# PROJECTED CONDITIONS

## Projected Traffic Volumes

The future transportation network was built using existing lane configurations and projected traffic volumes for the year 2030. This section summarizes the future year forecasting methodology and the results of the capacity analysis in the study area and influence area. The projected conditions are essentially future year no-build conditions.

### *Growth Trends*

Future year (2030) traffic projections for the highways and arterials within the study area were developed based on historical growth trends and projections from the WAMPO Travel Demand Model (TDM).

*Historical Traffic Growth*

Data from KDOT count maps between 1997 and 2005 indicate that traffic volumes along a screen line of east-west routes have grown at an annual rate of about 2.6 percent per year (linear growth). The daily traffic volumes at selected locations are shown in Exhibit 4.1. Review of this information indicates a 3.7 percent growth rate on US-54/400 (Kellogg Ave.) and a decline in traffic volumes on Central Avenue west of I-235. Note that east-west traffic on the screen-line routes peaked in 2003 and then declined about 4 percent between 2003 and 2005. While data is available on I-235 and US-54/400 prior to 1997, this was the oldest year that data was also available on all of the cross streets. The data since 1997 also represents a period since completion of major portions of US-54/400 and the trend toward lower growth on these facilities.

North-south traffic on I-235, West Street and Ridge Road has increased about 1.0 percent per year between 1997 and 2005, with a growth rate of 2.9 percent per year on I-235, but a decline on both West Street and Ridge Road.

**Exhibit 4.1 – Historical and Existing Traffic Volumes**

| | 1997 | 2000 | 2003 | 2005 | 97-'05 Growth |
|---|---|---|---|---|---|
| **East-West Routes** | | | | | |
| K-42 east of I-235 | 12,050 | 15,305 | 15,090 | 13,515 | 1.5% |
| US-54/400 (Kellogg Ave.) east of I-235 | 62,035 | 80,780 | 82,900 | 80,200 | 3.7% |
| 0Maple east of I-235 | 13,400 | 20,000 | 18,775 | 17,680 | 4.0% |
| Central east of I-235 | 21,125 | 21,175 | 23,9350 | 21,565 | 0.3% |
| Central west of I-235* | 33,405 | 30,855 | 32,550 | 30,790 | -1.0% |
| 13th east of I-235** | -- | -- | -- | -- | -- |
| Zoo east of I-235 | 20,975 | 20,115 | 23,230 | 23,385 | 1.4% |
| Total (east of I-235) | 129,585 | 157,375 | 163,930 | 156,345 | 2.6% |
| **North-South Routes** | | | | | |
| West north of Maple | 26,900 | 25,975 | 27,100 | 25,660 | -0.6% |
| I-235 north of US-54/400 (Kellogg Ave.) | 39,685 | 43,554 | 50,400 | 49,035 | 2.9% |
| Ridge south of Maple | 25,235 | 26,300 | 25,525 | 24,575 | -0.3% |
| Total | 91,820 | 95,829 | 103,025 | 99,270 | 1.0% |

*Not included in screen-line totals **Proposed 13th Street big ditch crossing

*WAMPO Model Traffic Projections*

In the future for year 2030, the WAMPO TDM projects a growth in east-west traffic through the study area of 0.9 percent annually (linear growth), however, the growth on US-54/400 (Kellogg Ave.) of only 0.1 percent. This may be associated with the overestimation of existing traffic volumes. The 2002 projections on US-54/400 are at 100,000 vehicles per day (vpd) which would have the facility operating near capacity. Actual traffic volumes are closer to 80,000 vpd. In order to test the sensitivity of US-54/400 to this capacity constraint, a second model run was conducted with the capacity of US-54/400

increased to eight lanes (widening of US-54/400) from Ridge to Seneca. This widening is not anticipated within the future horizon of this study – this exercise was conducted to test the impact of the overestimation of existing traffic volumes. With the increased capacity of US-54/400, much more traffic was attracted to the facility resulting in an annual growth rate of about 0.8 percent. Corresponding decreases in traffic volume growth were reflected on parallel routes such that the overall growth across the screen-line was similar for both the six and eight lane scenarios. A comparison of the selected routes with the WAMPO travel demand model output is shown in Exhibit 4.2.

