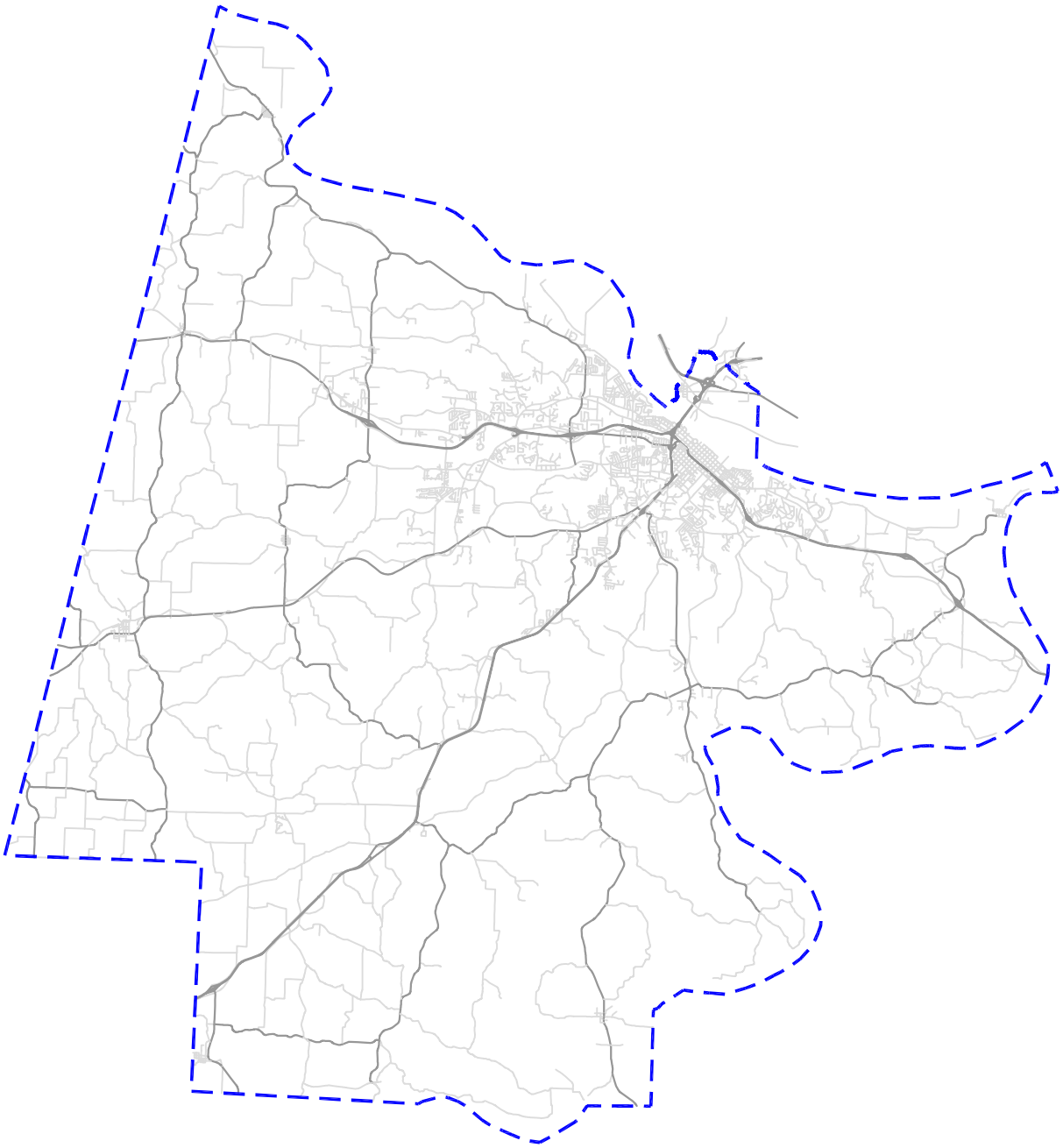
County-Wide Transportation Study

Cole County/
Jefferson City, Missouri



GBA

COUNTY-WIDE THOROUGHFARE STUDY
for
COLE COUNTY, MISSOURI
&
JEFFERSON CITY, MISSOURI

Final Report
September, 2003

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George Butler Associates, Inc., with the assistance of Parsons - Harlan Bartholomew and Associates, Inc. has completed this County-Wide Thoroughfare Study and Transportation Model to assist Cole County and Jefferson City, Missouri in determining the expected future impacts of continued development and what roadway infrastructure improvements will be expected to be required to supply the necessary roadway capacity to support these land use plans. The Thoroughfare Study utilizes both existing traffic volumes recorded within the Cole County and Jefferson City along major routes, and projected traffic volumes that would be expected due to planned future development. Please note that the study did not include detailed review of accident experience or history, or any detailed evaluation of pavement or bridge structural conditions or adequacy. Based on the analyses of identified capacity deficient intersections and corridors within the County and City, and utilizing both recorded existing and projected traffic volumes from the various traffic model scenarios that were completed, the following geometric or traffic control improvements should be considered to address both existing and/or projected traffic congestion or operational deficiencies. In addition, a review of the current Jefferson City Design Criteria is contained within the Appendix C of this document.

IMPROVEMENTS REQUIRED UNDER EXISTING CONDITIONS

Traffic Control Improvements:

1. Lafayette Street and Stadium Boulevard (Signal or Round-a-bout)
2. Tanner Bridge Road and Ellis Boulevard (Signal or Round-a-bout)
3. City View Drive and U.S. Highway 50 (Signal)
4. Bolivar and McCarty

Traffic Signal Timing / Phasing Optimization:

1. Broadway and Whitton Expressway (U.S. Highway 50)
2. Missouri Route 179 and Truman Boulevard / Industrial Drive
3. Dix Road and Industrial Drive
4. Eastland Drive and Eastbound U.S. Highway 50 Ramps
5. Jefferson Street and Ellis Boulevard
6. Vieth Drive and Missouri Route C
7. West Stadium Boulevard and Jefferson Street
8. Monroe and Whitton Expressway
9. Missouri Route B and Ellis Boulevard

Geometric Modifications at Intersections:

1. Moreau Drive and Leslie Street
   - Southbound Right-Turn Lane
2. Missouri Route 179 and Industrial / West Main Street
   - Restrict left turns from Main Street with median on Route 179
   - Route Main Street westbound left turn traffic to JayCee Drive
3. Missouri Boulevard and Whitton Expressway (U.S. Highway 50)
   - Eastbound Dual Left-Turn Lanes
4. Southwest Boulevard and West Stadium Boulevard
   - Eastbound Right-Turn Lane
   - Westbound Right-Turn Lane
5. Dix Road and Industrial Drive
   - Northbound Right-Turn lane

ZONED-BUT-NOT-BUILT (ZBNB) IMPROVEMENTS

Traffic Control Improvements

1. Missouri Route C and Missouri Route CC
2. Scotts Station Road and Truman Boulevard
3. Clark Street and US 50/63 Interchange Ramp

Geometric Modifications at Intersections

1. South Country Club / Truman Boulevard and Country Club Drive
   - Northbound Dual Left-Turn Lanes
2. Missouri Boulevard and Commerce (Missouri Route 179)
   - Eastbound Right-Turn Lane
   - Northbound Right-Turn Lane
   - Southbound Right-Turn Lane
   - Northbound Dual Left-Turn Lanes
3. Missouri Route 179 and Westbound U.S. Highway 50 Ramps
   - Southbound Right-Turn Lane
4. Missouri Route 179 and Country Club Drive
   - Southbound Left-Turn Lane

Regional Street System Improvements

1. Widen Missouri Route 179 to 4-lanes between Country Club Drive and Sue Drive.

MASTER PLAN IMPROVEMENTS

Geometric Modifications at Intersections

1. Ellis Boulevard and Missouri Route C
   - Westbound Dual Left-Turn Lanes
2. Missouri Boulevard and Commerce (Missouri Route 179)
   - Eastbound Through Lane
   - Northbound Through Lane
   - Southbound Through Lane
3. Jefferson Street and West Stadium Boulevard
   - Eastbound Right-Turn Lane

Regional Street System Improvements

1. Construct an arterial street running eastward from the existing intersection of Frog Hollow Road and Rock Ridge Road to the interchange with Route 179.
2. Continue the arterial to the east of this interchange about ½ mile before turning northward to the intersection of West Edgewood Drive with Frog Hollow. Connect existing Frog Hollow into the new arterial at a location south of the West Edgewood intersection (see Figure 13).
3. Provide connections for Frog Hollow and other local streets to the new arterial to provide local access.
4. Construct collector streets serving the large scale developments arranged around the proposed interchange of Route 179 with the new arterial were modeled to reflect expected operations of the new land use development in this area (see Figure 13).
5. Construct a new north-south arterial type street to the northwest of Jefferson City within the County to provide better emergency service access to this region (see Figure 13).
6. Christy Drive extension to new Route 179.
7. Construct E. Miller Street between Vetter Lane and Eastland Drive.

COUNTY-WIDE THOROUGHFARE STUDY
for
COLE COUNTY, MISSOURI
&
JEFFERSON CITY, MISSOURI

INTRODUCTION

Per your request, George Butler Associates has prepared this County-Wide Thoroughfare Study to assist Cole County and Jefferson City, Missouri in determining the expected future impacts of continued development and what roadway infrastructure improvements will be required to supply the necessary roadway capacity to support these land use plans. The Thoroughfare Study utilizes existing traffic volumes recorded within Cole County and Jefferson City along major routes, and projected traffic volumes that would be expected due to planned future development. Field recorded data was used to develop a computerized traffic model to assist in the determination of the improvements required for the major corridors and at major intersections.

Study Scope

This study program has combined land use and transportation planning with preliminary engineering to provide Cole County and Jefferson City with the recommendations for the construction of thoroughfare and intersection enhancements. The tasks included in the transportation plan include; measurement and definition of existing conditions; development of a computer-based traffic demand model which simulates existing conditions and projects future traffic volumes based on route characteristics and land use patterns; identification and evaluation of alternative thoroughfare system enhancements and expansions; preparation of preliminary plan drawings and cost estimates of key improvements at intersections and along major corridors; and the development of a process for Cole County and Jefferson City to utilize in the continued upkeep and use of the transportation model for future planning purposes.

Study Area

The overall transportation plan was completed for all of Cole County and Jefferson City. Cole County is a centrally located within the State of Missouri, and is bordered by the Missouri River on the north and the Osage River on the east. The five counties of Miller, Moniteau, Osage, Callaway, and Boone border Cole County. Columbia, Missouri in Boone County is the nearest large community to Cole County and Jefferson City within one of these counties. Jefferson City is a growing community that is mostly located within Cole County, with a small potion of the City that contains the municipal airport and associated businesses located in Callaway County north of the Missouri River. **Figure 1** illustrates where Jefferson City is situated within Cole County, and the location of Cole County within the State of Missouri.

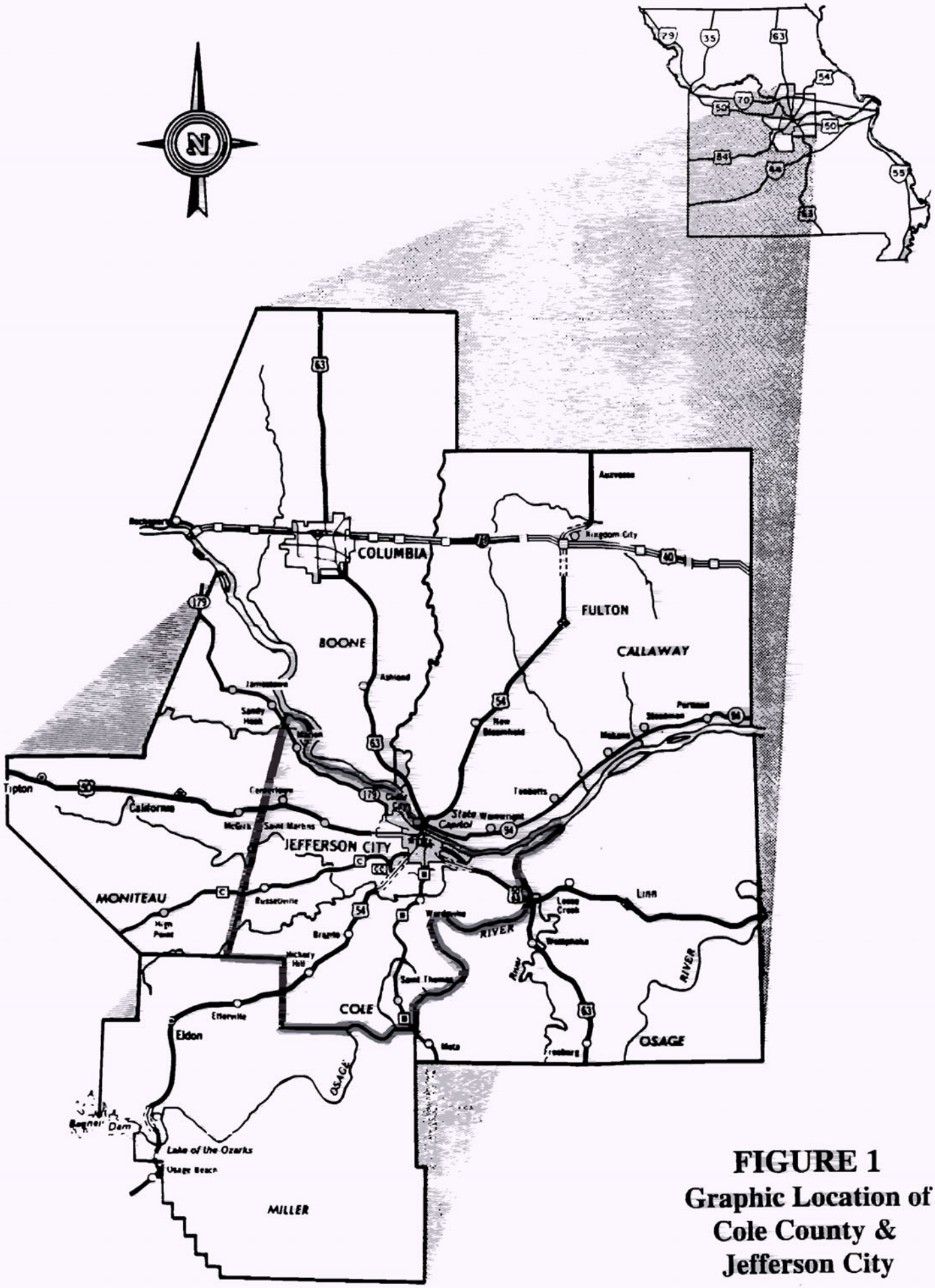


FIGURE 1
Graphic Location of Cole County & Jefferson City

EXISTING CONDITIONS

The first phase of the study program was to obtain and compile data that would describe and define the existing physical and operational characteristics of Cole County and Jefferson City thoroughfare system. The physical characteristics included the available street network and abutting land uses which generate traffic movements. The operational characteristics include the vehicular volumes or demands, and the travel speeds along the network streets. Meetings were also held with City, County, and State agencies to obtain information about planned or programmed expansions of the existing street network.

The existing physical characteristics of all arterial, all collector and many local streets were inventoried in detail for this Thoroughfare Study. This inventoried route information included street widths, number of lanes, route segment lengths, and intersection traffic controls. Parsons - Harlan Bartholomew Associates, Inc. (Parsons - HBA) assisted GBA with the inventory and compilation of the land use data. This information included numbers and types of dwelling units, areas of commercial, office and industrial land uses, and details of special land uses that would not fit the typical definitions of land uses required by the traffic demand model for the estimation of traffic generations. The existing land use information was inventoried and compiled for use in this study. Please note that the study did not include detailed review of accident experience or history, or any detailed evaluation of pavement or bridge structural conditions or adequacy.

Street System and Classifications

The efficient movement of vehicles within an urban area is dependant upon a balance of the various types of roadway facilities in the street network (i.e. arterials, collectors, and local routes). If there are too many miles of major streets, the cost of maintenance or improvements may be excessive. Inversely, if there are not enough major type roadways to serve the traffic demands, local streets and collectors become overloaded and traffic operations suffer. The proper balance of the number and type of facilities helps preserve the amenities of certain land use and can be particularly beneficial in residential areas where the properly classified street system can reduce the amount of through traffic and help preserve the existing land uses and area environment, and provide for greater safety for the residents of the area.

The benefits of the classification system are; that it determines the function and use of all streets within the County and City; indicates the physical requirements for construction and the needs for traffic controls; and establishes community needs as distinguished from the interests of the adjacent property owners. When all streets are properly classified and developed within their basic purpose, then the primary objective of a classification plan is attained. It is essential that the public officials recognize the planning objectives, the environmental factors, and the transportation requirements of the urban area when these plans are developed.

Local Street Classification ... Included in this system are all streets used primarily for direct access to residential, commercial, industrial, or other abutting properties. Continuity of the local street system in residential areas is necessary only to the extent required to provide easy and fairly direct access to adjacent properties and to connect with collector and arterial streets.

Through traffic movements on local streets is discouraged since, typically, local streets are not designed to provide the necessary width or other physical design characteristics that are required to adequately and safely serve large volumes of through traffic. In addition, by allowing significant volumes of through traffic to travel on the local streets, access to the adjacent properties may be disrupted.

Collector Street Classification ... This system includes all distributor and collector streets serving traffic between arterial and local facilities. This type of roadway basically serves an equal function for providing for through traffic movements and for access for abutting properties. These roads may also serve to connect adjacent neighborhoods. To discourage through traffic, some discontinuity of the collector system through residential areas is often desirable. Discontinuity of the collector street system disrupts the flow of through traffic along a route and makes a route through a local neighborhood a less desirable option. Some examples of how to provide discontinuity are to design the roadway with curves, cul-de-sacs or to utilize traffic calming measures, such as roundabouts, offset "T"s, chokers, and speed humps. While these calming measures tend to reduce the amount of through traffic, it does not physically preclude traffic from making these movements if necessary.

However, the collector street system through commercial areas should be more continuous. In order to accommodate local and through traffic movements, to distribute traffic effectively, and to provide sufficient capacity, the arterial and collector street system should form a network of streets generally spaced about ½ mile apart in urban areas of the study. In the more rural areas of Cole County, a collector spacing of 1 to 2 miles is more appropriate.

Some examples of the collector streets within the study area, as shown on **Figures 2A and 2B**, include West Brazito Road, North Teal Bottom Road, Frog Hollow Road, Bald Hill Road, and Old Lohman Road with the rural areas of Cole County, and Dunklin Street, Monroe Street, Lafayette Street, Country Club Drive and Chestnut Street within Jefferson City.

Arterial Street Classification ... This system, which also includes the State and U.S. highway routes, serves as the principal network for through traffic flows. Arterial streets should connect areas of principal traffic generation with the designated US and State Highways. The primary purpose of the arterial street system is to serve through traffic and local access should be kept to a minimum. A properly designed and developed major arterial street system should help define the residential neighborhoods, industrial sites, and commercial areas and minimize the conflicts with school and park development. To provide sufficient capacity and the desired quality of service, major arterials should be spaced about 1 mile apart within urbanized areas.

As can be seen on **Figures 2A and 2B**, the State highways such as US 50, US 54, US 63, Missouri Route C, Missouri Route CC, Missouri Route M, and Missouri Route D are examples of arterial thoroughfares within the County. Other routes, exemplified by Missouri Boulevard, Whitton Expressway, West Edgewood, McCarty Street, Eastland Trafficway, and Southwest Boulevard function as arterials within the City of Jefferson, proper.

Existing Street Systems

The primary regional through roadway system through both Cole County and Jefferson City is made up of two major routes; US 50 and US 54. US 50 is the major east-west State highway that travels through the northern portions of the County, and through the center of the Jefferson City metropolitan area. This section of US 50 has from 1 to 3 through traffic lanes in either direction, depending upon location. In addition to this primary east/west highway alignment, Missouri Boulevard (Business 50) travels through the majority of western Jefferson City as a parallel roadway serving as business access and as a major arterial.

US 54 is a State maintained major highway that bisects both the County and the City from the north to the south. The roadway has generally a 4-lane cross section with interchanges at major intersections within the urban area of Jefferson City. As well as being one of the major corridor for the circulation of traffic within Jefferson City, US 54 also functions as a major commuter connection within the County. US 54 is one of the few crossings of the Missouri River within the central region of the State of Missouri.

In addition, US 63 also travels through both Cole County and Jefferson City. US 63 travels southeast from Columbia, Missouri to just north of Jefferson City proper, where it merges with US 54. It then travels southward with US 54 to the tri-level interchange with U.S. 50 located within the heart of Jefferson City. From here , it turns eastward and travels along the route of US 50 out of the both the City and County. Just east of Cole County, US 63 separates from US 50 and continues southward through the State.

Many of the existing collector and arterial streets within Cole County and Jefferson City radiate outward from the tri-level interchange of US 50 and US 54 located in the center of Jefferson City. Other arterial and collector roadways wrap Jefferson City in a series of rings that connect the radiating roadways. See **Figures 2A** and **2B** for maps of the study area. In addition to the two primary routes detailed above, the following streets listed below were just some of the roadways reviewed in detail as part of the study;

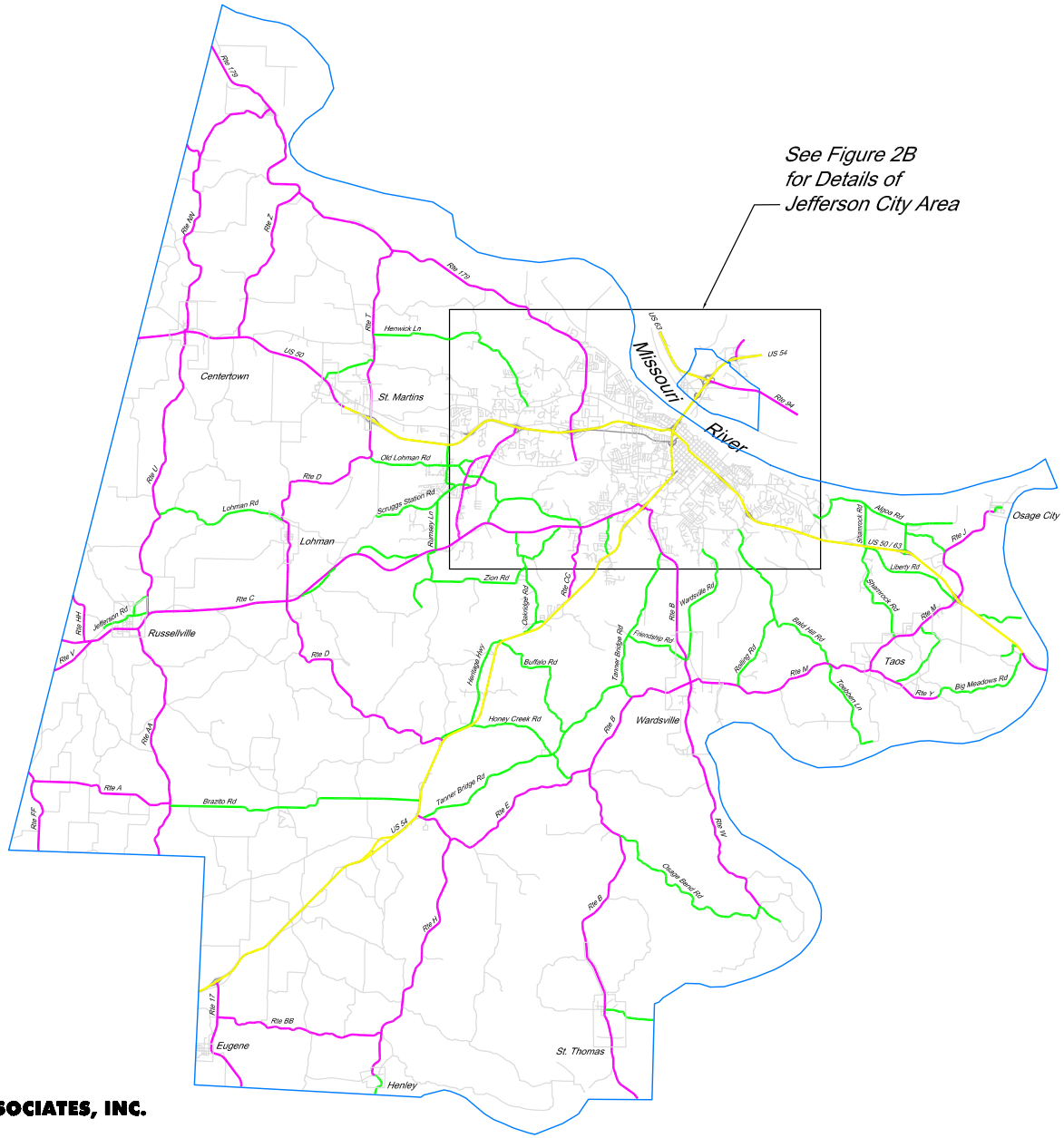
- Whitton Expressway
- Dix Road
- Southwest Boulevard
- Stadium Boulevard
- West Edgewood Road
- Clarke Avenue
- Eastland Drive
- Jefferson Street
- Madison Street
- Lafayette Street
- County Club Drive
- Wildwood Drive
- Rainbow Drive
- Satinwood Drive
- Missouri Route 17
- Missouri Route 179
- Missouri Route B
- Missouri Route C
- Missouri Route CC
- Missouri Route D
- Missouri Route H
- Missouri Route M
- Missouri Route T
- Missouri Route U

Traffic Volumes

As part of the study program, existing daily traffic counts were recorded for route segments throughout the study area. Recent counts from the City, County and State files were used where possible.

Detailed peak hour counts were recorded and/or compiled for the key intersections and interchange ramps throughout the County and City. Peak period volumes were recorded at 113 intersections as part of this study. These counts were used to establish the existing circulation patterns within the study area and to project future patterns and volumes based on the projected land use assumptions.

The list of the 113 intersections and the locations where existing peak period traffic counts that were recorded within the County and City are shown on **Figures 3A** and **3 B**. The location numbers on the exhibit denote the identification number of the recorded volumes as tabulated in **Appendix A**, of the ***Cole County / Jefferson City, Missouri County-Wide Transportation Model***, an accompanying document.



N.T.S.

LEGEND

- Freeway/Expressway
- Major Arterial (5 Lane/Divided)
- Arterial
- Collector
- Minor Collector/Local Streets

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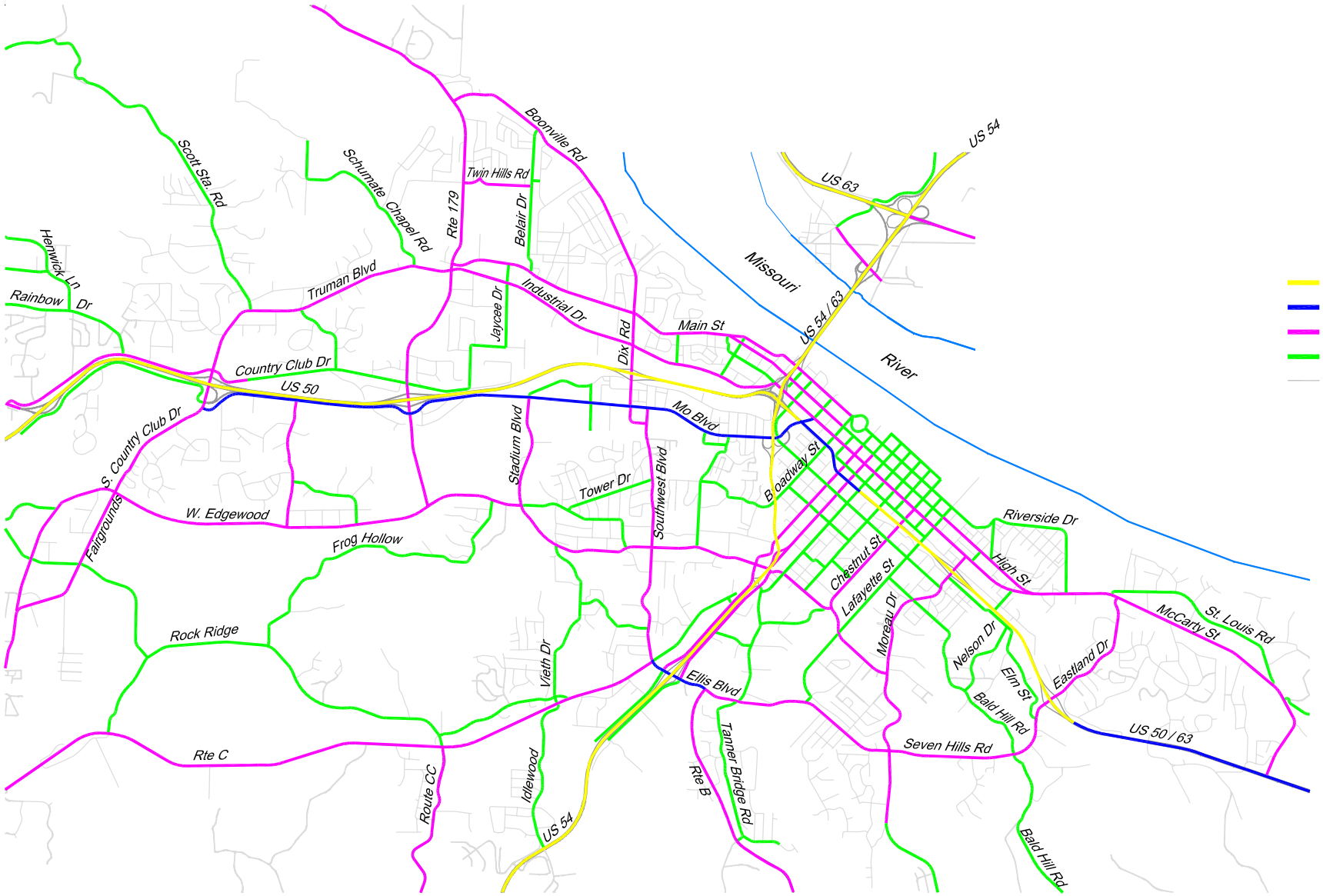
Engineers · Architects

Figure 2A
Cole County
Road Classifications



N.T.S.

