City of Fayetteville Item Review Form

2014-0119

Legistar File Number

3/18/14

City Council Meeting Date - Agenda Item Only

N/A for Non-Agenda Item

Chris Brown

Submitted By

Development Services

Department

Action Required:

Resolution Approving the Typical Cross Section for Rupple Road-Martin Luther King, Jr. Blvd. to Wedington Dr.

Does this item have a cost? No

Cost of this request	Category or Project Budget	Program or Project Name
Account Number	Funds Used to Date	Program or Project Category
Project Number	$0.00 Remaining Balance	Fund Name

Budgeted Item? ☐ **Budget Adjustment Attached?** ☐

Previous Ordinance or Resolution # _____

Original Contract Number: _____

ENTERED 3/3/14 PK

V20130812 ENTERED 2/28/14

Comments:

3-3-14

Paul A. Becker 3-3-2014

3-3-14

CITY OF Fayetteville ARKANSAS

CITY COUNCIL AGENDA MEMO

MEETING OF MARCH 18, 2014

TO: Mayor and City Council

THRU: Don Marr, Chief of Staff
Jeremy Pate, Development Services Director

FROM: Chris Brown, City Engineer

DATE: February 28, 2014

SUBJECT: **Resolution Approving the Typical Cross Section for Rupple Road-Martin Luther King, Jr. Blvd. to Wedington Dr.**

RECOMMENDATION:
Staff recommends approval of a 4-lane cross section with medians on Rupple Road, between Martin Luther King, Jr. Blvd and Wedington Drive, for the following reasons:

1) Rupple Road is designated as a Principal Arterial Parkway on the City's Master Street Plan (Figure 1), and as an arterial on the Regional Arterial Network (Figure 2).
2) Voters approved the Transportation Bond Program in 2006 with Rupple included as a 4-lane boulevard cross section (Figure 3).
3) The cost savings derived from constructing a 2 lane versus a 4 lane facility, while not insignificant, will be less than the cost of constructing the 2 lanes in the future, not only due to inflation, but due to required reconfiguration at intersections, traffic control requirements, a more constricted work area, and other factors that contractors must contend with on a widening project that do not exist on new construction.
4) Funding is available now in the Transportation Bond Program to construct the full 4 lanes, as approved by voters. Future funding is unknown, and funding may not be available when the need for widening arises.

BACKGROUND:
Rupple Road, in the western part of the City, is on the City's Master Street Plan as a Principal Arterial Parkway, and is the only north-south principal arterial on the Master Street Plan west of I-540. Principal Arterials on the Master Street Plan are planned as 4-lane facilities with medians. Refer to Figure 1 for a depiction of the Master Street Plan.

Secondly, Rupple Road is included on the Washington and Benton County Regional Arterial Network as established by the Northwest Arkansas Regional Planning Commission, as shown in Figure 2 attached. This regional network map is intended to identify all streets and highways in the 2-county area that should be planned for 4 lanes or more.

A summary of major project events includes:

2004-The Street Committee (now Transportation Committee) began compiling a list of projects to be presented to voters for a transportation bond issue. Rupple Road was included on that list as an arterial street. In 2006, as voting on the bond issued neared, a public meeting was held at the Fayetteville Public Library, and conceptual plans and cost estimates of all of the proposed bond projects were made available for public review. Rupple Road, from Martin Luther King Jr. Blvd. to Persimmon Street was presented at that meeting as a 4-lane road with a median. (The conceptual plan presented at the meeting is attached as Figure 3).

June, 2006 –The City Council approved an Ordinance setting a special sales tax election for the bond program. Included in the City Council agenda packet was a list of proposed projects, including Rupple Road as a new minor arterial. See the attached memo from City Attorney Kit Williams for further details and a summary of events and discussions related to Rupple Road prior to the bond election.

September 2006-Voters approved issuance of up to $65.9 million in bonds for transportation improvements.

2007-Widening of Rupple Road between Persimmon and Wedington Drive was recommended by the Committee, and this segment was added to the Bond Program budget, creating a total budget of $10 million for Rupple Road between Martin Luther King, Jr. Blvd. and Wedington Drive. Both segments of the project were planned to be funded by the sale of the third set of bonds, which at the time was planned for 2012, but was subsequently moved to 2014.

May 2013-In anticipation of funding for construction being available in 2014, a public meeting was held at the Boy's and Girl's Club on Rupple Road, to allow the public to review proposed conceptual plans for Rupple Road and provide input on the project prior to the commencement of detailed design. After this meeting, staff presented the summary of public comments to the Transportation Committee, and requested a recommendation from the Committee on the cross section. Staff recommended project elements included a 4 lane roadway, a 9 to 15 foot wide median (the narrower median was proposed between Persimmon and Wedington), a 5 foot sidewalk on the east side, and a 12 foot multi-use path on the west side. At that time, the Transportation Committee discussed the possibility of constructing only 2 of the 4 lanes, and staff proposed conducting a traffic study to determine the number of lanes needed from a capacity standpoint. The Transportation Committee concurred with this recommendation, and in September of last year Jacobs Engineering was engaged to perform the study.

DISCUSSION:
The traffic study by Jacobs Engineering analyzed existing traffic patterns, and predicted future traffic levels based on this traffic, as well as development patterns expected in the project area and on changes in traffic patterns that the new connection would bring about. The study developed level of service estimates for immediately after construction as well as for a 20 year horizon, for use by the City in making decisions about the type of facility that would be adequate now and in the future.

A summary of the traffic study inputs and analysis is as follows:

- Future traffic was generated in the study area by using densities similar to Rupple Row (Traditional/New Urbanism Development Pattern) of 6.24 units per acre or 1997 units which equates to a 24-hour two-way volume of 19,111 vehicles at build out. The development area used in this calculation is depicted on Figure 4.

- Based on historical traffic volumes, growth rates from 1.2% to 1.9% were applied to historic traffic counts outside of the Rupple Road corridor (background traffic) that would be utilizing the new Rupple Road.
- The intersection of Rupple Road and Persimmon Street was evaluated using the year 2033 volumes to determine whether a signalized intersection or a roundabout would operate the more efficiently and safely. In regards to the Level of Service, the roundabout barely nudged out the signal by 2 seconds which is considered negligible. Therefore, Jacobs recommends, and used a signalized intersection in the model in favor of the improved safety conditions for pedestrians, especially within a school zone.
- Two future intersections on Rupple Road south of Persimmon Street were modeled as roundabouts.

Final Study results are as follows:

- The 2-lane Build will operate at acceptable levels of service the opening year of this facility.
- The first section which will fail operationally or have unacceptable levels of service will be the 2-lane section from Persimmon Street to Wedington, with the Wedington intersection the most problematic due to the significant traffic volumes on Wedington.
- The study shows that in the design year 2033, Rupple Road needs to be a 4-lane facility to provide acceptable levels of service at each intersection/roundabout and acceptable travel times from MLK Jr. to Wedington Drive.
- The study states that a 2-lane roadway should operate with acceptable delays and speeds until the corridor is developed to approximately 50% to 75% of build out. The study states that this level of development could occur in 10 years given the need for the north-south connection, the close proximity to the school, Boys & Girls Club and I-540; however, the City has no control over the actual rate of development, which may be substantially different from the 10 year estimate.

Staff developed cost estimates for the new segment of Rupple Road, between Persimmon and Martin Luther King, Jr. Blvd. using three different road cross sections (Figures 7 and 8, attached). These estimates are summarized in the following table:

	Road Cross Section	Est. Cost	Dollars Saved	Percentage Saved
2-Lane Option 1	2-lanes west side only depressed median, 12' trail	$5.67 Million	-$1.70 Million	-23%
2-Lane Option 2	2-lanes depressed median, gravel shoulders, 12' trail, 5' s/w	$6.67 Million	-$0.70 Million	-10%
4-Lane Option	4-lane boulevard w/ 12' trail & 5' sidewalk	$7.37 Million		

Considering the relative closeness (for projects of this magnitude) of the above construction estimates, the difficulty of access management without the median in place, and the lack of major alternate routes for citizens, staff recommends moving forward with the 4-Lane Option. If the Council chooses a 2-lane option, Option 1 is preferred over Option 2 due to the relative ease of constructing the additional lanes in the future.

If Option 1 is chosen, the intersection at Wedington needs to be widened to accommodate the heavy northbound right turn on to Wedington and the intersection at Persimmon Street will also need to be widened to provide increased safety and a properly aligned intersection with the installation of the new traffic signal. Because of these needed improvements and considering

that there exists a short section of 4-lane Rupple Road south of Persimmon Street, staff recommends 4-laning this entire segment of Rupple Road from the Persimmon Street intersection north to Wedington. The traffic study also identified this segment as the first to fail from increased traffic volumes. The cost to widen only the intersections at Wedington and Persimmon is $1.5 million, versus $2.2 million for full widening between Persimmon and Wedington.

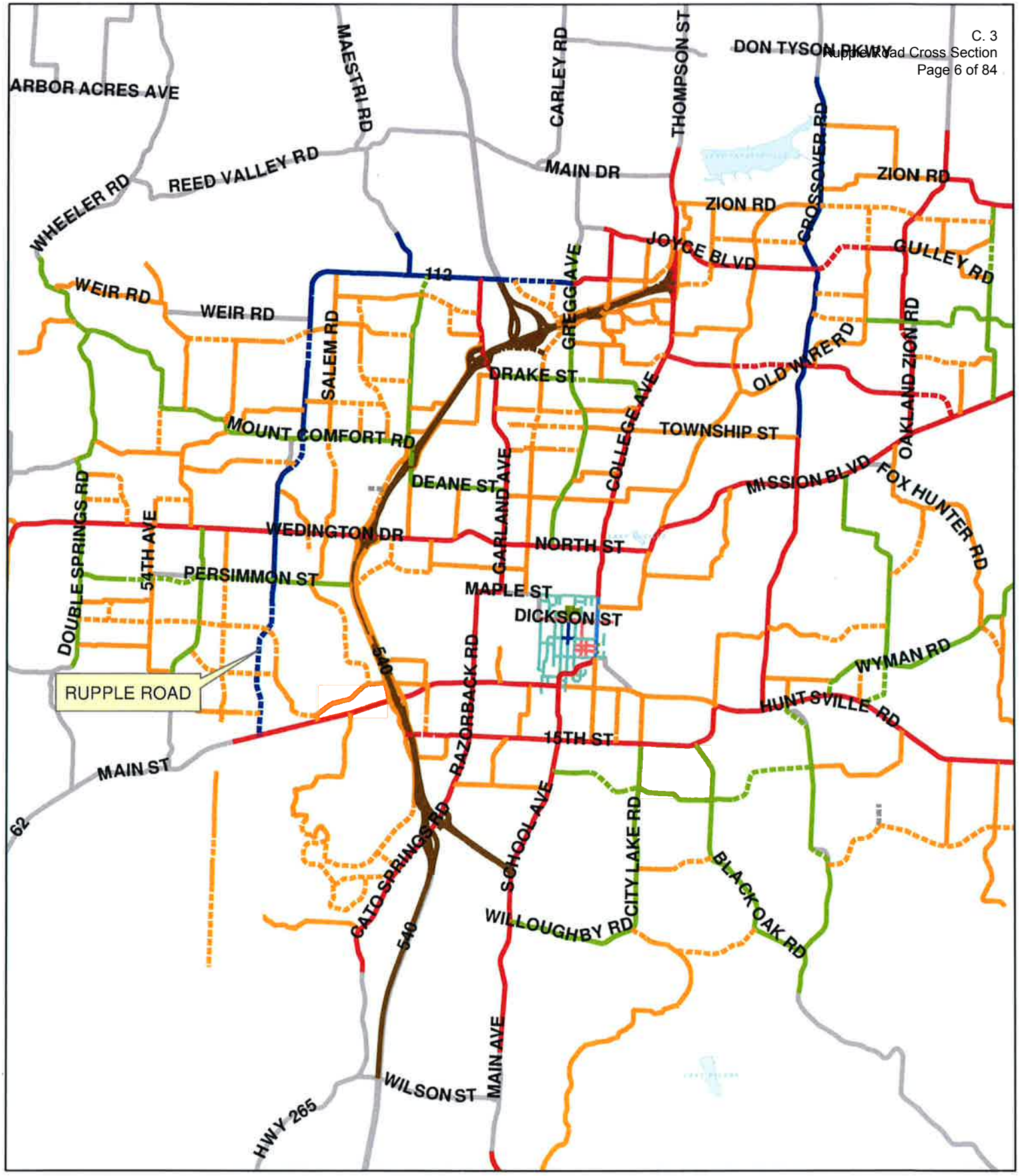
Regardless of whether the 4-lane option or the 2-lane option is chosen, staff recommends:

1) Signalization at Persimmon Street and Rupple Road.
2) Construction of roundabouts at the 3 planned collector streets intersecting Rupple Road.
3) Full width construction from MLK Jr. Blvd. to the Farmington Branch of Goose Creek crossing.
4) Widening Rupple Road to 4-lanes between Persimmon Street and Wedington, as noted above.

The Transportation Committee heard this item at the Committee meeting on February 25th, and voted to forward to the full City Council without a recommendation.