**Exhibit 4.2 – Traffic Model Projections**

| | Existing Actual | | Traffic Model | | | | |
|---|---|---|---|---|---|---|---|
| | 2005 | '97-'05 Growth | 2002 | 2030 6 Lane | Growth | 2030 8 Lane | Growth |
| **East-West Routes** | | | | | | | |
| K-42 east of I-235 | 13,515 | 1.5% | 26,345 | 40,654 | 1.9% | 37,060 | 1.5% |
| US-54/400 (Kellogg Ave.) east of I-235 | 80,200 | 3.7% | 99,373 | 101,841 | 0.1% | 121,303 | 0.8% |
| Maple east of I-235 | 17,680 | 4.0% | 19,256 | 27,785 | 1.6% | 22,917 | 0.7% |
| Central east of I-235 | 21,565 | 0.3% | 19,292 | 26,623 | 1.4% | 23,056 | 0.7% |
| Central west of I-235* | 30,790 | -1.0% | 19,773 | 28,501 | 1.6% | 23,633 | 0.7% |
| 13th east of I-235** | -- | | -- | 14,040 | | 13,574 | |
| Zoo east of I-235 | 23,385 | 1.4% | 36,062 | 38,753 | 0.3% | 37,068 | 0.1% |
| Total (east of I-235) | 156,345 | 2.6% | 200,328 | 249,696 | 0.9% | 254,978 | 1.0% |
| **North-South Routes** | | | | | | | |
| West north of Maple | 25,660 | -0.6% | 27,870 | 32,402 | 0.6% | 30,790 | 0.4% |
| I-235 north of US-54/400 (Kellogg Ave.) | 49,035 | 2.9% | 53,464 | 61,554 | 0.5% | 61,176 | 0.5% |
| Ridge south of Maple | 24,575 | -0.3% | 21,259 | 22,683 | 0.2% | 27,611 | 1.1% |
| Total | 99,270 | 1.0% | 102,593 | 116,639 | 0.5% | 119,577 | 0.6% |

*Not included in screen-line totals **Proposed 13th Street big ditch crossing

*Traffic Growth Projections*

Based on the historical growth trends and the TDM projections, the future traffic growth on the study area major east-west routes has been estimated (as shown in Exhibit 4.3) at 1.5 percent per year (37.5 percent growth from 2005 to 2030) plus the approximately 14,000 vehicles per day will use the 13th Street crossing in 2030. With the added 13th Street traffic, the overall east-west growth rate is 1.9 percent per year (46.5 percent over 25 years).

For north-south routes, a growth rate of 1.0 percent per year (25 percent over 25 years) is estimated. Traffic volumes on non-arterial streets would be held constant (including turning movements to/from these streets) as the study area is generally built-out – growth will primarily be in the form of through traffic.

As noted on Exhibit 4.3, the overall growth rate of east-west traffic through the study area will be approximately 1.9 percent per year (46.5 percent over 25 years). While this rate is somewhat below the historical growth rate of 2.6 percent between 1997 and 2005 it reflects the flattening trend of growth in the more recent years and is well above the 0.9 percent growth rate shown in the model.

To estimate the peak hour traffic volumes used for capacity analyses, the proposed growth was added to the existing turning movements. Exhibits 4.4a and b show the projected peak hour turning movements for year 2030.

**Exhibit 4.3 – Traffic Growth Projections**

| | Existing Actual | | Traffic Model | | | | | Proposed Projections | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2005 | 2005 | 2002 | 2030 6 Lane | Growth | 2030 8 Lane | Growth | Growth | 2030 Traffic | Increase |
| **East-West Routes** | | | | | | | | | | |
| K-42 east of I-235 | 13,515 | 1.5% | 26,345 | 40,654 | 1.9% | 37,060 | 1.5% | 1.5% | 18,583 | 5,068 |
| US-54/400 (Kellogg Ave.) east of I-235 | 80,200 | 3.7% | 99,373 | 101,841 | 0.1% | 121,303 | 0.8% | 1.5% | 110,275 | 30,075 |
| Maple east of I-235 | 17,680 | 4.0% | 19,256 | 27,785 | 1.6% | 22,917 | 0.7% | 1.5% | 24,310 | 6,630 |
| Central east of I-235 | 21,565 | 0.3% | 19,292 | 26,623 | 1.4% | 23,056 | 0.7% | 1.5% | 29,652 | 8,087 |
| Central west of I-235* | 30,790 | -1.0% | 19,773 | 28,501 | 1.6% | 23,633 | 0.7% | 1.5% | 42,336 | 11,546 |
| 13th east of I-235** | -- | | -- | 14,040 | | 13,574 | | | 14,000 | 14,000 |
| Zoo east of I-235 | 23,385 | 1.4% | 36,062 | 38,753 | 0.3% | 37,068 | 0.1% | 1.5% | 32,154 | 8,769 |
| Total (east of I-235) | 156,345 | 2.6% | 200,328 | 249,696 | 0.9% | 254,978 | 1.0% | 1.9% | 228,974 | 72,629 |
| **North-South Routes** | | | | | | | | | | |
| West north of Maple | 25,660 | -0.6% | 27,870 | 32,402 | 0.6% | 30,790 | 0.4% | 1.0% | 32,075 | 6,415 |
| I-235 north of US-54/400 (Kellogg Ave.) | 49,035 | 2.9% | 53,464 | 61,554 | 0.5% | 61,176 | 0.5% | 1.0% | 61,294 | 12,259 |
| Ridge south of Maple | 24,575 | -0.3% | 21,259 | 22,683 | 0.2% | 27,611 | 1.1% | 1.0% | 30,719 | 6,144 |
| Total | 99,270 | 1.0% | 102,593 | 116,639 | 0.5% | 119,577 | 0.6% | 1.0% | 124,088 | 24,818 |