LEGEND

- Freeway/Expressway
- Major Arterial (5 Lane/Divided)
- Arterial
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- Minor Collector/Local Streets

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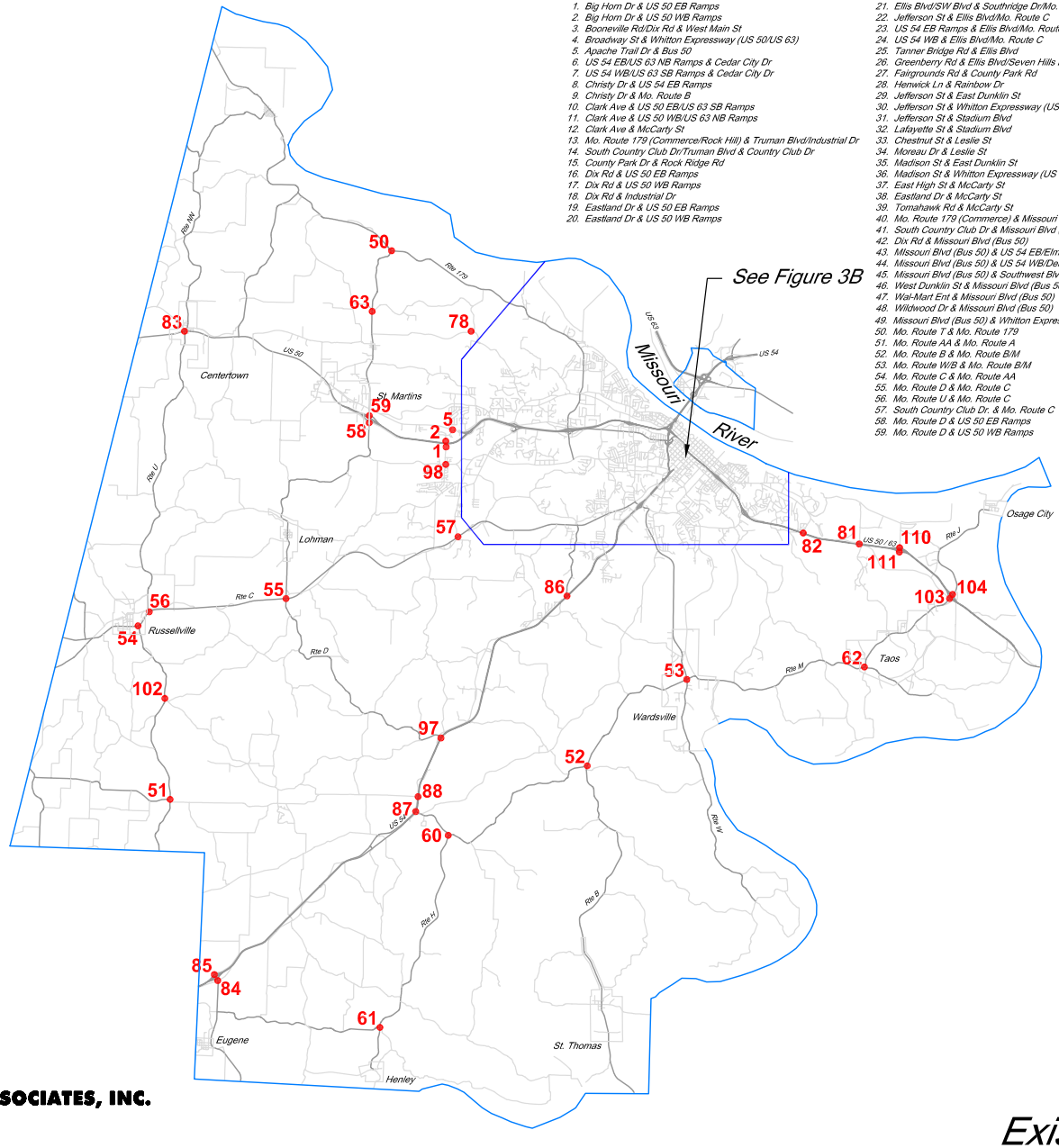
Engineers · Architects

Figure 2B
Jefferson City Area
Road Classifications



1. Big Horn Dr & US 50 EB Ramps
2. Big Horn Dr & US 50 WB Ramps
3. Booneville Rd/Dix Rd & West Main St
4. Broadway St & Whitton Expressway (US 50/US 63)
5. Apache Trail Dr & Bus 50
6. US 54 EB/US 63 NB Ramps & Cedar City Dr
7. US 54 WB/US 63 SB Ramps & Cedar City Dr
8. Christy Dr & US 54 EB Ramps
9. Christy Dr & Mo. Route B
10. Clark Ave & US 50 EB/US 63 SB Ramps
11. Clark Ave & US 50 WB/US 63 NB Ramps
12. Clark Ave & McCarty St
13. Mo. Route 179 (Commerce/Rock Hill) & Truman Blvd/Industrial Dr
14. South Country Club Dr/Truman Blvd & Country Club Dr
15. County Park Dr & Rock Ridge Rd
16. Dix Rd & US 50 EB Ramps
17. Dix Rd & US 50 WB Ramps
18. Dix Rd & Industrial Dr
19. Eastland Dr & US 50 EB Ramps
20. Eastland Dr & US 50 WB Ramps
21. Ellis Blvd/SW Blvd & Southridge Dr/Mo. Route C
22. Jefferson St & Ellis Blvd/Mo. Route C
23. US 54 EB Ramps & Ellis Blvd/Mo. Route B
24. US 54 WB & Ellis Blvd/Mo. Route C
25. Tanner Bridge Rd & Ellis Blvd
26. Greenberry Rd & Ellis Blvd/Seven Hills Dr
27. Fairgrounds Rd & County Park Rd
28. Henwick Ln & Rainbow Dr
29. Jefferson St & East Dunklin St
30. Jefferson St & Whitton Expressway (US 50/US 63)
31. Jefferson St & Stadium Blvd
32. Lafayette St & Stadium Blvd
33. Chestnut St & Leslie St
34. Moreau Dr & Leslie St
35. Madison St & East Dunklin St
36. Madison St & Whitton Expressway (US 50/US 63)
37. East High St & McCarty St
38. Eastland Dr & McCarty St
39. Tomahawk Rd & McCarty St
40. Mo. Route 179 (Commerce) & Missouri Blvd (Bus 50)
41. South Country Club Dr & Missouri Blvd (Bus 50)
42. Dix Rd & Missouri Blvd (Bus 50)
43. Missouri Blvd (Bus 50) & US 54 EB/Elm St Ramp
44. Missouri Blvd (Bus 50) & US 54 WB/Delaware St Ramp
45. Missouri Blvd (Bus 50) & Southwest Blvd
46. West Dunklin St & Missouri Blvd (Bus 50)
47. Wal-Mart Ent & Missouri Blvd (Bus 50)
48. Wildwood Dr & Missouri Blvd (Bus 50)
49. Missouri Blvd (Bus 50) & Whitton Expressway (US 50/US 63)
50. Mo. Route T & Mo. Route 179
51. Mo. Route AA & Mo. Route A
52. Mo. Route B & Mo. Route B/M
53. Mo. Route W/B & Mo. Route B/M
54. Mo. Route C & Mo. Route AA
55. Mo. Route D & Mo. Route C
56. Mo. Route U & Mo. Route C
57. South Country Club Dr. & Mo. Route C
58. Mo. Route D & US 50 EB Ramps
59. Mo. Route D & US 50 WB Ramps
60. Mo. Route H/E & Mo. Route E
61. Mo. Route H & Mo. Route BB
62. Mo. Route M & Mo. Route Y
63. Mo. Route T & Henwick Ln
64. Monroe St & Whitton Expressway (US 50/US 63)
65. Mo. Route 179 (Rock Hill) & Booneville Rd
66. Mo. Route 179 (Rock Hill) & West Main St
67. Mo. Route 179 (Commerce) & Country Club Dr
68. Mo. Route 179 (Commerce) & US 50 EB Ramps
69. Mo. Route 179 (Commerce) & US 50 WB Ramps
70. Mo. Route C & Bubba
71. Vieth Dr & Mo. Route C
72. Mo. Route CC/Rock Ridge Rd & Mo. Route C
73. South Country Club Dr & US 50 EB Ramps
74. South Country Club Dr & US 50 WB Ramps
75. South Country Club Dr & Fairgrounds Rd
76. South Country Club Dr & Scruggs Station Rd
76A. Scruggs Station Rd & Fairgrounds Rd
77. South Country Club Dr & West Edgewood Dr
78. Scotts Station Rd & Elston Rd
79. Bald Hill Rd & Seven Hills Rd/Eastland Dr
80. Scotts Station Rd & Truman Blvd
81. Shamrock Rd & US 50/US 63
82. City View Dr & US 50
83. Mo. Route U & US 50
84. Mo. Route 17 & US 50 EB Ramps
85. Mo. Route 17 & US 50 WB Ramps
86. Mo. Route CC & US 54
87. US 54 & Mo. Route E
88. US 54 & West Brazito Rd
89. US 54 EB/US 63 NB Ramps & West Main St
90. US 54 WB/US 63 SB Ramps & West Main St
91. Jefferson St & West Stadium Blvd
92. West Stadium Blvd & Missouri Blvd (Bus 50)
93. Satinwood Dr & West Stadium Dr
94. Southwest Blvd & West Stadium Blvd
95. Stadium Blvd & West Edgewood Dr
96. Mo. Route B & Ellis Blvd
97. US 54 & Mo. Route D
98. Big Horn Dr & Old Lohman Rd
99. Jefferson St & Zumwalt Rd
100. US 54 WB Ramp/Industrial Dr & McCarty St
101. Eastland Dr & Elm St
102. Mo. Route AA & Scrivner Rd
103. Mo. Route J & US 50 EB Ramps
104. Mo. Route J & US 50 WB Ramps
105. US 54 EB/US 63 NB Ramp & McCarty St
106. US 63 SB/US 50 EB Off-Ramp (Tri-Level)
107. US 50 EB/US 63 SB Ramp (Tri-Level)
108. US 54 EB/US 63 NB On-Ramp (Tri-Level)
109. Lafayette St & McCarty St
110. Militia Dr & US 50 WB/US 63 NB Ramp
111. Militia Dr & US 50 EB/US 63 SB Ramp
112. Rainbow Dr & Country Club Dr
113. St Louis Rd & McCarty St

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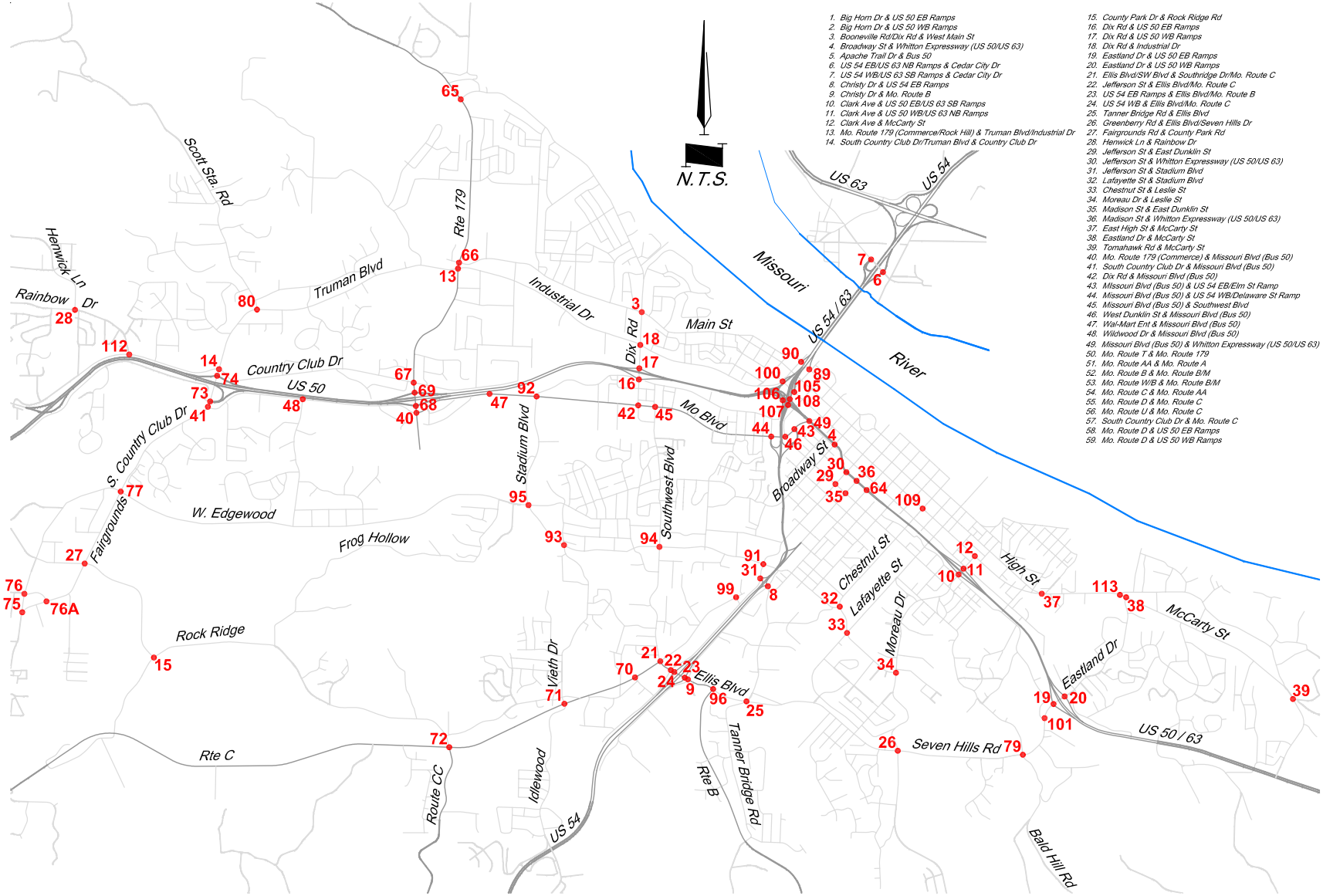
Figure 3A
Cole County
Existing Count Locations



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7. US 54 WB/US 63 SB Ramps & Cedar City Dr
8. Christy Dr & US 54 EB Ramps
9. Christy Dr & Mo. Route B
10. Clark Ave & US 50 EB/US 63 SB Ramps
11. Clark Ave & US 50 WB/US 63 NB Ramps
12. Clark Ave & McCarty St
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14. South Country Club Dr/Truman Blvd & Country Club Dr
15. County Park Dr & Rock Ridge Rd
16. Dix Rd & US 50 EB Ramps
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18. Dix Rd & Industrial Dr
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20. Eastland Dr & US 50 WB Ramps
21. Ellis Blvd/SW Blvd & Southridge Dr/Mo. Route C
22. Jefferson St & Ellis Blvd/Mo. Route C
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39. Tomahawk Rd & McCarty St
40. Mo. Route 179 (Commerce) & Missouri Blvd (Bus 50)
41. South Country Club Dr & Missouri Blvd (Bus 50)
42. Dix Rd & Missouri Blvd (Bus 50)
43. Missouri Blvd (Bus 50) & US 54 EB/Elm St Ramp
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46. West Dunklin St & Missouri Blvd (Bus 50)
47. Wal-Mart Ent & Missouri Blvd (Bus 50)
48. Wildwood Dr & Missouri Blvd (Bus 50)
49. Missouri Blvd (Bus 50) & Whitton Expressway (US 50/US 63)
50. Mo. Route T & Mo. Route 179
51. Mo. Route AA & Mo. Route A
52. Mo. Route B & Mo. Route B/M
53. Mo. Route W/B & Mo. Route B/M
54. Mo. Route C & Mo. Route AA
55. Mo. Route D & Mo. Route C
56. Mo. Route U & Mo. Route C
57. South Country Club Dr & Mo. Route C
58. Mo. Route D & US 50 EB Ramps
59. Mo. Route D & US 50 WB Ramps
60. Mo. Route H/E & Mo. Route E
61. Mo. Route H & Mo. Route BB
62. Mo. Route M & Mo. Route Y
63. Mo. Route T & Henwick Ln
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65. Mo. Route 179 (Rock Hill) & Booneville Rd
66. Mo. Route 179 (Rock Hill) & West Main St
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69. Mo. Route 179 (Commerce) & US 50 WB Ramps
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84. Mo. Route 17 & US 50 EB Ramps
85. Mo. Route 17 & US 50 WB Ramps
86. Mo. Route CC & US 54
87. US 54 & Mo. Route E
88. US 54 & West Brazito Rd
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113. St Louis Rd & McCarty St

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Figure 3B
Jefferson City Area
Existing Count Locations

TRAFFIC DEMAND FORECASTS

This section describes the development of the County-wide traffic forecasts based upon the existing and approved land uses, and the existing and programmed street system. Traffic predictions were completed for a number of analysis scenarios, with the Year 2001 calibrated model being based upon actual traffic counts. Subsequent model projections utilize the validated model as their basis to ensure that the projected future traffic volumes reflect actual Cole County and Jefferson City traffic conditions with regard to directional assignments and traffic growth, and not theoretical assumptions.

After completion and validation of the traffic model reflecting Year 2001 traffic conditions, a series of additional traffic volume models were completed. A short term traffic model was completed, based upon land use and traffic growth conditions that would be expected with build-out of the properties that are currently zoned but not yet developed. The resultant traffic projections from this short term planning model are referred to as the Zoned But Not Built (ZBNB) condition in this report. A longer term model was also developed as part of this report to reflect the expected traffic demand conditions within the City and County by approximately Year 2021, based on the current land use plan. The Master Planned conditions reflect the best estimate of land use densities and development types based upon the approved land use plan as of January 1, 2001.

These forecasts were then used to define the expected capacity deficiencies, evaluate alternatives, and develop recommendations. The computer-based travel demand model was used to replicate the existing conditions and to estimate future traffic demands. A traffic demand model is a mathematical model that synthesizes the traffic flow characteristics of an area/city using socioeconomic data, such as land use, population, trip generation characteristics and modal choice, as well as street system characteristic data.

Land Use Data

The existing land use data was used to replicate existing travel demand and projected land uses were utilized to estimate future travel demands. Cole County and Jefferson City was subdivided into Traffic Analysis Zones (TAZ) and existing land use data, population statistics, and employment information was determined for each zone. **Figures 4A** and **4B** illustrates the 508 internal TAZ's that the study area was divided into and that were used in the traffic demand model. The zone boundaries generally were developed following the major street system and are based on how the neighborhoods and areas of the County are provided access by the existing street system. The topography in the project area also often affects potential and zone boundary locations.

Parsons-HBA assisted GB A in the gathering and development of both the existing and projected land uses for this Thoroughfare Study. Existing land uses were developed from County and City records based on the size and types of commercial developments and numbers and types of residential dwelling units. Near term ZBNB land use projections were based on submitted or committed projects that are relatively certain to occur. Master Planned land use densities were based on the approved City Master Plan. Parsons-HBA staff estimated the type and density of development

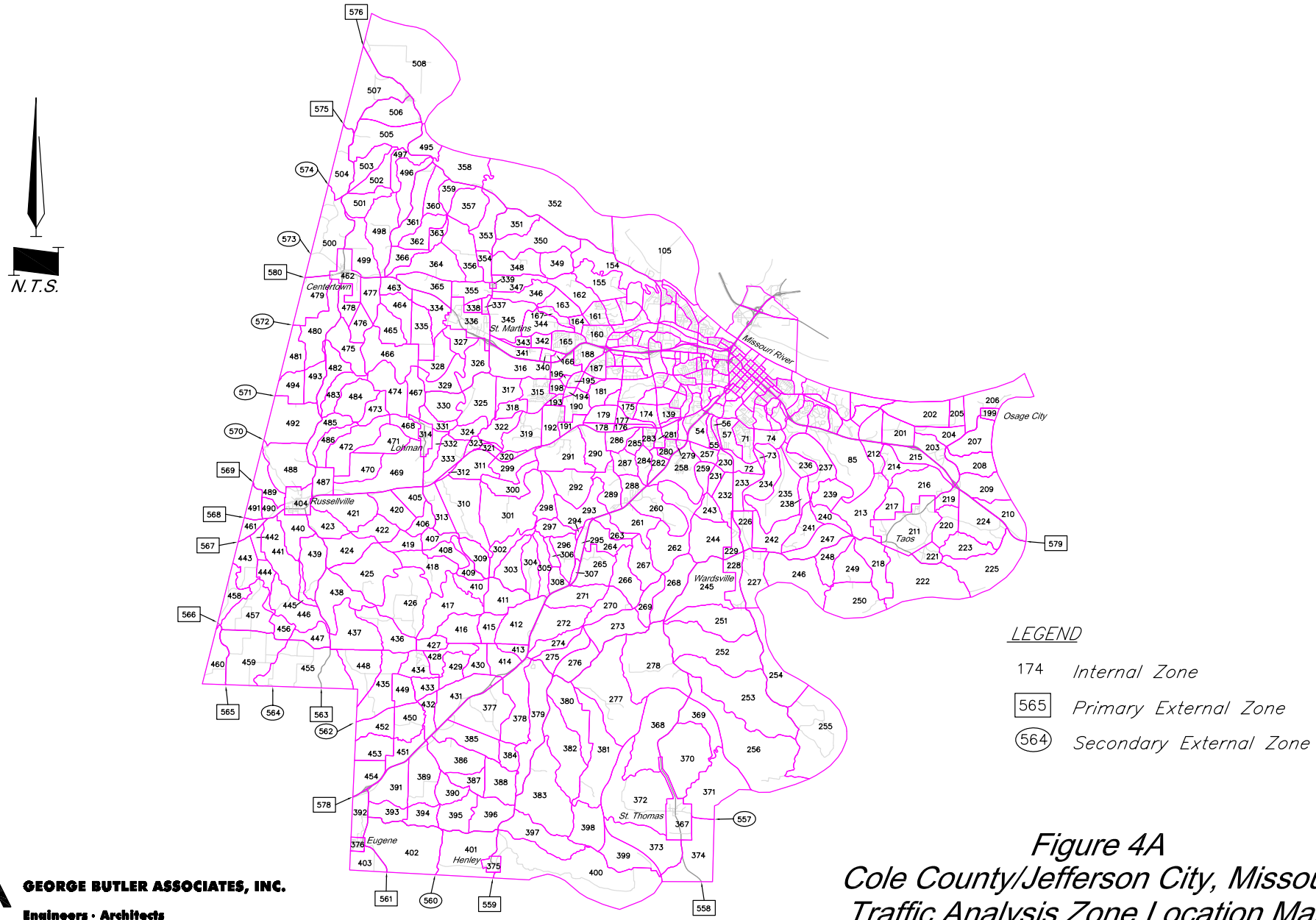

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Figure 4A
Cole County/Jefferson City, Missouri
Traffic Analysis Zone Location Map

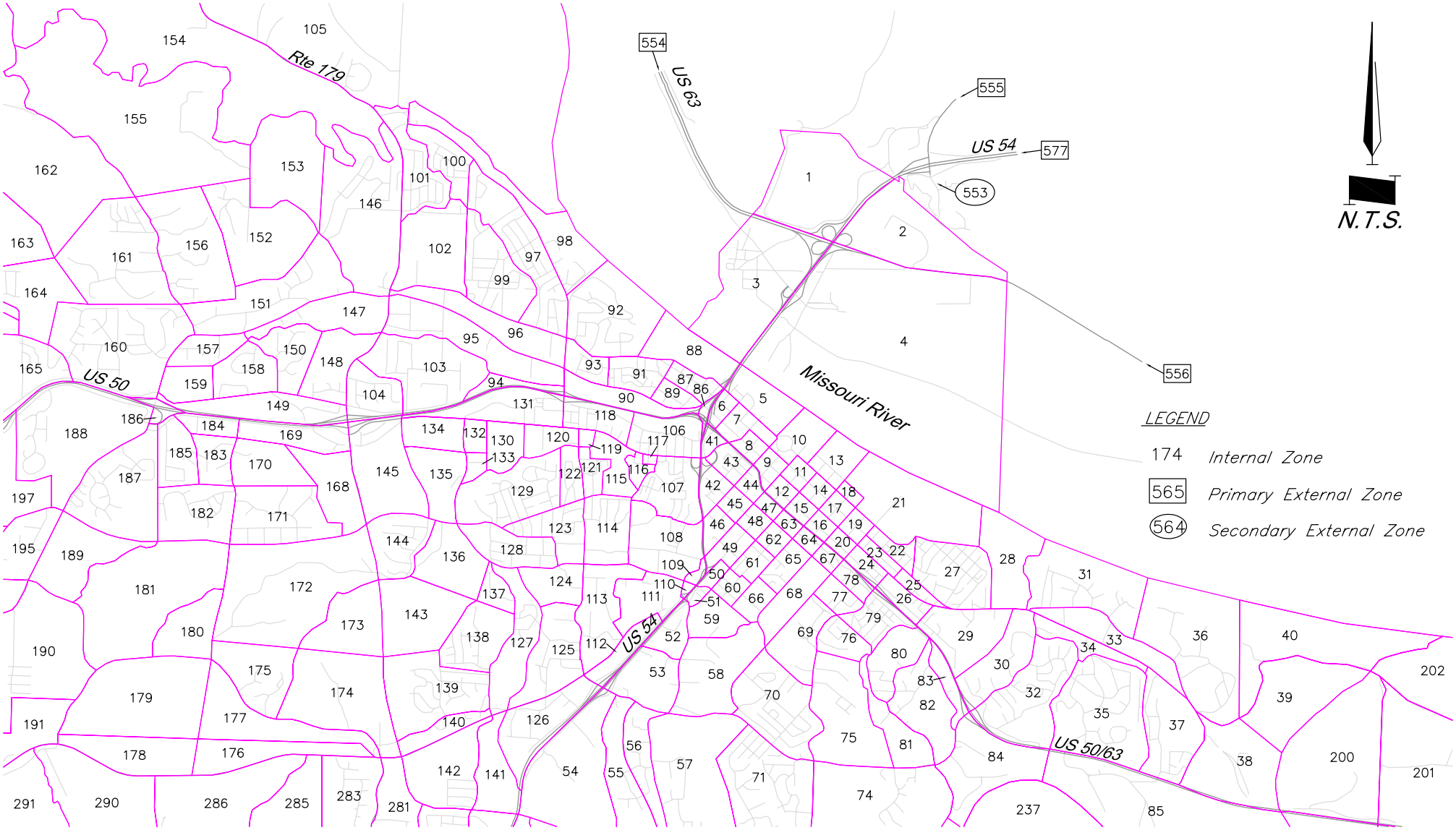

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Figure 4B
Cole County/Jefferson City, Missouri
Traffic Analysis Zone Location Map

that should be expected based on the approved plan and supplied this information to GBA for use in the traffic demand model. A detailed description of the methodology utilized for the development of the land use projections is attached to this report as **Appendix A - Methodology for Land Use Projections.**

Table 1 summarizes the existing and projected land use information for existing, ZBNB, and Master Planned conditions. For a detailed, TAZ by TAZ, listing of the land use information for each TAZ utilized by the traffic demand model, please see ***Tab 4 - Land Use Data Summary*** in the accompanying ***Cole County / Jefferson City, Missouri County-Wide Transportation Model*** notebook. The differences in the projections of the types of land use growth indicate that traffic will not grow uniformly throughout the County and City over the next 5 to 20 years, with the majority of the projected land use changes projected to occur in the area of the County immediately surrounding Jefferson City. A detailed discussion of these projected land use increases and associated traffic growth projections is contained within the **Traffic Model Results** section of this report.

Figures 5 and 6 chart the anticipated city-wide changes in the land uses as utilized in the traffic demand model. As can be seen on **Figure 5 - Residential Land Use Summary**, steady growth is projected for single family, multi-family condominiums / townhouses, and for apartments based on the approved land use plan. Single family residential units are projected to increase by about 4,950 over the next 20 years. This moderate growth pattern is very similar to the expected projections for commercial and industrial developments projected to occur within the County and City. As can be seen on **Figure 6 - Commercial Land Use Summary**, office space and retail space are expected to increase by about 30% over the next 20 years. Industrial spaces are anticipated to grow very similarly, with total space within the study increasing by about 25% over the next 20 years.

Travel Demand Model Development

As discussed, a traffic demand model is a mathematical model which synthesizes the travel characteristics of an area using the socioeconomic characteristics of the area such as land use, population, and employment data. A variety of standard computer based models are available. For the purposes of this study, a microprocessor-based model was used. Based on several factors, including ease of use, type of output, maintainability, and cost for training, the TModel2 software package was recommended and chosen for this project. TModel2 allows for detailed land use information to be input, as well as precise control of traffic loadings from the TAZ's to the model. In addition, TModel2 simulates peak period traffic conditions, instead of the average daily traffic conditions that many other models utilize. A peak period model is much more valuable to the engineer for analysis purposes than a daily traffic model since it is the peak traffic period that traffic engineers utilize in the analysis of intersection and corridor operations.

A travel demand model, such as TModel2, is made up of several computer modules, each performing a specific function. The modules include a network module, a pathway module, a land use module, a trip distribution module, and a traffic assignment module. The following paragraphs briefly describe the inputs and function of each of the modules.

Table 1
LAND USE SUMMARY
COLE COUNTY / JEFFERSON CITY TRANSPORTATION STUDY

Individual Component Totals	Single Family (Dwelling Units)	Multi-Family (Dwelling Units)	Apartments (Dwelling Units)	Hotel (Rooms)	Office (Square Feet)	Retail (Square Feet)	Resturant (Square Feet)	Industrial (Square Feet)
Existing (Ex)	16,253	4,108	3,545	1,438	7,688,508	5,984,829	295,314	5,973,601
Zoned-But-Not-Built (ZBNB)	825	260	345	250	204,848	464,896	0	350,000
Master Planned (MP)	4,124	906	891	550	1,404,560	1,786,297	0	1,200,000
Total	21,202	5,274	4,781	2,238	9,297,916	8,236,022	295,314	7,523,601

Cumulative Scenario Totals	Single Family (Dwelling Units)	Multi-Family (Dwelling Units)	Apartments (Dwelling Units)	Hotel (Rooms)	Office (Square Feet)	Retail (Square Feet)	Resturant (Square Feet)	Industrial (Square Feet)
Year 2001 Scenario (Ex)	16,253	4,108	3,545	1,438	7,688,508	5,984,829	295,314	5,973,601
Year 2006 Sceanrio (Ex + ZBNB)	17,078	4,368	3,890	1,688	7,893,356	6,449,725	295,314	6,323,601
Year 2021 Scenario (Ex + ZBNB+ MP)	21,202	5,274	4,781	2,238	9,297,916	8,236,022	295,314	7,523,601

Figure 5
Residential Land Use Summary

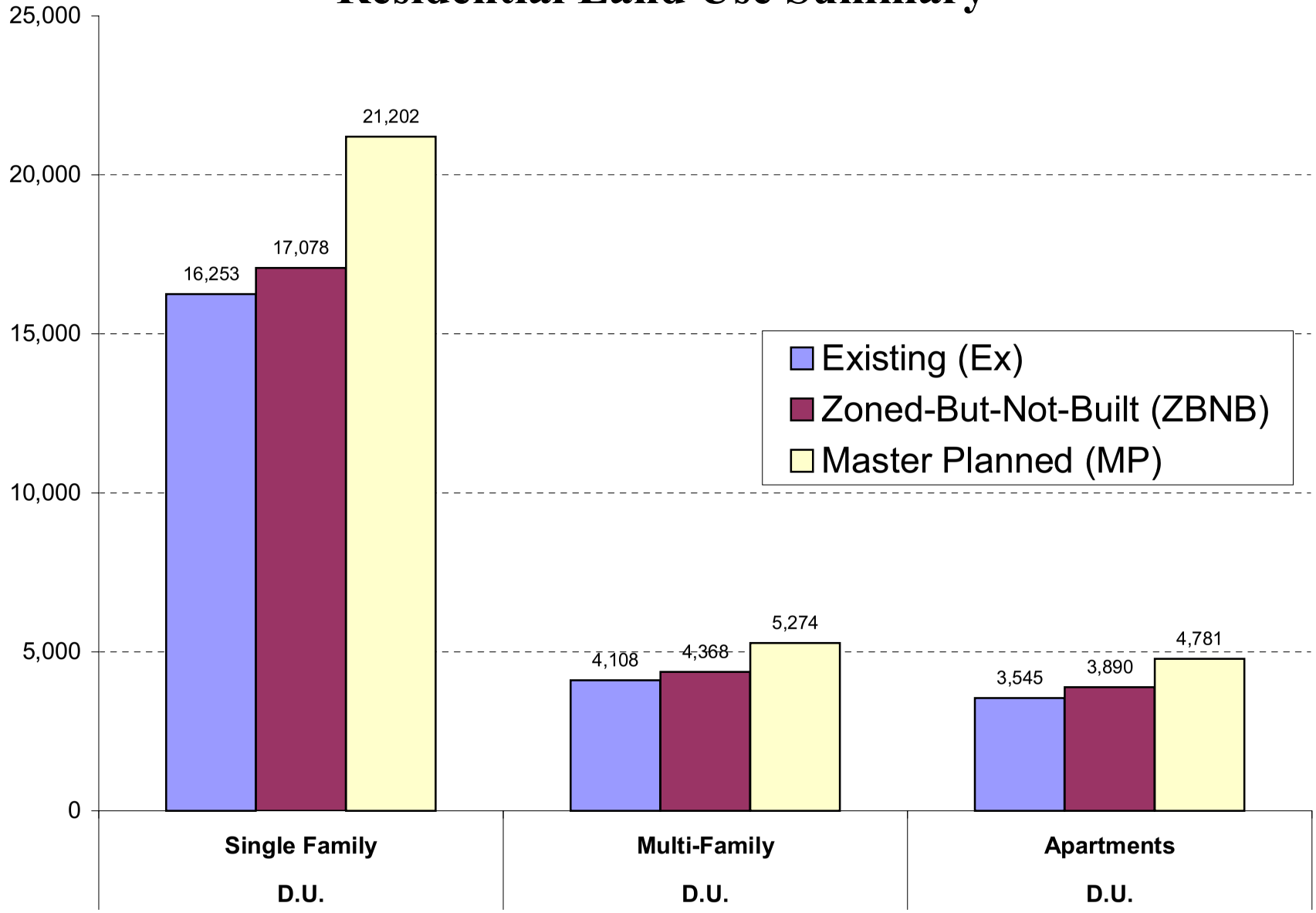
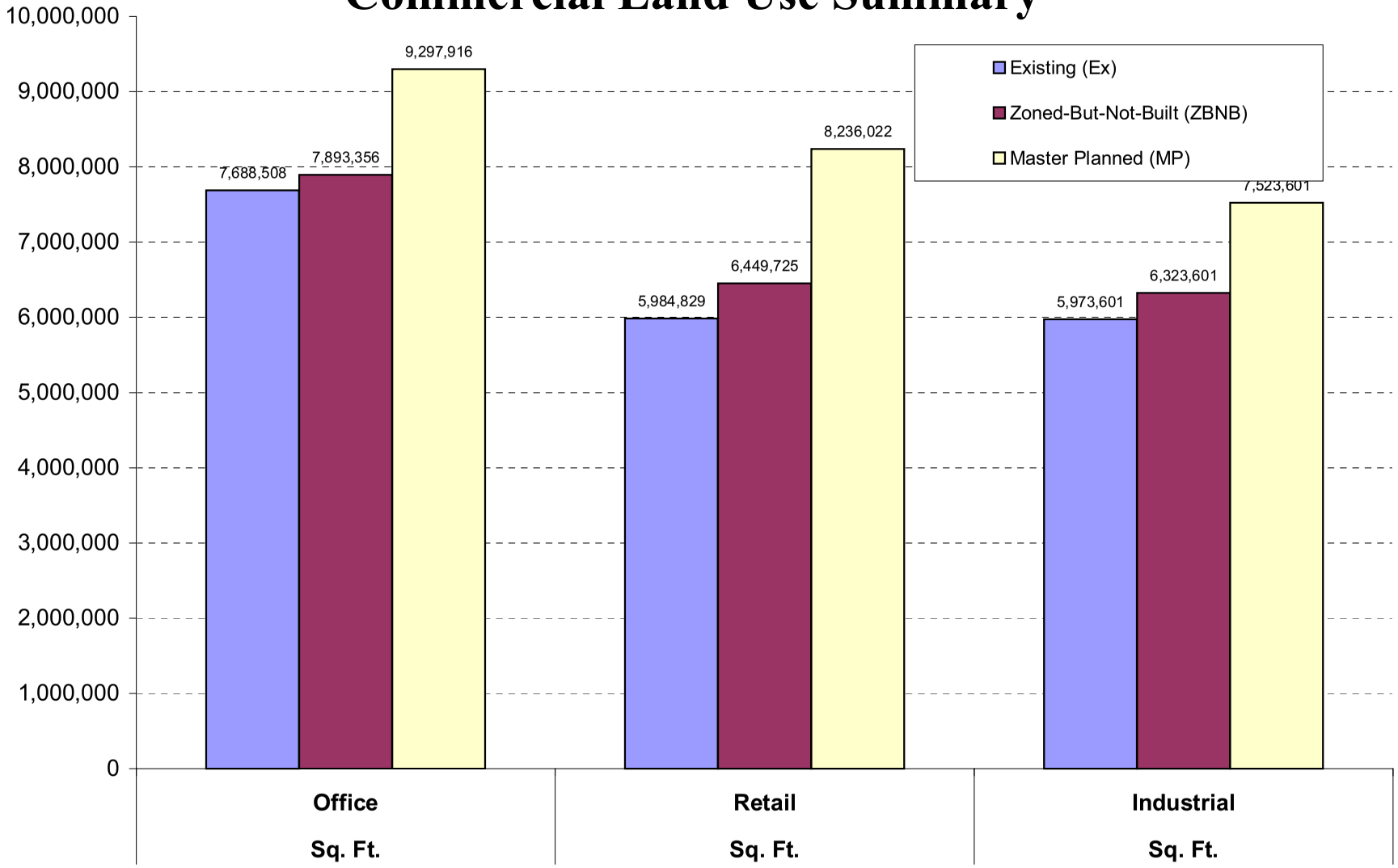


Figure 6
Commercial Land Use Summary



Network Module ... The network module creates a mathematical representation of the street and traffic control system of the study area. The inputs include intersections (nodes), traffic controls, node capacities, street segments (links), street speeds, numbers of lanes, and capacities. The study area is subdivided in traffic analysis zones (TAZ's) and the centroid of each zone is added to the area street system as a node. All of the highways, arterials, and collectors within the City and County were coded in the network for Cole County and Jefferson City. The street network for this Transportation Plan includes approximately 110 miles of freeways and ramps, 130 miles of rural State highways, 43 miles of City arterial streets, 140 miles of City and County collector type streets, and about 160 miles of minor collector roadways.