BUDGET/STAFF IMPACT:
The total budget for Rupple Road, between Martin Luther King, Jr. Blvd. and Wedington Drive, is $10 milllion. This funding is adequate to construct the full 4-lane section. Potential savings if the 2-lane options are selected include $2.4 million in construction and approximately $200,000 in asphalt maintenance costs over a 15 year period. However, this savings will ultimately be less than cost of constructing the additional two lanes in the future. This cost cannot be quantified accurately, but, by way of comparison, the cost of the two lanes of Rupple Road from Wedington to the Boys and Girls Club in 2002 was approximately $800,000, and the estimate cost of widening Rupple between Persimmon and Wedington to 4 lanes is $2.2 million.

Attachments:
Figure 1-Partial City of Fayetteville Master Street Plan
Figure 2-Benton and Washington County Regional Arterial Network
Figure 3-Concept Drawing presented at the May, 2006 public meeting.
Memo from City Attorney-History of Rupple Road and Sales Tax Capital Bond Election
Figure 4-Development Area used in traffic study calculations
Figure 5 and 6-Concept Drawings presented at May 2013 public meeting
Figures 7 and 8-Alternative 2-lane and 4-lane concepts currently under consideration
Figures 9 an 10-Alternative concepts between Persimmon and Wedington
Detailed Cost Estimates
Traffic Study by Jacobs Engineering



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1 inch = 7,000 feet

FIGURE 1
MASTER STREET PLAN

Legend

- COLLECTOR
- FREEWAY/EXPRESSWAY
- MINOR ARTERIAL
- PRINCIPAL ARTERIAL
- PRIN ARTERIAL PKWY

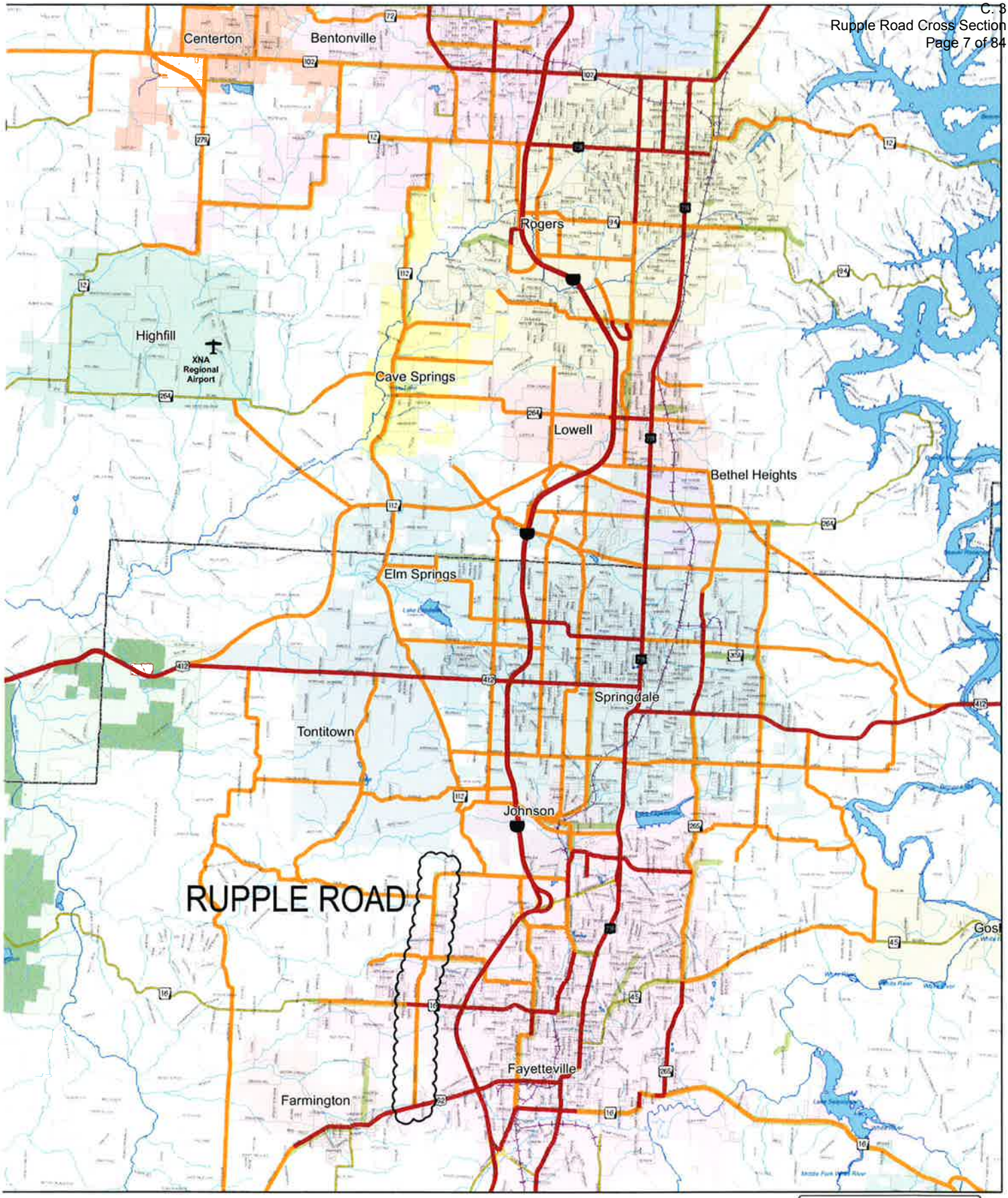

FIGURE 2
WASHINGTON AND BENTON CO.
2015 ARTERIAL NETWORK

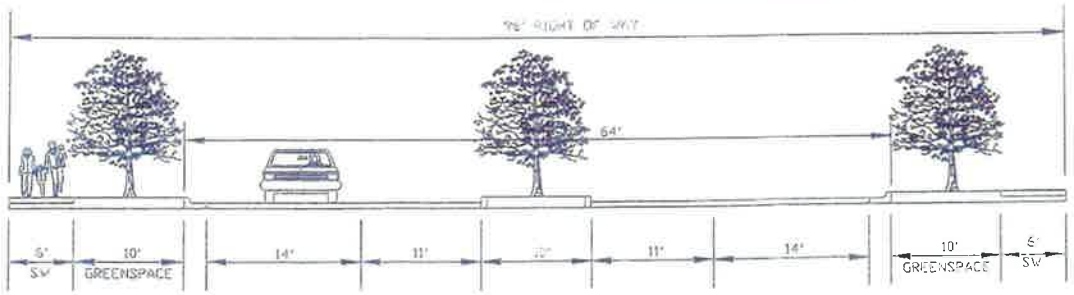

FIGURE 3

(17) RUPPLE ROAD IMPROVEMENTS
6th ST. TO PERSIMMON ST.
CONCEPT PLAT

Fayetteville ARKANSAS
www.accessfayetteville.org

Departmental Correspondence

LEGAL DEPARTMENT

Kit Williams
City Attorney

Jason B. Kelley
Assistant City Attorney

TO: **Mayor Jordan**
City Council

CC: **Don Marr**, Chief of Staff
Paul Becker, Finance Director
Jeremy Pate, Development Services Director
Chris Brown, City Engineer

FROM: **Kit Williams**, City Attorney

DATE: **February 24, 2014**

RE: **History of Rupple Road from Martin Luther King to Persimmon and Sales Tax Capital Bond Election**

For many months before the September 12, 2006 Special Sales Tax Bond Election, the City Council Street Committee studied the citizens' needs and desires (as ascertained by Citizens Surveys) and finally agreed to the Transportation Improvement Plan of which Phase One was to be financed by the Sale Tax Capital Bonds.

> "In response to a question from Alderman Marr, Alderman Jordan said we are probably looking at August before a bond election could be held. He thinks the Street Committee will need to initiate the discussion. He wants to be careful to have enough time for public comment.
>
> "Alderman Marr said he agrees that we need to have time to make sure it is done right but wants to also make sure it is a priority. He said he wants to see the Committee begin working on this at every meeting because it was **the number one item**

> **two years in a row in the Citizen Survey**." City Council Street Committee Minutes of February 13, 2006 (page 7) (emphasis added).

In the Agenda Packet for the Special Election for the Sales Tax Bond Ordinance, City staff informed the City Council what the bond revenue would be used for.

> "The City Council Street Committee has for the last 18 months been discussing the need for a major street improvement program based upon the community-wide Citizen Surveys of 2004 and 2005. The program has evolved during this time frame into 3-phases. Phase 1 is proposed to be a 6-year $62,000,000 program, providing traffic capacity and safety improvements and economic development opportunities to those corridors with the most need. Later phases, through additional bond elections, will address additional safety, capacity, and economic development needs. The resources required for the initial phase of the Transportation Improvement Program is $62,000,000 plus the bond and debt placement and surety costs."

Included with the memo was a listing of the road projects to be completed in Phase 1 of the Transportation Improvement Plan. Project #17 was "Rupple Road (6th to Persimmon), New-Minor Arterial-$8,155,000.00…."

The Special Election Capital Sales Tax Extension agenda item was entitled: "An Ordinance calling for a Special Election on September 12, 2006 to….pay….for Phase 1 of the Transportation Improvement Plan as recommended by the Street Committee…."

Thus, both the City Council and the public were expressly and explicitly informed before enacting the Special Election Ordinance that Rupple Road from Martin Luther King to Persimmon was supposed to be built **to arterial standards** at an estimated cost of over $8 million from the Sales Tax Capital Bond Proceeds. My memory is that the voters were

frequently informed that this project as well as the other major road improvement projects (Highway 265 from Highway 45 North to the City limits; Garland Street from North to Melmar; Mount Comfort, Fifteenth Street, Cato Springs, etc.) would be built as a result of a successful bond election.

I drafted the Bond Election Ballot to be more general: "acquisition, construction and equipping of certain street improvements,"; without specifically naming each proposed street improvement. Therefore, it is unlikely that the City could be found to have committed an illegal exaction if Rupple Road is not built to arterial standards. However, it is clear that the public was informed before the election that the City would construct Rupple Road as an arterial (as part of the City's "box" of arterials to improve city wide transportation). Thus, the City Council could be accused of not "keeping the faith" with citizens if it chose to build a two-lane road rather than arterial for Rupple from MLK to Persimmon.

RESOLUTION NO. _____

A RESOLUTION TO REAFFIRM THE CROSS SECTION OF RUPPLE ROAD FROM MARTIN LUTHER KING BOULEVARD TO WEDINGTON DRIVE AS A FOUR LANE BOULEVARD

WHEREAS, the City Council approved submitting a capital sales tax issue to the Fayetteville voters in 2006 with a stated objective to build Phase 1 of the Transportation Improvement Program with the bond proceeds; and

WHEREAS, Phase 1 of the approved Transportation Improvement Program included $8,155,000.00 for Rupple Road as an arterial from Martin Luther King Boulevard to Persimmon Street; and

WHEREAS, the Fayetteville citizens voted to approve this sales tax to support the bonds for the street improvements in September 12, 2006; and

WHEREAS, Rupple Road has long been and currently is designated as Principal Arterial Parkway on the City's Master Street Plan approved by both the Planning Commission and City Council.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF FAYETTEVILLE, ARKANSAS:

Section 1: That the City Council of the City of Fayetteville, Arkansas hereby reaffirms the designation of Rupple Road as a Principal Arterial Parkway between Martin Luther King Boulevard and Wedington Drive and confirms and approves the cross section of this four lane boulevard as presented to the public in the meeting at the Boys and Girls Club on Rupple Road in May of 2013.

PASSED and **APPROVED** this 18th day of March 2014.