*Not included in screen-line totals **Proposed 13th Street big ditch crossing

## Projected Capacity Analysis

As with the existing conditions analysis, VISSIM and HCM capacity analyses were performed using projected future (2030) year traffic volumes. With few committed transportation projects in the study area, existing lane configurations were used for analyses. Key statements regarding operations are underlined.

### *Highway Segments, Ramp and Weave Sections*

US-54/400 (Kellogg Ave.) Eastbound

The projected future year traffic volumes on Kellogg Ave. Eastbound entering the study area (west of W Ridge Road exit ramp) and exiting the study area (east of West Street entrance ramp) are approximately 3,400 vph and 4,600 vph in the AM peak hour. In the PM peak hour, the volumes at the same locations are approximately 5,400 vph and 6,400 vph.

The AM peak hour analysis in VISSIM indicates that the LOS is bordering between LOS D and LOS E all along US-54/400 Eastbound. The simulation shows that in general, the traffic is flowing but at reduced speeds. The weaving section near I-235 interchange fails to operate acceptably during the AM peak hour. This is due the growth in the weaving volumes by more than 37%.

During the PM Peak hour, the entire section of the highway from west of Ridge Road to I-235 interchange operates at capacity and with LOS F. The simulation shows that the traffic continues to move with reduced speeds.

US-54/400 (Kellogg Ave.) Westbound

The projected future year traffic volumes on US-54/400 Westbound entering the study area (east of West Street exit ramp) and exiting the study area (west of W Ridge Road entrance ramp) are approximately 3,300 vph and 2,400 vph in the AM peak hour. In the PM peak hour, the volumes at the same locations are approximately 7,600 vph and 6,200 vph.

The AM peak hour capacity analysis indicates that all the sections of the highway operate at acceptable LOS. During the PM peak hour, at several sections along the highway, capacity constraints are identified all along the highway. The weaving section near I-235 interchange operates poorly because of short weave section.