The pathway module determines the best possible travel path between zone centroids to each of the other zone centroids based on the input street system and potential capacity constraints. These paths are based on travel times on each roadway segment (link) and capacity of said segment. Minimum path and all efficient paths are identified and reviewed. The best path for a specific trip is identified by the route which minimized the travel time for this trip, in relation to the best path for all other trips within a model network.

Trip Generation Module ... The trip generation module calculates the number of trips to be produced by or attracted to each zone based upon the input land use type and density. These trip productions and attractions are stratified by trip purpose and/or type. The trip types used in this study were:

1. Home-based Work Trips (HBW)
2. Home-based Other Trips (HBO)
3. Non-home-based Trips (NHB)
4. Internal to External Trips (I-X)
5. External to Internal Trips (X-I)
6. External to External Trips (X-X)

The first three trip types are internal trips (both trip ends are within the study area), divided by trip purposes. Home-based work trips are all trips between residences and work places. Home-based other trips include trips to go shopping, recreation and social, school, personal business, etc., where the trip begins or ends at home. Non-home-based trips are trips where neither end is at home, such as a trip from work to the bank.

Internal-external trips are produced within the study area with a destination outside the study area and are divided by types of trip purpose. Similarly, external-internal are trips which originate outside the study are and are attracted to a destination within the study area. These trips are also divided into the three trip purpose types for distribution. External-external trips have both origin and destination outside of the study area and are generally trips through the city on the cities freeway and arterial street systems.

Due to the location of Jefferson City and Cole County within the central portion of the State of Missouri, the fact that the study area is bisected by US 50, US 54,and US 63, and that one of the only crossings of the Missouri River in this region of the State is US 54/63, there is a substantial

amount of external-external traffic traversing both the County and City. In addition to these external-external trips, there is a segment of the traffic that is generated by people that live outside the study area but work within the County or City. This creates a significant amount of internal-external/external-internal traffic.

To simplify the data input process, an Excel spreadsheet for the land use information was developed for this study. A printout of the input and summaries from this spreadsheet are contained in the ***Cole County / Jefferson City, Missouri County-Wide Transportation Model*** notebook.

Trip Distribution Module ... The trip distribution module links the productions to the attractions which were developed in the trip generation module and distributes trips from each zone to all other zones by trip type. The TModel2 software used for this study uses a standard gravity model for trip distribution. Essentially, trips are distributed to zones based on the relative attractiveness of each zone and travel times, friction factors, and other capacity constraints. The travel time factors used in this study were developed in other similar studies conducted by the consultant.

Traffic Assignment Module ... The traffic assignment module assigns the trip matrices produced by the distribution to the street system. TModel2 assigns the trips to the most efficient path based upon travel time and other capacity constraints that were programmed into the model as part of the validation process. Generally, the most efficient path is defined as any path that will move a trip maker closer to his destination in a shorter time period than other possible paths require. This type of assignment tends to produce the most realistic estimation of traffic demands.

Travel Demand Model Validation ... This series of computer modules constitute the travel demand model for the study area. A series of beginning assumptions were made and tested for the initial application of the model. The model was run and the results were compared to the recorded field data to determine how well the initial assumptions and model inputs replicated recorded conditions. The travel demand model was validated to the existing traffic counts to insure that the model replicated the existing conditions as closely as possible. Travel times and delay conditions at major intersections were also checked against recorded values to verify accuracy.

After the review, the individual module inputs were modified as required and the model was rerun. The resulting outputs were again compared to the recorded conditions. This process was repeated until an acceptable level of correlation was attained.

Application of Traffic Model... The application methodology to deploy the developed Transportation Model was created as part of this project for use by the County and City. A copy of this process, **"Application of Traffic Model"**, is attached to this report as **Appendix B**.

TRAFFIC MODEL RESULTS

The socioeconomic data compiled by Parsons - HBA was used to generate the expected future total travel demands in the study area for each of the traffic demand models developed. Under the existing condition model, there are 97,764 one-way trips routed within the validated model. The land use predictions show that a total of 103,823 one-way trips can be expected based on the near term, ZBNB condition, or an increase of 6,059 trips, or 6.20%, over existing demand. By Year 2021, there is a further increase of 42,819 trips to 125,232 one-way trips, or a growth in demand of 28.1%.

These increases in traffic projections are directly paralleled by the increases in land uses developed by Parsons - HBA. **Table 2 - Growth Trends by Areas of the County**, details the projected land use additions within 18 different regions of the county. **Figure 7** details the part of the County where each region is located as defined by this table. On a county-wide basis, as shown on **Table 2**, residential, commercial, and industrial land uses are all expected to grow by about 30% over the next 20 years for the Master Plan Traffic Condition.

When reviewing the individual growth trends for the 18 separate regions of the county, it can be seen that the region of the County and City that is projected to experience the most significant growth is Region 8. This region of the study area is located immediately southwest of the Jefferson City, in an area of the county bordered by Missouri Route 179 on the east, US 50 to the north, Missouri Route C to the south, and Bighorn Drive / Rumsey Lane to the west. This sub-area of the County is projected to have large scale residential and commercial developments occurring within it boundaries. Under Master Plan Traffic Conditions, Missouri Route 179 and a new east/west arterial street will provide local access to this area via a new interchange at the intersection of Route 179 with the arterial. In addition to Region 8, Region 5 which lies immediately east of Region 8 is also expected to experience significant growth. Part of the area that will be opened for development due to the proposed interchange of Route 179 with the new arterial is located within Region 5.

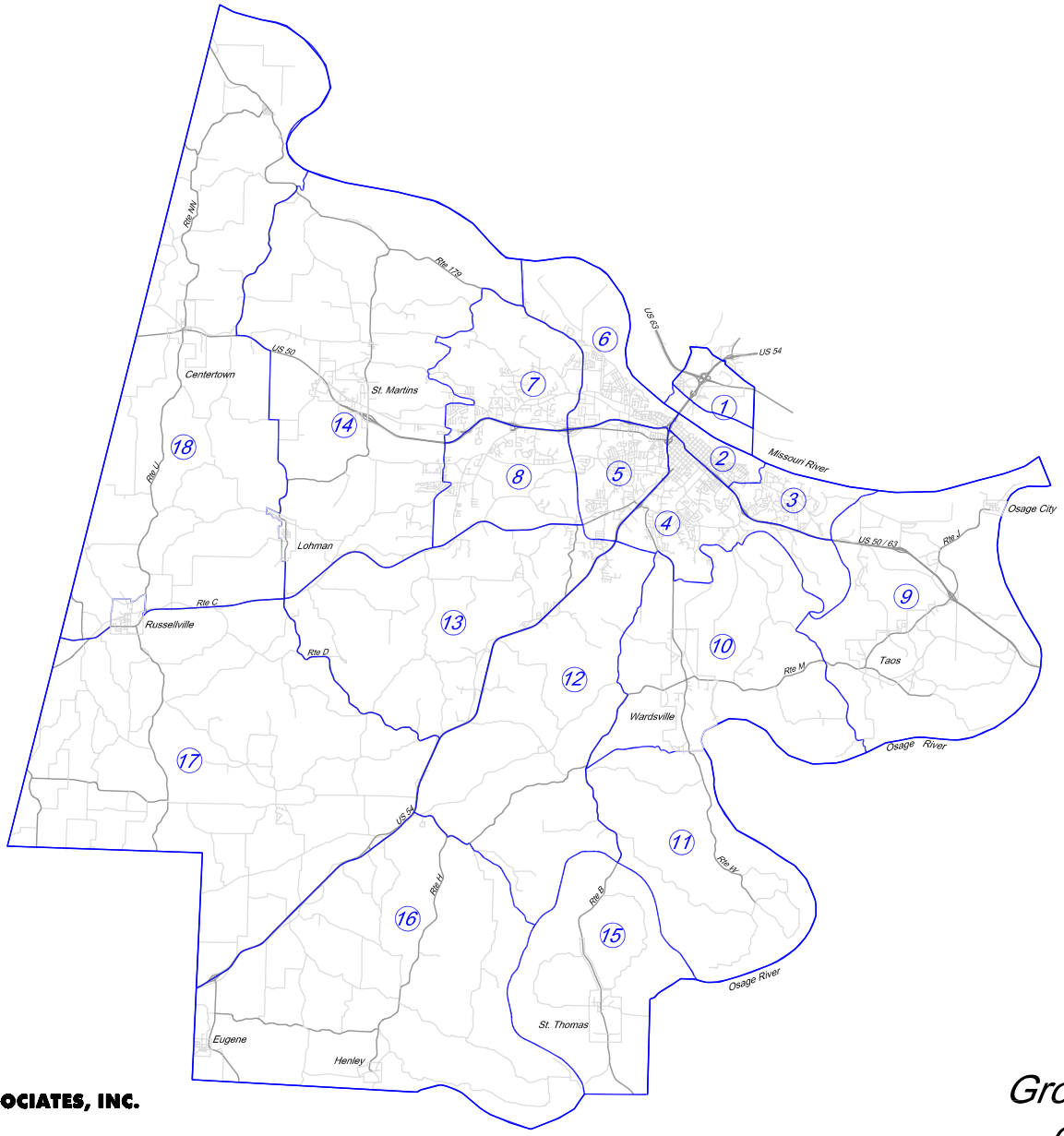
In addition to Regions 5 and 8, Region 10 is an area of the county that is projected to experience significant growth over the next 20 Years, especially in the office and retail markets. This region is roughly defined as the area of the County south of the Moreau River, east of Tanner Bridge Road, north of Rock Creek, and west of Bald Hill Road, and includes the community of Wardsville.

Residential growth rates of nearly 50% are expected to occur in many areas of the county, especially the areas closely bordering Jefferson City (i.e. Regions 8, 9, 10, 12, 13, and 14). Many of these regions are anticipated to experience this level of residential growth to satisfy the traffic demands associated with the increases in commercial and industrial land use that are projected to occur throughout the County. Region 18, the northwestern most region in the study area which includes the community of Centertown, is also expected to experience significant residential growth over the next 20 years.

Table 2
GROWTH TRENDS BY AREAS OF THE COUNTY
COLE COUNTY / JEFFERSON CITY TRANSPORTATION STUDY

	Land Use Summary						Growth Trends		
	Residential		Commercial		Industrial				
Area	**Ex**	**MP**	**Ex**	**MP**	**Ex**	**MP**	**Res**	**Comm**	**Ind**
1	34	54	0	0	620,000	770,000	158.82%		124.19%
2	1,853	1,883	4,204,585	5,741,147	229,059	229,059	101.62%	136.54%	
3	1,712	1,934	337,869	382,021	361,676	361,676	112.97%	113.07%	
4	5,152	5,623	1,968,825	2,234,555	212,732	212,732	109.14%	113.50%	
5	3,133	4,497	2,862,226	3,707,182	465,459	515,459	143.54%	129.52%	110.74%
6	4,132	4,327	881,614	968,572	1,452,258	1,552,258	104.72%	109.86%	106.89%
7	2,302	2,996	1,447,066	1,689,530	377,268	552,268	130.15%	116.76%	146.39%
8	1,919	4,919	1,243,171	2,432,998	563,202	1,113,202	256.33%	195.71%	197.66%
9	889	1,276	112,546	163,207	1,257,836	1,682,836	143.53%	145.01%	133.79%
10	696	1,121	26,433	55,833	0	0	161.06%	211.22%	
11	87	152	5,550	5,550	0	0	174.71%		
12	497	728	53,227	61,015	3,600	3,600	146.48%	114.63%	
13	1,032	1,580	179,882	189,882	78,117	78,117	153.10%	105.56%	
14	2,076	3,318	382,960	523,183	259,779	359,779	159.83%	136.62%	138.49%
15	202	255	17,272	22,780	3,000	3,000	126.24%	131.89%	
16	403	594	37,458	42,323	10,752	10,752	147.39%	112.99%	
17	689	974	116,512	145,838	41,593	41,593	141.36%	125.17%	
18	477	734	91,455	119,722	37,270	37,270	153.88%	130.91%	
Total	27,285	36,965	13,968,651	18,485,338	5,973,601	7,523,601	135.48%	132.33%	125.95%

Denotes areas projected to experience greater than 50% growth over next 20 Years.



N.T.S.

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6 Area Identifier

GBA GEORGE BUTLER ASSOCIATES, INC.
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Figure 7
Growth Trends by Area
of County and City

Results of Existing Condition Traffic Model (Year 2001)

Figure 8 illustrates graphically the results of the **Existing Condition - Year 2001** calibrated model run. Review of the calibrated model shows that there are 11 intersections where the overall P.M. Peak Period traffic operations would be expected to warrant further analysis. These intersections are all located within Jefferson City and are listed following;

Intersection
Truman Boulevard with Country Club Drive
Truman Boulevard with Scott Station Road
Dix Road and Industrial Drive
Dix Road and Missouri Boulevard
Country Club Drive and Rainbow Drive
Southwest Boulevard and Stadium Boulevard
Ellis Boulevard and Route C
Whitton Expressway and Missouri Boulevard
Whitton Expressway and Broadway Street
Whitton Expressway and Jefferson Street
Whitton Expressway and Monroe Street

Please note that the calibrated traffic model reports deficient intersections (nodes) that have physical capacity constraints, not capacity deficiencies caused by traffic controls. The model assumes that the capacity of the modeled intersections is representative of the optimum capacity based on traffic controls, lane arrangements, and other physical limitations. It must be noted that operational deficiencies that exist on any street system that are caused by poorly timed signals, non-optimum signal phasings, or other physical limitations can not be accurately modeled.

There are a few short segments of roadway that show congestion concerns under the Existing Traffic Condition (Year 2001) model runs, but these are due to intersection capacity issues, not roadway capacity concerns.

Detailed operational analysis of these problem intersections under existing conditions are detailed in the following ***Improvement Recommendation*** section of this study. It should be noted that most of the intersections (nodes) that the transportation model predicted would have capacity problems under Year 2001 conditions were verified through normal traffic engineering analysis methods as locations where geometric and/or traffic control improvements are required and therefore have been recommended to be made within the next 5 years.

Some intersections (nodes) that were identified as possible capacity constraints by the model were checked through normal traffic engineering analyses methods and found to have acceptable operational characteristics under existing traffic conditions. This minor discrepancy is typical to any traffic demand model and it is recommended that a model be conservative in this regard and report these marginal locations for further analysis.

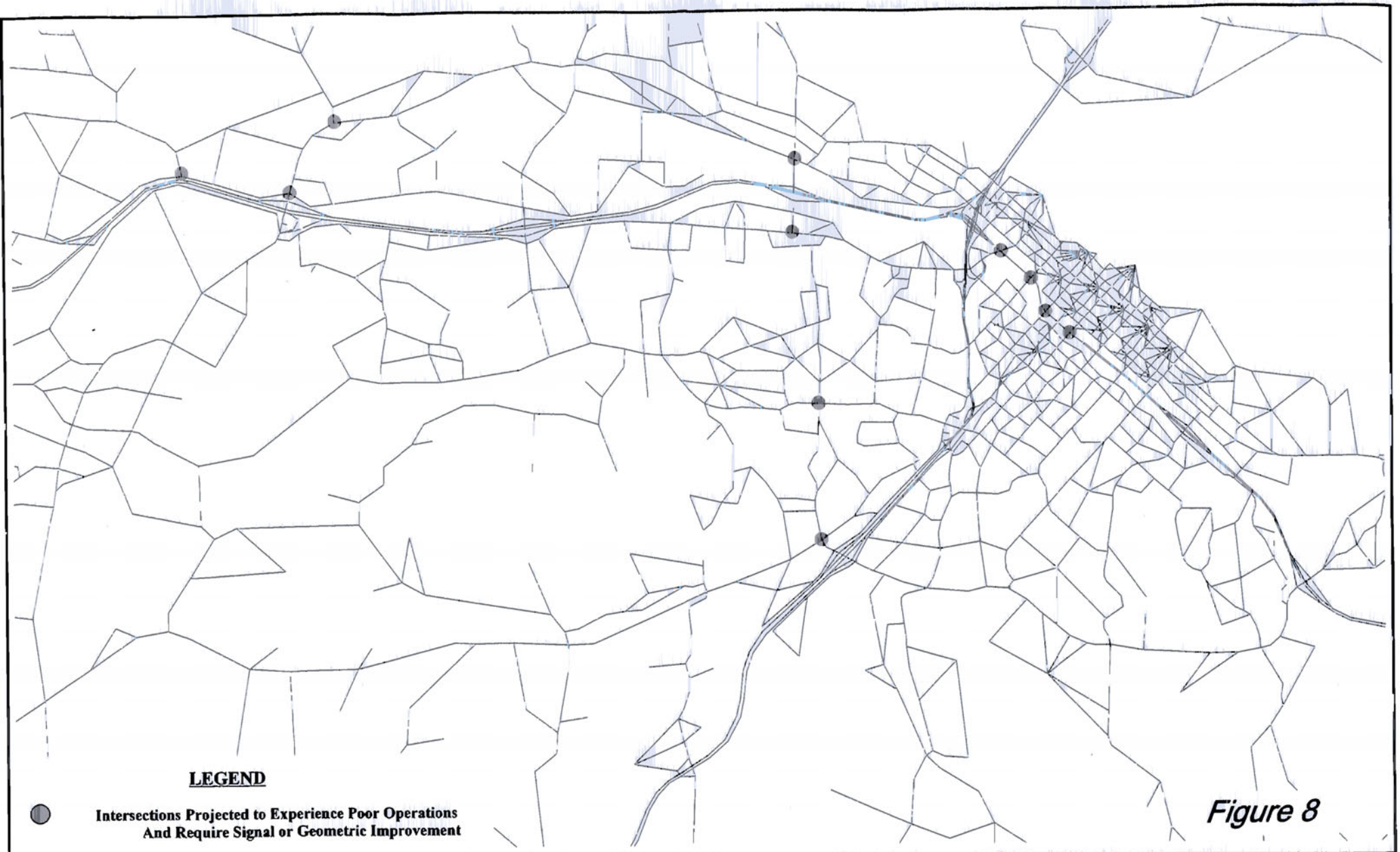


Figure 8

TMODEL ™2

Cole County/Jefferson City Model

Existing Condition (2001)

GEORGE BUTLER ASSOCIATES, LENEXA KS

CAL01 LLX
CAL01.NDE

JL: 12270/16154
JR 20690/21361
07-10-2002

Results of ZBNB Condition Traffic Model (Near Term)

The future travel demands from the ZBNB land use condition were developed and assigned to the existing plus committed street system by the transportation model to identify expected future system deficiencies. The existing plus committed street system is defined as the existing street system and all committed or programmed roadway improvements that are schedule within the next 5 to 7 years. For these analyses, the committed street system improvements include;

- Completion of Missouri Route 179 between West Edgewood Road and US 54.
- Add lanes to Missouri Boulevard - South Country Club to Rte 179.
- Clark Ave. and US 50 Interchange - install signals and widen ramps.

Other minor geometric and traffic control improvements that are committed to occur within the near term were also modeled as part of the ZBNB street network to accurately estimate traffic demands.

Please note that the improvement recommendations based on the existing deficiencies listed previously have not been assumed to have been completed for the ZBNB traffic model condition. These recommended improvements are not assumed to have been completed since this would not represent the expected sort term future condition based solely on the *EXISTING* and *COMMITTED* street system.

As can be seen on **Figure 9 - ZBNB Condition**, there are some additional intersections and segments of roadway that can be expected to experience capacity problems due to increase in land development and general traffic growth trends within the surrounding communities and area. Following is a listing of the 12 intersections where the model reported potential capacity constraints and potential improvements or modifications should be analyzed to determine if improvements should be expected to be required to satisfy capacity concerns.

Intersection

Truman Boulevard with Country Club Drive
Truman Boulevard with Scott Station Road
Dix Road and Industrial Drive
Dix Road and Missouri Boulevard
Southwest Boulevard and Stadium Boulevard
Whitton Expressway and Missouri Boulevard
Whitton Expressway and Broadway Street
Whitton Expressway and Jefferson Street
Whitton Expressway and Monroe Street
Country Club Drive and Rainbow Drive
Route 179 and Missouri Boulevard
Route 179 and Country Club Drive
Route 179 and Industrial Dive / Main Street
Rainbow Drive and Henwick Lane

XXX - new to list

The intersections identified by the model as potential concerns under ZBNB traffic conditions are again, mainly within the Jefferson City or in portions of the County immediately adjoining the City.

Some of the intersections that were expected to experience capacity concerns under existing conditions have either been dropped from this listing or are projected to have less serious capacity concerns under the ZBNB traffic condition. This is due to the expected diversion of traffic away from these intersections to the new path of Missouri Route 179 which will cut across the southwest quadrant of Jefferson City. This new roadway connection will allow traffic traveling from the south to the west to bypass much of Jefferson City and miss many locations where traffic congestion may be expected. The intersection of Rainbow Drive with Henwick Lane has been added to the listing due to the expected growth in residential developments projected in this area (i.e. Region 14 on **Figure 7**) of the study are within the next 5 to 7 years. Similarly, Missouri Route 179 with Industrial Drive has been projected to begin to experience capacity concerns within the next few years due to increases in traffic on Route 179 due to the connection of Route 179 to US 54 south of Jefferson City, and the increases in development along the Route 179 corridor north of Industrial Drive.

In conjunction with the expected capacity concerns at the intersection of Route 179 with Industrial Drive, the traffic operations at the intersection of Route 179 with Main Street are also expected to continue to degrade until unacceptable operations are projected to occur. Due to the close proximity of the intersections of Main Street and Industrial Drive with Route 179, it is anticipated that left turn movements from Main Street to Route 179 will need to be prohibited in the future. Traffic desiring to turn left from Main Street to Route 179 could instead re routed to the JayCee Drive connection between Main Street and Industrial Drive, which may require some improvements to the intersectio of main Street with JayCee Drive to provide needed capacity for this diverted traffic.

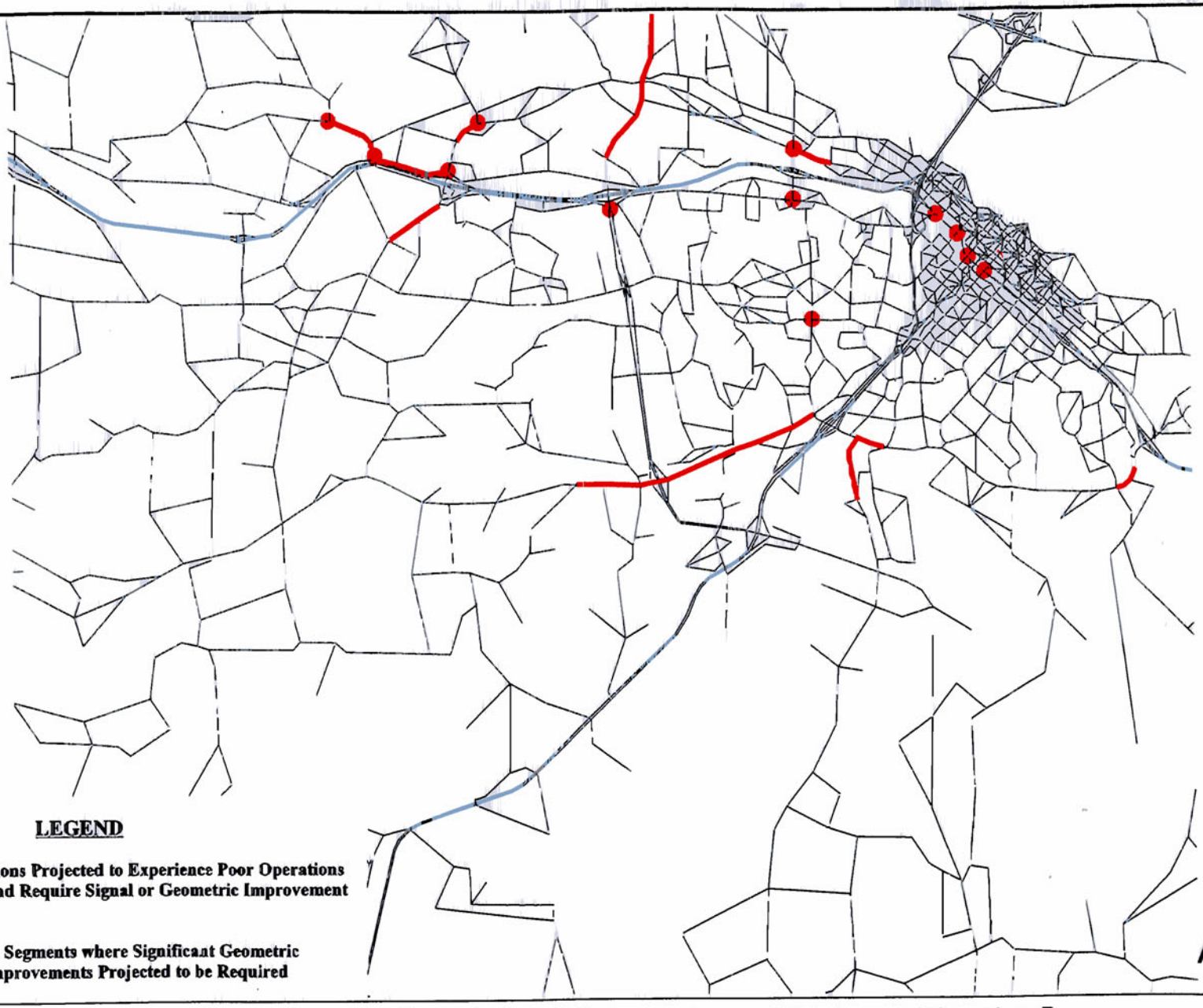
Similar to the intersections listed, there are segments of several existing roadways within the area that are expected to begin to experience delays and begin to operate poorly due to the increase in traffic volumes under the ZBNB land use scenario. The segments identified by the model where capacity issues can be expected to occur are;

Street	**Location**
Industrial Drive	Dix Road to Vista Road
Route 179	Country Club Drive to Sue Drive
S. Country Club	Missouri Boulevard to Country Ridge Drive
Country Club Road	Truman Boulevard to Rainbow
Route C	Ellis Boulevard to Zion Road
Route B	Ellis Boulevard to Millbrook Drive
Ellis Boulevard	Route B to Tanner Bridge Road
Rainbow Drive	Country Club to Henwick Lane

Due to these capacity concerns along these segments of roadways, it is expected that additional through lanes will be required on these roadways to increase the capacity.

In addition of these capacity concerns on existing routes, the extension of East Miller Street to connect to Eastland Drive will be expected to provide a local collector roadway that can be expected to carry as much as 1000 - 1200 vehicles per day. This new connection will slightly reduce the traffic volumes on the parallel route of East McCarty Street.

After the ZBNB Model was run and reviewed, the projected increases in traffic volumes were determined from the model and these volumes were added to the recorded traffic volumes at each of the major intersections that were tabulated as part of the calibration of the transportation model. Based on these traffic volume projections, detailed analyses of each of the above identified intersections was completed. Geometric and traffic control improvements at each of the intersections are detailed in the following ***Improvement Recommendation*** section of this study.



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Intersections Projected to Experience Poor Operations And Require Signal or Geometric Improvement

Roadway Segments where Significant Geometric Improvements Projected to be Required

Figure 9

TMODEL™2

Cole County/Jefferson City Model

Zoned But Not Built Condition (2006 - 2008)

GEORGE BUTLER ASSOCIATES LENEXA, KS

ZB06.L_X
ZB06.NDE
ZB_IMP.DAT
LL: 10000/12850
UR: 20600/21300
07-10-2002

Results of Master Plan Condition Traffic Models (Years 2021)

As for the Master Plan Traffic Conditions, as defined by the approved Land Use Master Plans, there can be expected to be additional inadequacies in the existing and committed street system. Many committed improvements programed by Missouri Department of Transportation (MoDOT) were added to the traffic model to account for anticipated and projected roadway and traffic control improvements. The list of these MoDOT committed improvements include;

- Widening of US 50 to a four-lane median divided roadway from St. Martin westward to limits of the model, and onward to Sedalia, Missouri.
- Add third through lanes to US 50 - S. County Club to US 54 Interchange.
- Add lanes to US 50/63 - Broadway to Monroe. Modify signalized intersections as required.

Jefferson City staff have also requested that the following new roadways be added to the future model to provide better access and to match improvement needs identified in previous reports. The following improvements were reviewed and found to be beneficial to the overall operations of traffic within the City and to provided needed continuity to the street system with regard to emergency vehicle access.

- Extend Christy Drive southward to connect with the new Missouri Route 179 roadway. This improvement will connect the Christy Drive frontage road from Stadium Road to Missouri Route 179, providing needed additional roadway capacity in this area of the City and County.
- Complete the construction of the portion of E. Miller Street between Vetter Lane and Eastland Drive.
- Construct a new north-south route within the County in the area immediately northwest of Jefferson City. This new route generally runs from Rainbow Drive east of Henwick Road, northward to an intersection with Scott Station Road east of Elston Road, and terminates at an intersection with Route 179 near Kleindienst Drive.

In addition to these specific improvements, other roadway and traffic control modifications were modeled as part of the Master Plan transportation model. One area where notable additions to the model were made is in the area of the County immediately southwest of Jefferson City (i.e. Region 8 as shown on **Figure 7**). As noted previously, this area is anticipated to experience very sizable increases in both land use densities and associated traffic projections.

During meetings with both County and City staff, it was determined that the transportation model should reflect the anticipated roadway improvements through this section of the County. Various improvement alternatives were reviewed and the following roadway intersection additions to the Master Plan transportation model were determined;

- Model a new, signal controlled interchange on Rte 179 near the midway point between the West Edgewood and Route C interchanges.
- Add an arterial street running eastward from the existing intersection of Frog Hollow Road and Rock Ridge Road to the new interchange with Route 179.

- Continue the arterial to the east of this interchange about ½ mile before turning northward to the intersection of West Edgewood Drive with Frog Hollow. Connect existing Frog Hollow into the new arterial at a location south of the West Edgewood intersection.
- Provide connections for Frog Hollow and other local streets to the new arterial to provide local access.
- Construct collector streets serving the large scale developments arranged around the proposed interchange of Route 179 with the new arterial to reflect expected needs of the new land use development in this area.

Without the addition of this roadway network to the model within this area of the County, the surrounding street system of Frog Hollow, Rock Ridge, West Edgewood, Vieth Road, Route C, and Route 179 could all be expected to carry the majority of traffic for this development, therefore operating at unsatisfactory levels of service with very poor operations at their intersections.

Another regional improvement that was analyzed includes the possibility of continuing the Missouri Route 179 roadway around the southern and eastern limits of the city and connecting this road to US 50/63 at an interchange east of the City in the Algoa area. It should be noted that the completion of this roadway would have a very high expected construction cost due to the multiple crossings of the Moreau River required by the expected route of the roadway and overall rugged nature of the terrain where this roadway would be built. Based on the completed model runs, the limited amounts of traffic that would be anticipated to use this roadway, and the high projected construction costs, it is not recommended that Route 179 be programmed for extension around the southeastern side of the city at this time.