APPROVED: ATTEST:

By: _____
LIONELD JORDAN, Mayor

By: _____
SONDRA E. SMITH, City Clerk/Treasurer

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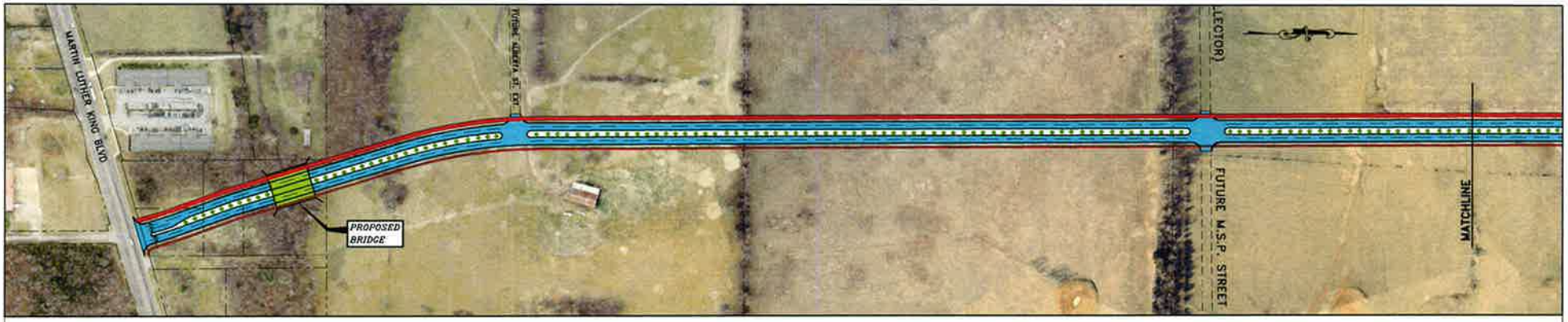
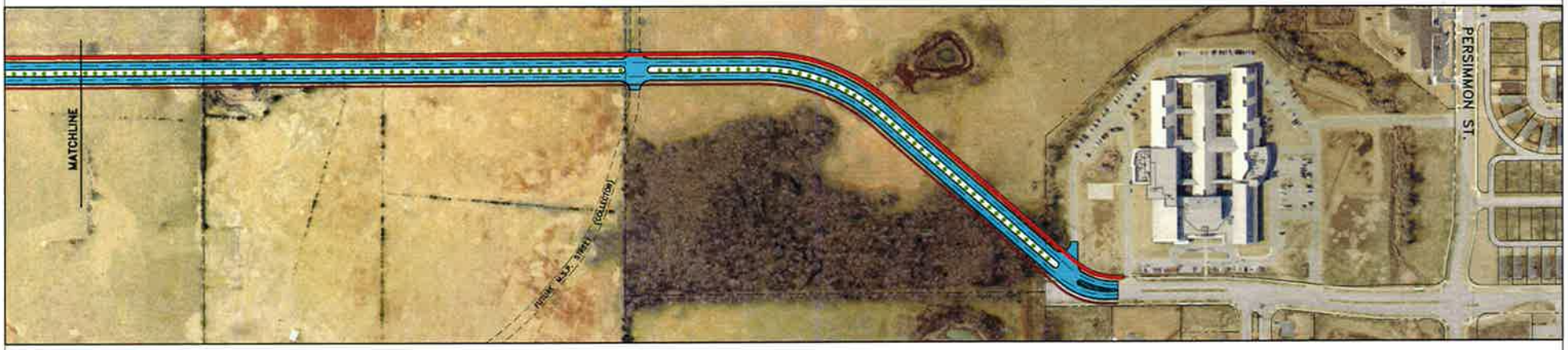
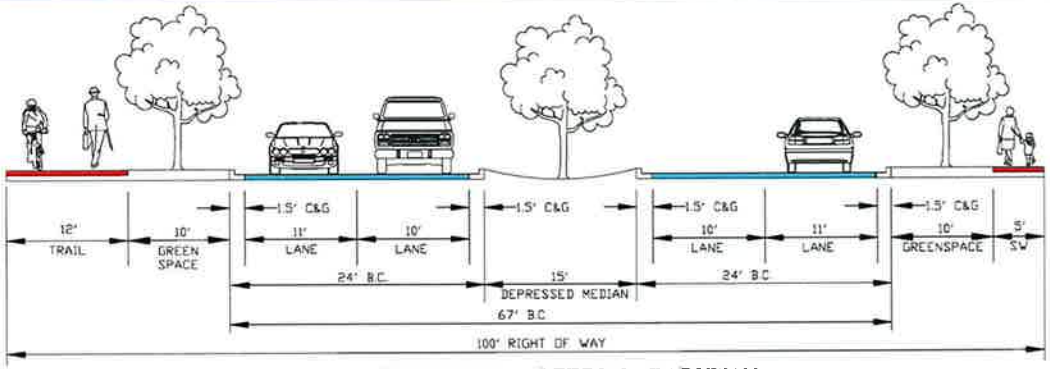
1 inch = 1,500 feet

FIGURE 4
TRAFFIC STUDY
DEVELOPMENT IMPACT AREA







PRINCIPAL ARTERIAL PARKWAY

Project Summary

- Extension of Rupple Road as a 4-lane boulevard from south of Owl Creek School to Martin Luther King Blvd.
- Total project budget: $8.155 million
- Construction scheduled for 2014.

FIGURE 5

④ RUPPLE ROAD IMPROVEMENTS MARTIN LUTHER KING BLVD TO PERSIMMON ST. CONCEPT PLAT

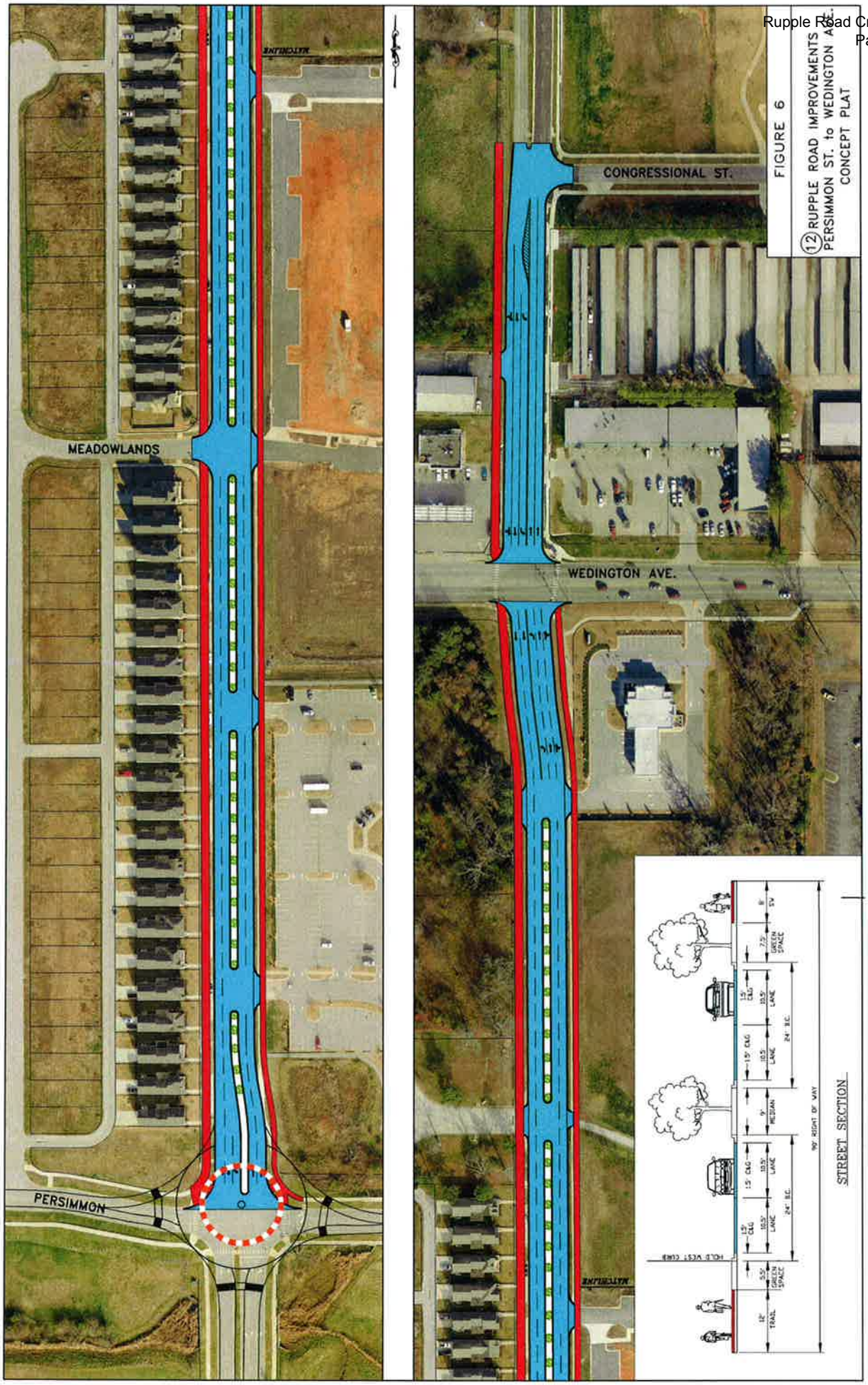
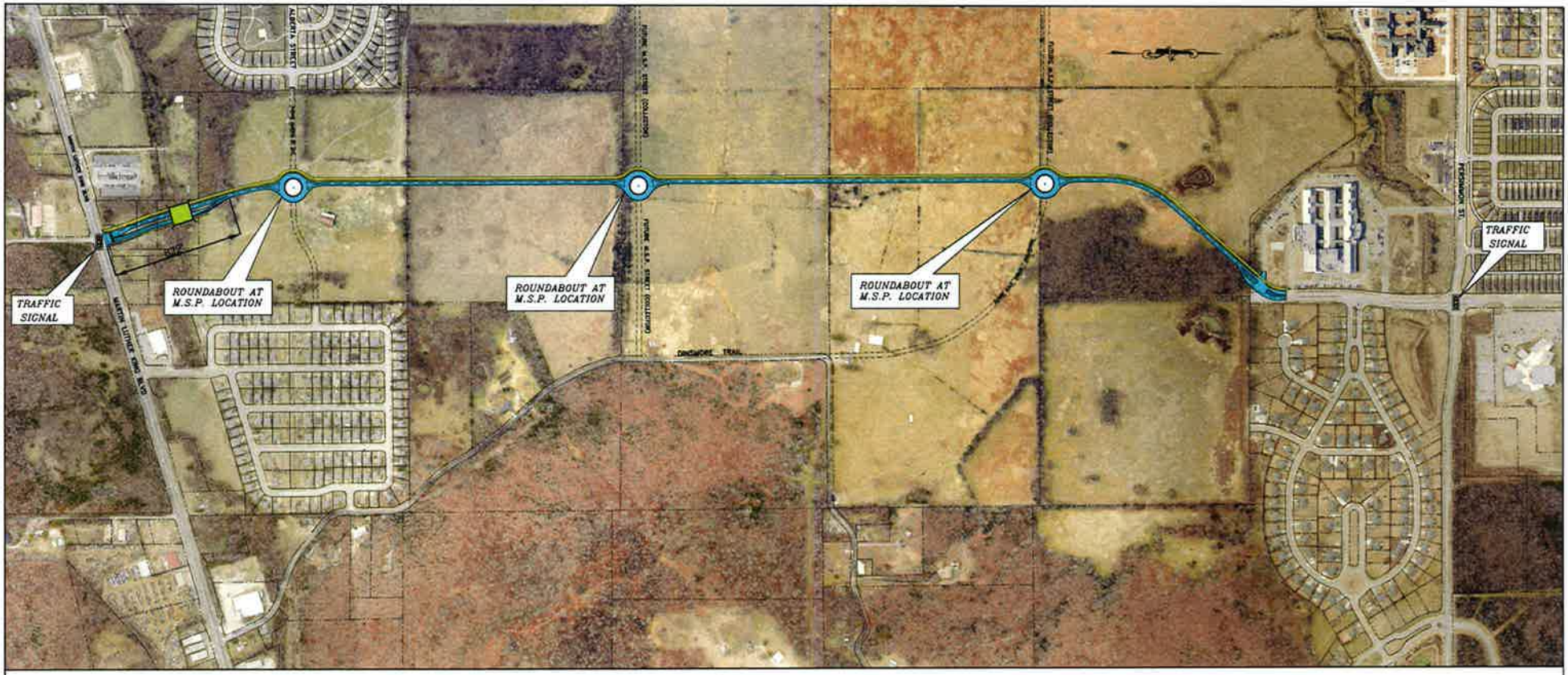
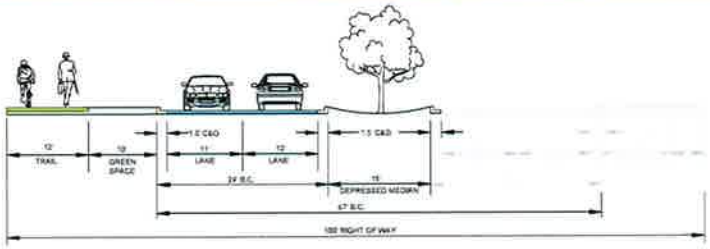