## Exhibit 4.4a – Projected 2030 Peak Hour Traffic Volumes – AM Peak Hour

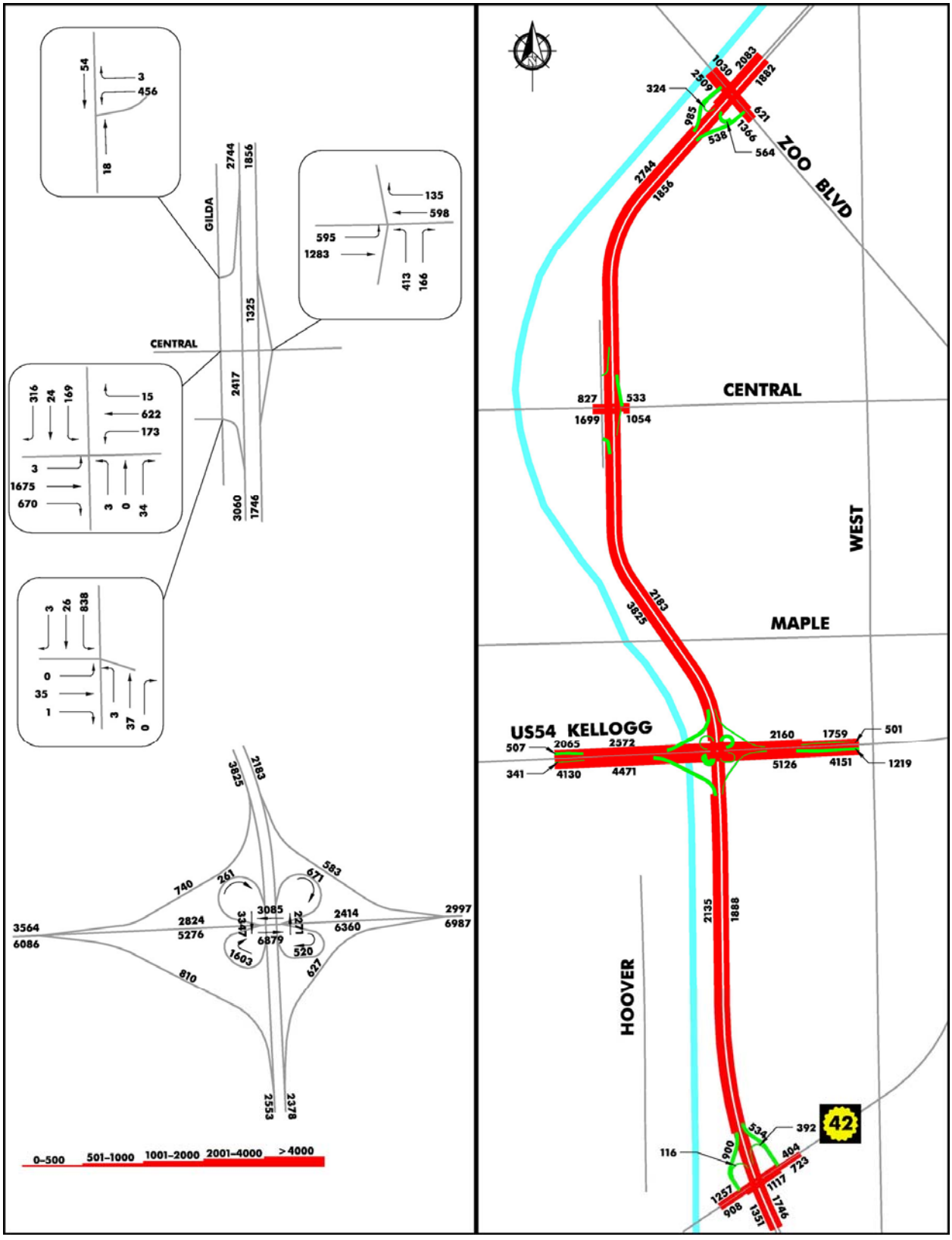
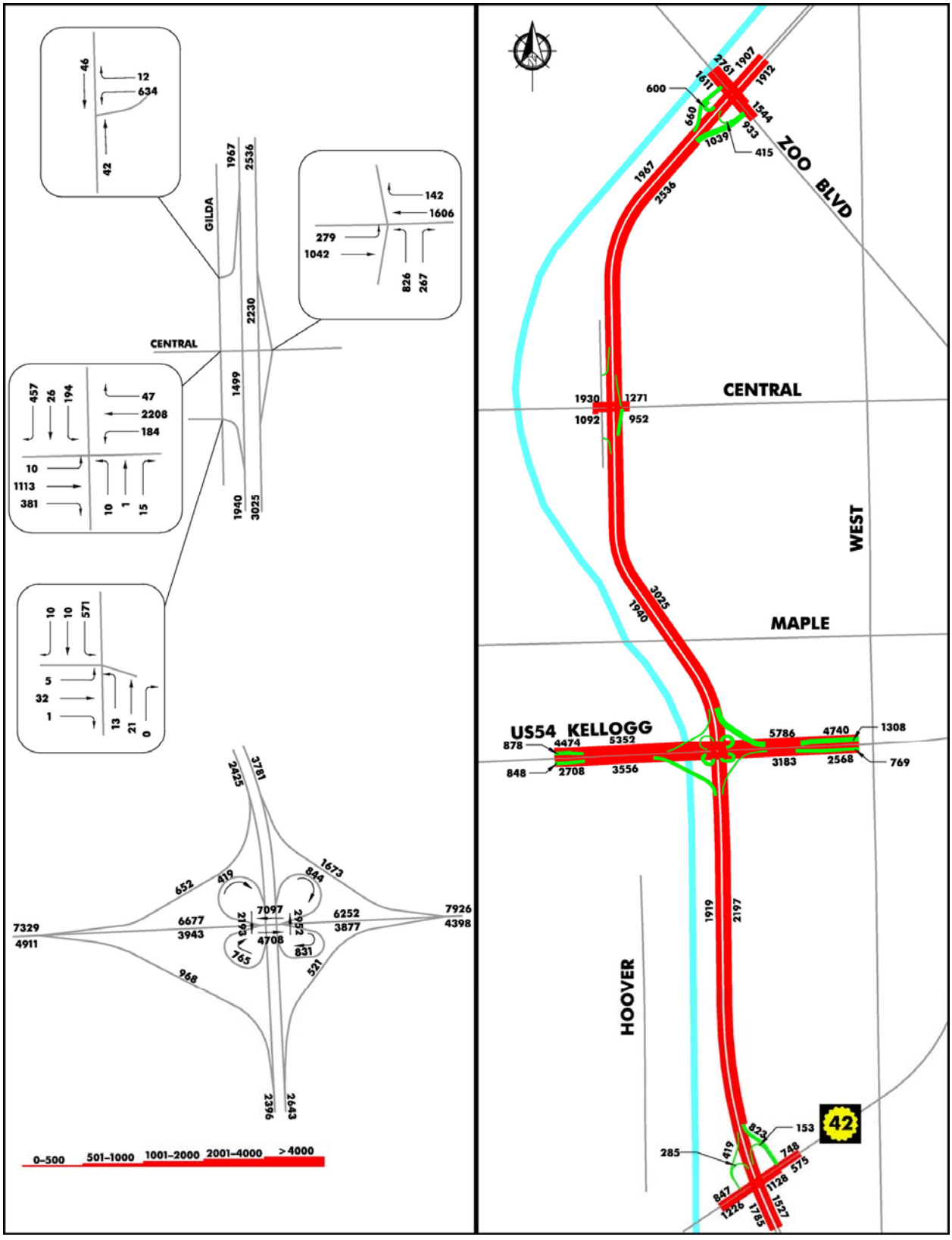