Please note, one major criteria of the street system improvements modeled in this section of the County as part of this scenario was that existing Frog Hollow Road was to remain as a local street, serving only residential traffic. **Figure 10 - Master Plan Condition Traffic Model** shows the new roadways as modeled as part of the Master Plan traffic and land use scenario.

By the Year 2021, as shown on **Figure 10**, there are a significant number of intersections and sections of roadways in both the City and County that will be expected to require improvements to provide adequate capacity. Following is a listing of the intersections where the model reported potential capacity constraints and where potential improvements or modifications should be reviewed in detail to determine if improvements should be expected to be required to satisfy capacity concerns.

Intersection

Truman Boulevard with Country Club Drive
Truman Boulevard with Scott Station Road
Dix Road and Industrial Drive
Dix Road and Missouri Boulevard
Southwest Boulevard and Stadium Boulevard
Whitton Expressway and Missouri Boulevard
Whitton Expressway and Broadway Street
Whitton Expressway and Jefferson Street
Whitton Expressway and Monroe Street
Country Club Drive and Rainbow Drive

Route 179 and Missouri Boulevard
Route 179 and Country Club Drive
Route 179 and Industrial Dive / Main Street
Rainbow Drive and Henwick Lane
Business 50 West and Country Club Drive
Business 50 West and Apache Trail
EB US 50 Ramps and Route 179
Missouri Boulevard and Stadium Boulevard
Missouri Boulevard and Dunklin Street
Whitton Expressway and Madison Street
Stadium Drive and Myrtle Avenue
Stadium Drive and Jefferson Street
Stadium Drive and Lafayette Street
Ellis Boulevard and Route C
Route C and Idlewood Drive
Chestnut Street and High Street

XXX - new or returned to list

Again, please note that the improvement recommendations based on the existing and/or short term deficiencies have not been assumed to have been completed for the Master Plan traffic model condition. The recommended improvements are not assumed to have been completed since this would not represent the expected future condition based solely on the *EXISTING* and *COMMITTED* street and traffic control improvements.

One location listed above that merits special mention is the intersection of Chestnut Street with High Street. This intersection is predicted to experience capacity and operational deficiencies due to the proposed redevelopment of the existing state prison located immediately east of the downtown area of Jefferson City. This redevelopment area has a significant increase in the amounts of both office and retail building space in the area east of the downtown core of the City. The planned redevelopment is located adjacent to an area of the City that has a complete grid system of streets. As such, many of the trips to and from this development have multiple opportunities for the route that they take to access this redevelopment area.

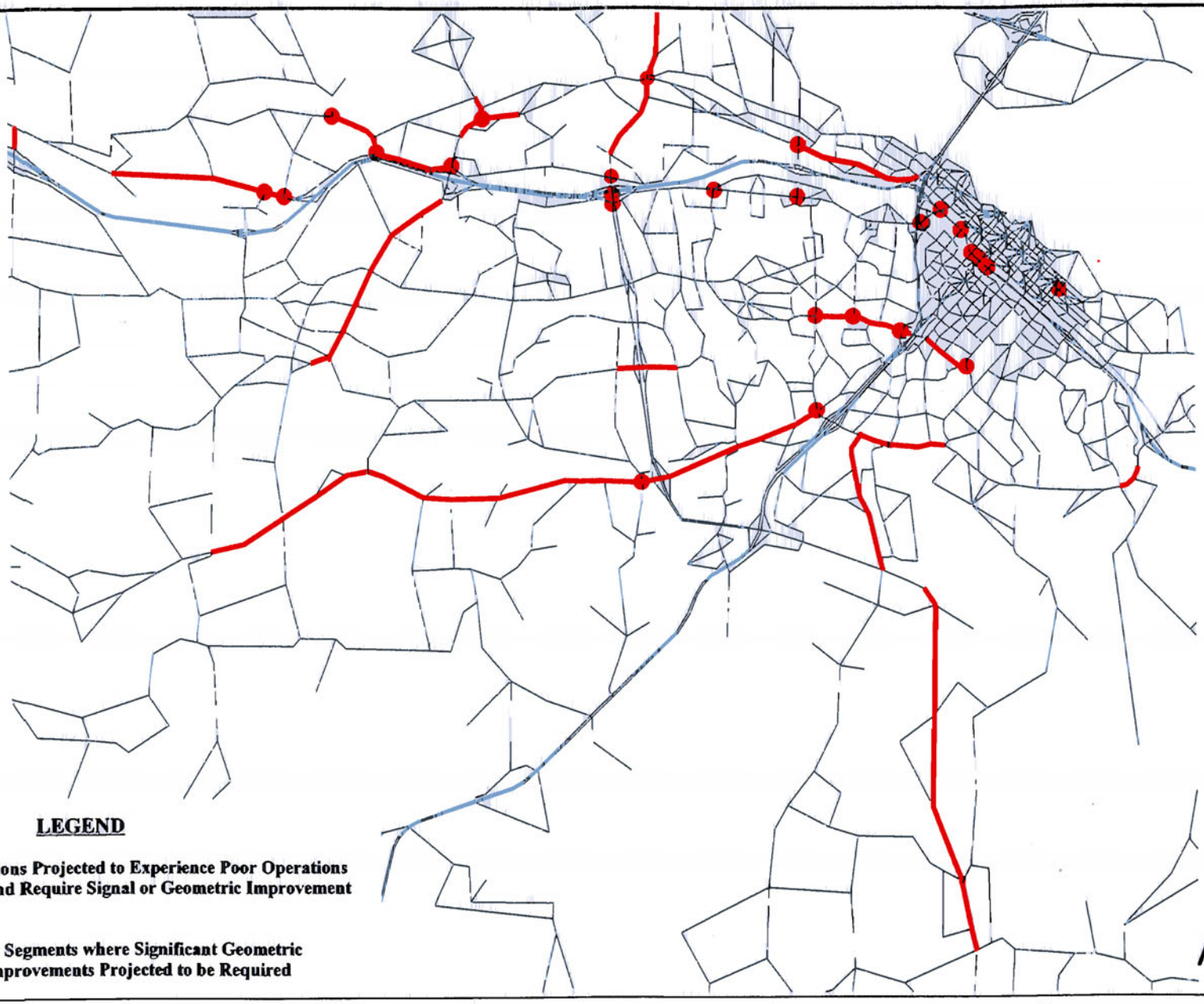
Due to the complexity and magnitude of the proposed state prison redevelopment project, and the more overall system-wide nature of this city-wide/county-wide transportation study, it is recommended that a separate, more detailed study of the prison access issues be completed. This separate study should be planned to emphasize and review of the access and capacity concerns of the prison site itself as well as reviewing capacity concerns that are anticipated along the US 50/63 corridor starting at the interchange of US 50 with US 54/63, running eastward through the downtown area, and extending toward the Algoa area of the City. There are multiple traffic operation concerns that currently exist along this corridor and the planned prison redevelopment will only add to their complexity.

Many of the roadways listed for potential improvement are State routes that serve as primary arterials for traffic flows throughout the study area. Following is a listing of the roadways where additional lanes, and the extent of the expected improvement requirements, are expected to be required under

Master Plan traffic conditions. Some of the listed street segments are duplicates from the ZBNB listing and/or extensions of that listing.

Street	**Location**
Industrial Drive	Dix Road to McCarty Road
Route 179	Country Club Drive to Sue Drive
S. Country Club / Fairgrounds Rd.	Missouri Boulevard to Scruggs Station Road
Country Club Road	Truman Boulevard to Rainbow
West Business 50	Country Club to Big Horn
Route C	Ellis Boulevard to Rumsey Lane
Route B	Ellis Boulevard to Route 179
Route B	Route 179 to Wardsville/Route M
Ellis Boulevard	Route B to Green Berry Road
Eastland Drive	Elm Street to Bald Hill Road
Stadium Road	US 54 Interchange to Lafayette Street
Truman Boulevard	Ex. 4-lane section east to Pembrooke
Scott Station Road	Truman Boulevard to Ten Mile Road
Rainbow Drive	Country Club to Henwick Lane

After the Master Plan Model was run and reviewed, the projected increases in traffic volumes were determined from the run model and added to the existing recorded traffic volumes at each of the major intersections recorded for the calibration of the transportation model. **Exhibits 1A** and **1B** show some spot representations of the expected future average daily traffic volumes within the City and County. Based on these traffic volume projections, geometric and traffic control improvements at each of these intersections have been determined for the Master Plan Traffic Condition and are detailed in the following ***Improvement Recommendation*** section of this study.



LEGEND

Intersections Projected to Experience Poor Operations And Require Signal or Geometric Improvement

Roadway Segments where Significant Geometric Improvements Projected to be Required

Figure 10

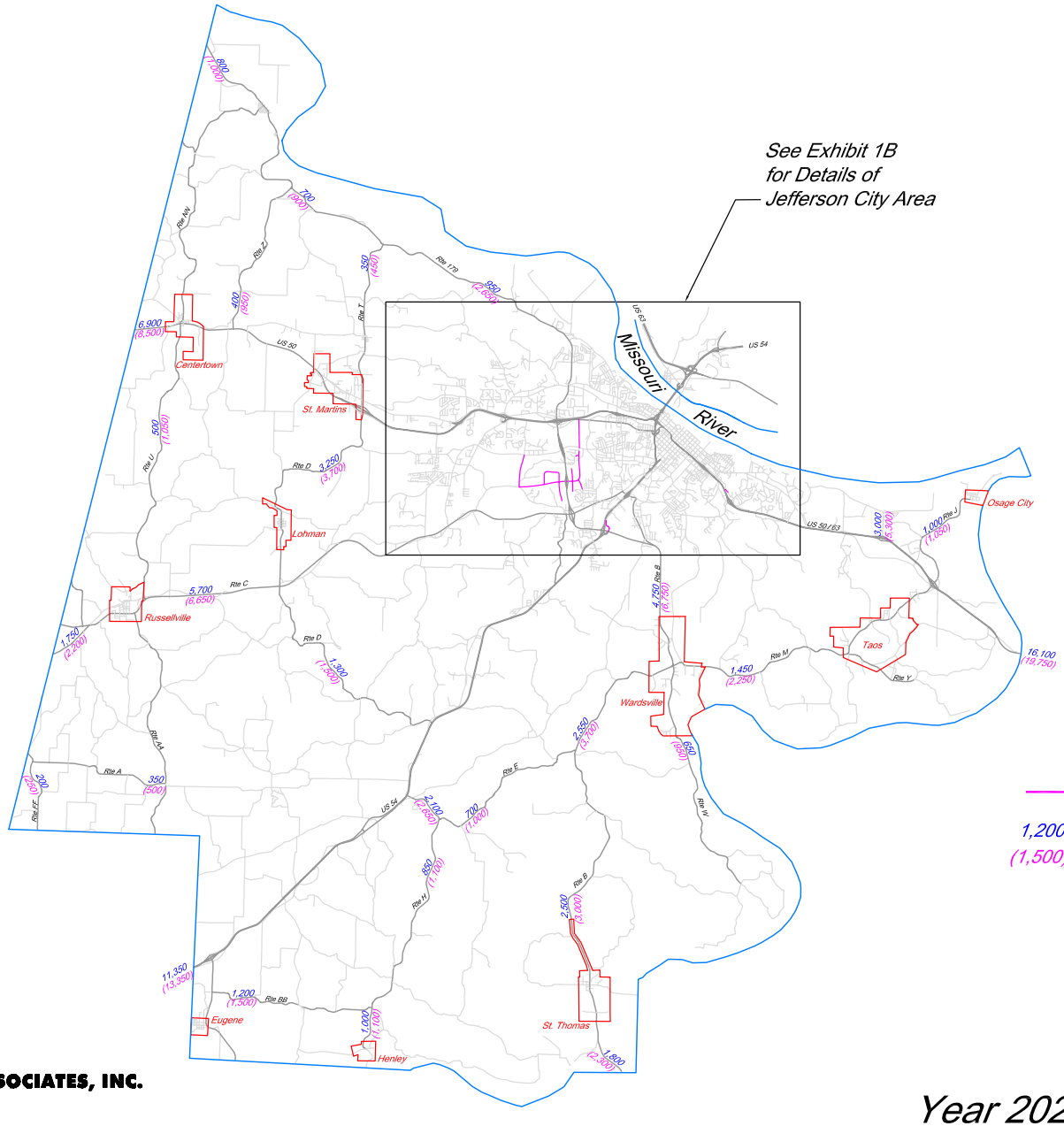
TMODEL™2

Cole County/Jefferson City Model

Master Planned Condition (2021 +/-)

GEORGE BUTLER ASSOCIATES, LENEXA, KS

MP21 LX
MP21.VDE
MP21_IMP DAF
LX: 10000/12830
VR: 20600/21300
07-10-2002



N.T.S.

LEGEND

New Regional Street Improvements

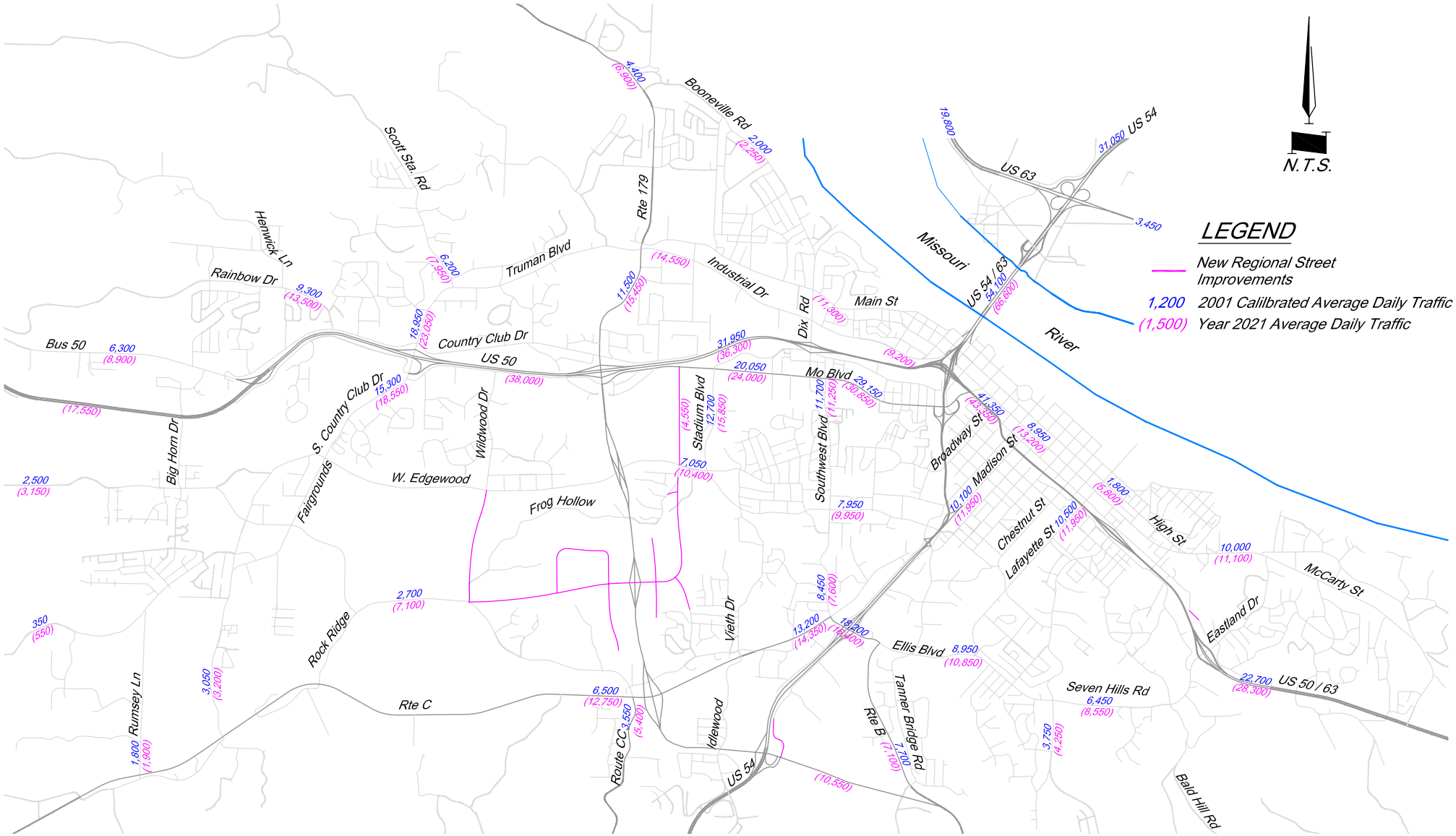
1,200 2001 Calilbrated Average Daily Traffic

(1,500) Year 2021 Average Daily Traffic

GEORGE BUTLER ASSOCIATES, INC.

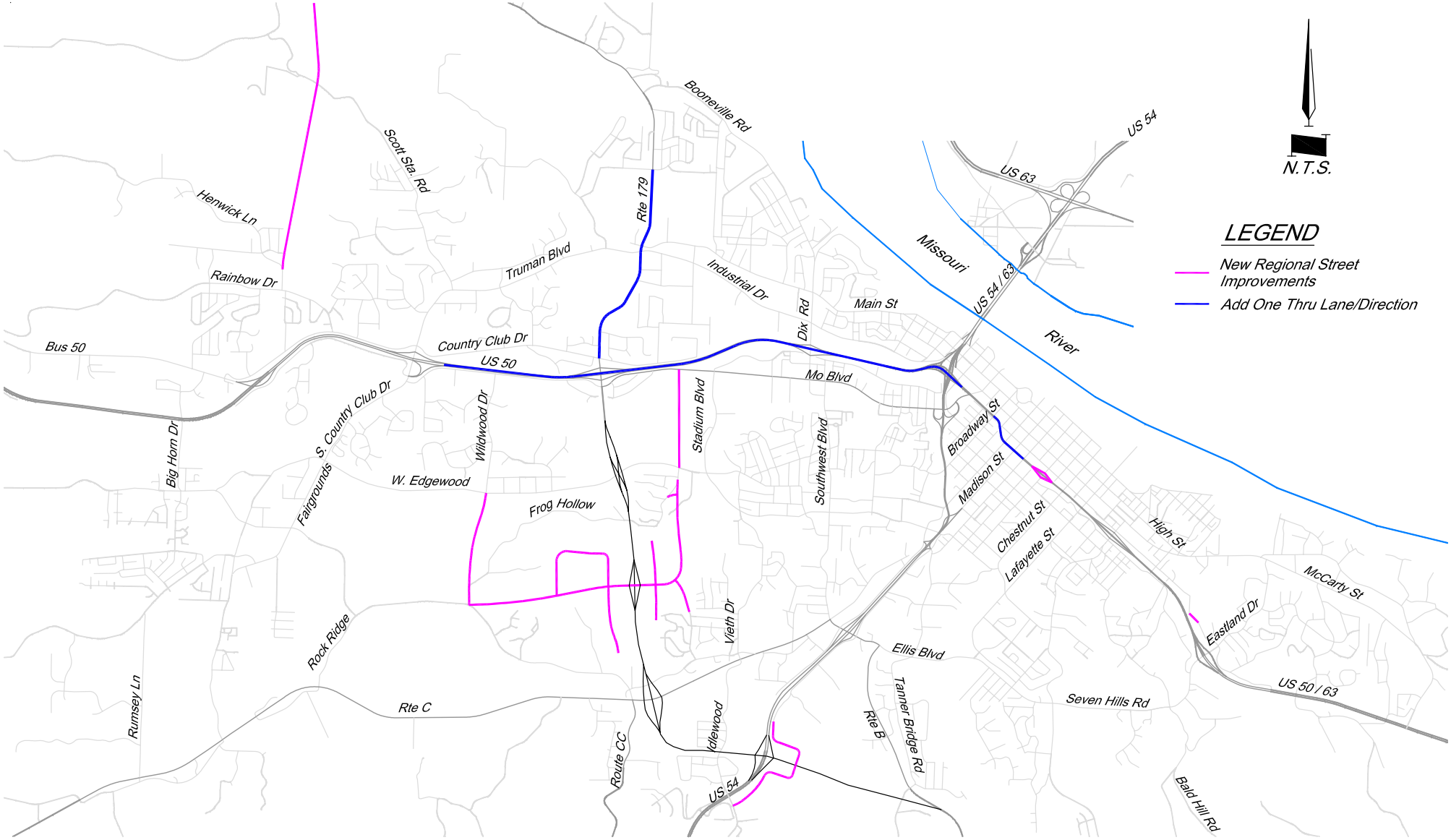
Engineers · Architects

Exhibit 1A
Cole County
Year 2021 Projected Volumes



GBA GEORGE BUTLER ASSOCIATES, INC.
Engineers · Architects

Exhibit 1B
Jefferson City Area
Year 2021 Projected Volumes



GBA GEORGE BUTLER ASSOCIATES, INC.
Engineers · Architects

Exhibit 2
Jefferson City Area
Roadway Improvement Summary

IMPROVEMENT RECOMMENDATIONS

The improvement recommendations were based on the capacity calculations for the three traffic volume scenarios. The first traffic volume scenario was based on capacity analysis for the existing traffic volumes that were recorded in the field and used in the calibrated traffic model.

The second traffic volume scenario was based on the existing traffic volumes with the addition of the "Zoned But Not Built" land uses with their generated traffic volumes. The **"Zoned But Not Built" (ZBNB)** traffic scenario consists of the traffic volumes that were projected to be generated from the areas of the City and County that have development projected based on the City and County's current land use plan but remained undeveloped as of January 1, 2001.

The third traffic volume scenario consists of the addition of the traffic volumes that would be generated by the expected development of the remaining undeveloped areas of the City and County under the existing Land Use Master Plan and is termed **"Master Planned Traffic Conditions"**.

Table 3 details the expected levels of services for each of the analyzed intersections while ***Table 4*** depicts the levels of service that would be expected for each of the turn movements for the unsignalized intersections. Both of these tables list the calculated results for the Existing, ZBNB, and Master Plan Traffic Volume Scenarios detailed following.

The capacity calculations described below determine the overall traffic flow quality of the study intersections. The quality of traffic flow, or Level of Service (LOS), at the study intersections are rated from Level "A" to Level "F" as described in ***Exhibit A,*** and as defined by the 2000 Highway Capacity Manual. LOS "A" represents the best condition, when little or no vehicle delay occurs. LOS "F" represents the worst condition when traffic demand exceeds capacity and resulting vehicle queuing interferes with the operation of other traffic movements at or adjacent to the intersection. The intersections were analyzed to obtain a maximum Level of Service "D" or better.

Table 3
Intersection Level of Service Summary with Recommended Improvements
Existing, Zoned But Not Built Master Plan Traffic Conditions

Intersection	Type of Control	Existing Traffic Volumes					Zoned But Not Built Traffic Volumes (P.M. Only)			Master Plan Traffic Volumes (P.M. Only)		
		Existing Geometrics					w/ Existing Recommended Improvements	Additional Improvement Recommendations		With Recommended Improvements	Additional Improvement Recommendations	
		A.M.	P.M.	A.M.	P.M.	Improvement Recommendations						
Clark Avenue and US 50 EB/US 63 SB Ramps	Unsignalized*	*	#			No Signal Warrant	*		No signal warrant	*		No signal warrant
Lafayette Street and Stadium Boulevard	Unsignalized*	*	*	C	B	Traffic Signal	B			C		
Moreau Drive and Leslie Street	Unsignalized*	*	*			SB Right Turn Lane	*			*		
Rock Hill Road (Mo. Route 179) and West Main Street	Unsignalized*	*	*			NB Right Turn Lane	*			*		
Route C and Route CC	Unsignalized*	*	*				#	B	Traffic Signal	B		
Scott Station Road & Truman Blvd.	Unsignalized*	#	#			No Signal Warrant	#	A	Traffic Signal	C		
City View Drive and US 50	Unsignalized*	*	*	A	A	Traffic Signal	A			B		
EB US 50 / EB US 63 Ramp (Tri-Level)	Unsignalized*	*	*			Interchange Modification	#		Interchange Modification	#		Interchange Modification
EB US 54 / NB US 63 On-Ramp (Tri-Level)	Unsignalized*	*	*			Interchange Modification	#		Interchange Modification	#		Interchange Modification
Country Club Dr. and Rainbow Dr.	Unsignalized*	*	*				*			*		
Tanner Bridge Road and Ellis Boulevard	All Way Stop	E	E	A	A	Traffic Signal or Roundabout	A			A		
Broadway and Whitton Expressway (US 50/US 63)	Signalized	E	D	C	C	Optimized Timings	C			D		
Mo. Route 179 and Truman/Industrial Drive	Signalized	E	F	D	D	Optimized Timings	D			D		
South County Club/Truman Blvd. And Country Club Dr.	Signalized	D	D				E	C	Dual NB LT, No NB RT	D		
Dix Road and Industrial Drive	Signalized	E	D	C	D	Optimized Timings	D			D		
Eastland Drive and US 50 EB Ramps	Signalized	C	E	C	C	Optimized Timings	C			C		
Ellis Boulevard and Missouri Route C	Signalized	B	C				D			E	C	Dual WB LT Lane
Jefferson Street and Ellis/Mo. Route C	Signalized	C	E	B	C	Optimized Timings	C			C		
Missouri Boulevard and Commerce (Missouri Route 179)	Signalized	C	C				E	D	EB, NB, SB RT Lanes Dual NB Left Trun Lane	E	D	Add SB Thru Lane Add EB & WB Thru Lane
Missouri Blvd. (Bus. 50) and Dix Road	Signalized	D	E			Under Construction	D			D		
Missouri Blvd. (Bus. 50) and Whitton Expressway (50/63)	Signalized	E	D	D	D	EB Dual Left Turn Lane	D			D		
Route 179 and Country Club Drive	Signalized	B	B				C			B		
Route 179 and EB US 50 Ramps	Signalized	D	D				D			C		
Route 179 and WB US 50 Ramps	Signalized	C	D				C	C	SB RT Lane	D		
Vieth Drive and Mo. Route C	Signalized	E	D	C	C	Optimized Timings	D			D		
W. Stadium Blvd and Jefferson Street	Signalized	F	E	D	D	Optimized Timings	D			E	D	EB Right Turn Lane
Southwest Blvd. And West Stadium Blvd.	Signalized	F	F	D	D	Add EB & WB Right Turn Lane	D			D		
Mo. Route B and Ellis Boulevard	Signalized	C	E	C	B	Optimized Timings	C			C		

* Indicates two-way stop controlled intersection, which an overall Level of Service (LOS) cannot be determined. See Unsignalized Intersection LOS Summary for approach LOS.

\# Indicates Level of Service "E" or "F" for at least one turning movement (unsignalized intersection only.)

Table 4
Unsignalized Intersection Level of Service Summary
PM Peak Hour

EXISTING TRAFFIC CONDITIONS

	AM PEAK	Eastbound			Westbound			Northbound			Southbound		
	Intersection	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**
10	Clark Avenue and US 50 EB/US 63 SB Ramps	C		C					A		A	A	
25	Tanner Bridge Road and Ellis Boulevard	B	**E**		B	**F**		B	D		B	B	
32	Lafayette Street and Stadium Boulevard	**F(1650')**		B				A	A			A	
34	Moreau Drive and Leslie Street	**E(75')**		B				A	A			A	
66	Rock Hill Road (Mo. Route 179) and West Main Street				**E(125')**		A		A		A	A	
80	Scotts Station Road and Truman Boulevard	A	A			A	A	D			**F(225')**		B
82	City View Drive and US 50	C	A		A	A	A	**E(25')**			B		
107	EB US 50 / EB US 63 Ramp (Tri-Level)	A							**F(725')**				
108	EB US 54 / NB US 63 On-Ramp (Tri-Level)					D		A	A				

EXISTING TRAFFIC CONDITIONS

	PM PEAK	Eastbound			Westbound			Northbound			Southbound		
	Intersection	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**
10	Clark Avenue and US 50 EB/US 63 SB Ramps	**E(100')**		B					A		A	A	
25	Tanner Bridge Road and Ellis Boulevard	B	**F(>999')**		B	**F(475')**		B	B		B	B	
32	Lafayette Street and Stadium Boulevard	**F(150')**		B				A	A			A	
34	Moreau Drive and Leslie Street	C		B				A	A			A	
66	Rock Hill Road (Mo. Route 179) and West Main Street				C		B		A		A	A	
80	Scotts Station Road and Truman Boulevard	A	A			A	A	**E(25')**			**F(100')**		B
82	City View Drive and US 50	B	A		B	A	A	**E(25')**			B		
107	EB US 50 / EB US 63 Ramp (Tri-Level)	A							**F(825')**				
108	EB US 54 / NB US 63 On-Ramp (Tri-Level)					**E(25')**		A	A				

ZBNB TRAFFIC CONDITIONS

	PM PEAK	Eastbound			Westbound			Northbound			Southbound		
	Intersection	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**
10	Clark Avenue and US 50 EB/US 63 SB Ramps	**E(125')**		B					A		A	A	
25	Tanner Bridge Road and Ellis Boulevard	B	**F(>999')**		B	**F(>999')**		B	B		B	C	
34	Moreau Drive and Leslie Street	B		B				A	A			A	
66	Rock Hill Road (Mo. Route 179) and West Main Street				C		B		A		A	A	
72	Route C and Route CC	A	A		A	A		**F(200')**	B		**F(100')**	C	
80	Scotts Station Road and Truman Boulevard	B	A			A	A	**E(25')**			**F(150')**		B
107	EB US 50 / EB US 63 Ramp (Tri-Level)	A							**F(875')**				
108	EB US 54 / NB US 63 On-Ramp (Tri-Level)					E(25')		A	**A**				
112	EB US 54 / NB US 63 On-Ramp (Tri-Level)	A				A					A		

MP TRAFFIC CONDITIONS

	PM PEAK	Eastbound			Westbound			Northbound			Southbound		
	Intersection	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**	**L**	**T**	**R**
10	Clark Avenue and US 50 EB/US 63 SB Ramps	**F(200')**		B					A		B	A	
25	Tanner Bridge Road and Ellis Boulevard	B	**F(>999')**		B	**F(>999')**		B	B		B	C	
34	Moreau Drive and Leslie Street	B		A				A	A			A	
66	Rock Hill Road (Mo. Route 179) and West Main Street				D		B		A		A	A	
80	Scotts Station Road and Truman Boulevard	B	A		B	A		**F(>999')**		**F(210')**	**F(>999')**		**F(475')**
107	EB US 50 / EB US 63 Ramp (Tri-Level)	B							**F(885')**				
108	EB US 54 / NB US 63 On-Ramp (Tri-Level)					**E(25')**		A	A				
112	Country Club Drive and Rainbow Drive	A				A					A		

EXHIBIT A

Level of Service Definitions

Level of service criteria are outlined in the 2000 edition of the *"Highway Capacity Manual"* (HCM) for both signalized and unsignalized intersections. The HCM defines the level of service as a measure of the quality of traffic flow. There are six different levels of service for each facility type, each representing a range of operating conditions. Each level of service is designated by a letter from "A" to "F," with "A" being the most desirable condition and "F" being the least desirable condition. The level of service criteria, as reported by the 2000 HCM, for both signalized and unsignalized intersections, are listed below:

Unsignalized Intersections		Signalized Intersections	
Level of Service	**Average Total Delay**	**Level of Service**	**Stopped Delay per Vehicle**
A	≤ 10	A	≤ 10
B	> 10 and ≤ 15	B	> 10 and ≤ 20
C	> 15 and ≤ 25	C	> 20 and ≤ 35
D	> 25 and ≤ 35	D	> 35 and ≤ 55
E	> 35 and ≤ 50	E	> 55 and ≤ 80
F	> 50	F	> 80

EXISTING TRAFFIC CONDITIONS

Following is a description of the improvements that are be recommended to completed at the intersections or along the corridor(s) that are currently experiencing capacity deficiencies under existing traffic volumes, lane arrangements, and traffic control measures. Most of the critical intersections are located near or within Jefferson City. **Figure 11** details the location of the intersections that are currently over capacity or operating with poor levels of service in Jefferson City vicinity based on actual recorded traffic volumes. ***Table 3*** details the expected levels of services for each of the analyzed intersections and ***Table 4*** depicts the levels of service that would be expected for each of the turn movements for the unsignalized intersections. Capacity analyses were conducted during both the A.M. and P.M. peak periods of all 113 intersections where actual traffic volume information was available. As such, there may be intersections identified within this section that require review or improvement that were not identified by the traffic model as locations of concern.

Following is a grouping of intersections that the review of the signal operations identified that there is opportunity to significantly improve the overall operations of traffic movements simply by modifying either signal timings and/or phasings. The existing phasings and timings that were reviewed were as reported by either the City or State during collection of data for this study. It should be noted that the existing poor levels of service due to the existing signal timings, signal phasings, or signal coordination issues may be due to circumstance that we are unaware of and therefore are the best operations that can be expected. Detailed analysis of each of these intersections should be completed to determine the exact improvements that should be undertaken. Please note that there is no particular significance to the order of the listed recommendations.

