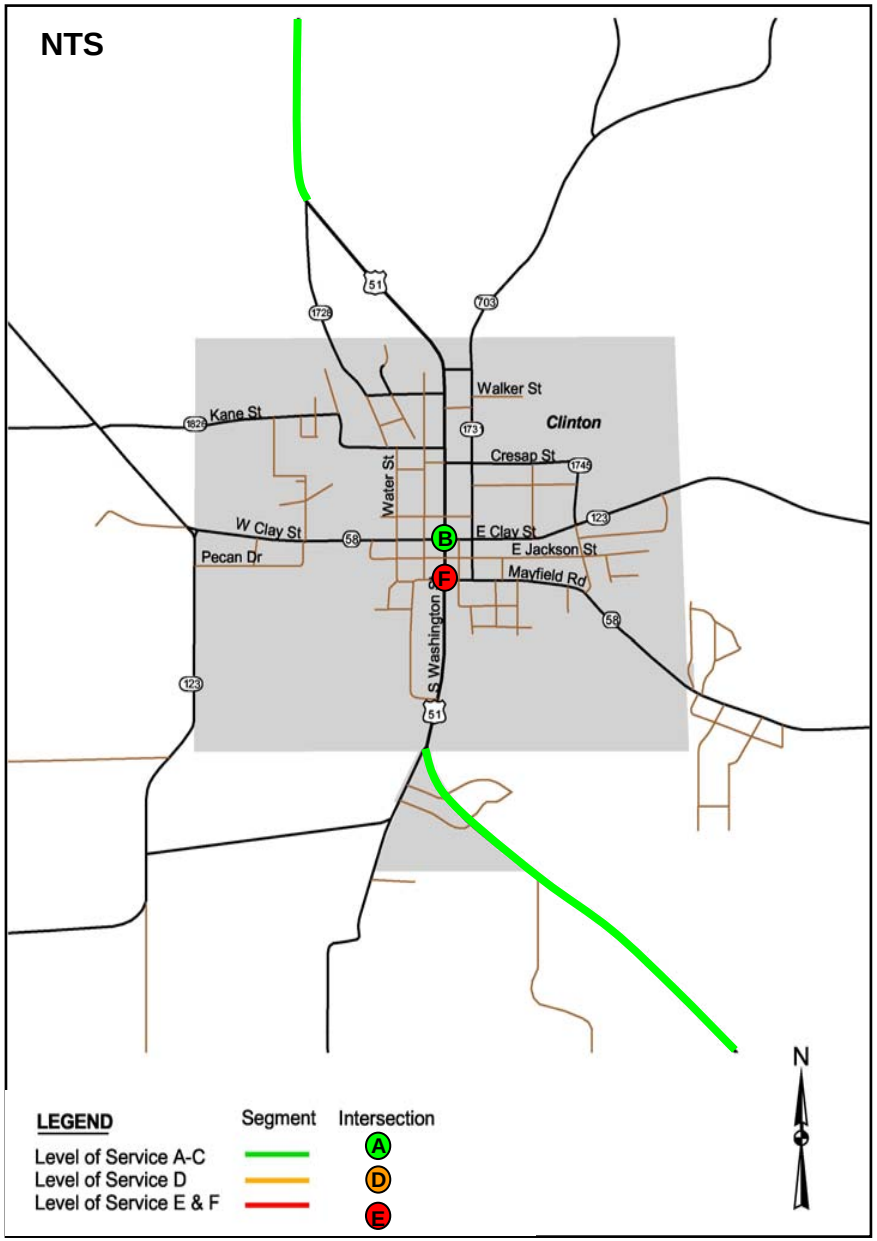



**Figure 8: Alternative 3 2030**
**Intersection and Segment