FIGURE 6

(12) RUPPLE ROAD IMPROVEMENTS
PERSIMMON ST. to WEDINGTON AVE.
CONCEPT PLAT





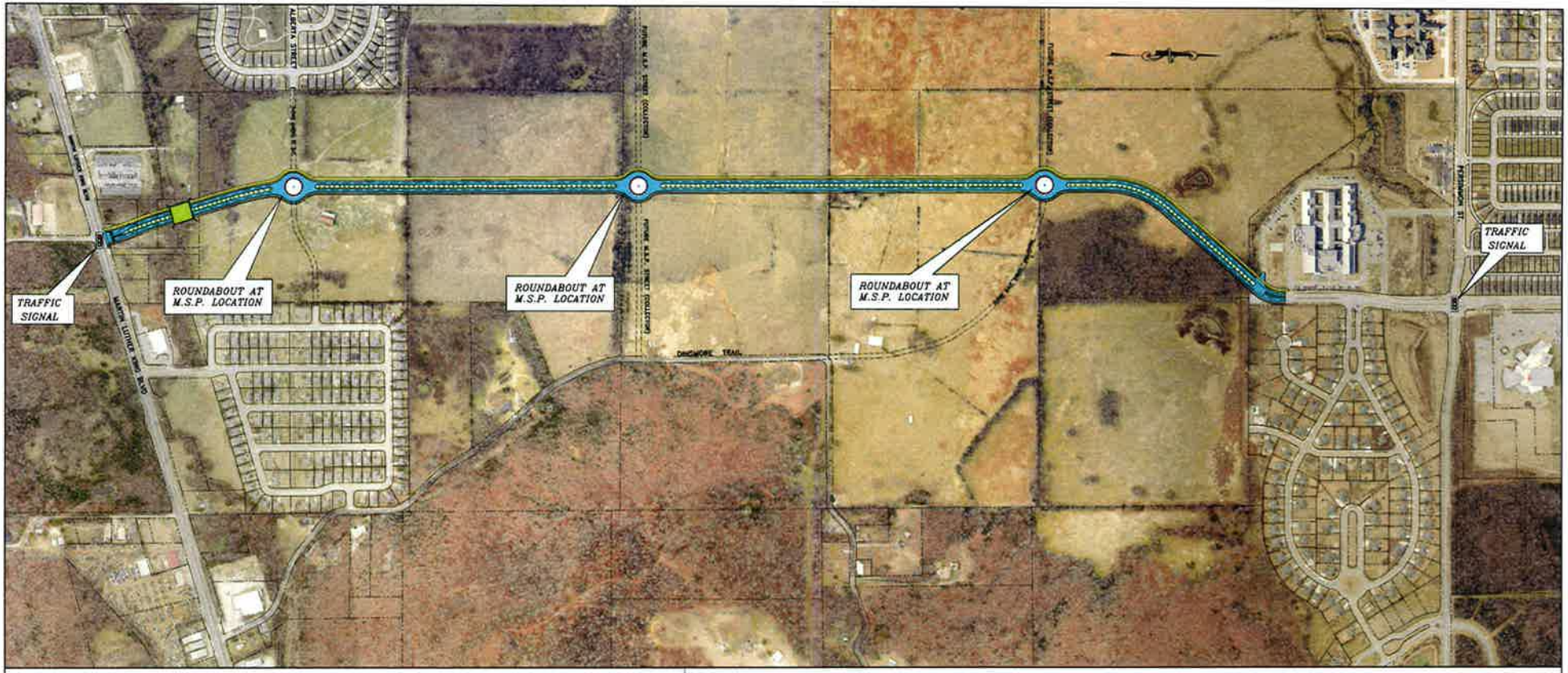
STREET SECTION
2-LANE OPTION 1

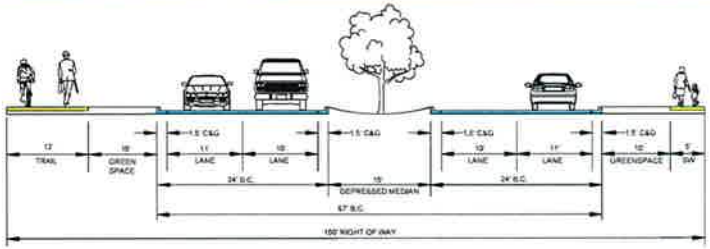
PROS
- LEAST EXPENSIVE OPTION.
- CONSTRUCTION OF SECOND PHASE WILL BE EASIER AND LESS EXPENSIVE THAN OPTION 2.
- ADDRESSES FIRE CODE REQUIREMENTS BETTER THAN OPTION 2.

CONS
- DOES NOT ESTABLISH ACCESS CONTROL.
- SIDEWALK ONLY ON ONE SIDE.

FIGURE 7

RUPPLE ROAD IMPROVEMENTS
MARTIN LUTHER KING BLVD
TO PERSIMMON ST.
2-LANE OPTION 1

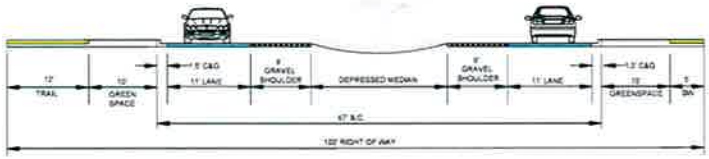




PROS
- ESTABLISHES FULL FOOTPRINT.
- ESTABLISHES MEDIAN ACCESS CONTROL.
- ASSURANCE OF CONSTRUCTION FUNDING.
- WOULD TAKE ADVANTAGE OF TODAY'S LOWER CONSTRUCTION COSTS

CONS
- MOST COSTLY OPTION.
- MAY NOT NEED CAPACITY FOR 10+ YEARS.

STREET SECTION
4-LANE OPTION



PROS
- ESTABLISHES FULL FOOTPRINT w/SIDEWALK & TRAIL.
- ESTABLISHES MEDIAN ACCESS CONTROL.

CONS
- FIRE CODE REQUIRES 20' ALL WEATHER SURFACE. SO A WIDE GRAVEL SHOULDER IS NEEDED.
- NOT AS MUCH COST SAVINGS AS OPTION 1 DUE TO FIRE CODE REQUIREMENTS.
- SECOND PHASE WILL BE MORE DIFFICULT AND COSTLY THAN OPTION 1.

STREET SECTION
2-LANE OPTION 2

FIGURE 8

RUPPLE ROAD IMPROVEMENTS
MARTIN LUTHER KING BLVD.
TO PERSIMMON ST.
4-LANE OPTION AND 2-LANE OPTION 2

FIGURE 9

RUPPLE ROAD
INTERSECTION IMPROVEMENTS

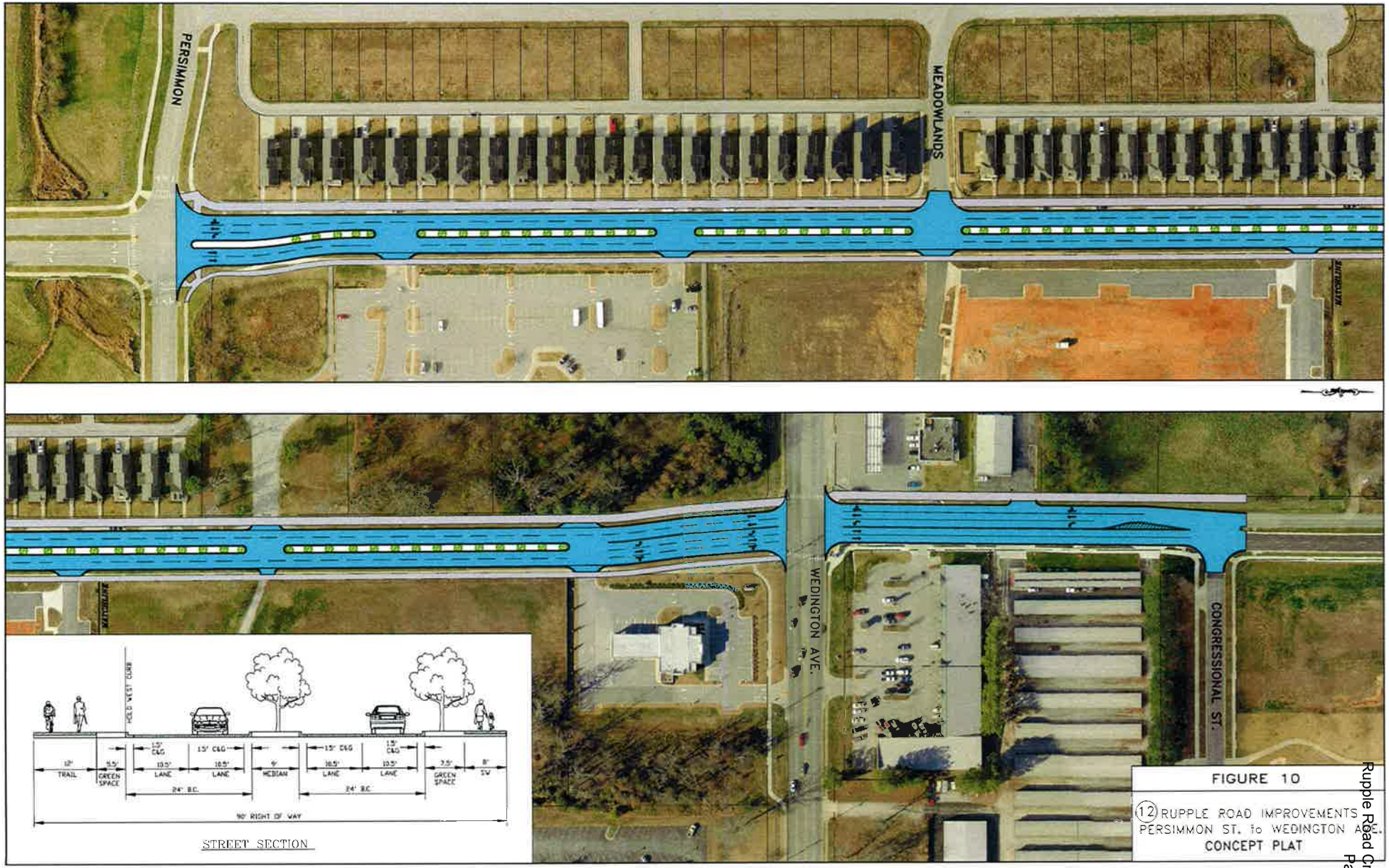


FIGURE 10

(12) RUPPLE ROAD IMPROVEMENTS
PERSIMMON ST. to WEDINGTON AVE.
CONCEPT PLAT

Rupple Rd. Improvements - MLK to Persimmon

FULL WIDTH CONCEPT COST ESTIMATE - FEBRUARY 2014

Item No.		Unit	Estimated Quantity	Costs	
				Unit Price	Estimated Price
1	Mobilization	LS	1	$150,000.00	$150,000.00
2	Construction Staking	LS	1	$50,000.00	$50,000.00
3	Maintenance of Traffic	LS	1	$15,000.00	$15,000.00
4	Tree Protection Fencing	LF	1,000	$5.00	$5,000.00
5	Excavation Safety	LS	1	$5,000.00	$5,000.00
6	Clearing & Grubbing	LS	1	$20,000.00	$20,000.00
7	R & D Curb & Gutter	LF	200	$4.00	$800.00
8	Asphalt Milling	SY	200	$8.00	$1,600.00
9	Unclassified Excavation	CY	54,400	$8.00	$435,200.00
10	Compacted Embankment - Select Hillside	CY	36,266	$12.00	$435,192.00
11	Undercut & Backfill	CY	10,000	$17.50	$175,000.00
12	Six-inch Aggregate Street Base Course (Class 7)	SY	44,200	$8.00	$353,600.00
13	Concrete Curb & Gutter	LF	30,000	$11.50	$345,000.00
14	Two-inch ACHM Surface Course (Type 2)	SY	36,000	$12.00	$432,000.00
15	Four-inch ACHM Binder Course (Type 2)	SY	36,000	$16.00	$576,000.00
16	18-inch Reinforced Concrete Pipe (RCP)	LF	6,000	$50.00	$300,000.00
17	36-inch Reinforced Concrete Pipe (RCP)	LF	3,000	$110.00	$330,000.00
18	4 Ft x 4 Ft Type 'C' Drop Inlet	EA	40	$3,000.00	$120,000.00
19	Drop Inlet Extension (8 Ft)	EA	40	$1,000.00	$40,000.00
20	Erosion Control	LS	1	$50,000.00	$50,000.00
21	Concrete Sidewalk (4")	SY	4,300	$32.00	$137,600.00
22	Concrete Trail	SY	10,200.0	$35.00	$357,000.00
23	Seeding & Mulching	AC	8.5	$2,500.00	$21,250.00
24	Imported Top Soil	SY	40,000	$3.00	$120,000.00
25	Striping and Signage	LS	1	$20,000.00	$20,000.00
26	3" PVC Schedule 40 Conduit	LF	750	$20.00	$15,000.00
27	Right-of-Way/ Easement Acquisition	LS	1	$575,000.00	$575,000.00
28	Concrete Bridge (66'x100')	SF	6,600	$130.00	$858,000.00
29	Street Trees	EA	85	$600.00	$51,000.00
30	Signalization (Sixth St.)	LS	1	$150,000.00	$150,000.00
	TOTAL ESTIMATED CONSTRUCTION COSTS				**$6,144,242.00**
	CONTINGENCY (20%)				**$1,228,848.40**
	TOTAL ESTIMATED COST				**$7,373,090.40**