Broadway and Whitton Expressway (U.S. 50 / U.S. 63) (#4)... Signal capacity analyses indicate that the intersection would be expected to operate with a Level of Service "E" and "D" during the A.M. and P.M. peak periods, respectively. By optimizing the signal timings, the overall intersection improved to a Level of Service "C" during both the A.M. and P.M. peak periods. It should be noted that at intersections with coordinated traffic signal operations, the levels of service at individual signal locations may be impacted negatively to allow better operations of the overall signal system.

Monroe and Whitton Expressway (U.S. 50 / U.S. 63) (#64)... Signal capacity analyses indicate that the intersection would be expected to operate with a Level of Service "C" and "D" during the A.M. and P.M. peak periods, respectively, with many movements experiencing unsatisfactory levels of service "E" or "F". By optimizing the signal timings, the overall intersection improved to a Level of Service "C" during both the A.M. and P.M. peak periods with no movements expected to operate at worse than Level of Service "D".

Missouri Route 179 and Industrial Drive (#13)... Signal capacity analyses indicate that the intersection would be expected to operate with a Level of Service "E" and "F" during the A.M. and P.M. peak periods, respectively. Currently, traffic queues at this location stack up to the north through the intersection of Missouri Route 179 and W. Main Street. By optimizing the signal timings, the overall intersection improved to a Level of Service "D" during both the A.M. and P.M. peak periods.

Dix Road and Industrial Drive (#18)... Signal capacity analyses indicate that the intersection would be expected to operate with a Level of Service "E" and "D" during the A.M. and P.M. peak periods, respectively. By optimizing the signal timings, the overall intersection improved to a Level of Service "C" and "D" during the A.M. and P.M. peak periods, respectively.

The City also requested that GBA review the addition of a northbound right-turn lane at this intersection to eliminate an existing accident problem. Currently, northbound turning trucks off-track and overrun the curb-line. With the addition of a properly designed separate northbound right-turn lane, many of these concerns would be addressed.

Eastland Drive and Eastbound U.S. 50 ramps (#19)... Signal capacity analyses indicate that the intersection would be expected to operate with a Level of Service "C" and "E" during the A.M. and P.M. peak periods, respectively. By optimizing the signal timings, the overall intersection improved to a Level of Service "C" during both the A.M. and P.M. peak periods.

Jefferson Street and Ellis Boulevard (#22)... Signal capacity analyses indicate that the intersection would be expected to operate with a Level of Service "C" and "E" during the A.M. and P.M. peak periods, respectively. By optimizing the signal timings, the overall intersection improved to a Level of Service "B" and "C" during the A.M. and P.M. peak periods, respectively.

Vieth Drive and Missouri Route C (#71)... From the signal capacity analysis, the overall intersection would be expected to operate with a Level of Service "E" and "D" during the A.M. and P.M. peak periods, respectively. By optimizing the signal timings, the overall intersection improved to a Level of Service "C" during both the A.M. and P.M. peak periods.

Missouri Route B and Ellis Boulevard (#96)... From the signal capacity analysis, the overall intersection would be expected to operate with a Level of Service "C" and "E" during the A.M. and P.M. peak periods, respectively. By optimizing the signal timings, the overall intersection improved to a Level of Service "C" and "B" during the A.M. and P.M. peak periods, respectively.

West Stadium Boulevard and Jefferson Street (#91)... From the signal capacity analysis, the overall intersection would be expected to operate with a Level of Service "F" and "E" during the A.M. and P.M. peak periods, respectively. By optimizing the signal timings, the overall intersection improved to a Level of Service "D" during both the A.M. and P.M. peak periods.

Bolivar Street and McCarty Street... During project review meetings, the City reported that a previously complete Traffic Engineering Assistance Program (TEAP) project determined that this intersection has sufficient traffic volumes to warrant signalization.

Following are intersections where analyses indicated that signal and/or geometric improvements should be expected to be required to satisfy existing capacity deficiencies.

Tanner Bridge Road and Ellis Boulevard (#25)... Currently, the intersection is an all-way stop sign controlled intersection. Based on the unsignalized capacity analyses, the overall intersection operates with a poor Level of Service "E" during the A.M. and P.M. peak periods. The eastbound and westbound through/right turn movements operate with a very poor Level of Service "F" during the A.M. and P.M. peak periods. ***Table 3*** details the overall level of service for the intersection and ***Table 4*** details the level of service for each turn movement for an unsignalized intersection during the P.M. peak period. Due to the poor level of service, signal warrant analyses were conducted to determine if a traffic signal would be required. The signal warrant analyses indicated that the Peak Hour Warrant (Warrant 3) was met.

With the addition of a traffic signal at the intersection, the level of service for the intersection would be expected to improve to a Level of Service "B" and "A" during the A.M. and P.M. peak hours. The addition of a traffic signal would help the overall level of service but may not be the best alternative.

Construction of a roundabout was a second alternative that was looked at to improve the overall intersection operation. Roundabouts are becoming more prevalent in the Midwest, especially at intersections that may have a unique design aspect, such as the sharp shew angle at the intersection of Tanner Bridge Road and Ellis Boulevard. The capacity analyses indicate a need for improvement to increase the overall level of service. Based on the roundabout capacity analyses, using aaSIDRA, the overall intersection would be expected to operate with a Level of Service "A" during both the A.M. and P.M. peak periods. From our experience with roundabout, the necessary geometric changes required for the roundabout is usually similar in price to an installation of a traffic signal. The major benefit to a roundabout is there are no routine signal maintenance issues and utility fees, and vehicle delays and queues are shorter. ***Exhibit E-1*** illustrates how a roundabout would look in this location.

Lafayette Street and Stadium Boulevard (#32)... The unsignalized capacity analyses indicated that the eastbound left-turn movement currently operates with a Level of Service "F" during the A.M. and P.M. peak period. ***Table 3*** details the overall level of service for the intersection and ***Table 4*** details the level of service for each turn movement for an unsignalized intersection during the P.M. peak period. Due to the poor level of service, signal warrant analyses were conducted to determine if a traffic signal would be warranted. The signal warrant analyses revealed that the Peak Hour Warrant (Warrant 3) would be met under existing traffic volume conditions.

With the addition of a traffic signal, the overall intersection of Lafayette Street and Stadium Boulevard would be expected to operate with a Level of Service "C" and "B" during the A.M. and P.M. peak periods, respectively.

Similar to the above intersection, construction of a roundabout is a second alternative that was looked at to improve the overall intersection operation. Based on the roundabout capacity

analyses, using aaSIDRA, the overall intersection would be expected to operate with a Level of Service "A" during both the A.M. and P.M. peak periods. From our experience with roundabout, the necessary geometric changes required for the roundabout is usually similar in price to an installation of a traffic signal. The major benefit to a roundabout is there are no routine signal maintenance issues and utility fees, and vehicle delays and queues are shorter.

Moreau Drive and Leslie Street (#34)... The unsignalized capacity analyses indicated that the eastbound left-turn movement currently operates with a Level of Service "E" during the A.M. peak period. ***Table 3*** details the overall level of service for the intersection and ***Table 4*** details the level of service for each turn movement for an unsignalized intersection during the P.M. peak period. Due to the poor level of service, signal warrant analyses were conducted to determine if a traffic signal would be required. The signal warrant analyses indicated that the Peak Hour Warrant (Warrant 3) would not be met under existing traffic volume conditions.

A southbound right-turn lane was proposed to help improve the overall operation of the intersection. With the right-turn lane, the eastbound left-turn movement would be expected to improve to a Level of Service "D". ***Exhibit E-2*** illustrates the addition of the southbound right-turn lane. The right-turn lane will eliminate some of the on-street parking. The addition of the lane can be taken care of with appropriate pavement marking and signing.

Missouri Route 179 and West Main Street (#66)... The unsignalized capacity analyses indicated that the westbound left-turn movement currently operates with a Level of Service "E" during the A.M. peak period. ***Table 3*** details the overall level of service for the intersection and ***Table 4*** details the level of service for each turn movement for an unsignalized intersection during the P.M. peak period. Due to the poor level of service, signal warrant analyses were conducted to determine if a traffic signal would be required. The signal warrant analyses indicated that the Peak Hour Warrant (Warrant 3) would not be met under existing traffic volume conditions. Plus with the intersection located 200 feet north of the intersection of Missouri Route 179 and Industrial Drive, a traffic signal would not be recommended.

To improve the overall operation of the intersection, a northbound right-turn lane to eastbound Main Street is proposed because of the significant right-turn volume. It is also recommended that Route 179 be widened north of Industrial Drive to provide median channelization that would prohibit left turns from Main Street. The westbound left turns from Main Street to Route 179 would be routed south on Jaycee Drive to Industrial Drive. This recommendation is in lieu of traffic signalization of the Main Street intersection. ***Exhibit E-3*** illustrates a possible layout of the exclusive right-turn lane and median channelization. These additions will require working with the railroad because of the at-grade location on Missouri Route 179.

City View Drive and U.S. 50 (#82)... The unsignalized capacity analyses indicated that the northbound approach currently operates with a Level of Service "E" during the A.M. and P.M. peak periods. ***Table 3*** details the overall level of service for the intersection and ***Table 4*** details the level of service for each turn movement for an unsignalized intersection during the P.M. peak period. Due to the poor level of service, signal warrant analyses were conducted to determine if a traffic signal would be required. The signal warrant analyses indicated that the Peak Hour Warrant (Warrant 3) would be met under existing traffic volume conditions. With the addition

of a traffic signal, the overall intersection would be expected to operate with Level of Service "A" during the A.M. and P.M. peak periods. Additional warrant analyses should be completed to determine if the other warrants are met prior installation of the traffic signal.

Southwest Boulevard and West Stadium Boulevard (#94)... Currently, all four approaches at the intersection of Southwest Boulevard and West Stadium Boulevard have an exclusive left-turn lane and a through/right-turn lane. From the signal capacity, the overall intersection would be expected to operate with a Level of Service "F" during both the A.M. and P.M. peak periods under existing conditions.

The addition of an exclusive right-turn lane to the eastbound and westbound approaches would improve the overall operation of the intersection to Level of Service "D". ***Exhibit E-4*** illustrates the layout of the improvements. The addition of the eastbound right-turn lane will affect the existing parking lot the business on the southwest corner of the intersection and one residential driveway. The westbound right-turn lane will affect one residential driveway.

The following interchange areas can be expected to operate with somewhat poor levels of service due primarily to geometric layout and spacing between the each individual intersection. Due to the very short distances between the signalized intersections located at and near the interchanges, operations at these intersections is highly dependant upon each other, i.e. when one intersection experiences capacity problems, all other intersections within the area also experience problems.

Missouri Boulevard (Business 50) and Whitton Expressway (#49)... Signal capacity analyses indicate that the intersection would be expected to operate with a Level of Service "E" and "D" during the A.M. and P.M. peak periods, respectively. Signal capacity analyses indicate the need for eastbound dual left-turn lanes. The primary need for the dual left-turn lanes is for the A.M. peak period. The overall intersection operations would improve to a Level of Service "D" during both the A.M. and P.M. peak periods with the additional turn lanes. Missouri Boulevard is about 450 feet east of the gore of the westbound off-ramp to the U.S. 63 / U.S. 54 tri-level interchange. The eastbound on-ramp from the U.S. 63 / U.S. 54 tri-level interchange is located about 500 feet east of Missouri Boulevard (Stop Bar to Gore). The widening for the extra turn lane would have to occur on the north side of Whitton Expressway. But due to the close proximity of the tri-level interchange, the ramps will have to be modified. ***Exhibit E-5*** provides a view of the close location of Missouri Boulevard to the tri-level ramps.

Missouri Route 179 and U.S. 50 Interchange... The intersections of the Missouri Route 179 (Commerce Drive)with the Eastbound and Westbound U.S. 50 ramps, Country Club Drive and Missouri Boulevard have been analyzed as independent intersections. The capacity analyses indicate that the overall intersections would be expected to operate with a Level of Service "D" or better during the peak periods. However, due to the close proximity of the intersections, the individual intersections more than likely operate at a level of service worse than reported in the above individual intersection discussion. This is due to the fact that the intersection vehicle queue lengths interact with each other. Therefore, the overall delays would increase because the queues block certain movements of the intersections (i.e. the through movement blocks the right or left-turn movement.)

U.S. 54 Interchange and Ellis Boulevard... Similarly, the intersections of the Ellis Boulevard with the Eastbound and Westbound U.S. 54 ramps, Jefferson Street, Christy Drive, and Missouri Route "C" have been analyzed as independent intersections. The capacity analyses indicate that the overall intersections would be expected to operate with a Level of Service "E" or better during the peak periods. Again, due to the close proximity of the intersections, the individual intersections more than likely operate at a level of service worse than reported for the individual intersections.

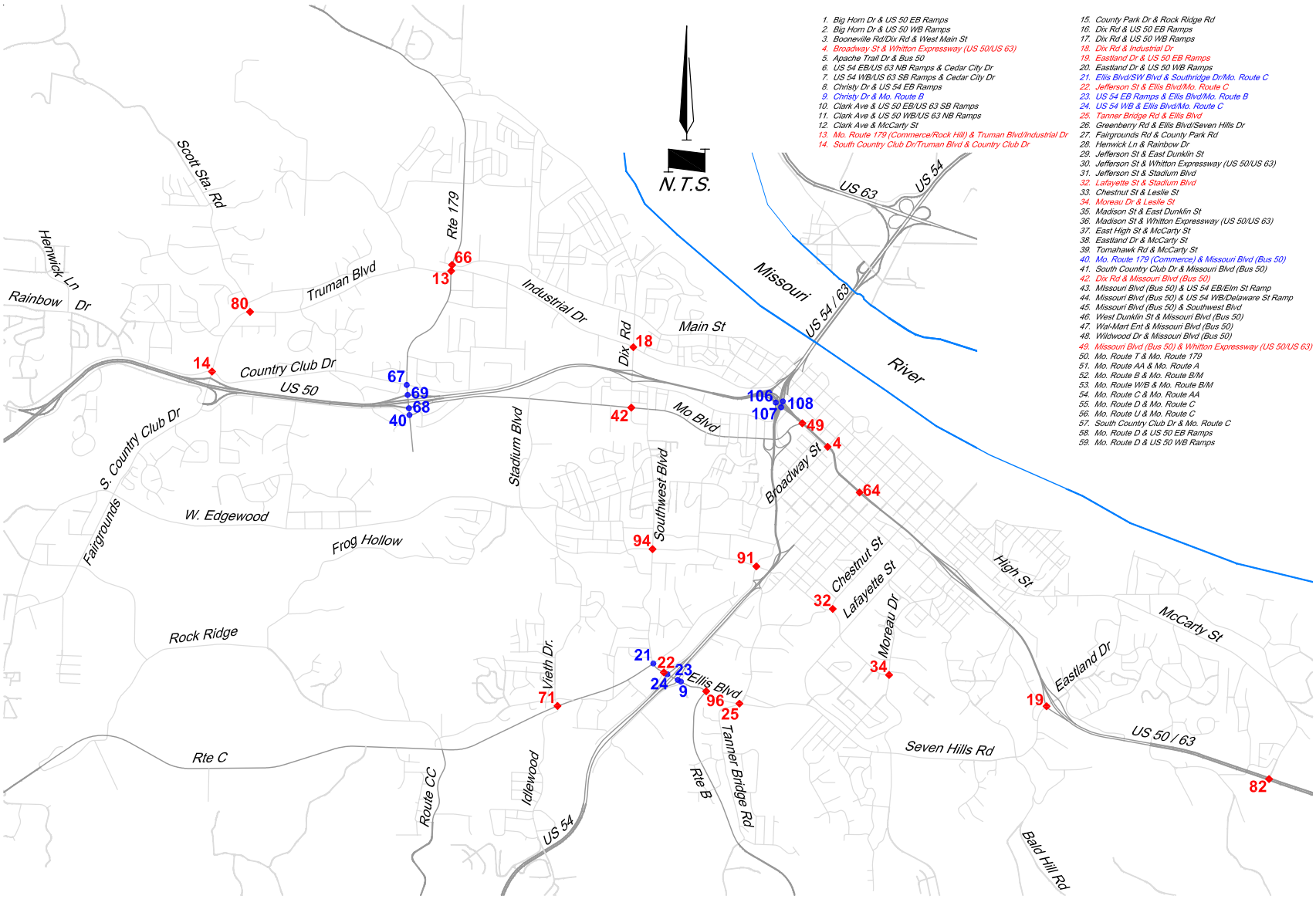
Tri-level Interchange (U.S. 54 / U.S. 50 / U.S. 63)... The northbound off-ramp from US 54 with the Tri-level is expected to operate with a Level of Service "F"during both the A.M. and P.M. peak periods. The westbound off-ramp from US 50/63 and the Tri-level is expected to operate with a Level of Service "E" during the P.M. peak hour. Due to the nature of the Tri-level interchange, no geometric improvements can be recommended to improve the overall intersection level of service.

The following locations can be expected to have marginal or poor operations under Existing Traffic conditions, but there are few options for improvement under current design criteria that can be recommended.

Truman Boulevard and Scott Station Road (#80) ... The unsignalized capacity analyses indicated that the southbound left-turn movement currently operates with a Level of Service "F" during the A.M. and P.M. peak commuter periods. ***Table 3*** details the overall level of service for the intersection and ***Table 4*** details the level of service for each turn movement for an unsignalized intersection during the P.M. peak period. Due to the poor level of service, signal warrant analyses were conducted to determine if a traffic signal would be required. Based on the signal warrant analyses of the projected traffic volumes at this location, a traffic signal would not be expected to be warranted at this intersection.

Truman Boulevard and Country Club Drive (#14) ... The capacity analyses indicated that this intersection can be expected to operate with an overall Level of Service of "C" in the A.M. and "D" in the P.M. While these overall Levels of Service are good, the eastbound and westbound approaches both can be expected to operate at Level of Service "E". There are no improvements other that optimizing the phasing that would be expected to significantly improve this condition but the close spacing of this intersection to the interchange of Country Club Drive with US 50 may make this impossible.

The last intersection that warrants comment under the Existing Traffic Conditions is the intersection of **Missouri Boulevard (Bus 50) and Dix Road (#42)**. At the time of the recorded traffic volumes, geometric and traffic controls, this intersection experience very poor operations. Since that time, construction of the designed improvements at this location have begun and the operations of this intersection can be expected to improve to acceptable levels immediately upon completion.



1. Big Horn Dr & US 50 EB Ramps
2. Big Horn Dr & US 50 WB Ramps
3. Booneville Rd/Dix Rd & West Main St
4. Broadway St & Whitton Expressway (US 50/US 63)
5. Apache Trail Dr & Bus 50
6. US 54 EB/US 63 NB Ramps & Cedar City Dr
7. US 54 WB/US 63 SB Ramps & Cedar City Dr
8. Christy Dr & US 54 EB Ramps
9. Christy Dr & Mo. Route B
10. Clark Ave & US 50 EB/US 63 SB Ramps
11. Clark Ave & US 50 WB/US 63 NB Ramps
12. Clark Ave & McCarty St
13. Mo. Route 179 (Commerce/Rock Hill) & Truman Blvd/Industrial Dr
14. South Country Club Dr/Truman Blvd & Country Club Dr
15. County Park Dr & Rock Ridge Rd
16. Dix Rd & US 50 EB Ramps
17. Dix Rd & US 50 WB Ramps
18. Dix Rd & Industrial Dr
19. Eastland Dr & US 50 EB Ramps
20. Eastland Dr & US 50 WB Ramps
21. Ellis Blvd/SW Blvd & Southridge Dr/Mo. Route C
22. Jefferson St & Ellis Blvd/Mo. Route C
23. US 54 EB Ramps & Ellis Blvd/Mo. Route B
24. US 54 WB & Ellis Blvd/Mo. Route C
25. Tanner Bridge Rd & Ellis Blvd
26. Greenberry Rd & Ellis Blvd/Seven Hills Dr
27. Fairgrounds Rd & County Park Rd
28. Henwick Ln & Rainbow Dr
29. Jefferson St & East Dunklin St
30. Jefferson St & Whitton Expressway (US 50/US 63)
31. Jefferson St & Stadium Blvd
32. Lafayette St & Stadium Blvd
33. Chestnut St & Leslie St
34. Moreau Dr & Leslie St
35. Madison St & East Dunklin St
36. Madison St & Whitton Expressway (US 50/US 63)
37. East High St & McCarty St
38. Eastland Dr & McCarty St
39. Tomahawk Rd & McCarty St
40. Mo. Route 179 (Commerce) & Missouri Blvd (Bus 50)
41. South Country Club Dr & Missouri Blvd (Bus 50)
42. Dix Rd & Missouri Blvd (Bus 50)
43. MIssouri Blvd (Bus 50) & US 54 EB/Elm St Ramp
44. Missouri Blvd (Bus 50) & US 54 WB/Delaware St Ramp
45. Missouri Blvd (Bus 50) & Southwest Blvd
46. West Dunklin St & Missouri Blvd (Bus 50)
47. Wal-Mart Ent & Missouri Blvd (Bus 50)
48. Wildwood Dr & Missouri Blvd (Bus 50)
49. Missouri Blvd (Bus 50) & Whitton Expressway (US 50/US 63)
50. Mo. Route T & Mo. Route 179
51. Mo. Route AA & Mo. Route A
52. Mo. Route B & Mo. Route B/M
53. Mo. Route W/B & Mo. Route B/M
54. Mo. Route C & Mo. Route AA
55. Mo. Route D & Mo. Route C
56. Mo. Route U & Mo. Route C
57. South Country Club Dr & Mo. Route C
58. Mo. Route D & US 50 EB Ramps
59. Mo. Route D & US 50 WB Ramps
60. Mo. Route H/E & Mo. Route E
61. Mo. Route H & Mo. Route BB
62. Mo. Route M & Mo. Route Y
63. Mo. Route T & Henwick Ln
64. Monroe St & Whitton Expressway (US 50/US 63)
65. Mo. Route 179 (Rock Hill) & Booneville Rd
66. Mo. Route 179 (Rock Hill) & West Main St
67. Mo. Route 179 (Commerce) & Country Club Dr
68. Mo. Route 179 (Commerce) & US 50 EB Ramps
69. Mo. Route 179 (Commerce) & US 50 WB Ramps
70. Mo. Route C & Bubba
71. Vieth Dr & Mo. Route C
72. Mo. Route CC/Rock Ridge Rd & Mo. Route C
73. South Country Club Dr & US 50 EB Ramps
74. South Country Club Dr & US 50 WB Ramps
75. South Country Club Dr & Fairgrounds Rd
76. South Country Club Dr & Scruggs Station Rd
76A. Scruggs Station Rd & Fairgrounds Rd
77. South Country Club Dr & West Edgewood Dr
78. Scotts Station Rd & Elston Rd
79. Bald Hill Rd/ & Seven Hills Rd/Eastland Dr
80. Scotts Station Rd & Truman Blvd
81. Shamrock Rd & US 50/US 63
82. City View Dr & US 50
83. Mo. Route U & US 50
84. Mo. Route 17 & US 50 EB Ramps
85. Mo. Route 17 & US 50 WB Ramps
86. Mo. Route CC & US 54
87. US 54 & Mo. Route E
88. US 54 & West Brazito Rd
89. US 54 EB/US 63 NB Ramps & West Main St
90. US 54 WB/US 63 SB Ramps & West Main St
91. Jefferson St & West Stadium Blvd
92. West Stadium Blvd & Missouri Blvd (Bus 50)
93. Satinwood Dr & West Stadium Dr
94. Southwest Blvd & West Stadium Blvd
95. Stadium Blvd & West Edgewood Dr
96. Mo. Route B & Ellis Blvd
97. US 54 & Mo. Route D
98. Big Horn Dr & Old Lohman Rd
99. Jefferson St & Zumwalt Rd
100. US 54 WB Ramp/Industrial Dr & McCarty St
101. Eastland Dr & Elm St
102. Mo. Route AA & Scrivner Rd
103. Mo. Route J & US 50 EB Ramps
104. Mo. Route J & US 50 WB Ramps
105. US 54 EB/US 63 NB Ramp & McCarty St
106. US 63 SB/US 50 EB Off-Ramp (Tri-Level)
107. US 50 EB/US 63 SB Ramp (Tri-Level)
108. US 54 EB/US 63 NB On-Ramp (Tri-Level)
109. Lafayette St & McCarty St
110. Militia Dr & US 50 WB/US 63 NB Ramp
111. Militia Dr & US 50 EB/US 63 SB Ramp
112. Rainbow Dr & Country Club Dr
113. St Louis Rd & McCarty St

LEGEND

◆ 4 Intersection with Deficient Level of Service

● 9 Interchange Areas with Capacity Concerns

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Figure 11
Jefferson City & Vicinity
Existing Traffic Conditions

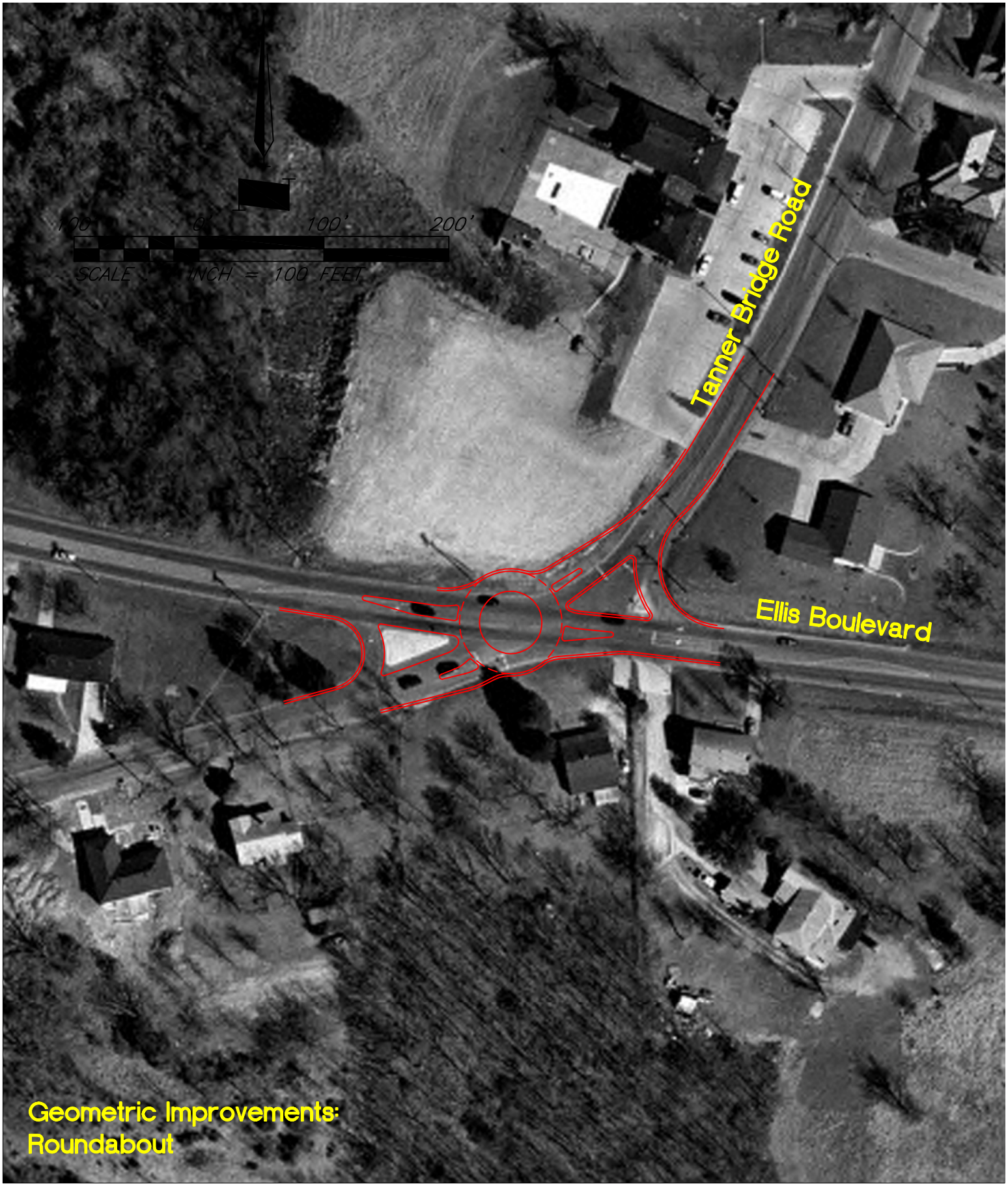

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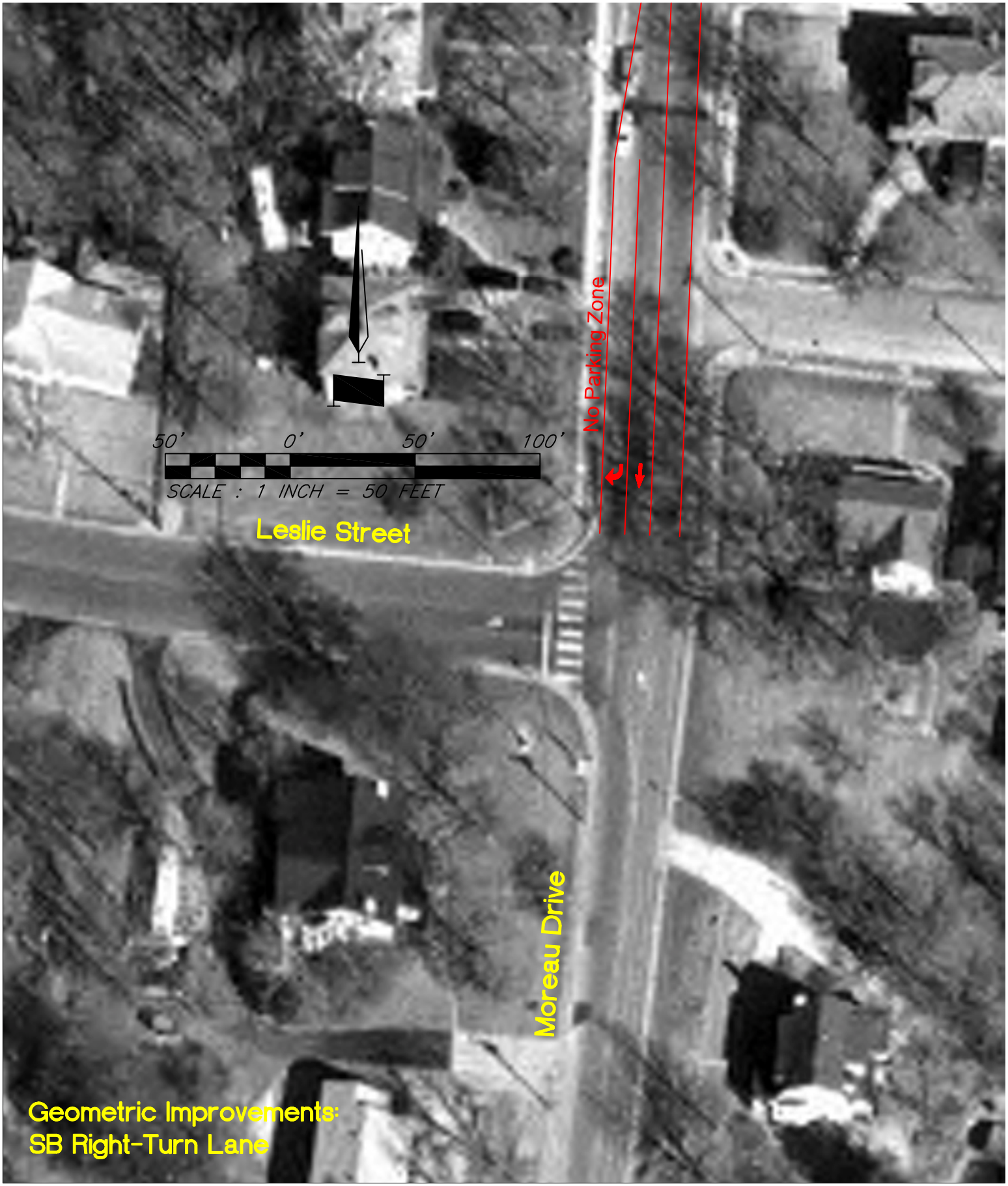
Exhibit E-1
Tanner Bridge Road and Ellis Boulevard
Recommended Geometric Improvements
(Intersection 25)



GBA GEORGE BUTLER ASSOCIATES, INC.
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Exhibit E-2
Moreau Drive and Leslie Street
Recommended Geometric Improvements
(Intersection 34)