LOS**

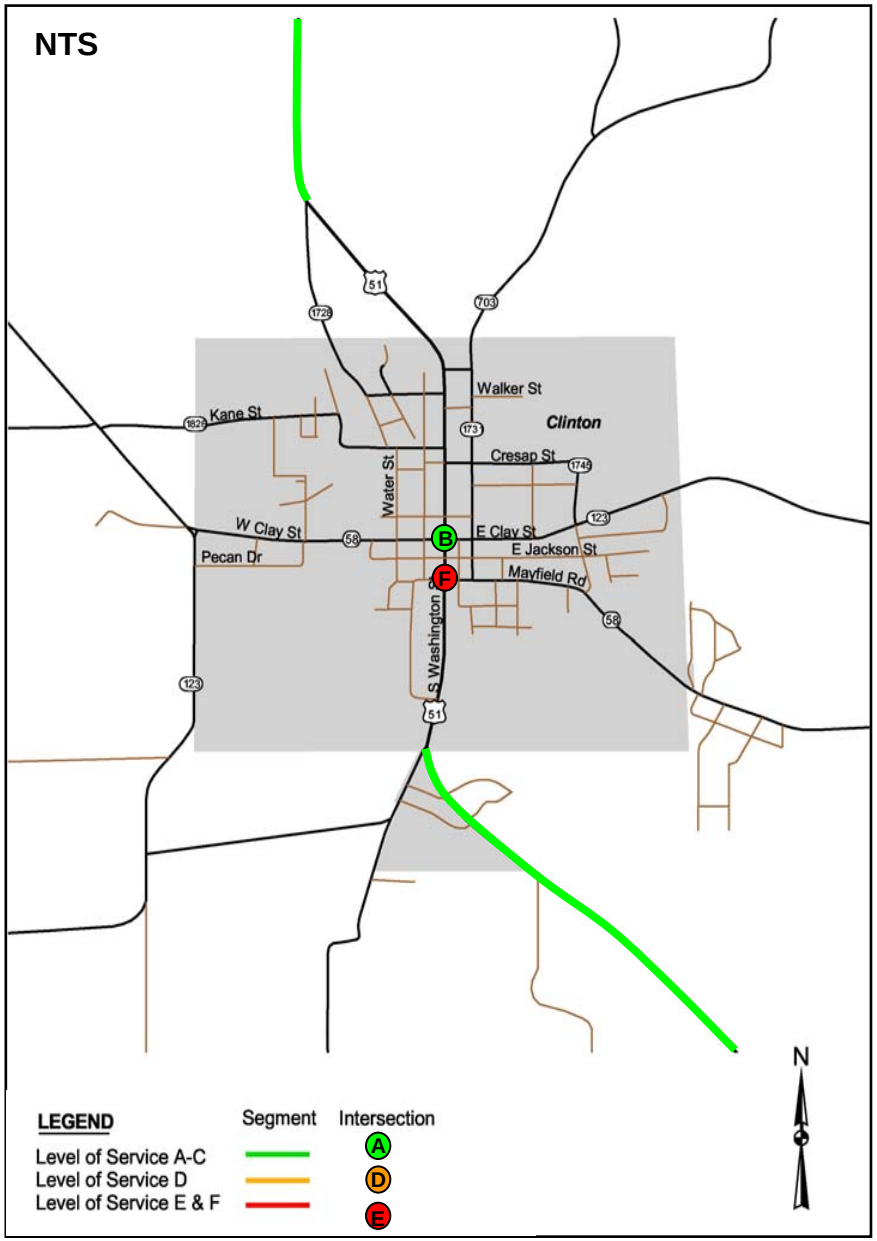


**Figure 9: Alternative 6A 2030**
**Intersection