**Exhibit 4.4b – Projected 2030 Peak Hour Traffic Volumes – PM Peak Hour**



I-235 Northbound

The projected future year traffic volumes on I-235 Northbound entering the study area (south of K-42 exit ramp) and exiting the study area (north of Zoo Boulevard entrance ramp) are approximately 2,200 vph and 2,400 vph in the AM peak hour. In the PM peak hour, the volumes at the same locations are approximately 1,700 vph and 2,250 vph.

The AM peak hour capacity analysis indicates that the only section operating poorly is the weaving section near US-54/400. In general, during the PM peak hour, the northbound direction of I-235 freeway is near capacity with only two lanes. Minor turbulence in traffic flow is observed at the weaving section near US-54/400.

I-235 Southbound

The projected future year traffic volumes on I-235 Southbound entering the study area (north of Zoo Boulevard exit ramp) and exiting the study area (south of K-42 entrance ramp) are approximately 2,500 vph and 1,500 vph in the AM peak hour. In the PM peak hour, the volumes at the same locations are approximately 2,380 vph and 2,200 vph.

During the AM peak hour, the analysis indicates that there is significant congestion southbound caused partly by merge of the Central Avenue entrance ramp with mainline I-235 traffic. Simulation of this scenario shows that traffic bound for US-54/400 exit ramp, reach a decision making point when they arrive closer to Central Avenue ramps on I-235. The traffic starts queuing on the right travel lane thus competing with the merging traffic. This bottleneck queues all the way up to Zoo Boulevard interchange.

During the PM peak hour, the congestion at the weaving section near Kellogg Ave. builds up half-way to Central Avenue interchange. In general, the freeway is near capacity with only two lanes.