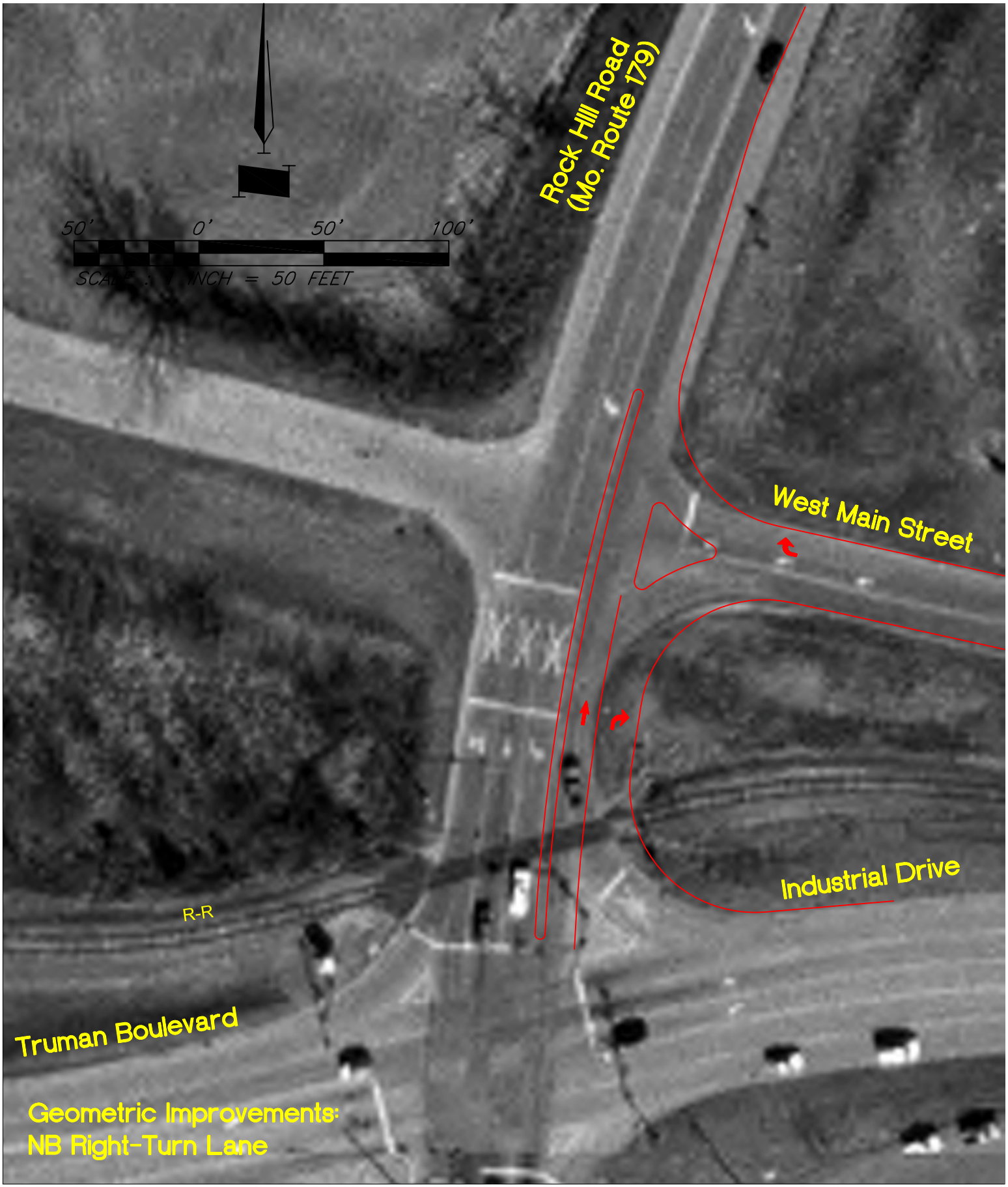

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Exhibit E-3
Rock Hill Road and West Main Street
Recommended Geometric Improvements
(Intersection 66)

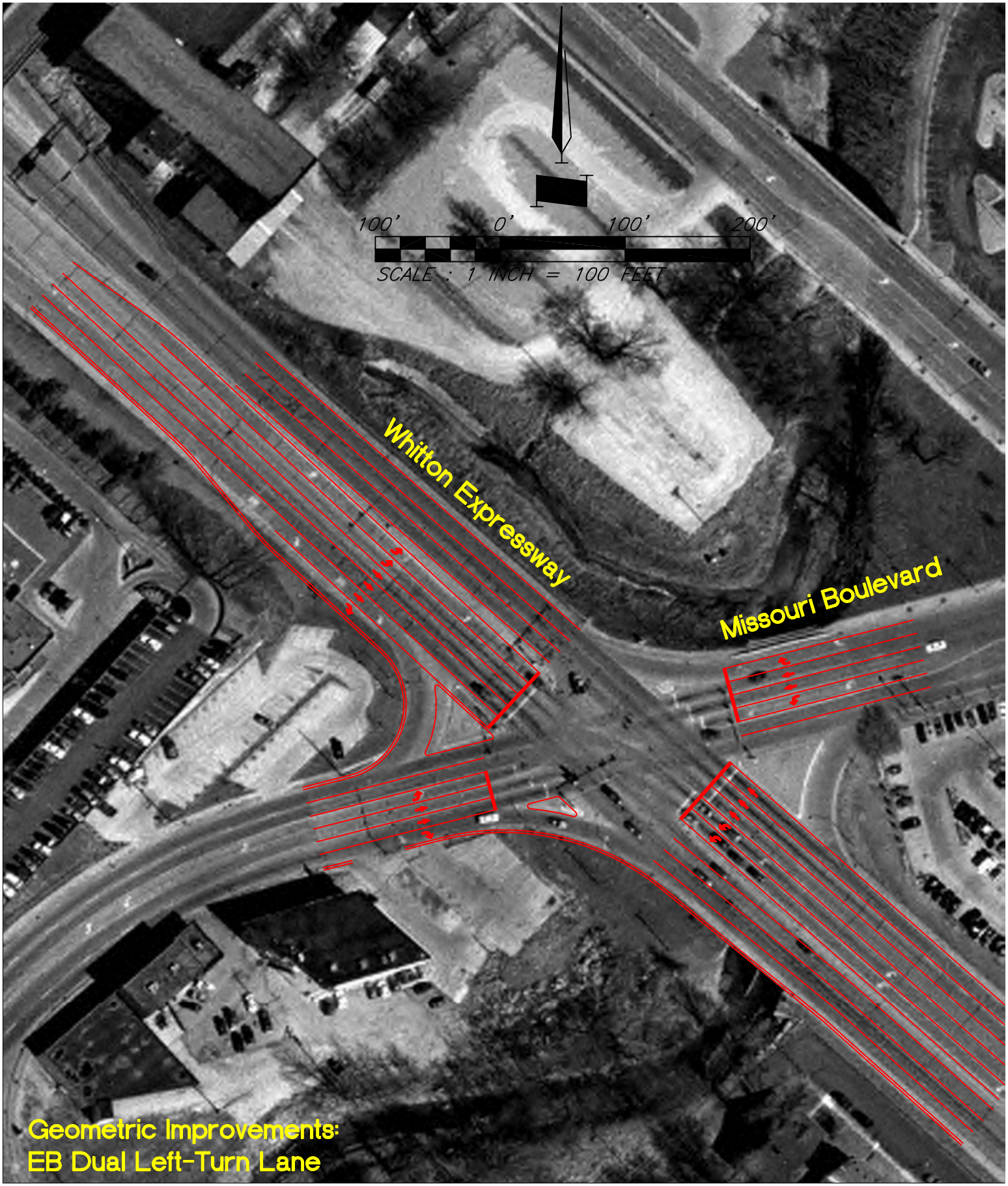

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Exhibit E-4
Missouri Boulevard and Whitton Expressway
Recommended Geometric Improvements
(Intersection 49)

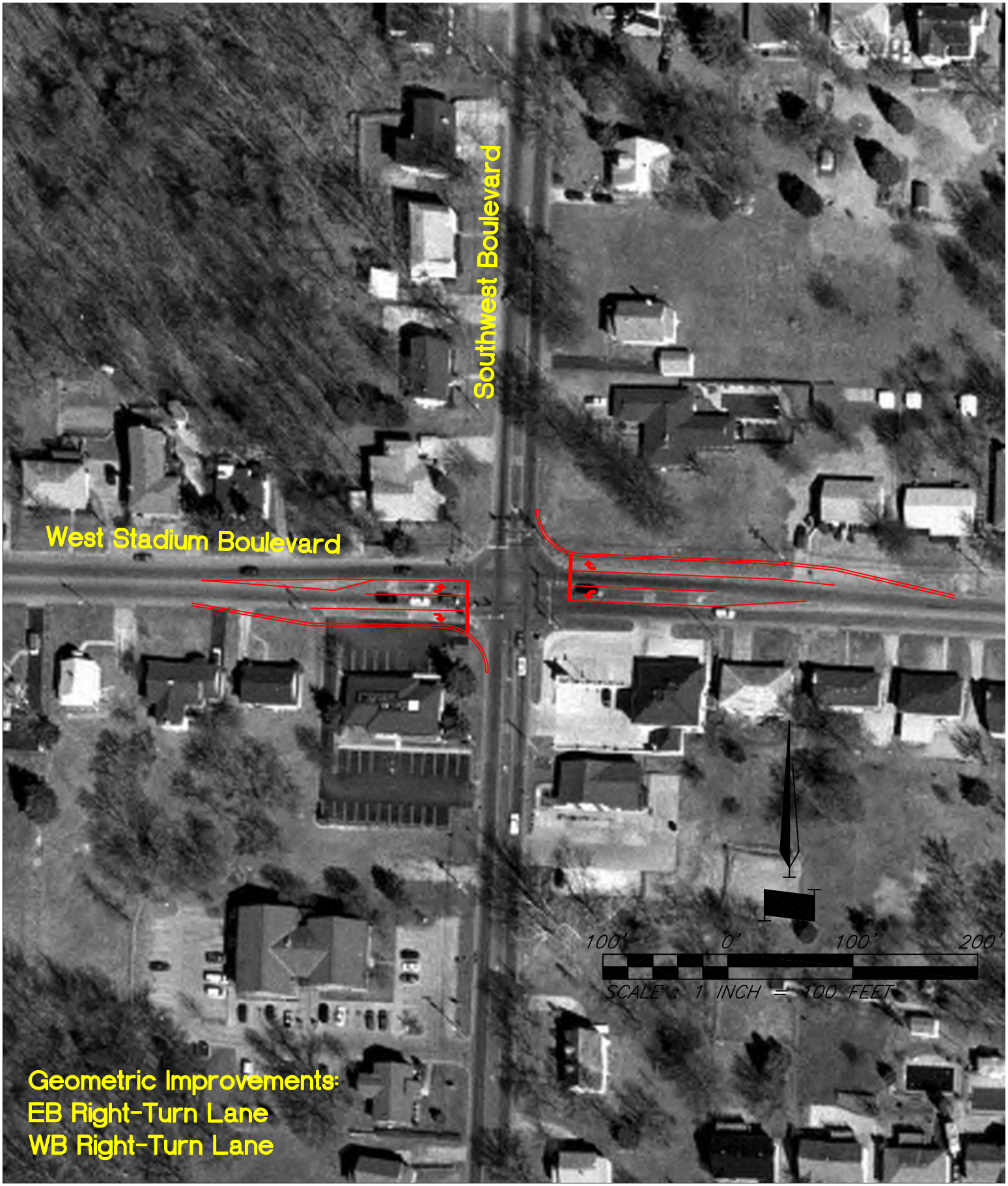

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Exhibit E-5
Southwest Blvd. and West Stadium Blvd.
Recommended Geometric Improvements
(Intersection 94)

ZONED BUT NOT BUILD (ZBNB) TRAFFIC CONDITIONS

Following is a description of the improvements that are be recommended to be completed at the intersections or along the corridor(s) that are projected to experience capacity deficiencies under Zoned-but-Not-Built traffic volumes (i.e. Short Term Growth). ***Figure 12*** details the location of the intersections that are expected to be under capacity or operating with poor levels of service in the ZBNB traffic condition. ***Table 3*** details the expected levels of services for each of the analyzed intersections and ***Table 4*** depicts the levels of service that would be expected for each of the turn movements for the unsignalized intersections. The intersections described within this section were identified by the analysis of the available turning movement counts plus the volumes determined for the ZBNB traffic model. There are more intersections identified with in this section than listed in the traffic model section as areas of concern.

With the addition of the "Zoned But Not Built" traffic volumes to the existing traffic volumes, the improvements detailed in the following paragraphs can be expected to be required to satisfy capacity concerns and are therefore recommended. Intersections that were identified as requiring signal or geometric improvements due to capacity concerns under existing traffic conditions were assumed to have had those improvements completed under the ZBNB traffic condition. Obviously, if the improvements recommended under existing conditions were not completed, the same, or slightly worse, deficient traffic operations can be expected under the ZBNB traffic scenario. The recommendations made for the existing traffic scenario and detailed previously were evaluated under ZBNB traffic conditions and verified. If the previously recommended improvements satisfy the ZBNB condition, no additional improvements are detailed in this section of the report.

Following are intersections where analyses indicated that new signal installations should be expected to be required to satisfy projected capacity deficiencies based on expected ZBNB traffic conditions. Again, please note that there is no significance to the order of the listed recommendations.

Missouri Route C and Missouri Route CC (#72)... With the addition of the ZBNB traffic volumes to the recorded existing volumes, the unsignalized capacity analyses indicated that the northbound and southbound approaches would be expected to operate with Level of Service "F" during the P.M. peak period. ***Table 3*** details the overall level of service for the intersection and ***Table 4*** details the level of service for each turn movement for an unsignalized intersection during the P.M. peak period. Due to the poor level of service, signal warrant analyses were conducted to determine if a traffic signal would be required. The signal warrant analyses indicated that the Peak Hour Warrant (Warrant 3) would be met under the ZBNB traffic volume conditions. The signalized intersection capacity analyses indicate that the overall intersection would be expected to operate with a Level of Service "B" during the P.M. peak period.

Scotts Station Road and Truman Boulevard (#80)... The unsignalized capacity analyses indicated that the northbound approach would be expected to operate with Level of Service "E" and the southbound left-turn movement currently operates with a Level of Service "F" during the A.M. and P.M. peak periods. ***Table 3*** details the overall level of service for the intersection and ***Table 4*** details the level of service for each turn movement for an unsignalized intersection during the P.M. peak period. Due to the poor level of service, signal warrant analyses were conducted to determine if a traffic signal would be required. The signal warrant analyses

indicated that the Peak Hour Warrant (Warrant 3) would be met under the ZBNB traffic volume conditions. The overall level of service would be expected to improve to a Level of Service "A" with the addition of a traffic signal at the intersection. The signal warrants should be checked periodically to determine when the traffic signal would be required.

South Country Club/Truman Boulevard and Country Club Drive (#14)... With the addition of the ZBNB traffic volumes, the overall intersection would be expected to operate with a Level of Service "E" during the P.M. peak period. Based on the capacity analyses, a northbound dual left-turn lane should be considered to improve the overall operation of the intersection. To provide enough pavement width, the exclusive Northbound right-turn lane could be eliminate. Currently, the intersection is located about 270 feet to the north of the westbound U.S. 50 off ramp intersection. ***Exhibit Z-1*** shows a possible layout of the extra turn lane. The limited distance between intersections complicate the issue of adding the additional lane. The ideal solution would require that the bridge over U.S. 50 be widened to accommodate the extra lane.

Missouri Boulevard and Missouri Route 179 (#40)... With the addition of the ZBNB traffic volumes, the overall intersection would be expected to operate with a Level of Service "E" during the P.M. peak period. Based on the capacity analyses, to improve the overall level of service a northbound dual left-turn lane, a northbound right-turn lane, a southbound right-turn lane, and a eastbound right-turn lane should be considered.

The following interchange areas continue to be expected to operate with poor levels of service due primarily to geometric layout and spacing between individual intersections. Due to the very short distances between the signalized intersections located at and near the interchanges, operations at these intersections are highly dependant upon each other, i.e. when one intersection experiences capacity problems, all other intersections within the area also experience problems.

Tri-level Interchange (U.S. 54 / U.S. 50 / U.S. 63)... The northbound off-ramp from US 54 with the Tri-level is expected to operate with a Level of Service "F"during both the A.M. and P.M. peak periods. The westbound off-ramp from US 50/63 and the Tri-level is expected to operate with a Level of Service "E" during the P.M. peak hour. Due to the nature of the Tri-level interchange, no geometric improvements can be recommended to improve the overall intersection level of service.

Missouri Route 179 and U.S. 50 Interchange... Missouri Route 179 is proposed to connect U.S. 50 to U.S. 54 within the next five years. With the new connection of Missouri Route 179 with the Eastbound and Westbound U.S. 50 ramps, Country Club Drive and Missouri Boulevard have been analyzed as independent intersections with the addition of the ZBNB traffic volumes to the intersections. The capacity analyses indicate that the overall intersections would be expected to operate with a Level of Service "D" or better during the peak periods. Due to the close proximity of the intersections, the individual intersections are more than likely to operate at a level of service worse than reported in the above individual intersection discussion. This is due to fact that the intersection vehicle queue lengths interact with each other. Therefore, the overall delays may increase because the queues may block certain movements of the intersections (i.e. the through movement blocks the right or left-turn movement.)

With the addition of the ZBNB traffic volumes, the overall intersection of Route 179 with the Westbound US 50 Ramps would be expected to operate with a Level of Service "C" during the P.M. peak period. The southbound through movement queue length at this intersection was expected to be about 700 feet. A southbound right-turn lane is recommended to help decrease the expected vehicle queue length between the ramp intersection and the intersection of Route 179 with Country Club Drive. The overall level of service would still remain LOS "C."

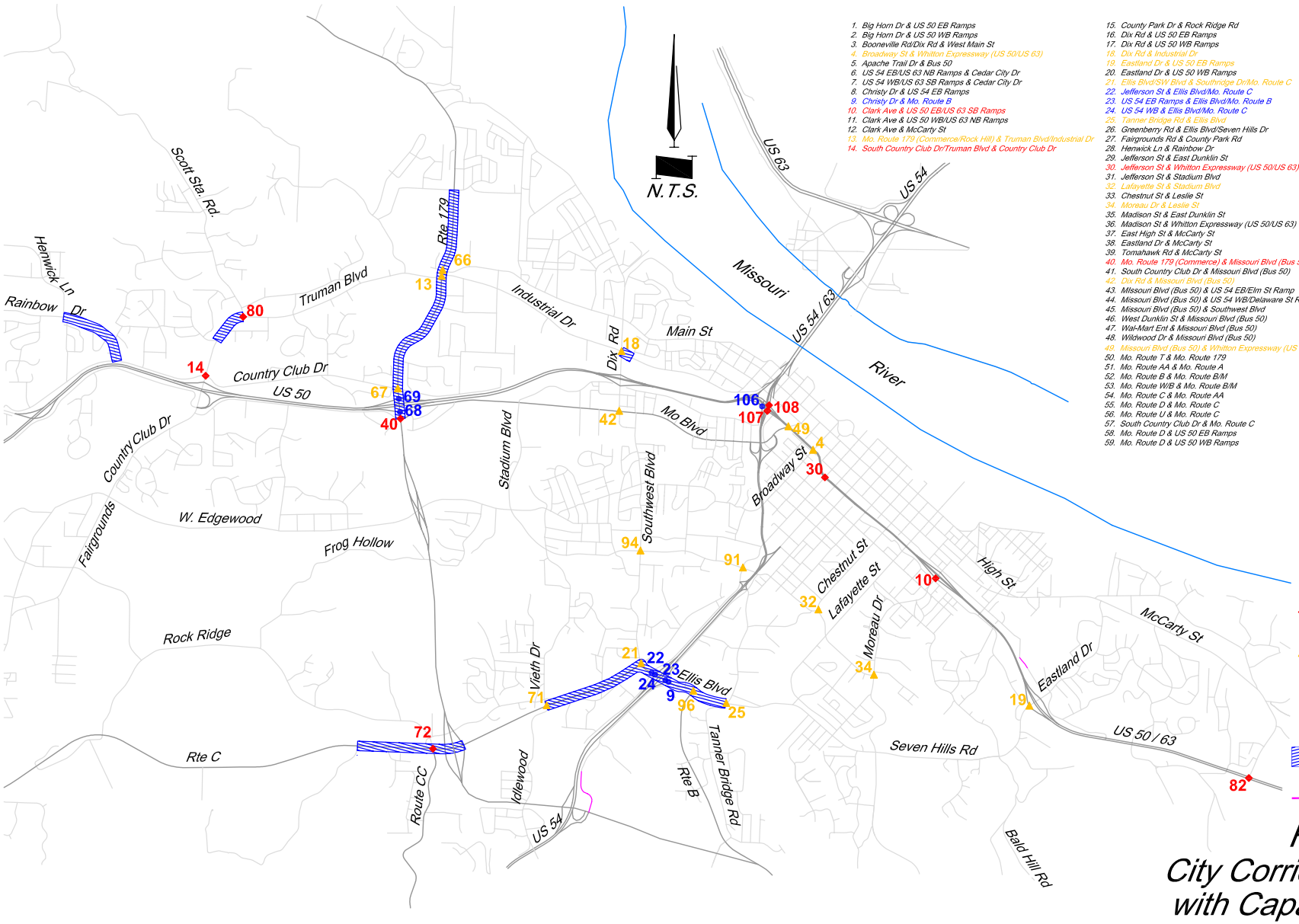
Currently, MoDOT is planning the construction of a Southbound Left-Turn lane at the intersection of Route 179 and Country Club Drive. This planned geometric improvement will positively impact the expected operations of this intersection and the overall interchange area. As such, this planned improvement should be encouraged to occur.

Missouri Route 179 and Industrial/Main Street... The traffic operations at the intersection of Route 179 with Main Street are also expected to continue to degrade with traffic growth until unacceptable operations are projected to occur. Due to the close proximity of the intersections of Main Street and Industrial Drive with Route 179, it is anticipated that left turn movements from Main Street to Route 179 will need to be prohibited in the future. Traffic desiring to turn left from Main Street to Route 179 could instead re routed to the JayCee Drive connection between Main Street and Industrial Drive, which may require some improvements to the intersection of main Street with JayCee Drive to provide needed capacity for this diverted traffic.

U.S. 54 Interchange and Ellis Boulevard... The intersections along Ellis Boulevard within the US 54 interchange area would be expected to improve with the new Missouri Route 179 connection. The intersections of the Ellis Boulevard with the Eastbound and Westbound U.S. 54 ramps, Jefferson Street, Christy Drive, and Missouri Route "C" have been analyzed as independent intersections. The capacity analyses indicate that the overall intersections would be expected to operate with a Level of Service "D" or better during the peak periods. Again, due to the close proximity of the intersections, the individual intersections are more likely to operate at a worse level of service than reported for the individual intersections.

Clark Avenue and Eastbound U.S. 50/Southbound U.S. 63 Ramps (#10) ... The unsignalized capacity analyses indicated that the eastbound left-turn movement currently operates with a Level of Service "E" during the P.M. peak commuter period. ***Table 3*** details the overall level of service for the intersection and ***Table 4*** details the level of service for each turn movement for an unsignalized intersection during the P.M. peak period. Due to the poor level of service, signal warrant analyses were conducted to determine if a traffic signal would be required. Based on the signal warrant analyses of the projected traffic volumes at this location, a traffic signal would not be expected to be warranted at this intersection.

It should be noted that MoDOT has programmed the addition of traffic signal at this location within the next 5 to 7 years. As such, it can be expected that this location will be expected to operate at an acceptable level of service after the installation of these signals.



1. Big Horn Dr & US 50 EB Ramps
2. Big Horn Dr & US 50 WB Ramps
3. Booneville Rd/Dix Rd & West Main St
4. Broadway St & Whitton Expressway (US 50/US 63)
5. Apache Trail Dr & Bus 50
6. US 54 EB/US 63 NB Ramps & Cedar City Dr
7. US 54 WB/US 63 SB Ramps & Cedar City Dr
8. Christy Dr & US 54 EB Ramps
9. Christy Dr & Mo. Route B
10. Clark Ave & US 50 EB/US 63 SB Ramps
11. Clark Ave & US 50 WB/US 63 NB Ramps
12. Clark Ave & McCarty St
13. Mo. Route 179 (Commerce/Rock Hill) & Truman Blvd/Industrial Dr
14. South Country Club Dr/Truman Blvd & Country Club Dr
15. County Park Dr & Rock Ridge Rd
16. Dix Rd & US 50 EB Ramps
17. Dix Rd & US 50 WB Ramps
18. Dix Rd & Industrial Dr
19. Eastland Dr & US 50 EB Ramps
20. Eastland Dr & US 50 WB Ramps
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22. Jefferson St & Ellis Blvd/Mo. Route C
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24. US 54 WB & Ellis Blvd/Mo. Route C
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32. Lafayette St & Stadium Blvd
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34. Moreau Dr & Leslie St
35. Madison St & East Dunklin St
36. Madison St & Whitton Expressway (US 50/US 63)
37. East High St & McCarty St
38. Eastland Dr & McCarty St
39. Tomahawk Rd & McCarty St
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42. Dix Rd & Missouri Blvd (Bus 50)
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44. Missouri Blvd (Bus 50) & US 54 WB/Delaware St Ramp
45. Missouri Blvd (Bus 50) & Southwest Blvd
46. West Dunklin St & Missouri Blvd (Bus 50)
47. Wal-Mart Ent & Missouri Blvd (Bus 50)
48. Wildwood Dr & Missouri Blvd (Bus 50)
49. Missouri Blvd (Bus 50) & Whitton Expressway (US 50/US 63)
50. Mo. Route T & Mo. Route 179
51. Mo. Route AA & Mo. Route A
52. Mo. Route B & Mo. Route B/M
53. Mo. Route W/B & Mo. Route B/M
54. Mo. Route C & Mo. Route AA
55. Mo. Route D & Mo. Route C
56. Mo. Route U & Mo. Route C
57. South Country Club Dr & Mo. Route C
58. Mo. Route D & US 50 EB Ramps
59. Mo. Route D & US 50 WB Ramps
60. Mo. Route H/E & Mo. Route E
61. Mo. Route H & Mo. Route BB
62. Mo. Route M & Mo. Route Y
63. Mo. Route T & Henwick Ln
64. Monroe St & Whitton Expressway (US 50/US 63)
65. Mo. Route 179 (Rock Hill) & Booneville Rd
66. Mo. Route 179 (Rock Hill) & West Main St
67. Mo. Route 179 (Commerce) & Country Club Dr
68. Mo. Route 179 (Commerce) & US 50 EB Ramps
69. Mo. Route 179 (Commerce) & US 50 WB Ramps
70. Mo. Route C & Bubba
71. Vieth Dr & Mo. Route C
72. Mo. Route CC/Rock Ridge Rd & Mo. Route C
73. South Country Club Dr & US 50 EB Ramps
74. South Country Club Dr & US 50 WB Ramps
75. South Country Club Dr & Fairgrounds Rd
76. South Country Club Dr & Scruggs Station Rd
76A. Scruggs Station Rd & Fairgrounds Rd
77. South Country Club Dr & West Edgewood Dr
78. Scotts Station Rd & Elston Rd
79. Bald Hill Rd & Seven Hills Rd/Eastland Dr
80. Scotts Station Rd & Truman Blvd
81. Shamrock Rd & US 50/US 63
82. City View Dr & US 50
83. Mo. Route U & US 50
84. Mo. Route 17 & US 50 EB Ramps
85. Mo. Route 17 & US 50 WB Ramps
86. Mo. Route CC & US 54
87. US 54 & Mo. Route E
88. US 54 & West Brazito Rd
89. US 54 EB/US 63 NB Ramps & West Main St
90. US 54 WB/US 63 SB Ramps & West Main St
91. Jefferson St & West Stadium Blvd
92. West Stadium Blvd & Missouri Blvd (Bus 50)
93. Saltnwood Dr & West Stadium Dr
94. Southwest Blvd & West Stadium Blvd
95. Stadium Blvd & West Edgewood Dr
96. Mo. Route B & Ellis Blvd
97. US 54 & Mo. Route D
98. Big Horn Dr & Old Lohman Rd
99. Jefferson St & Zumwalt Rd
100. US 54 WB Ramp/Industrial Dr & McCarty St
101. Eastland Dr & Elm St
102. Mo. Route AA & Scriver Rd
103. Mo. Route J & US 50 EB Ramps
104. Mo. Route J & US 50 WB Ramps
105. US 54 EB/US 63 NB Ramp & McCarty St
106. US 63 SB/US 50 EB Off-Ramp (Tri-Level)
107. US 50 EB/US 63 SB Ramp (Tri-Level)
108. US 54 EB/US 63 NB On-Ramp (Tri-Level)
109. Lafayette St & McCarty St
110. Militia Dr & US 50 WB/US 63 NB Ramp
111. Militia Dr & US 50 EB/US 63 SB Ramp
112. Rainbow Dr & Country Club Dr
113. St Louis Rd & McCarty St

LEGEND

- 4 Intersection with Deficient Level of Service
- 6 Acceptable Level of Service with Recommended Improvements
- 9 Interchange Areas with Capacity Concerns
- Corridor/Intersections with Deficient Level of Service
- New Regional Street Improvements

Figure 12
City Corridors/Intersections with Capacity Deficiencies Zoned But Not Built Traffic Conditions

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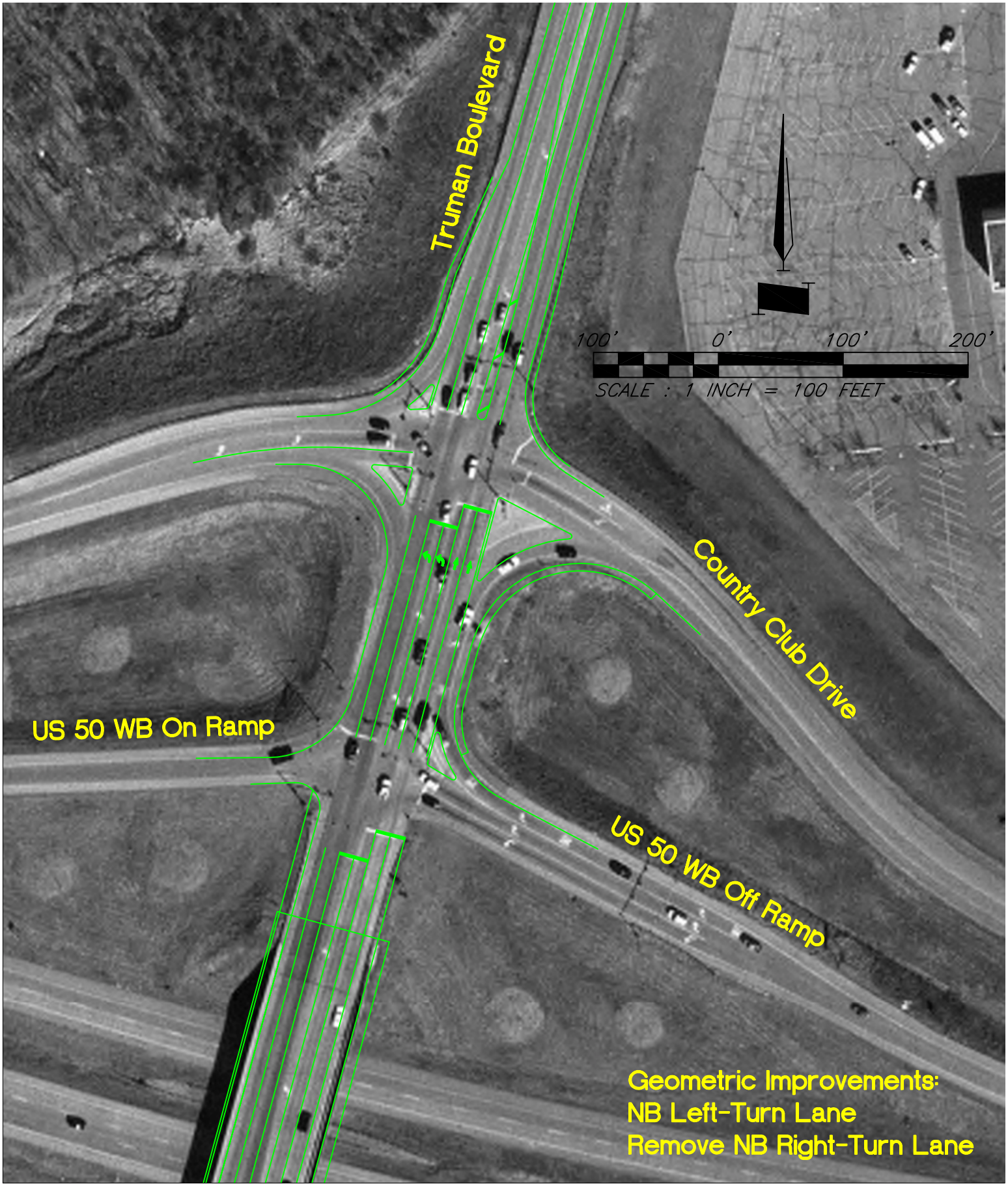

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Exhibit Z-1
Truman Boulevard and Country Club Drive
Recommended Geometric Improvements
(Intersection 14)

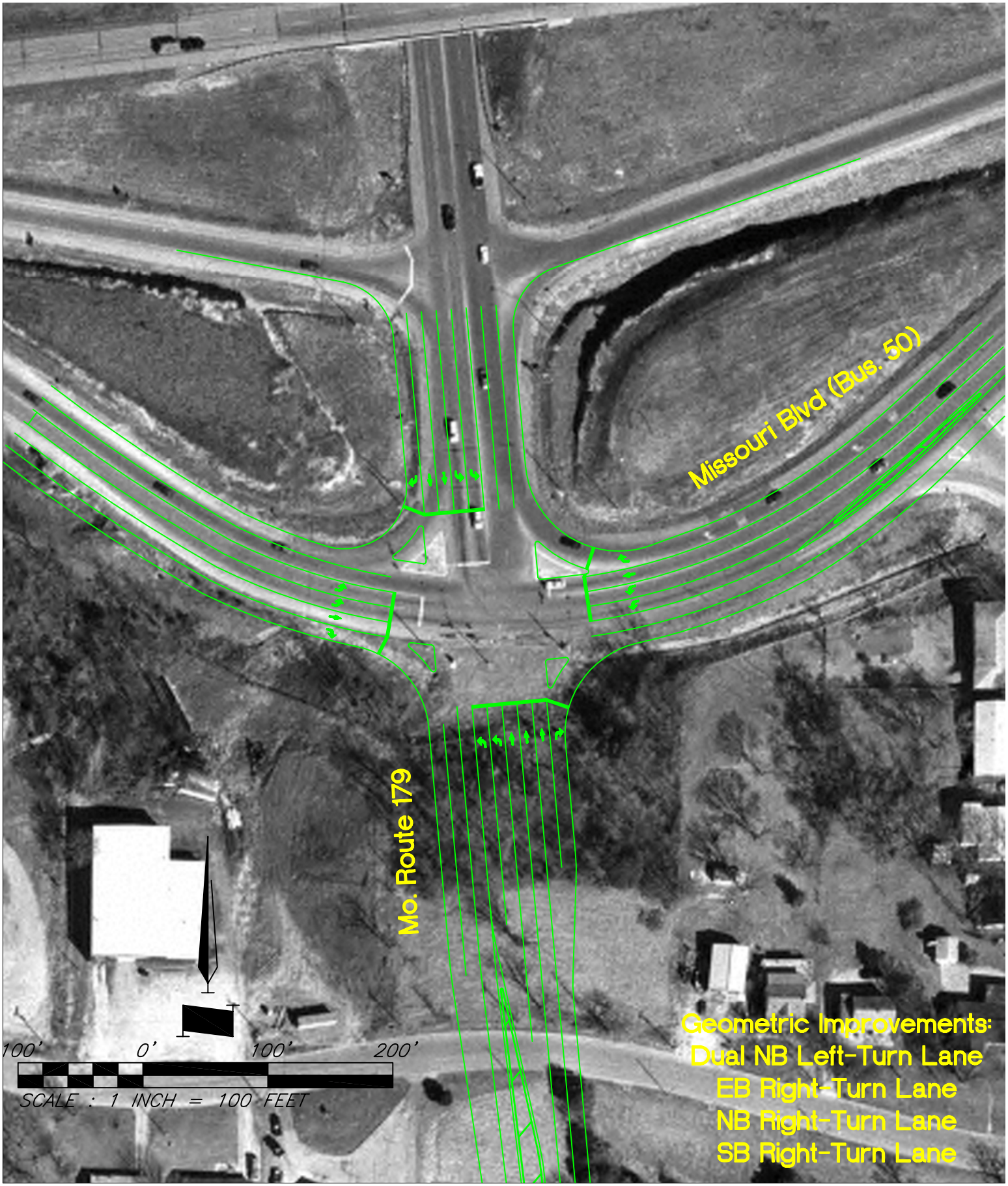

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Exhibit Z-2
Missouri Boulevard and Mo. Route 179
Recommended Geometric Improvements
(Intersection 40)

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Exhibit Z-3
U.S. 50 WB Ramps and Mo. Route 179
Recommended Geometric Improvements
(Intersection 69)

MASTER PLAN TRAFFIC CONDITIONS

Following is a description of the improvements that are be recommended to be completed at the intersections or along the corridor(s) that are projected to experience capacity deficiencies under Master Plan traffic volumes (i.e. 20-Year Growth). ***Figure 13*** details the location of the intersections that are expected to be under capacity or operating with poor levels of service in the Master Plan traffic condition. ***Table 3*** details the expected levels of services for each of the analyzed intersections and ***Table 4*** depicts the levels of service that would be expected for each of the turn movements for the unsignalized intersections. The intersections described within this section were identified by analysis of available turning movement counts plus the projected future Master Plan volumes from the traffic model. There are be more intersections identified within this section than listed in the traffic model section as areas of concern.