Rupple Rd. Improvements - MLK to Persimmon

OPTION 1 COST ESTIMATE- FEBRUARY 2014

Item No.	Item Description	Unit	Estimated Quantity	Costs	
				Unit Price	Estimated Price
1	Mobilization	LS	1	$150,000.00	$150,000.00
2	Construction Staking	LS	1	$50,000.00	$50,000.00
3	Maintenance of Traffic	LS	1	$15,000.00	$15,000.00
4	Tree Protection Fencing	LF	1,000	$5.00	$5,000.00
5	Excavation Safety	LS	1	$5,000.00	$5,000.00
6	Clearing & Grubbing	LS	1	$16,000.00	$16,000.00
7	R & D Curb & Gutter	LF	200	$4.00	$800.00
8	Asphalt Milling	SY	200	$8.00	$1,600.00
9	Unclassified Excavation	CY	34,756	$8.00	$278,048.00
10	Compacted Embankment - Select Hillside	CY	23,170	$12.00	$278,040.00
11	Undercut & Backfill	CY	6,000	$17.50	$105,000.00
12	Six-inch Aggregate Street Base Course (Class 7)	SY	24,556	$8.00	$196,448.00
13	Concrete Curb & Gutter	LF	23,200	$11.50	$266,800.00
14	Two-inch ACHM Surface Course (Type 2)	SY	20,133	$12.00	$241,596.00
15	Four-inch ACHM Binder Course (Type 2)	SY	20,133	$16.00	$322,128.00
16	18-inch Reinforced Concrete Pipe (RCP)	LF	4,500	$50.00	$225,000.00
17	36-inch Reinforced Concrete Pipe (RCP)	LF	2,250	$110.00	$247,500.00
18	4 Ft x 4 Ft Type 'C' Drop Inlet	EA	30	$3,000.00	$90,000.00
19	Drop Inlet Extension (8 Ft)	EA	30	$1,000.00	$30,000.00
20	Erosion Control	LS	1	$50,000.00	$50,000.00
21	Concrete Sidewalk (4")	SY	500	$32.00	$16,000.00
22	Concrete Trail	SY	10,200.0	$35.00	$357,000.00
23	Seeding & Mulching	AC	7.0	$2,500.00	$17,500.00
24	Imported Top Soil	SY	32,400	$3.00	$97,200.00
25	Striping and Signage	LS	1	$15,000.00	$15,000.00
26	3" PVC Schedule 40 Conduit	LF	750	$20.00	$15,000.00
27	Right-of-Way/ Easement Acquisition	LS	1	$575,000.00	$575,000.00
28	Concrete Bridge (66'x100')	SF	6,600	$130.00	$858,000.00
29	Street Trees	EA	85	$600.00	$51,000.00
30	Signalization (Sixth St.)	LS	1	$150,000.00	$150,000.00
31					$0.00
	TOTAL ESTIMATED CONSTRUCTION COSTS				**$4,725,660.00**
	CONTINGENCY (20%)				**$945,132.00**
	TOTAL ESTIMATED COST				**$5,670,792.00**

Rupple Rd. Improvements - MLK to Persimmon

OPTION 2 COST ESTIMATE- FEBRUARY 2014

Item No.	Item Description	Unit	Estimated Quantity	Costs	
				Unit Price	Estimated Price
1	Mobilization	LS	1	$150,000.00	$150,000.00
2	Construction Staking	LS	1	$50,000.00	$50,000.00
3	Maintenance of Traffic	LS	1	$15,000.00	$15,000.00
4	Tree Protection Fencing	LF	1,000	$5.00	$5,000.00
5	Excavation Safety	LS	1	$5,000.00	$5,000.00
6	Clearing & Grubbing	LS	1	$20,000.00	$20,000.00
7	R & D Curb & Gutter	LF	200	$4.00	$800.00
8	Asphalt Milling	SY	200	$8.00	$1,600.00
9	Unclassified Excavation	CY	49,111	$8.00	$392,888.00
10	Compacted Embankment - Select Hillside	CY	32,740	$12.00	$392,880.00
11	Undercut & Backfill	CY	9,000	$17.50	$157,500.00
12	Six-inch Aggregate Street Base Course (Class 7)	SY	38,911	$8.00	$311,288.00
13	Concrete Curb & Gutter	LF	16,400	$11.50	$188,600.00
14	Two-inch ACHM Surface Course (Type 2)	SY	20,889	$12.00	$250,668.00
15	Four-inch ACHM Binder Course (Type 2)	SY	20,889	$16.00	$334,224.00
16	18-inch Reinforced Concrete Pipe (RCP)	LF	6,000	$50.00	$300,000.00
17	36-inch Reinforced Concrete Pipe (RCP)	LF	3,000	$110.00	$330,000.00
18	4 Ft x 4 Ft Type 'C' Drop Inlet	EA	50	$3,000.00	$150,000.00
19	Drop Inlet Extension (8 Ft)	EA	40	$1,000.00	$40,000.00
20	Erosion Control	LS	1	$50,000.00	$50,000.00
21	Concrete Sidewalk (4")	SY	4,300	$32.00	$137,600.00
22	Concrete Trail	SY	10,200.0	$35.00	$357,000.00
23	Seeding & Mulching	AC	9.5	$2,500.00	$23,750.00
24	Imported Top Soil	SY	47,600	$3.00	$142,800.00
25	Striping and Signage	LS	1	$20,000.00	$20,000.00
26	3" PVC Schedule 40 Conduit	LF	750	$20.00	$15,000.00
27	Right-of-Way/ Easement Acquisition	LS	1	$575,000.00	$575,000.00
28	Concrete Bridge (66'x100')	SF	6,600	$130.00	$858,000.00
29	Street Trees	EA	85	$600.00	$51,000.00
30	Signalization (Sixth St.)	LS	1	$150,000.00	$150,000.00
31	Five-inch Aggregate Base Course for Shoulder	SY	12,089	$7.00	$84,623.00
	TOTAL ESTIMATED CONSTRUCTION COSTS				**$5,560,221.00**
	CONTINGENCY (20%)				**$1,112,044.20**
	TOTAL ESTIMATED COST				**$6,672,265.20**

Rupple Rd. Improvements - Persimmon to Congressional

FULL IMPROVEMENTS COST ESTIMATE - FEBRUARY 2014

Item No.		Unit	Estimated Quantity	Costs	
				Unit Price	Estimated Price
1	Mobilization	LS	1	$150,000.00	$150,000.00
2	Construction Staking	LS	1	$50,000.00	$50,000.00
3	Maintenance of Traffic	LS	1	$15,000.00	$15,000.00
4	Tree Protection Fencing	LF	1,000	$5.00	$5,000.00
5	Excavation Safety	LS	1	$5,000.00	$5,000.00
6	Clearing & Grubbing	LS	1	$20,000.00	$20,000.00
7	R & D Curb & Gutter	LF	3,740	$4.00	$14,960.00
8	Asphalt Milling	SY	11,070	$8.00	$88,560.00
9	Unclassified Excavation	CY	5,700	$8.00	$45,600.00
10	Compacted Embankment - Select Hillside	CY	9,150	$12.00	$109,800.00
11	Undercut & Backfill	CY	500	$17.50	$8,750.00
12	Six-inch Aggregate Street Base Course (Class 7)	SY	6,171	$8.00	$49,368.00
13	Concrete Curb & Gutter	LF	7,860	$11.50	$90,390.00
14	Two-inch ACHM Surface Course (Type 2)	SY	10,556	$12.00	$126,672.00
15	Four-inch ACHM Binder Course (Type 2)	SY	5,400	$16.00	$86,400.00
16	18-inch Reinforced Concrete Pipe (RCP)	LF	600	$50.00	$30,000.00
17	36-inch Reinforced Concrete Pipe (RCP)	LF	1,300	$110.00	$143,000.00
18	4 Ft x 4 Ft Type 'C' Drop Inlet	EA	30	$3,000.00	$90,000.00
19	Drop Inlet Extension (8 Ft)	EA	30	$1,000.00	$30,000.00
20	Erosion Control	LS	1	$50,000.00	$50,000.00
21	Concrete Sidewalk (4")	SY	1,700	$32.00	$54,400.00
22	Concrete Trail	SY	3,900	$35.00	$136,500.00
23	Seeding & Mulching	AC	2	$2,500.00	$5,000.00
24	Imported Top Soil	SY	10,300	$3.00	$30,900.00
25	Striping and Signage	LS	1	$35,000.00	$35,000.00
26	3" PVC Schedule 40 Conduit	LF	700	$20.00	$14,000.00
27	Right-of-Way/ Easement Acquisition	LS	1	$100,000.00	$100,000.00
28	Signalization	LS	1	$250,000.00	$250,000.00
29	Street Trees	EA	30	$600.00	$18,000.00
30					
	TOTAL ESTIMATED CONSTRUCTION COSTS				**$1,852,300.00**
	CONTINGENCY (20%)				**$370,460.00**
	TOTAL ESTIMATED COST				**$2,222,760.00**

Rupple Rd. Improvements - Persimmon to Congressional

INTERSECTIONS ONLY COST ESTIMATE - FEBRUARY 2014

Item No.	Item Description	Unit	Estimated Quantity	Costs	
				Unit Price	Estimated Price
1	Mobilization	LS	1	$150,000.00	$150,000.00
2	Construction Staking	LS	1	$50,000.00	$50,000.00
3	Maintenance of Traffic	LS	1	$15,000.00	$15,000.00
4	Tree Protection Fencing	LF	1,000	$5.00	$5,000.00
5	Excavation Safety	LS	1	$5,000.00	$5,000.00
6	Clearing & Grubbing	LS	1	$20,000.00	$20,000.00
7	R & D Curb & Gutter	LF	2,400	$4.00	$9,600.00
8	Asphalt Milling	SY	7,470	$8.00	$59,760.00
9	Unclassified Excavation	CY	2,100	$8.00	$16,800.00
10	Compacted Embankment - Select Hillside	CY	1,400	$12.00	$16,800.00
11	Undercut & Backfill	CY	150	$17.50	$2,625.00
12	Six-inch Aggregate Street Base Course (Class 7)	SY	2,300	$8.00	$18,400.00
13	Concrete Curb & Gutter	LF	2,500	$11.50	$28,750.00
14	Two-inch ACHM Surface Course (Type 2)	SY	10,556	$12.00	$126,672.00
15	Four-inch ACHM Binder Course (Type 2)	SY	2,087	$16.00	$33,392.00
16	18-inch Reinforced Concrete Pipe (RCP)	LF	250	$50.00	$12,500.00
17	36-inch Reinforced Concrete Pipe (RCP)	LF	500	$110.00	$55,000.00
18	4 Ft x 4 Ft Type 'C' Drop Inlet	EA	15	$3,000.00	$45,000.00
19	Drop Inlet Extension (8 Ft)	EA	15	$1,000.00	$15,000.00
20	Erosion Control	LS	1	$50,000.00	$50,000.00
21	Concrete Sidewalk (4")	SY	1,000	$32.00	$32,000.00
22	Concrete Trail	SY	2,100	$35.00	$73,500.00
23	Seeding & Mulching	AC	1.0	$2,500.00	$2,500.00
24	Imported Top Soil	SY	6,800	$3.00	$20,400.00
25	Striping and Signage	LS	1	$30,000.00	$30,000.00
26	3" PVC Schedule 40 Conduit	LF	500	$20.00	$10,000.00
27	Right-of-Way/ Easement Acquisition	LS	1	$100,000.00	$100,000.00
28	Signalization	LS	1	$250,000.00	$250,000.00
	TOTAL ESTIMATED CONSTRUCTION COSTS				**$1,253,699.00**
	CONTINGENCY (20%)				**$250,739.80**
	TOTAL ESTIMATED COST				**$1,504,438.80**

RUPPLE ROAD Corridor from MLK (Hwy 62) to Wedington Drive (Hwy 16)

Traffic Impact Analysis

Date: February 25, 2014

Introduction

JACOBS was hired by the City of Fayetteville to conduct a traffic impact analysis for the extension of Rupple Road from MLK (Hwy 62) to just south of Persimmon Street. The study area also included the existing section from Persimmon Street to Wedington Drive. The study area is shown in **Figure 1**.

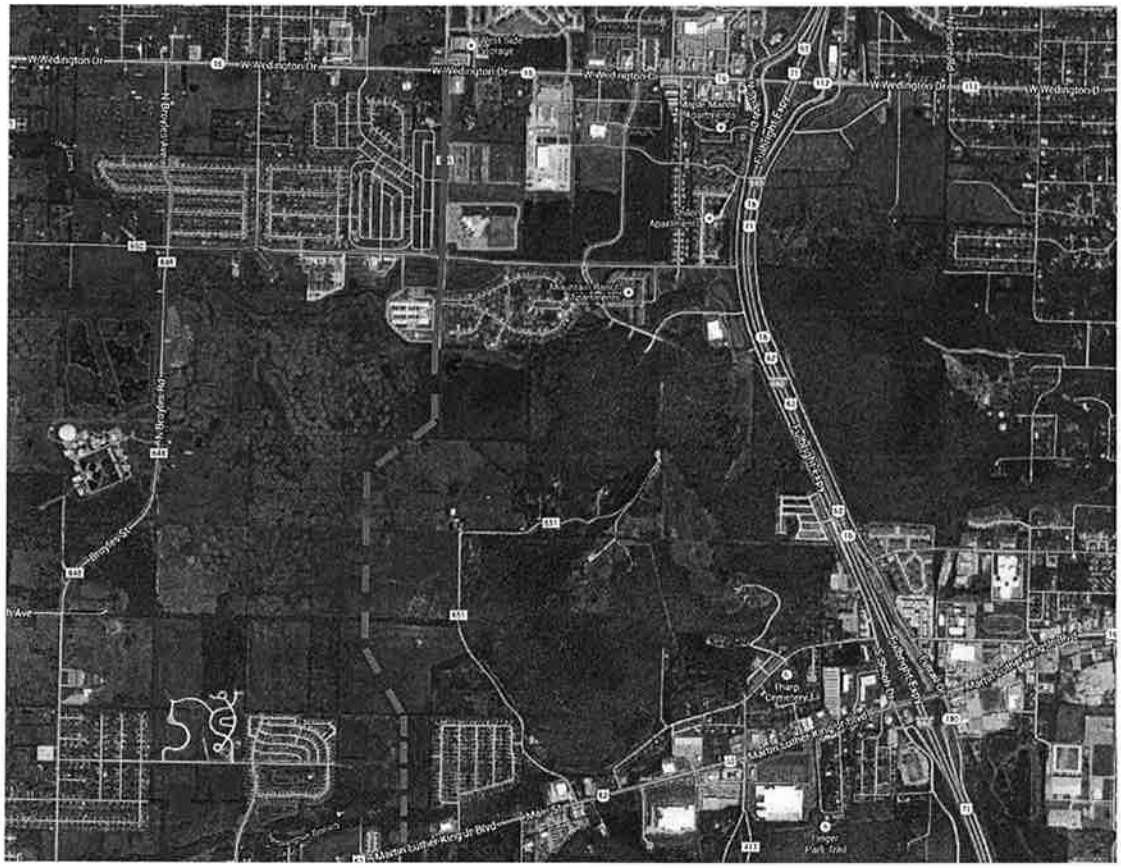


Figure 1. Study Area

Currently Rupple Road in the study area extends south from Wedington Drive to just south of the Owl Creek Elementary/Middle School. There is a traffic signal at the intersection with Wedington Drive and a 4-way stop at the Persimmon Street intersection. Rupple Road does not exist between the school and MLK (Hwy 62). The Master Street Plan (City Plan 2030) designates Rupple Road as a principal arterial parkway. The typical section for principal arterials obtained from the Master Street Plan is shown in **Figure 2**. For the study, parking was not included in the analysis.