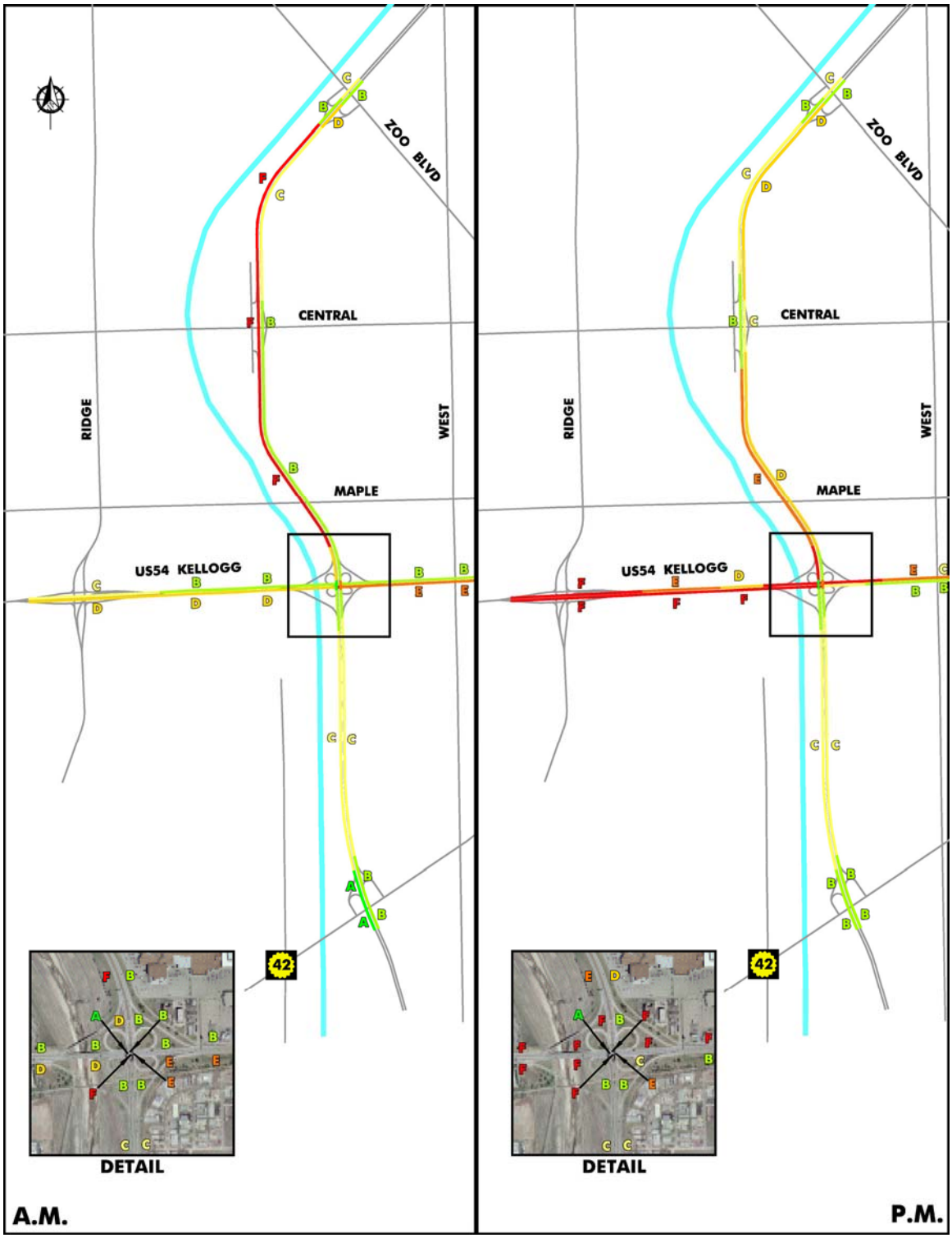
The LOS indicated by the VISSIM analyses for various segments are shown on Exhibit 4.5. The LOS calculated using HCM methodology using basic freeway segments, merge and diverge areas and weaving sections analyses are shown on Exhibit 4.6a and b for the AM and PM peak hours respectively. The freeway analysis results from the VISSIM model are included in the Appendix.

***Ramp Terminals***

The ramp terminals analyzed for existing conditions are also analyzed for capacity with projected future year traffic volumes using HCM methodology during both AM and PM peak hours. The projected future year traffic volumes and existing lane configurations were used. Exhibit 4.7 shows the results of the capacity analysis for signalized ramp terminals as well as arterial signalized intersections under projected no-build conditions.

In general, intersection operations at all ramp terminals deteriorate during both peak hours. The intersection operations at Central Avenue are most critical because of their association with queuing on I-235 mainline. The intersection on Central Avenue at I-235 Northbound ramps operates reasonably during AM peak hour but fails during PM peak hour. The unsignalized I-235 Southbound ramp intersections on Newell Street and Gilda Street continue to operate similar to the Existing Conditions. Traffic exiting Newell Street experiences long delays due to heavy opposing traffic volumes during both AM and PM peak hours. The critical intersection at Gilda Street and Central Avenue operates poorly at LOS E during both peak hours. Several phasing combinations were tested at this intersection. The signal timing analysis indicates that operating with the existing PM peak hour phasing and reducing cycle lengths to 120 seconds improves the LOS.