With the addition of the "Master Plan" traffic volumes to the existing traffic volumes, the improvements detailed in the following paragraphs can be expected to be required to satisfy capacity concerns and are therefore recommended. Intersections that were identified as requiring signal or geometric improvements due to capacity concerns under either the existing or ZBNB traffic conditions were assumed to have had those improvements completed under the Master Planned traffic condition. Again, if the improvements recommended under the existing or ZBNB traffic conditions were not completed, the same, or slightly worse, deficient traffic operations can be expected under the Master Planned traffic scenario. The recommendations made for the existing and ZBNB traffic scenarios and detailed previously were evaluated under the Master Planned traffic conditions and verified. The recommendations made for the existing and ZBNB traffic scenarios detailed previously were evaluated under Master Planned traffic conditions and verified. If the previously recommended improvements satisfy the Master Plan traffic condition, no additional improvements are detailed in this section of the report.

The analyses of the Master Planned scenario were only conducted during the P.M. peak period only because this has been identified as the critical period for the majority of the study intersections and that the traffic model only reports PM peak period volumes. Again, please note that there is no significance to the order of the listed recommendations.

Ellis Boulevard and Missouri Route C (#21)... With the addition of the Master Plan traffic volumes, the overall intersection would be expected to operate with a Level of Service "E" during the P.M. peak period. Based on the capacity analyses, to improve the overall level of service, westbound dual left-turn lanes should be considered. With the addition of the dual left-turn lanes, the overall intersection would be expected to operate with a Level of Service "C" during the P.M. peak period.

Missouri Boulevard and Missouri Route 179 (#40)... With the addition of the Master Plan traffic volumes and the ZBNB improvement recommendations, the overall intersection would be expected to operate with a Level of Service "E" during the P.M. peak period. Based on the capacity analyses, to improve the overall level of service, a southbound through lane and through lanes to the eastbound and westbound approaches should be considered. With the addition of the recommended improvements, the overall intersection would be expected to operate with a Level of Service "D" during the P.M. peak period.

Jefferson Street and West Stadium Boulevard (#91) ... With the addition of the Master Plan traffic volumes, the overall intersection wold be expected to operate with a Level of Service "E" during the P.M. peak period. Based on the capacity analyses, to improve the overall operation of the intersection, an eastbound right-turn lane should be considered. With the addition of the right-turn lane the overall level of service would be expected to improve to a Level of Service "D" during the P.M. peak period.

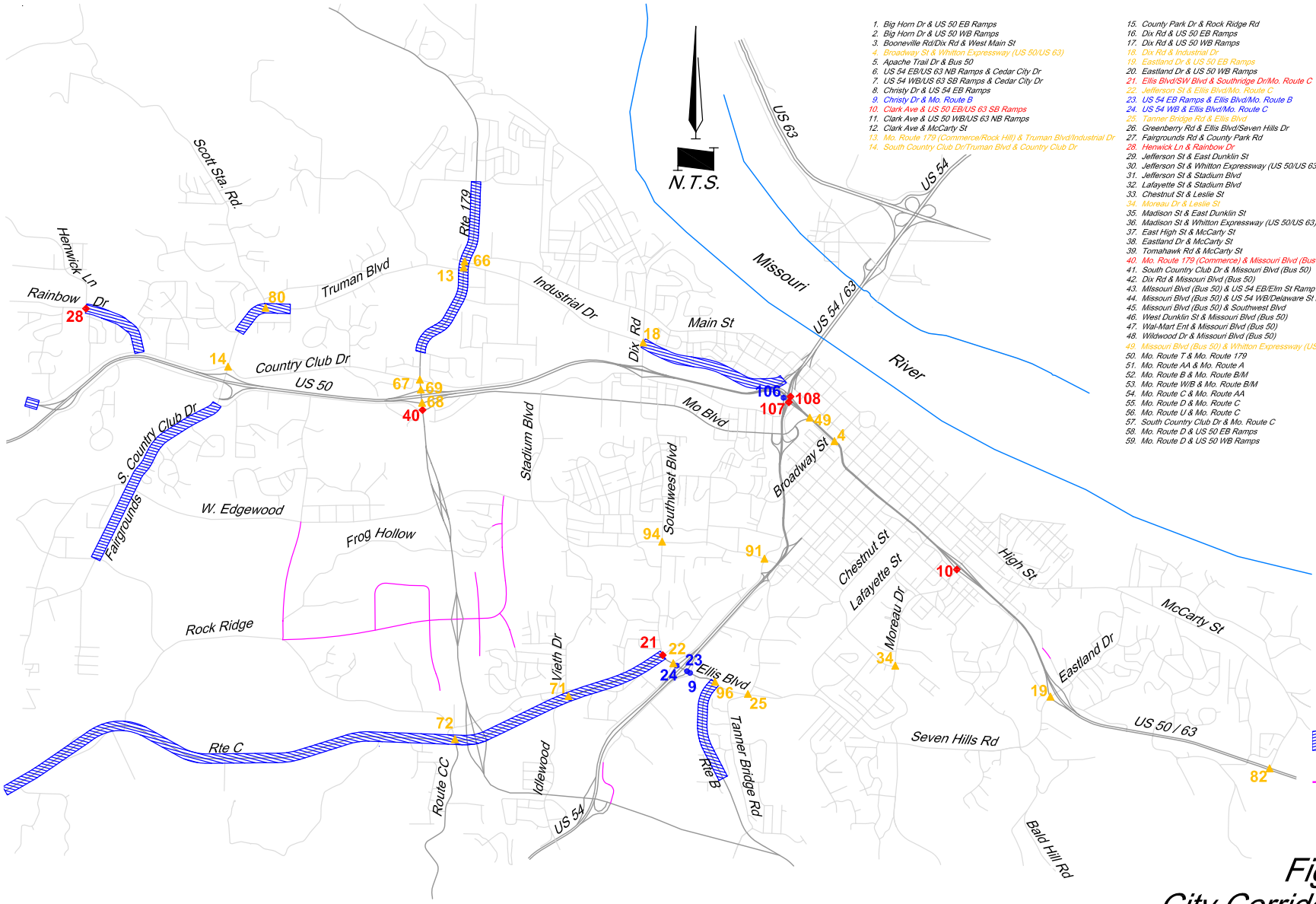
The following interchange areas are still expected to operate with poor levels of service due primarily to geometric layout and spacing between the individual intersections. Due to the very short distances between the signalized intersections located at and near the interchanges, operations at these intersections are highly dependant upon each other, i.e. when one intersection experiences capacity problems, all other intersections within the area also experience problems.

Tri-level Interchange (U.S. 54 / U.S. 50 / U.S. 63)... The northbound off-ramp from US 54 with the Tri-level is expected to operate with a Level of Service "F"during both the A.M. and P.M. peak periods. The westbound off-ramp from US 50/63 and the Tri-level is expected to operate with a Level of Service "E" during the P.M. peak hour. Due to the nature of the Tri-level interchange, no geometric improvements can be recommended to improve the overall intersection level of service.

Whitton Expressway Corridor... With the addition of the Master Plan traffic volumes and the signal timings along the corridor should be checked periodically to maintain acceptable levels of service.

Missouri Route 179 and U.S. 50 Interchange... With the new connection and the addition of the Master Plan traffic volumes the intersections of the Missouri Route 179 with the Eastbound and Westbound U.S. 50 ramps, Country Club Drive and Missouri Boulevard have been analyzed as independent intersections. The capacity analyses indicate that the overall intersections would be expected to operate with a Level of Service "D" or better during the peak periods. Due to the close proximity of the intersections, the individual intersections are more than likely operate a level of service worse than reported in the above individual intersection discussion. This is due to fact that the intersection vehicle queue lengths interact with each other. Therefore, the overall delays may increase because the queues may block certain movements of the intersections (i.e. the through movement blocks the right or left-turn movement.)

U.S. 54 Interchange and Ellis Boulevard... The intersections of the Ellis Boulevard with the Eastbound and Westbound U.S. 54 ramps, Jefferson Street, Christy Drive, and Missouri Route "C" have been analyzed as independent intersections. The capacity analyses indicate that the overall intersections would be expected to operate with a Level of Service "D" or better during the peak periods. Again, due to the close proximity of the intersections, the individual intersections are more than likely operate a level of service worse than reported in the above individual intersection discussion.



1. Big Horn Dr & US 50 EB Ramps
2. Big Horn Dr & US 50 WB Ramps
3. Booneville Rd/Dix Rd & West Main St
4. Broadway St & Whitton Expressway (US 50/US 63)
5. Apache Trail Dr & Bus 50
6. US 54 EB/US 63 NB Ramps & Cedar City Dr
7. US 54 WB/US 63 SB Ramps & Cedar City Dr
8. Christy Dr & US 54 EB Ramps
9. Christy Dr & Mo. Route B
10. Clark Ave & US 50 EB/US 63 SB Ramps
11. Clark Ave & US 50 WB/US 63 NB Ramps
12. Clark Ave & McCarty St
13. Mo. Route 179 (Commerce/Rock Hill) & Truman Blvd/Industrial Dr
14. South Country Club Dr/Truman Blvd & Country Club Dr
15. County Park Dr & Rock Ridge Rd
16. Dix Rd & US 50 EB Ramps
17. Dix Rd & US 50 WB Ramps
18. Dix Rd & Industrial Dr
19. Eastland Dr & US 50 EB Ramps
20. Eastland Dr & US 50 WB Ramps
21. Ellis Blvd/SW Blvd & Southridge Dr/Mo. Route C
22. Jefferson St & Ellis Blvd/Mo. Route C
23. US 54 EB Ramps & Ellis Blvd/Mo. Route B
24. US 54 WB & Ellis Blvd/Mo. Route C
25. Tanner Bridge Rd & Ellis Blvd
26. Greenberry Rd & Ellis Blvd/Seven Hills Dr
27. Fairgrounds Rd & County Park Rd
28. Henwick Ln & Rainbow Dr
29. Jefferson St & East Dunklin St
30. Jefferson St & Whitton Expressway (US 50/US 63)
31. Jefferson St & Stadium Blvd
32. Lafayette St & Stadium Blvd
33. Chestnut St & Leslie St
34. Moreau Dr & Leslie St
35. Madison St & East Dunklin St
36. Madison St & Whitton Expressway (US 50/US 63)
37. East High St & McCarty St
38. Eastland Dr & McCarty St
39. Tomahawk Rd & McCarty St
40. Mo. Route 179 (Commerce) & Missouri Blvd (Bus 50)
41. South Country Club Dr & Missouri Blvd (Bus 50)
42. Dix Rd & Missouri Blvd (Bus 50)
43. Missouri Blvd (Bus 50) & US 54 EB/Elm St Ramp
44. Missouri Blvd (Bus 50) & US 54 WB/Delaware St Ramp
45. Missouri Blvd (Bus 50) & Southwest Blvd
46. West Dunklin St & Missouri Blvd (Bus 50)
47. Wal-Mart Ent & Missouri Blvd (Bus 50)
48. Wildwood Dr & Missouri Blvd (Bus 50)
49. Missouri Blvd (Bus 50) & Whitton Expressway (US 50/US 63)
50. Mo. Route T & Mo. Route 179
51. Mo. Route AA & Mo. Route A
52. Mo. Route B & Mo. Route B/M
53. Mo. Route W/B & Mo. Route B/M
54. Mo. Route C & Mo. Route AA
55. Mo. Route D & Mo. Route C
56. Mo. Route U & Mo. Route C
57. South Country Club Dr & Mo. Route C
58. Mo. Route D & US 50 EB Ramps
59. Mo. Route D & US 50 WB Ramps
60. Mo. Route H/E & Mo. Route E
61. Mo. Route H & Mo. Route BB
62. Mo. Route M & Mo. Route Y
63. Mo. Route T & Henwick Ln
64. Monroe St & Whitton Expressway (US 50/US 63)
65. Mo. Route 179 (Rock Hill) & Booneville Rd
66. Mo. Route 179 (Rock Hill) & West Main St
67. Mo. Route 179 (Commerce) & Country Club Dr
68. Mo. Route 179 (Commerce) & US 50 EB Ramps
69. Mo. Route 179 (Commerce) & US 50 WB Ramps
70. Mo. Route C & Bubba
71. Vieth Dr & Mo. Route C
72. Mo. Route CC/Rock Ridge Rd & Mo. Route C
73. South Country Club Dr & US 50 EB Ramps
74. South Country Club Dr & US 50 WB Ramps
75. South Country Club Dr & Fairgrounds Rd
76. South Country Club Dr & Scruggs Station Rd
76A. Scruggs Station Rd & Fairgrounds Rd
77. South Country Club Dr & West Edgewood Dr
78. Scotts Station Rd & Elston Rd
79. Bald Hill Rd & Seven Hills Rd/Eastland Dr
80. Scotts Station Rd & Truman Blvd
81. Shamrock Rd & US 50/US 63
82. City View Dr & US 50
83. Mo. Route U & US 50
84. Mo. Route 17 & US 50 EB Ramps
85. Mo. Route 17 & US 50 WB Ramps
86. Mo. Route CC & US 54
87. US 54 & Mo. Route E
88. US 54 & West Brazilo Rd
89. US 54 EB/US 63 NB Ramps & West Main St
90. US 54 WB/US 63 SB Ramps & West Main St
91. Jefferson St & West Stadium Blvd
92. West Stadium Blvd & Missouri Blvd (Bus 50)
93. Saltnwood Dr & West Stadium Dr
94. Southwest Blvd & West Stadium Blvd
95. Stadium Blvd & West Edgewood Dr
96. Mo. Route B & Ellis Blvd
97. US 54 & Mo. Route D
98. Big Horn Dr & Old Lohman Rd
99. Jefferson St & Zumwalt Rd
100. US 54 WB Ramp/Industrial Dr & McCarty St
101. Eastland Dr & Elm St
102. Mo. Route AA & Scriver Rd
103. Mo. Route J & US 50 EB Ramps
104. Mo. Route J & US 50 WB Ramps
105. US 54 EB/US 63 NB Ramp & McCarty St
106. US 63 SB/US 50 EB Off-Ramp (Tri-Level)
107. US 50 EB/US 63 SB Ramp (Tri-Level)
108. US 54 EB/US 63 NB On-Ramp (Tri-Level)
109. Lafayette St & McCarty St
110. Militia Dr & US 50 WB/US 63 NB Ramp
111. Militia Dr & US 50 EB/US 63 SB Ramp
112. Rainbow Dr & Country Club Dr
113. St Louis Rd & McCarty St

LEGEND

- 4 Intersection with Deficient Level of Service
- 6 Acceptable Level of Service with Recommended Improvements
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- New Regional Street Improvements

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Figure 13
City Corridors/Intersections with Capacity Deficiencies
Master Plan Traffic Conditions

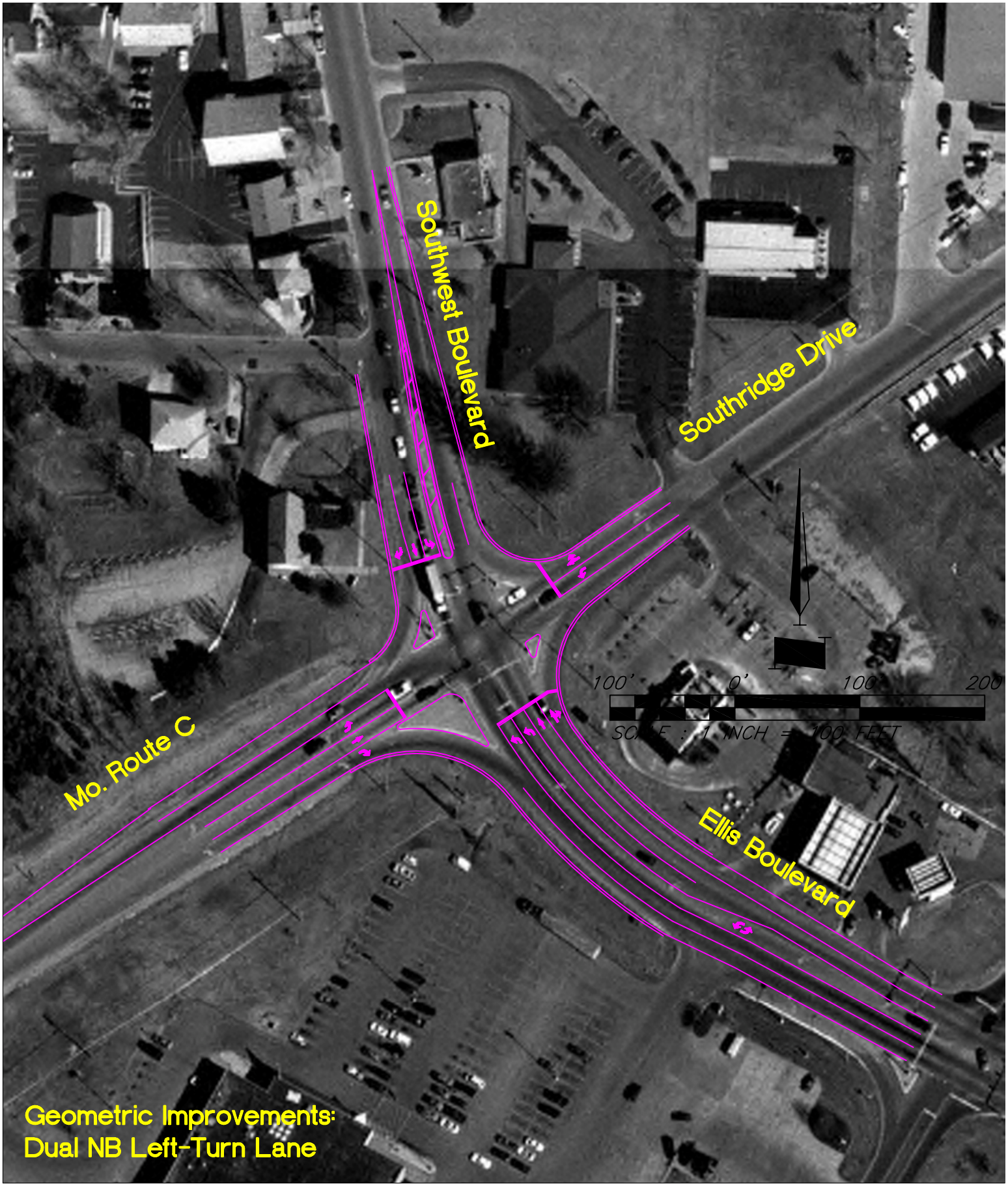

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Exhibit MP-1
Ellis Boulevard and Mo. Route C
Recommended Geometric Improvements
(Intersection 21)

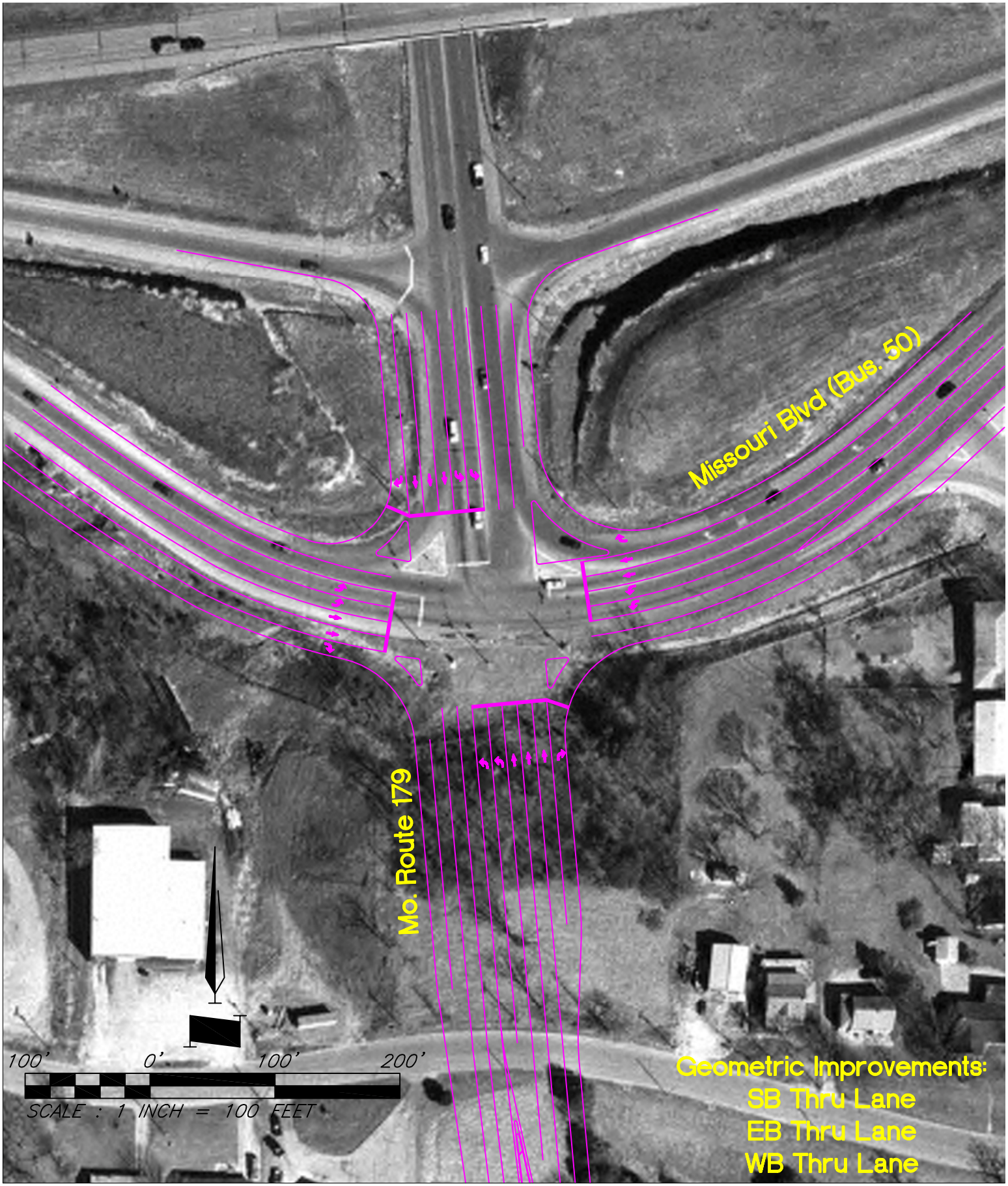

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Exhibit MP-2
Missouri Boulevard and Mo. Route 179
Recommended Geometric Improvements
(Intersection 40)

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Exhibit MP-3
W. Stadium Boulevard and Jefferson Street
Recommended Geometric Improvements
(Intersection 91)

IMPROVEMENT RECOMMENDATION SUMMARY

Based on the individual capacity analyses of the intersections described in the above sections, the following geometric and/or traffic control recommendations should be considered for implementation. The traffic signals that are noted for signal optimization should be checked periodically to determine what signal timings would be best to satisfy traffic volumes at the best operational level of service.

IMPROVEMENTS UNDER EXISTING TRAFFIC CONDITIONS

Traffic Control Improvements:

1. Lafayette Street and Stadium Boulevard
2. Tanner Bridge Road and Ellis Boulevard
3. City View Drive and U.S. Highway 50
4. Bolivar Street and McCarty Street

Traffic Signal Timing / Phasing Optimization:

1. Broadway and Whitton Expressway (U.S. Highway 50)
2. Missouri Route 179 and Truman Boulevard / Industrial Drive
3. Dix Road and Industrial Drive
4. Eastland Drive and Eastbound U.S. Highway 50 Ramps
5. Jefferson Street and Ellis Boulevard
6. Vieth Drive and Missouri Route C
7. West Stadium Boulevard and Jefferson Street
8. Monroe and Whitton Expressway
9. Missouri Route B and Ellis Boulevard

Geometric Modifications to Intersection:

1. Moreau Drive and Leslie Street
   - Southbound Right-Turn Lane

2. Missouri Route 179 and Industrial / West Main Street
   - Restrict left turns from Main Street with median on Route 179
   - Route Main Street westbound left turn traffic to JayCee Drive

3. Missouri Boulevard and Whitton Expressway (U.S. Highway 50)
   - Eastbound Dual Left-Turn Lanes

4. Southwest Boulevard and West Stadium Boulevard
   - Eastbound Right-Turn Lane
   - Westbound Right-Turn Lane

5. Dix Road and Industrial Drive
   - Northbound Right-Turn lane

ZONED-BUT-NOT-BUILT (ZBNB) IMPROVEMENTS

Traffic Signal Installation:

1. Missouri Route C and Missouri Route CC
2. Scotts Station Road and Truman Boulevard
3. Clark Street and US 50/63 Interchange Ramp

Geometric Modifications to Intersection:

1. South Country Club / Truman Boulevard and Country Club Drive
   - Northbound Dual Left-Turn Lanes

2. Missouri Boulevard and Missouri Route 179
   - Eastbound Right-Turn Lane
   - Northbound Right-Turn Lane
   - Southbound Right-Turn Lane
   - Northbound Dual Left-Turn Lanes

3. Missouri Route 179 and Westbound U.S. Highway 50 Ramps
   - Southbound Right-Turn Lane

4. Missouri Route 179 and Country Club Drive
   - Southbound Left-Turn Lane

5. Missouri Route 179 and Industrial / West Main Street
   - Restrict left turns from Main Street with median on Route 179
   - Route Main Street westbound left turn traffic to JayCee Drive

Regional Street System Improvements

1. Widen Missouri Route 179 to a 4-lane roadway between Country Club Drive and Sue Drive

MASTER PLAN IMPROVEMENTS

Geometric Modifications to Intersection:

1. Ellis Boulevard and Missouri Route C
   - Westbound Dual Left-Turn Lanes

2. Missouri Boulevard and Commerce (Missouri Route 179)
   - Eastbound Through Lane
   - Northbound Through Lane
   - Southbound Through Lane

3. Jefferson Street and West Stadium Boulevard
   - Eastbound Right-Turn Lane

Regional Street System Improvements (See Figure 13)

1. Construct an arterial street running eastward from the existing intersection of Frog Hollow Road and Rock Ridge Road to the interchange with Route 179.

2. Continue the arterial to the east of this interchange about ½ mile before turning northward to the intersection of West Edgewood Drive with Frog Hollow. Connect existing Frog Hollow into the new arterial at a location south of the West Edgewood intersection.

3. Provide connections for Frog Hollow and other local streets to the new arterial to provide local access.

4. Construct collector streets serving the large scale developments arranged around the proposed interchange of Route 179 with the new arterial were modeled to reflect expected operations of the new land use development in this area.

5. Construct a new north-south arterial type street to the northwest of Jefferson City within the County to provide better emergency service access to this region.

6. Construct the connection of E. Miller Street between Vetter Lane and Eastland Drive

7. Extend Christy Drive southward to connect with the new Missouri Route 179.

EXHIBIT A

Level of Service Definitions

Level of service criteria are outlined in the 2000 edition of the *"Highway Capacity Manual"* (HCM) for both signalized and unsignalized intersections. The HCM defines the level of service as a measure of the quality of traffic flow. There are six different levels of service for each facility type, each representing a range of operating conditions. Each level of service is designated by a letter from "A" to "F," with "A" being the most desirable condition and "F" being the least desirable condition. The level of service criteria, as reported by the 2000 HCM, for both signalized and unsignalized intersections, are listed below:

Unsignalized Intersections		**Signalized Intersections**	
Level of Service	**Average Total Delay**	**Level of Service**	**Stopped Delay per Vehicle**
A	≤ 10	A	≤ 10
B	> 10 and ≤ 15	B	> 10 and ≤ 20
C	> 15 and ≤ 25	C	> 20 and ≤ 35
D	> 25 and ≤ 35	D	> 35 and ≤ 55
E	> 35 and ≤ 50	E	> 55 and ≤ 80
F	> 50	F	> 80

APPENDIX A

Methodology for Land Use Projections

by

Parsons - Harlan Bartholomew and Associates, Inc.

COLE COUNTY / JEFFERSON CITY TRANSPORTATION STUDY

METHODOLOGY FOR LAND USE PROJECTIONS

1.0 Methodology

The methodology for the 5-year and 20-year land use projections for Cole County entailed a series of analytical exercises to arrive at seemingly rational and realistic projections for residential housing units, including unit mix; square footage of office space; and square footage of commercial and industrial space. Factors considered during the process of land use projections included the following:

- Zoning Ordinance and Comprehensive Plan Update for Jefferson City.
- Population trends, 1980-2000
- Residential building permit trends.
- Current projects approved for construction, or under construction.
- Ratio of commercial and industrial space to residential development/population.
- Current growth areas in the city and county.
- Current and/or future availability of infrastructure (water, sanitary sewers).
- Roadway improvements underway/planned.
- Area anticipated to be most subject to annexation by Jefferson City in the future.
- Physical features impacting future development, including topography and floodplains.

The basic premise used for the projections was current and past trends in building permits issued for residential units, including housing unit mix; and the current square footage of office, commercial and industrial space extrapolated into the future based upon population.

1.1. Zoning Ordinance and Comprehensive Plan Update

Jefferson City's Zoning Ordinance (December, 1998) and Comprehensive Plan Update (March, 1996) were utilized as the basic parameters for the land use projections for Jefferson City, and for individual Transportation Analysis Zones (TAZ). However, these planning tools were unavailable for unincorporated Cole County as the county has no zoning ordinance and comprehensive land use plan in effect. The absence of these parameters for land use planning purposes presented a lesser degree of confidence in the projections for individual TAZ for unincorporated Cole County. Consequently, in effect, a general future land use plan was indirectly prepared during the process of the land use projections for the unincorporated portion of Cole County. Existing zoning and the land

use plan were major factors in projecting future development within Jefferson City, especially in regard to type and density of residential development. Existing zoning in combination with remaining development capacity were used in projecting additional potential development.