PRINCIPAL ARTERIALS WITH ON-STREET PARKING are intended to be used in compact urban environments that are highly walkable and where building entries front the street. This street section is not intended to be used where traffic speeds exceed 30 MPH.

7	PRINCIPAL ARTERIAL BOULEVARD (WITH PARKING):
Design Service Volume:	< 17,600 vpd
Desired Operating Speed:	25-30 mph
Travel Lanes:	Four 11' lanes
Bicycle Lanes:	Shared with outer auto travel lanes
Median/Turn Lane:	10' median, 12' turn lane
Parking:	8' lane, both sides of street
Paved Width:	30' from face of curb with median 42' from face of curb with turn lane 70' entire width including median
Right of Way:	87'
Sidewalks:	Both sides of street, min. 8' wide with grated tree wells against curb
Greenspace:	None

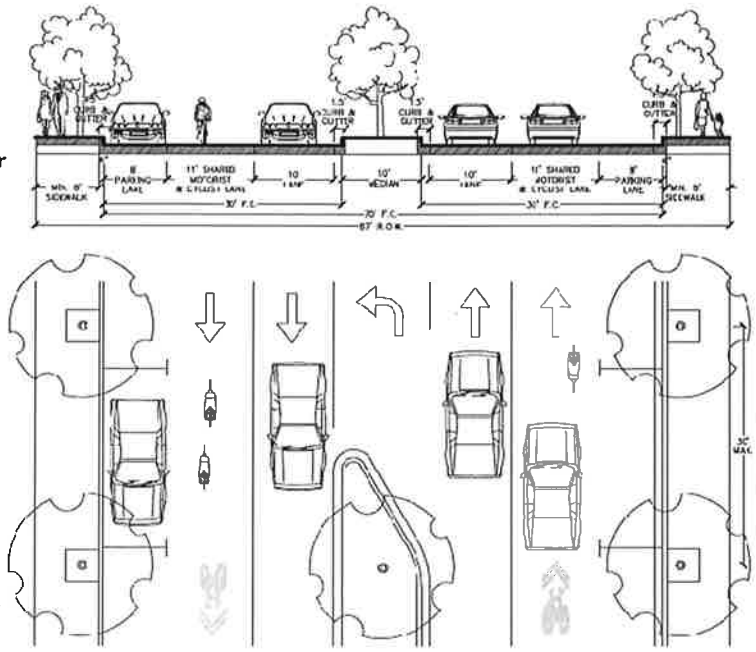
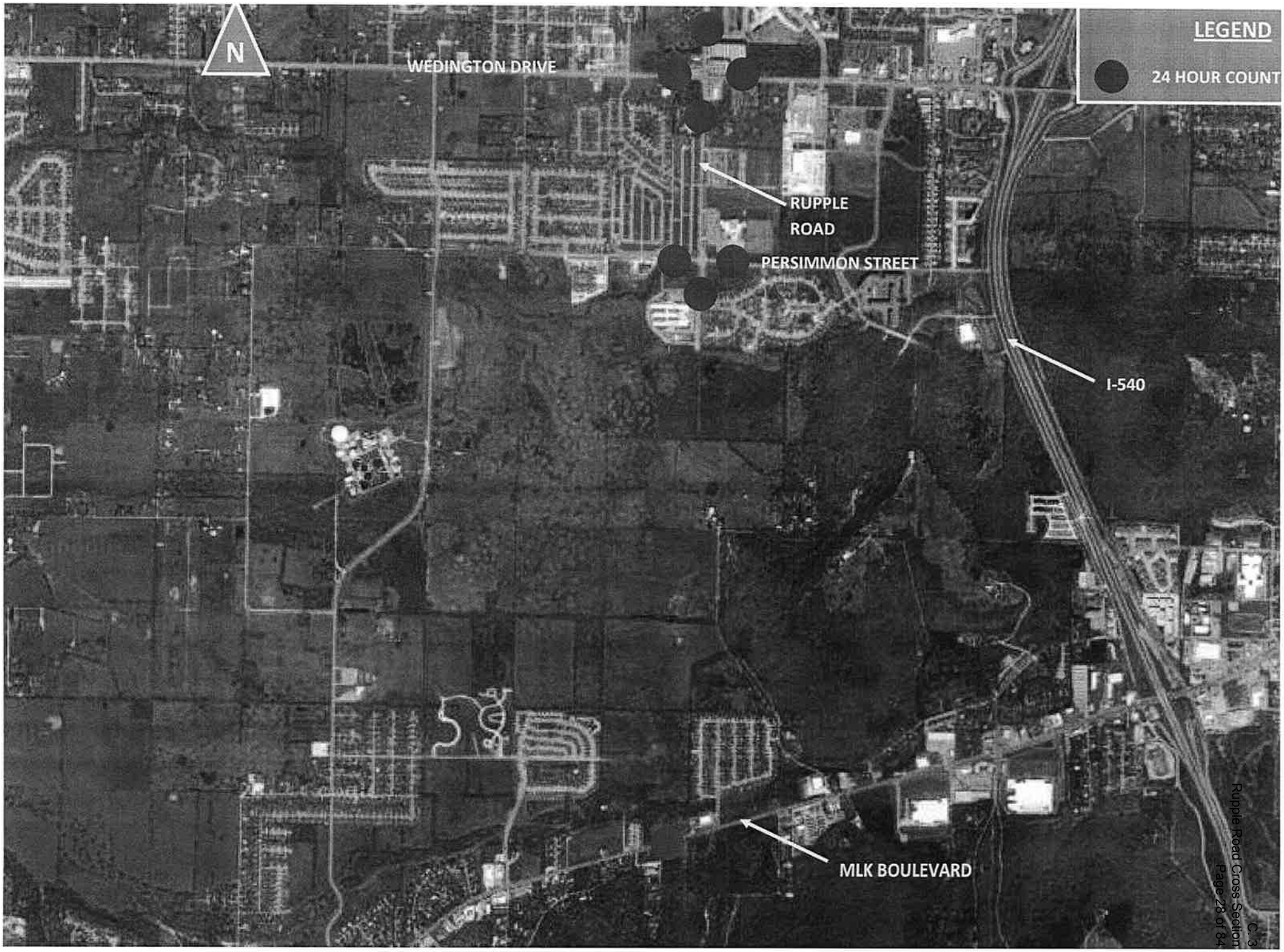


Figure 2. Master Street Plan – Street Section

Study Process:

The step by step study process that we have used in this study is:

1. Collected the existing information in and around the study area.
2. The turning movement counts were collected from two (2) intersections(Rupple Road/Wedington Drive and Rupple Road/Persimmon Street). Turning movement counts were collected on a Tuesday and a Wednesday in October and November, 2013.
3. Radar counters were used to collect 24 hour counts at strategic points on the road network around the campus as shown in **Figure 3.**
4. The City of Fayetteville provided the future zoning information for the study area (see **Table 4**).


N
WEDINGTON DRIVE
LEGEND
24 HOUR COUNT
RUPPLE
ROAD
PERSIMMON STREET
I-540
MLK BOULEVARD

5. Jacobs has collected some information from other sources:
    a. Signal timings from City of Fayetteville.
    b. Average Daily Traffic (ADT's) from the Arkansas Highway and Transportation Department (AHTD) website.
6. Development of VISSIM and Synchro base models for the study area.
7. Development of future traffic numbers based on the historical traffic counts in the area as well as future development of the area along the corridor using the future zoning information provided by the City.
8. Analysis and calibration of the existing traffic in the base models.
9. Analysis of the future alternatives.
10. Summary of results and findings.

After collecting the data a base traffic model was developedfor the analysis. The modeling software that is used on this project is VISSIM. VISSIM is microscopic time step driver behavior traffic simulation software, developed to model urban traffic (vehicle and pedestrian) and public transit operations. The program analyzes traffic and transit operations under constraints such as lane configuration, traffic composition, traffic signals, transit stops, etc.,thus making it a useful tool for the evaluation of various alternatives based on transportation engineering and planning measures of effectiveness (MOE's) such as vehicle delay, travel times and queue lengths. This program is capable of implicitly modeling passenger vehicle, light rail transit (LRT) vehicle and pedestrians simultaneously and also offers great visualization from simple to complex traffic conditions to provide a realistic picture of the traffic operations.

Level of Service

Level of service (LOS) is a term defined in the Highway Capacity Manual (HCM) to describe the operating performance of an intersection or roadway. The LOS of an intersection is a qualitative measure of capacity and operating conditions and is directly related to vehicle delay. LOS results range from "A" (minimal delay and conflicts) to "F" (significant delays and congestion), with LOS A representing very short delays and LOS F representing very long delays. As a practical consideration, LOS D is considered the limit of acceptable operation in an urban environment. LOS C is the desirable condition. LOS conditions for signalized intersections are shown in **Table 1.** For unsignalized intersections, the levels of service are shown in **Table 2.** The graphical representation of each intersect on LOS category is displayed in the below **Figure 4.**

Table 1. Level of Service Criteria for Signalized Intersections

Level-of-Service (LOS)	Average Control Delay (seconds/vehicle)	Description
A	≤ 10.0	Very low vehicle delays, free flow, signal progression extremely favorable, most vehicles arrive during given signal phase.
B	10.1 to 20.0	Good signal progression, more vehicles stop and experience higher delays than for LOS A.
C	20.1 to 35.0	Stable flow, fair signal progression, significant number of vehicles stop at signals.
D	35.1 to 55.0	Congestion noticeable, longer delays and unfavorable signal progression, many vehicles stop at signals.
E	55.1 to 80.0	Limit of acceptable delay, unstable flow, poor signal progression, traffic near roadway capacity, frequent cycle failures.
F	> 80.0	Unacceptable delays, extremely unstable flow and congestion, traffic exceeds roadway capacity, stop-and-go conditions.

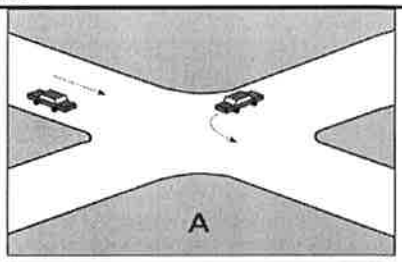
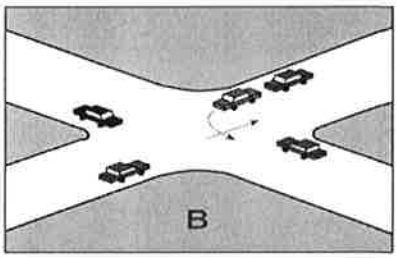
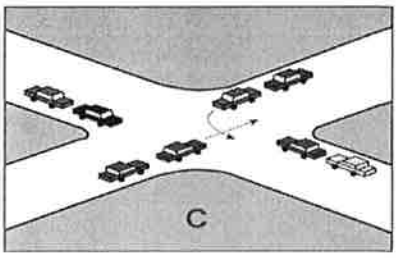
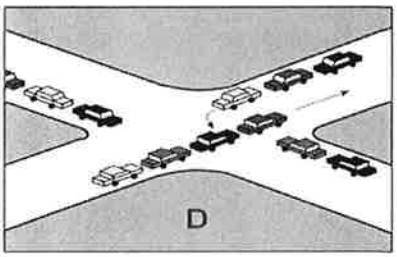
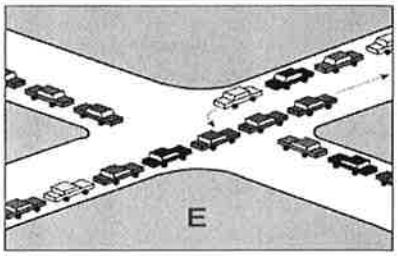
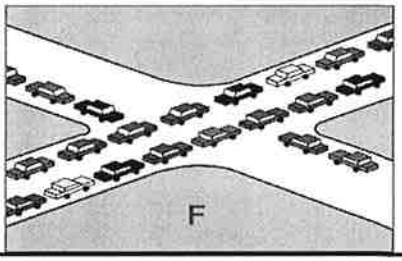
Source: HCM 2010

Table 2. Level of Service Criteria for Unsignalized Intersections

Level-of-Service (LOS)	Average Control Delay (seconds/vehicle)	Description
A	≤ 10.0	No delays at intersections with continuous flow of traffic. Uncongested operations: high frequency of long gaps available for all left and right turning traffic. No observable queues.
B	10.1 to 15.0	Same as LOS A
C	15.1 to 25.0	Moderate delays at intersections with satisfactory to good traffic flow. Light congestion; infrequent backups on critical approaches.
D	25.1 to 35.0	Increased probability of delays along every approach. Significant congestion on critical approaches, but intersection functional. No standing long lines formed.
E	35.1 to 50.0	Heavy traffic flow condition. Heavy delays probable. No available gaps for cross-street traffic or main street turning traffic. Limit of stable flow.
F	> 50.0	Unstable traffic flow. Heavy congestion. Traffic moves in forced flow condition. Average delays greater than one minute highly probable. Total breakdown.