**Exhibit 4.5 – Projected 2030 AM and PM Segment Analysis – VISSIM LOS**



## Exhibit 4.6 – Projected 2030 AM and PM Segment Analysis

### Interstate 235

| SEGMENT | | AM | | | PM | | |
|---|---|---|---|---|---|---|---|
| | | DENSITY | | LOS | DENSITY | | LOS |
| | | VISSIM | HCM | HCM | VISSIM | HCM | HCM |
| **I-235 Southbound** | | *Approx.* | | | Approx. | | |
| Zoo Off Ramp | Diverge | *22* | 22.4 | C | *21* | 17.7 | B |
| Zoo On Ramp | Merge | *30* | 31.3 | D | *14* | 23.3 | C |
| **Zoo to Central** | **Basic** | ***60*** | 29.3 | D | *23* | 20.1 | C |
| **Central Off Ramp** | **Diverge** | ***>70*** | 30.3 | D | *20* | 19.3 | B |
| **Central On Ramp** | **Merge** | ***>70*** | 34.7 | D | *18* | 22.7 | C |
| **Central to US-54** | **Basic** | ***>70*** | **36** | **E** | ***45*** | 19.8 | C |
| US-54 Off Ramp | Diverge | *20* | 32.3 | D | *35* | 19.5 | B |
| **US-54 Loops** | **Weave** | *30* | **45.7** | **F** | ***60*** | 25.6 | C |
| US-54 On Ramp | Merge | *15* | 24.3 | C | *15* | 22.8 | C |
| US-54 to K-42 | Basic | *22* | 20.8 | C | *20* | 19.5 | C |
| K-42 Off Ramp | Diverge | *25* | 15.6 | B | *19* | 20.6 | C |
| K-42 On Ramp | Merge | *10* | 13.5 | B | *15* | 19.9 | B |
| **I-235 Northbound** | | | | | | | |
| K-42 Off Ramp | Diverge | *22* | 18.9 | B | *15* | 17.6 | B |
| K-42 On Ramp | Merge | *13* | 22.8 | C | *14* | 24.9 | C |
| K-42 to US-54 | Basic | *19* | 19.4 | C | *22* | 21.6 | C |
| US-54 Off Ramp | Diverge | *14* | 19.2 | B | *17* | 22.8 | C |
| **US-54 Loops** | **Weave** | ***38*** | 23.3 | B | ***48*** | **39.2** | **E** |
| US-54 On Ramp | Merge | *13* | 20.2 | C | *17* | 33.8 | D |
| **US-54 to Central** | **Basic** | *17* | 17.8 | B | *30* | **35.1** | **E** |
| Central Off Ramp | Diverge | *13* | 12.2 | B | *20* | 22.8 | C |
| Central On Ramp | Merge | *15* | 22.1 | C | *20* | 29.2 | D |
| Central to Zoo | Basic | *27* | 19 | C | *30* | 26 | C |
| Zoo Off Ramp | Diverge | *15* | 17.9 | B | *20* | 18.8 | B |
| Zoo On Ramp | Merge | | 20.9 | C | *15* | 20 | B |