and Segment LOS**

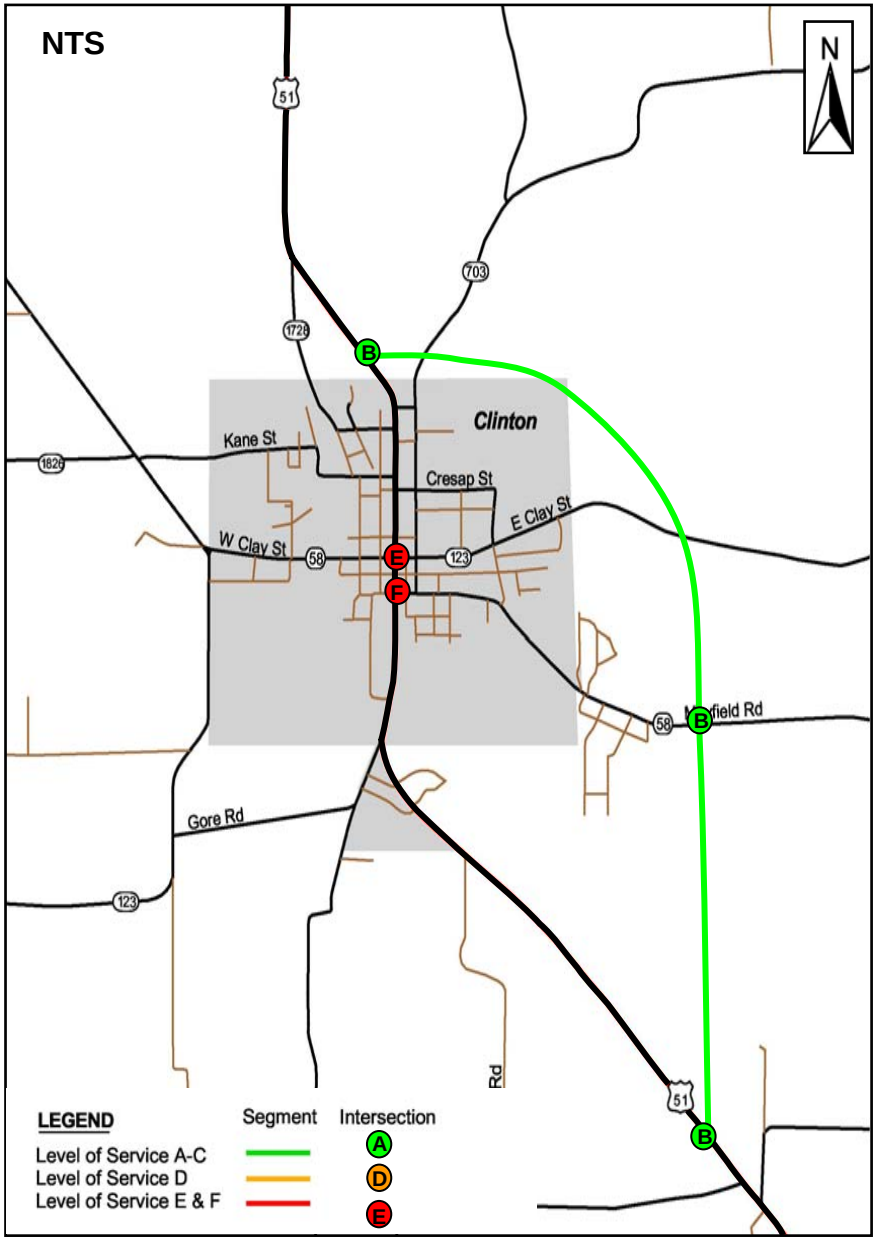
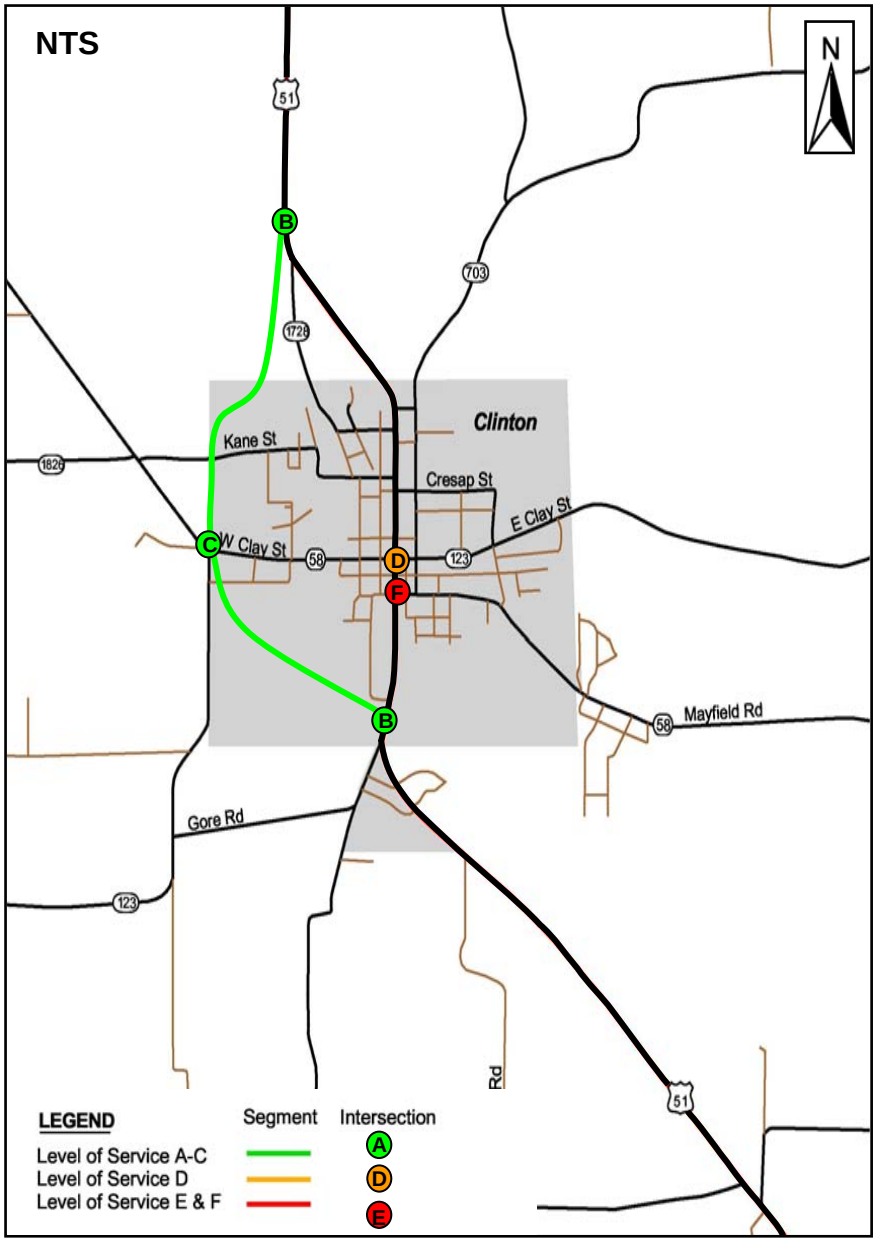