Source: HCM 2010

Figure 4 – Level of Service Descriptions

LOS	Intersections	
A	No vehicle waits longer than one signal indication.	
B	On a rare occasion, vehicles wait through more than one signal indication.	
C	Intermittently, vehicles wait through more than one signal indication, occasionally backups may develop, traffic flow still stable and acceptable.	
D	Delays at intersections may become extensive, but enough cycles with lower demand occur to permit periodic clearance, preventing excessive backups.	
E	Very long queues may create lengthy delays.	
F	Backups from locations downstream restrict or prevent movement of vehicles out of approach creating a "gridlock" condition.	

Existing Traffic

The existing traffic data collected for the study area are summarized in the tables below. The traffic data counts are in the appendix. Overall, the AM traffic counts represent higher peak hour volumes for the study area and are, therefore, the focus of the analysis.

Table 3 – Existing 2013 Peak Hour Traffic Volumes

Existing AM Intersection	Southbound			Westbound			Northbound			Eastbound		
	Lt	Th	Rt	Lt	Th	Rt	Lt	Th	Rt	Lt	Th	Rt
Wedington Dr /Rupple Rd	182	107	45	172	239	82	14	74	161	172	999	25
Persimmon St /Rupple Rd	106	127	63	79	66	13	32	72	124	90	175	27
MLK Blvd /Rupple Rd(Future)	-	-	-	-	114	-	-	-	-	-	351	-

Existing PM Intersection	Southbound			Westbound			Northbound			Eastbound		
	Lt	Th	Rt	Lt	Th	Rt	Lt	Th	Rt	Lt	Th	Rt
Wedington Dr/Rupple Rd	154	101	158	194	835	110	20	46	121	51	527	13
Persimmon St/Rupple Rd	41	36	44	27	61	16	12	76	58	60	79	7
MLK Blvd/Rupple Rd (Future)	-	-	-	-	304	-	-	-	-	-	200	-

Future Traffic

Future traffic was generated for the study area using zoning to estimate future development densities. Fayetteville Planning provided two densities for residential zoning in the area.

Table 4 – Future Zoning in Study Area

Fayetteville Planning	Type	Density
Mountain Ranch	Typical Suburban Development	1.95 units per acre
Rupple Row	Traditional/New Urbanism Development Pattern	6.24 units per acre

The future zoning area is approximately 1 mile long by a half mile wide or 320 acres. Which would provide approximately 1997 units with the higher density or 624 units for the lesser density. For this study, 1997 units were used.

Table 5 – Average Weekday – ITE Trip Generation

Average Weekday – ITE Trip Generation					
24 Hour Two-way Volume	7-9 AM Peak Hour		4-6 PM Peak Hour		Units
	Enter	Exit	Enter	Exit	
19111	**379**	**1118**	1278	739	**1997**
12537	249	734	838	485	1310
5972	119	349	399	231	624

Using the data from the table above, traffic was generated along the study corridor. For the future design year (2033), historical traffic volumes were used to develop a growth rate for

road. Multiple growth rates were developed (Wedington Drive, Rupple Road, and MLK Blvd). The rates varied from 1.% on Rupple Road, 1.8% on Wedington Drive and 1.3% on MLK Blvd.

Table 6 – 2013 Opening Peak Hour Traffic Volumes with Improvements

Existing (with Improvements) AM Intersection	Southbound			Westbound			Northbound			Eastbound		
	Lt	Th	Rt	Lt	Th	Rt	Lt	Th	Rt	Lt	Th	Rt
Wedington Drive/Rupple Road	164	143	45	216	215	82	45	105	185	172	999	130
Intermediate Int/Rupple Road	18	461	10	10	2	25	5	235	13	75	2	25
Persimmon Street/Rupple Road	126	292	78	79	66	13	62	135	124	105	175	46
School/Subdivision/ Rupple Road	25	362	30	40	10	50	20	251	20	20	10	20
Future Intersection 1	25	362	30	40	10	50	20	251	20	20	10	20
Future Intersection 2	20	382	20	25	20	50	15	184	15	57	20	25
MLK Blvd/ Rupple Road (Future)	357	-	75	-	114	125	-	-	-	89	316	-

Table 7 – 2033 Future Traffic with Improvements

Future (with Improvements) AM Intersection	Southbound			Westbound			Northbound			Eastbound		
	Lt	Th	Rt	Lt	Th	Rt	Lt	Th	Rt	Lt	Th	Rt
Wedington Drive /Rupple Road	239	248	66	374	307	117	159	269	674	246	1284	201
Intermediate Int/Rupple Road	23	765	13	13	3	32	6	973	18	96	3	32
Persimmon Street /Rupple Road	187	498	125	101	85	17	80	845	159	135	224	59
School/Subdivision/ Rupple Road	32	588	38	51	13	64	26	994	26	26	13	26
Future Intersection 1	86	610	86	144	26	233	62	572	59	241	26	144
Future Intersection 2	60	780	60	112	26	201	58	324	55	168	26	112
MLK Blvd /Rupple Road (Future)	818	-	186	-	148	288	-	-	-	149	409	-

Analysis

Synchro Analysis

The intersection of Rupple Road and Persimmon Street was evaluated in Synchro using Design Year-2033 volumes (developed earlier when determining the type of intersection control to be used at the intersection, not the same traffic volumes used in the VISSIM models) to determine if the intersection would operate best as a signalized intersection or as a roundabout intersection based on Highway Capacity Manual (HCM) 2010 methodology.

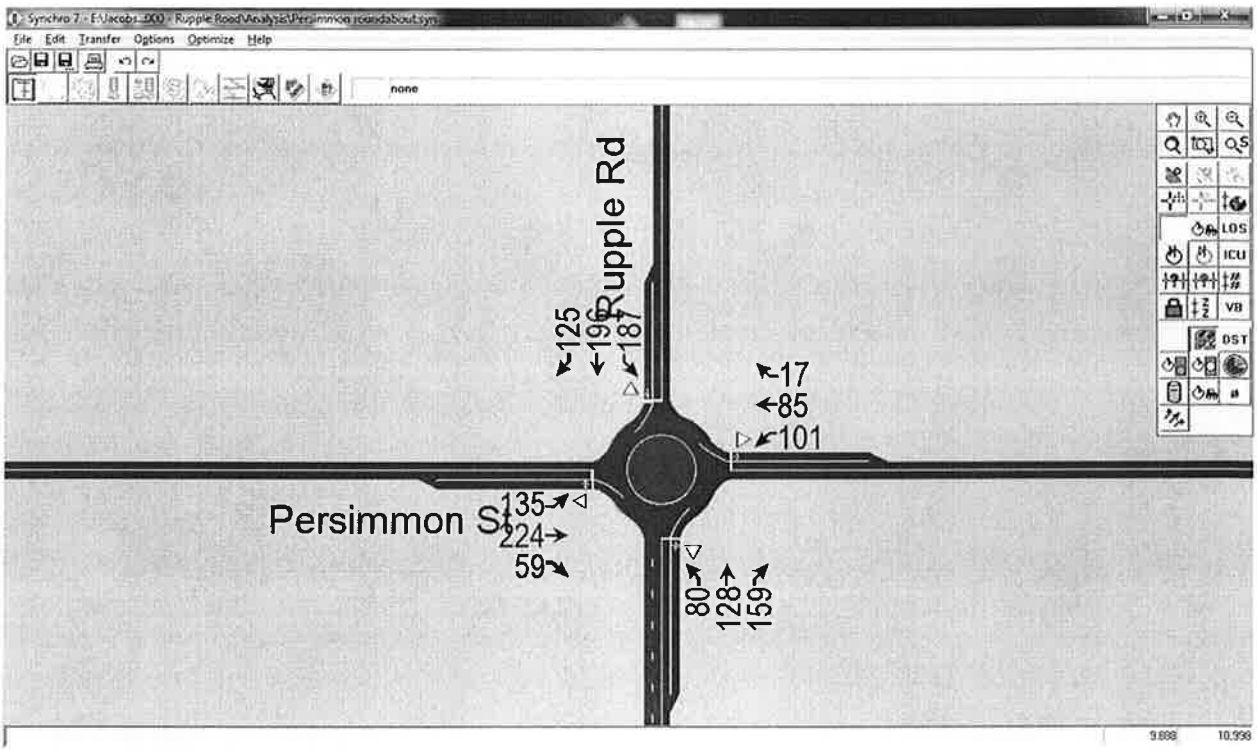


Figure 5 – Syncrho Roundabout Graphic

The following assumptions were made regarding the roundabout analysis:

- North and south approaches reduced to one lane northbound and one lane southbound
- Two-lane roundabout with two exit lanes on the south leg.
- 75 feet outer radius
- 15 feet roundabout lanes
- 18 mph circle speed
- PHF = 0.92
- 5% heavy vehicles
- 25 mph approach link speed

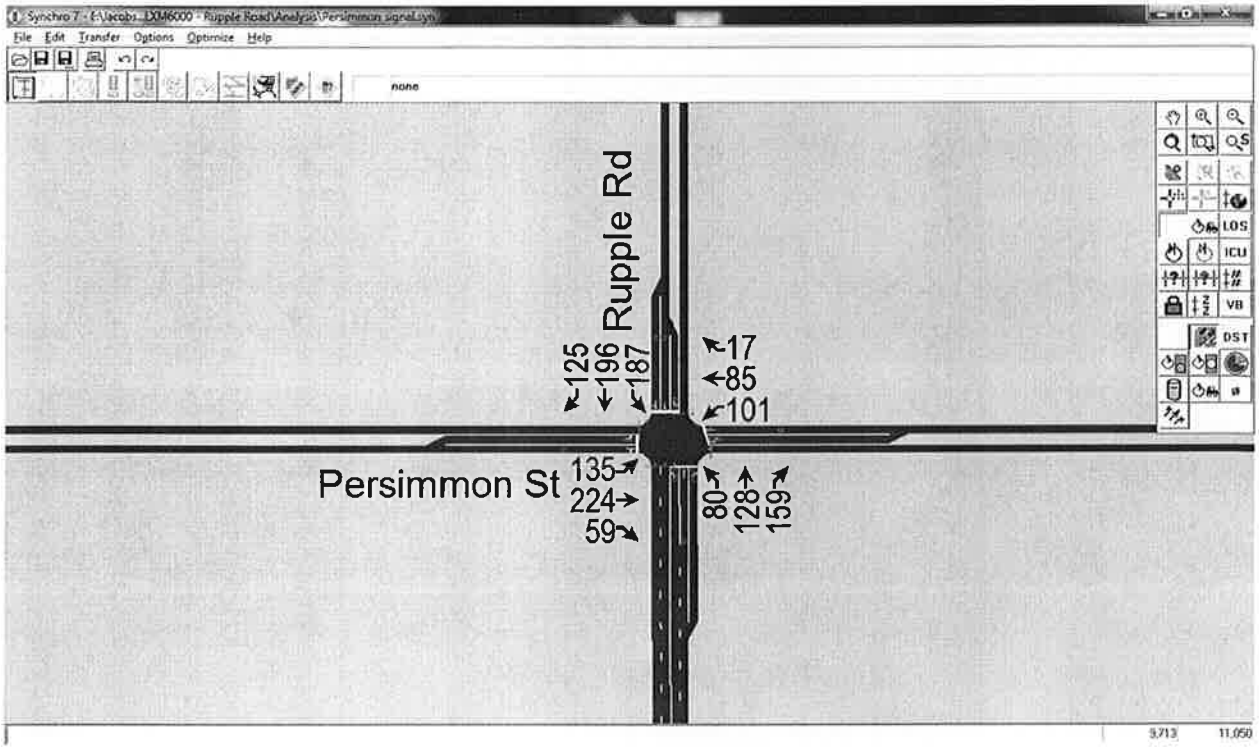


Figure 6 – Syncrho Signalized Graphic

The following assumptions were made with regard to the signalized intersection analysis:

- Existing lane configuration at approaches will not change
- Cycle length of 120 seconds
- Permitted left turns
- PHF = 0.92
- 5% heavy vehicles
- 25 mph approach link speed

The results are shown in the table below.