### US-54/400 (Kellogg Ave.)

| SEGMENT | | AM | | | PM | | |
|---|---|---|---|---|---|---|---|
| | | DENSITY | | LOS | DENSITY | | LOS |
| | | VISSIM | HCM | HCM | VISSIM | HCM | HCM |
| **US-54/400 Eastbound** | | *Approx.* | | | *Approx.* | | |
| **Ridge to Dugan** | **Basic** | *35* | **36.6** | **E** | ***>70*** | 23.3 | C |
| **Dugan to I-235** | **Weave** | *28* | 34.1 | D | ***>70*** | 26.9 | C |
| **EB-SB Ramp to Loops** | **Basic** | ***40*** | 31.7 | D | ***>70*** | 22.6 | C |
| **I-235 Loops** | **Weave** | ***60*** | **59** | **F** | ***>70*** | **37.2** | **E** |
| **Loops to NB-EB Ramp** | **Basic** | ***40*** | **>70** | **F** | ***>70*** | 25.3 | C |
| **I-235 to West Street** | **Weave** | *31* | **52.1** | **F** | *25* | 28.3 | C |
| **Btw. West St. Ramps** | **Basic** | *34* | **36.9** | **E** | *19* | 20.8 | C |
| West Street On Ramp | Merge | | 33.5 | D | *19* | 25.3 | C |
| West Street to K-42 | Basic | | 27.8 | D | | 19.8 | C |
| **US-54/400 Westbound** | | | | | | | |
| **K-42 to West Street** | Basic | | 14 | B | | **36.3** | **E** |
| **West StreetOff Ramp** | Diverge | *15* | 11.6 | B | ***38*** | **>70** | **F** |
| **Btw. West St. Ramps** | Basic | *14* | 14.3 | B | ***42*** | **>70** | **F** |
| **West Street to I-235** | Weave | *15* | 16.8 | B | ***45*** | **62.6** | **F** |
| **WB-NB Ramp to Loops** | Basic | *15* | 17.2 | B | ***48*** | **44.1** | **E** |
| **I-235 Loops** | Weave | *16* | 20.2 | B | ***60*** | **55.1** | **F** |
| **Loops to SB-WB Ramps** | Basic | *16* | 16.2 | B | ***45*** | **>70** | **F** |
| **I-235 to Dugan** | Weave | *15* | 17.4 | B | *32* | **40.6** | **F** |
| **Dugan to Ridge** | Basic | *17* | 17.5 | B | ***42*** | **>70** | **F** |

The analyses indicate that all the ramp terminals on US-54/400 continue to operate acceptably with LOS C or better during both peak hours. LOS D occurs at the ramp terminals on West Street during PM peak hour. Both ramp terminals on K-42 operate at LOS D during AM peak hour. The intersection on K-42 at I-235 Northbound ramps operates poorly with LOS E during PM peak hour. Capacity improvements such as dual left-turn lanes may be needed at this intersection. On Zoo Boulevard, the intersection at I-235 Southbound ramps operate poorly with an LOS E during the AM peak hour and the intersection at I-235 Northbound ramps fails with LOS F during PM peak hour. In the AM peak hour conditions, heavy eastbound traffic on Zoo Boulevard causes capacity issues. In the PM peak hour, the signalized intersection is burdened more with the heavy exiting volumes from I-235 Northbound.

***Arterial Junctions***

*Signalized Intersections*

The arterial signalized intersections were analyzed with projected future year traffic and existing lane configurations. During both the AM and PM peak periods the majority of operations at arterial junctions are at a LOS D or better. On Zoo Boulevard and Windmill Road, LOS E and F occur during AM and PM peak hours respectively. Heavier eastbound traffic on Zoo Boulevard causes the intersection to reach capacity. Most of the deteriorating signalized intersection operations in the projected future year conditions occur at the ramp terminals, as discussed in the previous section. Exhibit 4.7 shows the results of the capacity analysis for all signalized intersections.

*Unsignalized Intersections*

The primary set of unsignalized intersections on Central Avenue was analyzed for projected future year conditions using the existing lane configurations. In general, the majority of these unsignalized intersections experience delays with left-turning movements operating at LOS F. During the AM peak hour, the southbound approaches at Boyd Avenue and Eisenhower Street and the northbound approaches at Hoover Road and Flora Street operate poorly at LOS F. The eastbound traffic on Newell Street at Gilda Street and I-235 Southbound on ramp also operates at LOS F. Despite the long delays experienced by drivers at these approaches, the number of vehicles is significantly low compared to heavy traffic on Central Avenue. During the PM peak hour, the eastbound and westbound left-turning movement operates at LOS F and experiences delays. Similar to AM peak hour conditions, the southbound turning movements at both these intersections also fail to operate acceptably. At the intersections on the other side of I-235, the northbound approaches at both Hoover Road and Flora Street operate poorly during the PM peak hour. In addition, the southbound approach at Flora Street also experiences long delays and operates at LOS F. Similar to AM peak hour conditions, the eastbound approach at Newell Street and Gilda Street operates at LOS F.

In the projected future year conditions, no considerable growth is expected on side-streets and their turning movements to or from Central Avenue. This is associated with the adjacent neighborhoods being fully developed. Although several intersection approaches in the projected future year conditions operate at LOS F, the number of vehicles experiencing the delays is significantly lower compared to traffic on Central Avenue. These intersections should be monitored for traffic signal warrants if the delays become unmanageable.

**Exhibit 4.7 – Projected 2030 AM and PM Signalized Intersection Analysis**