**Figure 10: Alternative 9 2030**
**Intersection and Segment LOS**



## Table 3: Two-Lane Level of Service Analysis

| Segment | 2002 | | | 2010 | | | 2020 | | | 2030 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Alts. 1 - 3 | Alt. 6A | Alt. 9 | Alts. 1 - 3 | Alt. 6A | Alt. 9 | Alts. 1 - 3 | Alt. 6A | Alt. 9 | Alts. 1 - 3 | Alt. 6A | Alt. 9 |
| KY 1728 to KY 1540 | C | - | - | C | - | - | C | - | - | C | - | - |
| KY 1540 to KY 288 | B | - | - | B | - | - | B | - | - | C | - | - |
| KY 1529 to KY 780 | C | - | - | C | - | - | C | - | - | C | - | - |
| Fulton Co. Line to KY 1529 | B | - | - | C | - | - | C | - | - | C | - | - |
| US 51 N to KY 58 ( 6A bypass segment) | - | B | - | - | B | - | - | B | - | - | B | - |
| KY 58 to US 51 S (6A bypass segment) | - | B | - | - | B | - | - | B | - | - | B | - |
| US 51 N to KY 58 (9 bypass segment | - | - | B | - | - | B | - | - | C | - | - | C |
| KY 58 to US 51 S (9 bypass segment) | - | - | B | - | - | B | - | - | C | - | - | C |

The two-lane analysis showed that nearly all of the existing segments operate at LOS C or better and will continue to operate at LOS C or better through 2030 with and without improvements.

### I-66 / I-69 Impacts

Due to the proximity to the study area of the proposed Interstate 66 and Interstate 69 highways, the project team investigated the possible impact of these highways on future US 51 traffic volumes. Regarding I-69 in the vicinity of the study area, the Kentucky Transportation Cabinet is considering the possibility of designating the Purchase Parkway as I-69 from the Tennessee State Line to Interstate 24. From there, I-69 will run concurrent with I-24 to the Western Kentucky Parkway.