1.2 Population Trends

Population trends were analyzed for Cole County and Jefferson City for the 1980-2000 time period. The annualized population growth rate during this time period was slightly greater than 1%, or an overall 10-year growth rate approximating 12%. This same growth rate was used for population projections for the year 2005 and year 2020 as it was assumed that this low to moderate growth rate would continue into the future.

The relative share of the total county population residing in Jefferson City has decreased from approximately 60% in 1980 to 55% in 2000. It is anticipated that Jefferson City's relative share of the total county population will continue to decrease in the future with the continued extension and provision of infrastructure, and the availability of developable land. This implies that future housing demand will be greater in Cole County outside the Jefferson City Limits.

Table 1.1 Population Trends, Cole County and Jefferson City, 1980-2000

Jurisdiction	% Change 1990-2000	2000	% Change 1980-1990	1990	1980
Cole County	12.3	71,397	12.2	63,579	56,663
Jefferson City	11.6	39,636	5.6	35,494	33,618

Source: U.S. Census Bureau, Population and Housing, 2000, 1990, 1980.

1.3 Residential Building Permit Trends

Residential building permit trends (1991-2000) for Cole County and Jefferson City were an important element in the land use projections. Cole County GIS provided a graphic view of the location and distribution of permits issued for the above 10-year period within Cole County exclusive of Jefferson City. The TAZ (Transportation Analysis Zone) map was overlaid on the GIS map to provide a view of the distribution of permits issued by TAZ. This GIS database was not available for Jefferson City. Table 1.2 in Section 2.1 portrays the annual issuance of residential building permits (housing units) for Cole County and Jefferson City.

1.4 Projects Approved/Under Construction

Residential, office, commercial and industrial development projects currently underway, approved for construction, or planned, were identified through consultation with the Jefferson City Planning/Zoning Department, and Cole County personnel. These projects

were added to the existing inventory of housing units and office/commercial/industrial space, and included in the 5-year projections.

1.5 Ratio of Commercial/Industrial Space to Population and Employment

It is difficult to project commercial and industrial space growth over a period of time because of the many variables and factors involved in such growth. The most common method of projection for these types of land uses is that of correlating such growth with population and employment growth. Thus, for example, if there is a 10% increase in population or employment over a 10-year period, the commercial and industrial growth rate would be approximately commensurate with population growth.

Considering the past and projected population and employment growth rates for Cole County, an annual average growth rate of 1 – 1 ½ % was applied for projecting future commercial and industrial development. This growth rate approximates the average annual projected population by the Missouri Census Data Center, and the employment growth rates for Cole County/Jefferson City as projected by the Missouri Department of Economic Development, Division of Workforce Development.

1.6 Current Growth Areas

The areas within Cole County, including Jefferson City, currently experiencing the most growth were identified and subsequently targeted for additional growth. These areas are primarily in the western, northern and southern ends of Jefferson City and adjoining areas in unincorporated Cole County. Several outlying areas in Cole County were also identified as future growth areas, including the communities of Wardsville, Taos and St. Martins. These growth areas, with some exceptions, generally have several common denominators, including accessibility to supporting infrastructure (e.g. roads, water, sewers) and services, and future development capacity.

1.7 Current/Future Availability of Infrastructure

Existing and future expansion of supportive infrastructure (i.e. water, sewers) was considered in the projections for future growth. Those areas within the sewer districts, or in areas with proposed sewers, were assumed to have greater growth potential. Examples include the areas immediately adjacent to the Jefferson City Limits in Cole County, and Wardsville where a bond issue for sewers has been approved by voters.

1.8 Roadway Improvements

Major roadway improvements under construction, funded for construction, or proposed, were considered a major contributing factor for future growth of adjacent areas served by these roadways. Examples include the extension of Highway 179, Edgewood Drive and Wildwood Drive. Consequently, the TAZ in these areas were identified as areas for future growth, including both residential and commercial/office development.

1.9 Future City Annexation Areas

Areas which have been identified by Jefferson City as potential future annexation areas were given special consideration in developing the projections. These areas were considered to be more subject to future development because of various factors, including current growth; infrastructure availability (roads, water, sewers); and accessibility; and development capacity.

1.10 Physical Features Impacting Future Development

The primary natural features which were considered in affecting or limiting future development potential were severe topography and the 100-year floodplain. Areas with steep slopes were identified and considered as areas with less dense development potential (i.e. housing units per acre), while the 100-year floodplains were not considered as areas for urban development.

2.0 Projections

Five-year and 20-year projections for residential, office, commercial and industrial development were completed through a process of analysis based on a hierarchy of geographic areas, beginning with the largest geographic area (Cole County) and progressing downward to the smallest area (TAZ). This hierarchy consisted of Cole County, including Jefferson City➔geographic sectors ➔ sector sub-areas ➔ rural Cole County➔Transportation Analysis Zones. The geographic sectors consisted of (a) Jefferson City, (b) South/Southwest City and County, (c) North/Northwest City and County, and (d) East/Southeast City and County.

Overall projections were completed initially for Cole County/Jefferson City for the 5-year and 20-year time horizons. The second step involved distributing the projected housing units and office/commercial/industrial space among the above identified sectors. This distribution was based on a number of factors, including past and current development trends; availability and future expansion of infrastructure; development capacity; planned roadway improvements; and natural limitations for development, including topography and floodplains. The third step involved allocation of a portion of the projections to the rural and less developed areas of Cole County. The fourth step included distributing the sector projections between the sector sub-areas. The final step involved allocating the sector and sub-area projections among the individual TAZ within each sector/sub-area. Thus, the procedure for the projections is analogous to that of a taking a whole pie and subsequently breaking it down into a series of smaller pieces (units) for distribution of the whole.

2.1 Residential Projections

An inventory of existing residential dwelling units was conducted through an analysis of parcel/building records of the Cole County Assessor Office. Dwelling units were sorted

and identified by TAZ. The dwelling units were identified by type of unit. (e.g. single-family, multiple-family, apartment).

Residential building permits for Cole County/Jefferson City were inventoried for the 1991-2000 period. Table 1.2 portrays the annual number of building permits issued for residential construction in Cole County and Jefferson City during this period.

Table 1.2 Residential Building Permits Issued Annually (Housing Units), 1991-2000

	Cole County		Jefferson City	
Year	**Single-FamilyUnits[1]**	**Multiple-Family Units**	**Single-Family Units**	**Multiple-Family Units**
1991	175	25 (est.)	127	33
1992	258	28 (est.)	126	16
1993	219	63 (est.)	163	27
1994	250	109 (est.)	178	11
1995	246	126	126	10
1996	280	112	136	110
1997	256	82	145	127
1998	217	50	147	68
1999	197	46	156	45
2000	175	106	132	19
Total	**2,273**	**747**	**1,436**	**466**
Annual Average	**227**	**75**	**144**	**47**

[1] Includes mobile homes.
*Source: Cole County Public Works; Jefferson City Building Regulations Division***.**

As reflected in Table 1.2, building permits were issued for an annual average of 493 housing units, or a median of 470 units, in Cole County and Jefferson City during the 1991-2000 period. The dwelling unit mix consisted of 75% single-family and 25% multiple-family. Approximately 60% of the new dwelling units during this period were constructed in Cole County outside of the Jefferson City Limits.

Applying the above annual average number of permits (493) and the median number of permits (470), results in a projected additional 9,860 and 9,400 dwelling units respectively for the year 2020. A compromise of approximately 9,600 units (480 units year) was used as the projected number of new additional housing units for the year 2020. A slightly higher annual value (500 units) was used for the 5-year projections considering the number of housing units currently under construction, approved for construction, or planned but not approved for construction.

For projection purposes, based upon current trends, development capacities, etc., it was assumed that approximately 70% of the new housing units would be developed in Cole County outside of the Jefferson City Limits. This compares to 60% for the 1991-2000 period. Dwelling unit mix was assumed to be 80% single-family/20% multiple-family for Cole County outside of Jefferson City, and 70% single-family/30% multiple-family

within Jefferson City. The South and West areas of Jefferson City and adjacent Cole County was projected to have the highest growth rate for the 2000-2020 period, with approximately one-third of the projected 9,600 new housing units developed within this area.

Cole County Assessor property database indicates a total of 30,798 housing units in Cole County, including Jefferson City, in the year 2000, with 75% of these units being single-family dwellings, which includes mobile homes. Based upon the above projection methodology and assumptions, the 5-year and 20-year projections indicate an additional 2,500 and 9,600 housing units respectively with the year 2000 serving as the base year.

2.2 Office Space Projections

An inventory of existing office space (square feet) was conducted through an analysis of parcel/building records of the Cole County Assessor Office. Parcel/building record files were sorted and identified by TAZ. The square footage of each office building was subsequently identified through a manual inventory of the individual parcel/building records. Major tax exempt office buildings (e.g. State of Missouri, school district, etc.) were identified by TAZ with square footage information obtained from the respective public entity. In some instances, a field survey was conducted to obtain a building measurement.

Office space projections, as with commercial/industrial space projections, are based primarily on population growth. Thus, new office space was assumed to develop at an annual 1 – 1 ½% rate. However, considering the current magnitude of occupancy of office space by the State government, future office development in Cole County will be greatly influenced by the State's demand for additional office space and policies regarding the distribution and location of such space. (i.e. Jefferson City/Cole County, or elsewhere)

2.3 Commercial Space Projections

An inventory of existing commercial space (square feet) was conducted through an analysis of parcel/building records of the Cole County Assessor Office. Parcel/building record files were sorted and identified by TAZ. The square footage of each commercial establishment, including restaurants as a separate category, was subsequently identified through a manual inventory of the individual parcel/building records. Commercial projects currently under construction, approved for construction, or proposed were also inventoried and included in the projections.

Commercial space projections are also based on an estimated future growth rate of 1 –1 ½% reflective of the projected population and employment growth rates. Large-scale planned projects were given special consideration in all of the projections. An example of such is the development of the new State prison site in eastern Cole County, and the redevelopment of the existing prison site into a mixed-use development. Proposed square

feet of office, commercial and other space in these developments were considered and included in future projections of such space.

2.4 Industrial Space Projections

An inventory of existing industrial space (square feet) was conducted through an analysis of parcel/building records of the Cole County Assessor Office. Parcel/building record files were sorted and identified by TAZ. The square footage of each industrial establishment was subsequently identified through a manual inventory of the individual parcel/building records.

Industrial space projections were also based on population growth and employment projections. An annual population growth of 1-1 ½ % and employment growth of 1 ½% was assumed for projection purposes. This annual population growth rate is based on past trends, with the employment growth rate also based on past trends and on projections by the State of Missouri Department of Economic Development.

Industrial zoned parcels in Jefferson City were identified and analyzed for future remaining development capacity. The major industrial parks, including Algoa Industrial Park and the Capital City Industrial Park, were also analyzed regarding remaining development capacity. All of the projected growth in industrial space is expected to occur within the currently industrial zoned areas and industrial parks since there is more than sufficient capacity to accommodate future industrial growth demand.

APPENDIX B

Application
of the
Cole County and Jefferson City Traffic Model
(CCJCTM)

Application of the Traffic Model (CCJCTM) **APPENDIX B**

The County and City anticipates that the Traffic Model (CCJCTM) will be used in conjunction with the Comprehensive Land Use Plan as the basis for determining acceptable development densities and types that can be supported by the existing and planned infrastructure. Once the results of the CCJCTM are integrated with the Comprehensive Plan, and the resultant traffic conditions are projected, City officials will be able to review future development plans, as compared with the levels of traffic generation contained within the CCJCTM. If development traffic generation is equal to of less than that depicted for a specific site within the CCJCTM, or as provided for in the Comprehensive Plan, no area wide or regional traffic studies would be required. Traffic studies would be limited to those issues directly related to site improvements and geometric configurations. For this condition, the CCJCTM will be available for establishing "background " traffic projections to be used for site specific traffic impact studies.

Procedure for Developing Future Traffic Projections Utilizing the CCJCTM

The recommended method to develop traffic projections from the CCJCTM is basically to determine the incremental change in traffic volumes between the calibrated model and the future projections models. The additional traffic volumes reported by the models is added to existing traffic volumes recorded to produce projections of future traffic volumes.

<u>Methodology</u>

1. Create a project directory for the current analysis and copy the following file into this directory;
   "Land Use O&D (current year)".xls

2. Determine the zone(s) covered by the proposed development and set them up as select zones. NOTE: Traffic to/from these zones will be assigned by hand.

3. Modify the land use assumptions for the required zone(s) by deleting all land uses noted for these zones - i.e. zero out the land uses for this zone in the spreadsheet.

4. Starting at the Land Use Data tab, calculate and/or sort the data on the individual tabs as you progress through the spreadsheet to the right. ***Remember - DO NOT MISS ANY OF THE CALCULATE/SORT BUTTONS ON ANY OF THE TABBED SHEETS!!!***

5. Export the existing and 20 year future "origin and destination" input files for use in TModel to the project directory [ex(year).ond and mp(year).ond]. Note, the files can be named however you'd like as long as they have less than 8 characters prior to the (.) and end with(ond).

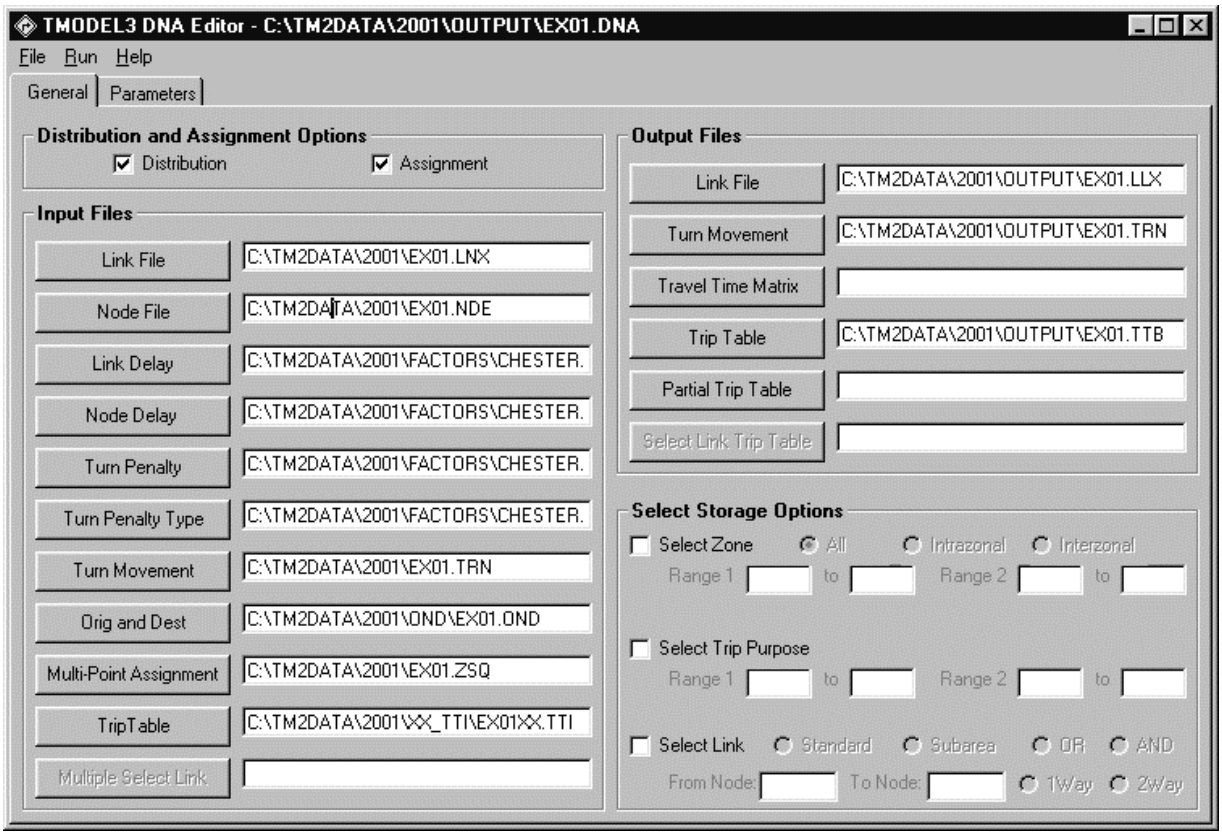
6. Create a blank turning movement file containing all intersections (i.e. nodes) to be analyzed as part of the study (i.e. PZ2021in.trn)

7. Run the existing and 20 year future model using the TM3dna module with the origin and destination files specified in (5) above and the turning movement file created in (6) above. A minimum of two assignment runs are necessary to complete the traffic study, one for existing conditions and one for the 20 year projected condition. *(NOTE - you can run a future 5 year analyses if desired by using the zbnb(year).* files - the remaining steps are the same as follows.)*

8. The following traffic model input files must be loaded into the TM3dna.exe module for each of the model runs.

<u>Existing Model Network Files</u>

EX(year).lnk	-	link file
EX(year).nde	-	node file
EX(year)XX.tti	-	through trip table
Ex(year).zsq	-	multi-point assignment file
EX(year).ond	-	origin and destination file created in step (5) above
Ccjc.ndc	-	node delay coefficients
Ccjc.ldc	-	link delay coefficients
Ccjc.tnp	-	turn penalties
Ccjc.tpt	-	turn penalty types
(proj).trn	-	input turn movement file created in step (6) above



Output files must be created and pathed for each of the model runs as well. These files should be saved in the created project directory. Wherever the files are saved, it is recommended that they are kept separate from the input files and from output files from other projects.

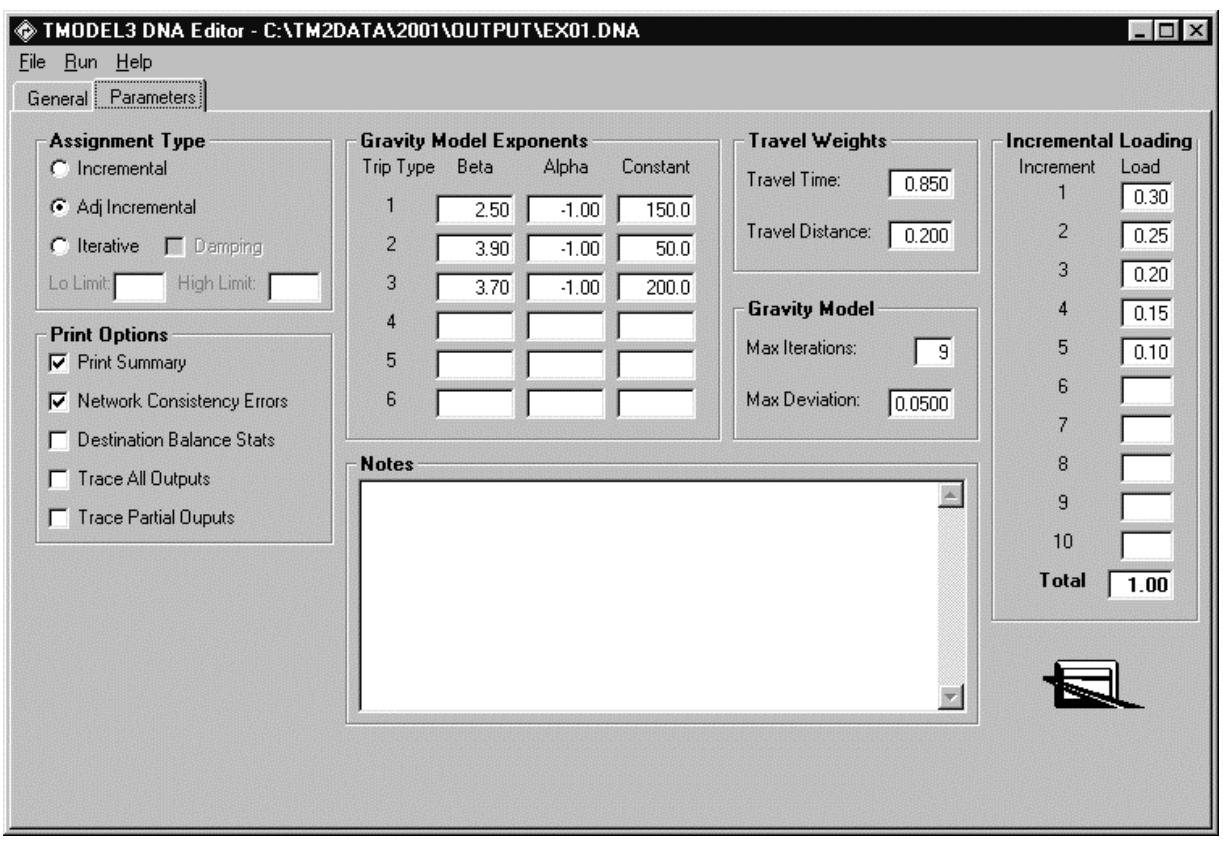
NOTE: *Remember to name the output turning movement file differently from the input file - this is the one type of file that TModel uses the same extension for both the input as well as the output.*

Similarly, future model runs have the following input file requirements;

<u>Future Model Network Files</u>

mp(year).lnk	-	link file
mp(year).nde	-	node file
mp(year)xx.tti	-	through trip table
mp(year).zsq	-	multi-point assignment file
mp(year).ond	-	origin and destination file created in step (5) above
Ccjc.ndc	-	node delay coefficients
Ccjc.ldc	-	link delay coefficients
Ccjc.tnp	-	turn penalties
Ccjc.tpt	-	turn penalty types
(proj).trn	-	input turn movement file created in step (6) above

9. The run parameters shown on the following screen capture from the **Parameter** tab of the "TM3dna.exe" program should always be used for the model runs.



Warning - Modification of any of these values changes the parameters of the calibration and make any resulting model runs suspect and therefore invalid

10. Run the model(s) to determine the expected background traffic volumes without the proposed development. Print out the turning movement output files created by TM3dna for each of the runs completed.

11. Subtract the turning movement file from the "Existing" model run from the turning movement file from the "Future" model run. The remainder of these turning movement volumes are the additional background traffic volumes that would be expected at the study intersections due to city and regional growth.

12. Add the resultant of the subtracted model volumes from step (11) to the manually recorded turning movements at the study intersections to determine the expected future background traffic volumes (i.e. future intersection traffic volumes without site development traffic).

    Please note: At times the subtracted turning movements may show a reduction in traffic as compared to existing (i.e. a negative remainder in step 11), or a very large increase. Good judgement must be used when adding the resultant of step (11) to the recorded existing volumes. One rule of thumb is to ignore negative projections (i.e. leave existing recorded volumes same). Another is to review very large increases logically before adding (i.e. is there a change in land use or road network that could be expected to cause such a major change in volumes). If the answer is yes, add the predicted turning movement. If the answer is no or unknown, add a reasonable portion of the predicted volume to the existing recorded volume. *FYI - determining the appropriate action when these situations occur is the hardest part of any traffic assignment with any traffic model.*

13. Determine the total expected trips for the development(s) within the selected zone(s) and assign by hand these trips to the study intersections. Add the site generated traffic projections to the traffic volumes determined in step (12) to determine the expected total future traffic volumes.

14. The addition of the existing recorded traffic volumes, the growth in background traffic determined by the model, and the hand assigned site generated traffic results in the total future traffic volumes that should be used in any analyses or evaluation of potential site impacts.

Recommended File and Directory Structure

There are three sets of standard Traffic Model (CCJCTM) network input files - one set for the existing year, one set for the short term or Zoned But Not Built condition (approx. 5 years in future), and a final set for future conditions (20 or 40 years in future). These files are as follows:

Existing Model Network Files

EX(year).lnk	-	link file
EX(year).nde	-	node file
EX(year)XX.tti(1)	-	through trip table
EX(year).zsq	-	multi-point assignment file
EX(year).ond	-	origin and destination file created from Land Use spreadsheet
Chester.ndc(2)	-	node delay coefficients
Ccjc.ldc(2)	-	link delay coefficients
Ccjc.tnp(2)	-	turn penalties
Ccjc.tpt(2)	-	turn penalty types

ZBNB Model Network Files

zb(year).lnk	-	link file
zb(year).nde	-	node file
zb(year)XX.tti(1)	-	through trip table
zb(year).zsq	-	multi-point assignment file
zb(year).ond	-	origin and destination file created from Land Use spreadsheet
Ccjc.ndc(2)	-	node delay coefficients
Ccjc.ldc(2)	-	link delay coefficients
Ccjc.tnp(2)	-	turn penalties
Ccjc.tpt(2)	-	turn penalty types

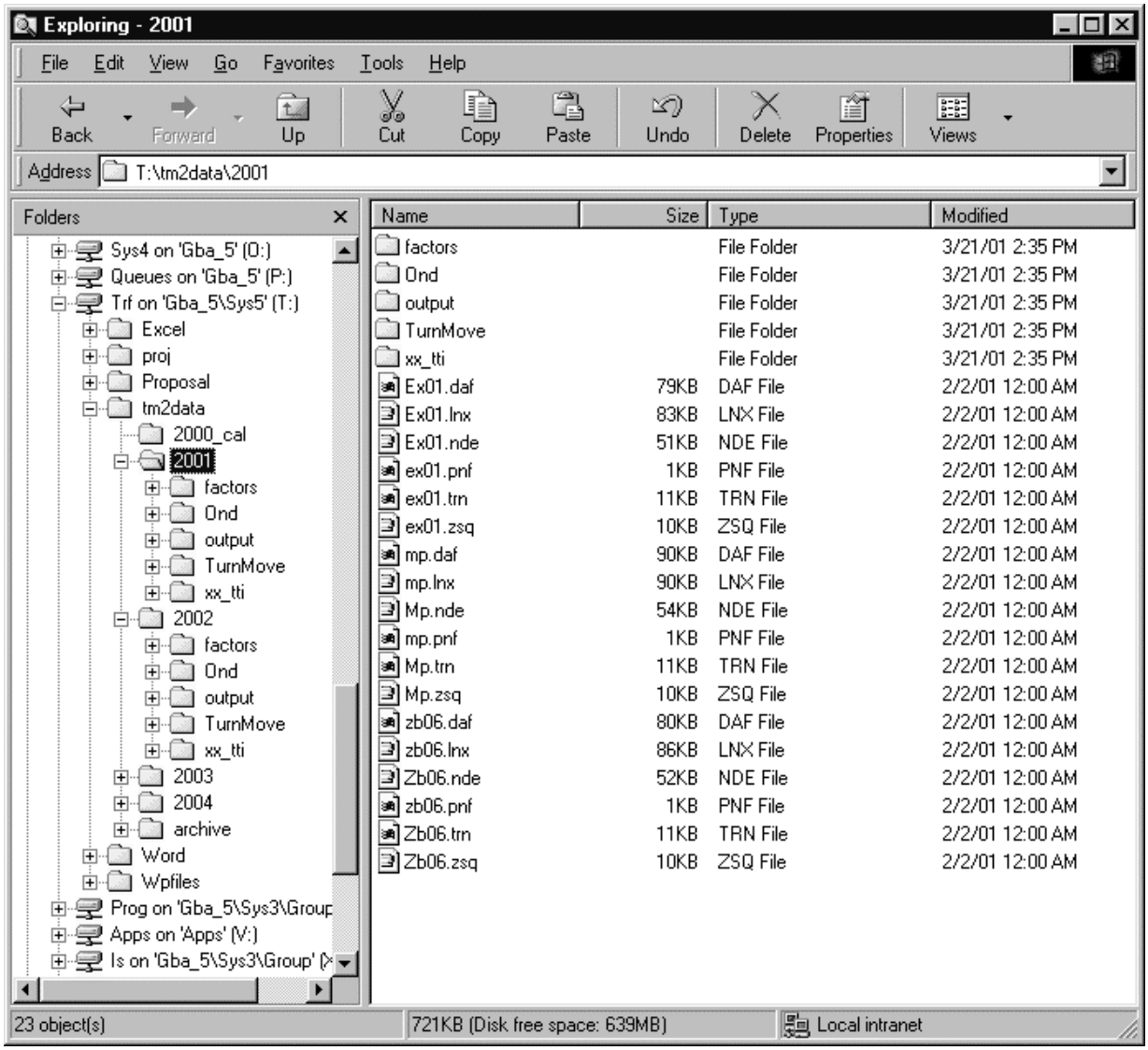
Future Model Network Files

mp(year).lnk	-	link file
mp(year).nde	-	node file
mp(year)xx.tti(1)	-	through trip table
mp(year).zsq	-	multi-point assignment file
mp(year).ond	-	origin and destination file created from Land Use spreadsheet
Ccjc.ndc(2)	-	node delay coefficients
Ccjc.ldc(2)	-	link delay coefficients
Ccjc.tnp(2)	-	turn penalties
Ccjc.tpt(2)	-	turn penalty types

(1) Through trip tables estimated by GBA for next 5 years for use in the Existing and ZBNB model runs. 20 year and 40 year XX trip tables also estimated by GBA for Future model use.

(2) These files are developed during the calibration process and should not be modified or edited until the next calibration of the model is completed.

The input network files should be maintained in one location on a shared file server that each individual running the CCJCTM has access to. The yearly input files should be read-only in nature and should not be modified except for the yearly update process. An example of one directory structure that could work follows:



As each year is completed, data for that year is zipped and maintained on the server for reference purposes. Each year after the update process of the land use spreadsheet and link/node network is completed, the previous years data set should be archived for reference only.

NOTE: the data structure is only shown for a five year period since the model should be re-calibrated every 5 years.

The link and node network files for the existing model were set during the initial programing and calibration of the model. The link/node structure for the short term ZBNB model was set based on planned geometric and traffic control improvements planned by the City and County within the next five years. The future or master plan link node structure was developed based on the best estimates of what roadway and traffic improvements can realistically be expected to be built within the next 20 to 40 years.

These link/node network files should not be modified on a project by project basis. It is recommended that both the land use element and the link/node network of the CCJCTM be updated annually to reflect changes in development and modifications to the street system. The yearly update should reflect significant geometric and traffic control modifications that have been constructed (i.e. modify the existing link and node files) and committed improvements by government agencies for future implementation (i.e. changes to the ZBNB or Future link/node files). Similarly, the "Land Use O&D (year)" spreadsheet files should be adjusted to reflect new developments and planned developments which are different than the previous years assumptions.

APPENDIX C

Review of

Design Criteria for Streets and Trafficways

City of Jefferson, Missouri

Review of Design Criteria – City of Jefferson, Missouri **APPENDIX C**

At the request of the City of Jefferson Public Works Department, George Butler Associates, Inc. has completed a review of the current "Design Criteria – Streets and Trafficways" adopted by the city to provide guidance for the uniform design of streets and roadways. Detailed following are comments on specific provisions or portions of the design criteria that should be modified or updated to conform with the most current nationally adopted design specifications.

Chapter I – Street Design – General

The first paragraph states that the two noted manuals – "A Policy on Geometric Design of Highways and Streets – 1984 edition" by the American Association of State highway and Transportation Officials (ASSHTO) and the "Manual on Uniform Traffic Control Devices – 1978 edition" should be utilized as primary sources for design information. The second paragraph states that the latest edition of these referenced manuals should be used.

The reference to dates in the first paragraph should be removed to eliminate confusion. It is recommended that the latest editions of these manuals be utilized for design and review purposes.

Chapter III – Geometric Design

Table 2 – "Design Controls for Crest Vertical Curves" and **Table 3** – "Design Controls for Sag Vertical Curves" should be replaced by the following Exhibit 3-76 from the current edition of "A Policy of Design of Highways and Streets":

AASHTO—Geometric Design of Highways and Streets

Metric				US Customary			
Design speed (km/h)	Stopping sight distance (m)	Rate of vertical curvature, K[a]		Design speed (mph)	Stopping sight distance (ft)	Rate of vertical curvature, K[a]	
		Calculated	Design			Calculated	Design
20	20	0.6	1	15	80	3.0	3
30	35	1.9	2	20	115	6.1	7
40	50	3.8	4	25	155	11.1	12
50	65	6.4	7	30	200	18.5	19
60	85	11.0	11	35	250	29.0	29
70	105	16.8	17	40	305	43.1	44
80	130	25.7	26	45	360	60.1	61
90	160	38.9	39	50	425	83.7	84
100	185	52.0	52	55	495	113.5	114
110	220	73.6	74	60	570	150.6	151
120	250	95.0	95	65	645	192.8	193
130	285	123.4	124	70	730	246.9	247
				75	820	311.6	312
				80	910	383.7	384

[a] Rate of vertical curvature, K, is the length of curve per percent algebraic difference in intersecting grades (A). K = L/A

Exhibit 3-76. Design Controls for Stopping Sight Distance and for Crest and Sag Vertical Curves

The intersection sight distance discussion and tables on Pages 13 and 14 of the Jefferson City Design Criteria should be modified to reflect the changes in the most current version of "A Policy on Geometric Design of Highways and Streets". Intersection sight distance criteria have bee substantially modified and are detailed with the new policy on Pages 654 – 683.

All other portions of the current Design Criteria are correct and in compliance with nationally and regionally accepted codes, policies, and criteria. As such, no other significant modifications are recommended.