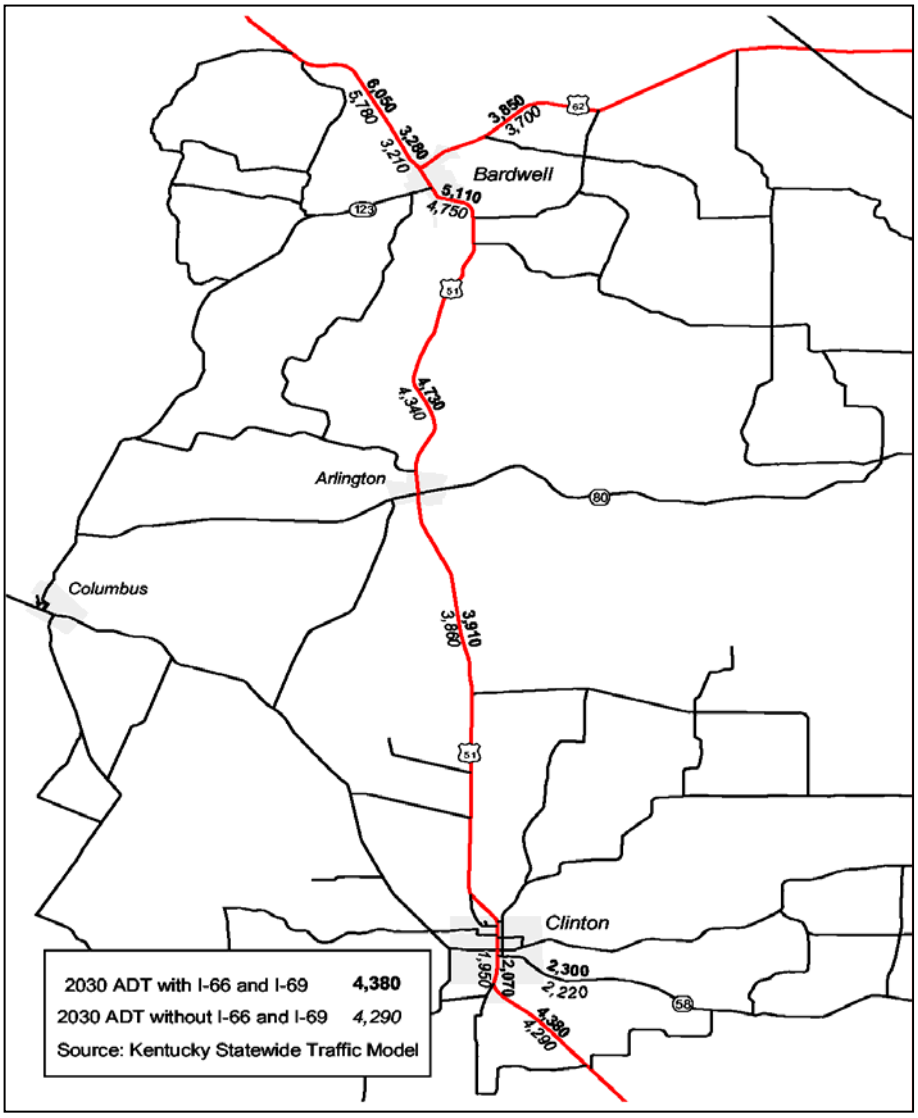
The final recommendation for I-66 in Western Kentucky is currently a no-build approach. However, the Kentucky Statewide Traffic Model (KYSTM) was reviewed to determine whether or not a proposed I-66 and I-69 highways would significantly increase traffic volumes on US 51. Year 2030 KYSTM assignments were examined both with and without the proposed new interstates in place. The results of these two runs are illustrated in Figure 11. As shown, the increase in traffic is not significant in the study area when I-66 and I-69 are added to the model. This is likely due to two factors:

1. The US 51 corridor is in a rural, sparsely populated area of the state. There are not a lot of trips in the corridor to begin with and even the addition of I-66 and I-69 will not generate enough growth in the corridor to cause a significant increase

in traffic. The KYSTM version that contains I-66 and I-69 also includes projections for population and employment growth in these corridors as a result of their construction.

2. On a system-wide level, I-55/I-57 to the west and US 45 to the east are parallel north-south alternatives to US 51, which connect population centers of considerably larger size. US 51 connects Fulton at its south end to Wickliffe and Cairo, Illinois at its northern terminus.

**Figure 11: Traffic Impacts of I-66 and I-69**



## Traffic Forecast Summary

Traffic volumes are not expected to increase significantly by the year 2030. Furthermore, the addition of I-66 and I-69 is not expected to have a significant impact on future traffic in the area. However, even with relatively low traffic volumes, in the future, the level of service for some of the intersections will begin to break down because of poor operating conditions generally associated with the streets intersecting with US 51. The intersection operational issues can be addressed by upgrading the existing highway as proposed with Alternatives 2 and 3.

Alternatives 6A and 9 involve new alignments and therefore will result in diverted traffic from the existing US 51 alignment. Year 2030 traffic projections for both of the bypass alternatives are low – less than 3,000 vehicles per day. The projections are based on a manual diversion technique that relies on travel time savings. As proposed, the bypasses would offer little travel time savings – one minute or less – for those vehicles traveling through the Clinton area on US 51. Thus, travel time-based traffic projections are low.