Table 8 – Persimmon Street Intersection Delay Comparison

Scenario	Delay (sec/veh)	LOS
Roundabout	9.3	A
Signalized Intersection	11.3	B

Both scenarios have a low overall intersection delay. Given the negligible difference in overall delay, it was decided to model the intersection of Rupple Road and Persimmon Street as a signalized intersection in VISSIM to provide improved safety conditions for pedestrians.

VISSIM Analysis

Three (3) horizon year models were created within VISSIM. These models consisted of an Existing Year 2013, Opening Year 2013, and Design Year 2033 scenarios.

The Existing Year 2013 model has the existing geometry for Rupple Road including the intersections of Wedington Drive and Persimmon Street. The Existing Year model was calibrated using traffic volumes and travel times collected in October and November 2013. The targets of this calibration effort were obtained from the *Traffic Analysis Toolbox Volume III – Guidelines for Applying Traffic Microsimulation Modeling Software* published by the Federal Highway Administration (FHWA) and shown in the figure below.

Criteria and Measures	Calibration Acceptance Targets
Hourly Flows, Model Versus Observed	
Individual Link Flows	
Within 15%, for 700 veh/h < Flow < 2700 veh/h	> 85% of cases
Within 100 veh/h, for Flow < 700 veh/h	> 85% of cases
Within 400 veh/h, for Flow > 2700 veh/h	> 85% of cases
Sum of All Link Flows	Within 5% of sum of all link counts
GEH Statistic < 5 for Individual Link Flows*	> 85% of cases
GEH Statistic for Sum of All Link Flows	GEH < 4 for sum of all link counts
Travel Times, Model Versus Observed	
Journey Times, Network	
Within 15% (or 1 min, if higher)	> 85% of cases
Visual Audits	
Individual Link Speeds	
Visually Acceptable Speed-Flow Relationship	To analyst's satisfaction
Bottlenecks	
Visually Acceptable Queuing	To analyst's satisfaction

Figure 7 – FHWA Microsimulation Model Calibration Targets

Most of the criteria included in the above figure are self-explanatory, with the possible exception of GEH Statistic. This measure is a formula used in traffic modeling to compare two sets of traffic volumes (Observed and Modeled). Its mathematical formulation is similar to the Chi-Squared test, but it is not a true statistical test but rather an empirical formula. The formulation for the GEH Statistic is as follows:

$$GEH = \sqrt{\frac{2 * (M - O)^2}{(M + O)}}$$

Where M represents model estimate volume and O represents field counts.

This statistic is typically used to offset the discrepancies that occur when using only simple percentages, as traffic volumes vary over a wide range. In other words, if using only percentages, small absolute discrepancies have no impact on large volumes but a large percent impact in smaller numbers, and vice versa. It has been shown that for traffic volumes smaller than 10,000 a five percent variation yields smaller numbers than a GEH of five. Beyond 10,000, five percent differences keep growing linearly whereas GEH=5 follows a decaying curve.

The tables below summarize the calibration results in terms of GEH values and link flows for the AM peak period model. The results indicate that the model satisfies the volume calibration criteria listed above.

Table 9 – Percentage of Links Meeting Flow Thresholds

Individual Link Flows			
Time	**Flow<700 vph (± 100)**	**700<Flow<2700 vph (± 15%)**	**Flow>2700 vph(±400)**
AM	100%	100%	NA

Table 10 – Sum of Link Flows (Criteria within ±5%):

Sum of Link Flows	
AM	0.1%

Table 11 – Percentage of Links by GEH (Criteria GEH < 5)

GEH Links	
AM	100%

According to the calibration guidelines, a model is reasonably calibrated when the modeled travel times are within 15% (or one minute if higher) of the average field collected travel time for 85% of the cases. Of the field collected travel times provided, only one of the segments fell within the section of Rupple Road being modeled in the Existing Year model. This segment, specifically southbound Rupple Road from Wedington Drive to Persimmon Street, had an average field collected travel time of 83 seconds, this time is used to help calibrate the Existing Year model. The travel time for this segment within the Existing Year model was also 83 seconds.

The detailed volume and travel time calibration spreadsheets are included in the appendix for further reference.

For the Design Year 2033 VISSIM analysis the following geometry assumptions were made:

- Rupple Road would curve west shortly after the existing southern terminus before traveling directly south to Martin Luther King Jr. Boulevard
- The two proposed roundabouts between Persimmon Street and MLK Boulevard would have approximately equal spacing between them. The intersecting east-west roadways were assumed to be two-lane undivided facilities.
- As determined based upon the Synchro analysis, the intersection of Rupple Road and Persimmon Street would be modeled as a signalized intersection.

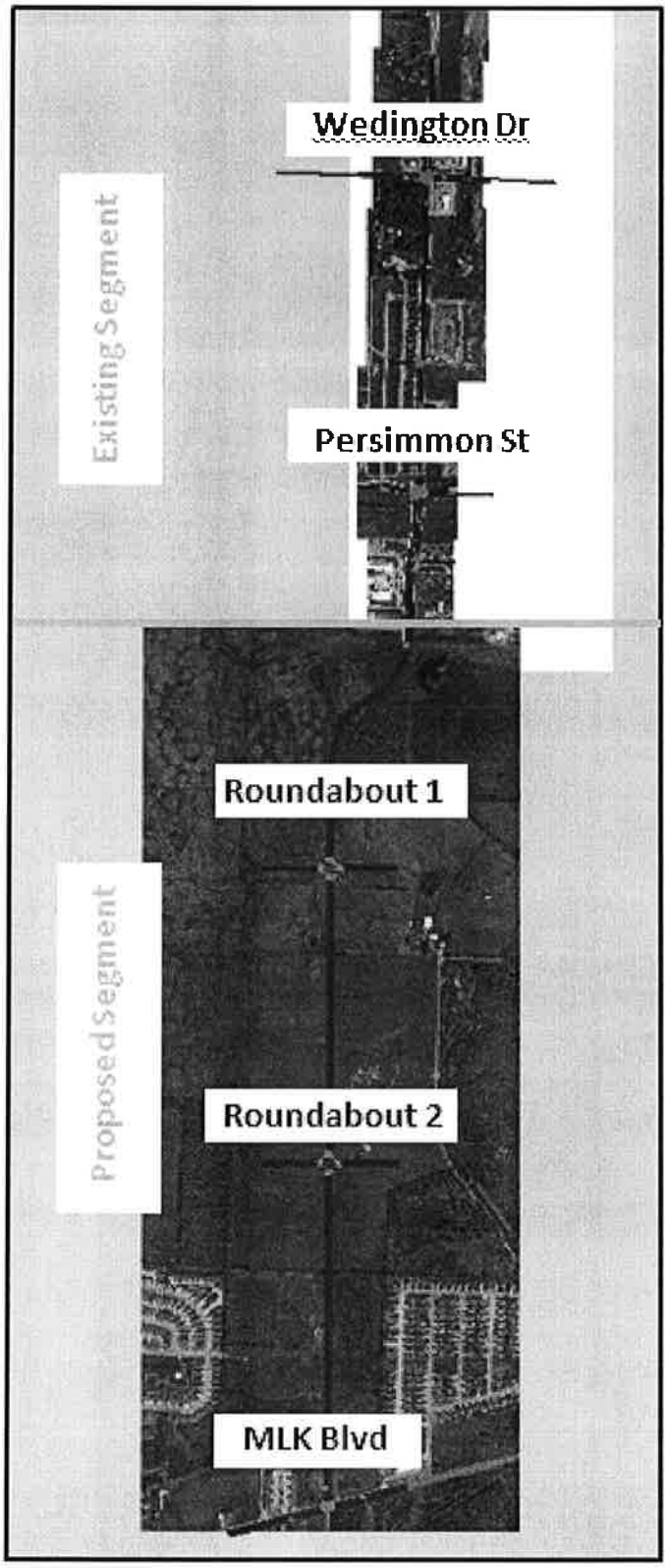


Figure 8 – Rupple Road Extension VISSIM Model

The following three (3) Build Alternatives were analyzed:

- 2-lane Build: Two-lane Rupple Road extension: This alternative provides a 2-lane roadway between Martin Luther King Jr. Boulevard and the existing 4-lane southern termini south of Persimmon Street, thereby providing a 2-lane facility between Martin Luther King Jr. Boulevard and Wedington Drive, with the exception of the existing 1,300 foot 4-lane segment south of Persimmon Street.
- 4-lane Build: This scenario provides a four lane roadway between Martin Luther King Jr. Boulevard and the existing 4-lane southern termini south of Persimmon Street. Under this scenario, Rupple Road between Martin Luther King Jr. Boulevard and Persimmon Street has a 4-lane section that reduces to a 2-lane facility at Persimmon Street.
- 4-lane to Wedington Drive Build Alternative: This alternative would provide a 4-lane facility from Martin Luther King Jr. Boulevard to Wedington Drive, eliminating the choke point which occurs when the roadway reduces from four lanes to two lanes at Persimmon Street. This alternative will require widening between Persimmon Street and Wedington Drive.
  Additional improvements also proposed under this scenario include:
  - Persimmon Street intersection: Modifying the northbound right turn lane into a shared thru-right turn lane
  - Wedington Drive intersection: Modify the northbound approach to include exclusive left turn lane, through lane and exclusive right turn lane with overlap phasing.
  - Wedington Drive intersection: Modify the southbound right turn lane to a shared thru-right turn lane.

The alternatives were evaluated using opening year and design year demand volumes, with the exception of 4-lane Build to Wedington Drive alternative which was only analyzed for Design Year 2033. Average vehicle delay at each intersection, corridor travel times, and network-wide performance measures (i.e., total process volumes, latent demand, total delay time, and average speed) were extracted from the VISSIM models to assess the performance of each alterative.

Summary of Results and Findings

One of the objectives of this analysis was to determine if and/or when the proposed segment of Rupple Road, extending from the current terminus south of Persimmon Street to Martin Luther King Jr. Boulevard, would need to be expanded from a two-lane roadway to a four-lane roadway. After analyzing the proposed segment of Rupple Road modeled as a two-lane roadway, it was determined that, although a two-lane facility appears to be operate satisfactorily under opening year demand conditions, a two-lane facility would not have sufficient capacity to accommodate the design year demand. Severe congestion was observed throughout the corridor in the Year 2033 2-lane Build microsimulation model. As shown in **Table 12**, an acceptable level of delay was observed at all intersections for both the 2-lane and 4-lane Build alternatives during opening year; whereas, **Table 13** shows the intersection delay at several intersections increases considerably as a result of the increase in

traffic volume expected in Year 2033 and lack of intersection capacity under the 2-lane and 4- lane alternatives. The results also indicate that delay along the corridor is substantially decreased when Rupple Road is widened from two to four lanes between Persimmon Street and Wedington Drive. Under the improved 4-lane scenario, intersection delays are less than 25 sec/veh, with the exception of the intersection at Wedington Drive which experiences a significant delay on the eastbound approach.

Table 12 – Opening Year 2013 Intersection Vehicle Delay

Intersection	Approach Direction	Opening Year (Existing AM with Corridor Extension)					
		2 Lane Build		4 Lane Build		Difference (4L - 2L)	
		Approach Delay	Intersection Delay/LOS	Approach Delay	Intersection Delay	Approach Delay	Intersection Delay
Wedington Drive	SB	25.8	26.0/C	26.8	26.3/C	0.9	0.3
	WB	20.0		20.4		0.4	
	NB	36.4		34.5		-1.9	
	EB	25.5		26.1		0.6	
Persimmon Street	SB	10.3	10.8/B	9.1	10.6/B	-1.2	-0.2
	WB	12.9		13.0		0.0	
	NB	9.6		10.0		0.4	
	EB	11.9		12.2		0.3	
Roundabout 1	SB	5.3	5.1/A	2.9	2.8/A	-2.4	-2.3
	WB	3.0		3.4		0.3	
	NB	5.4		1.2		-4.2	
	EB	4.8		6.0		1.3	
Roundabout 2	SB	6.5	5.4/A	1.9	2.0/A	-4.6	-3.4
	WB	2.7		2.0		-0.7	
	NB	4.5		1.5		-3.0	
	EB	4.9		3.7		-1.3	
Main Street / MLK Boulevard	SB	23.7	13.9/B	20.5	12.1/B	-3.2	-1.8
	WB	7.6		6.4		-1.1	
	-	-		-		-	
	EB	6.9		6.1		-0.9	

tersection	Approach Direction	2 Lane Build		4 Lane Build		Difference (4L - 2L)		Drive Build		Difference (4LW - 2L	
		Approach Delay	Intersection Delay/LOS	Approach Delay	Intersection Delay/LOS	Approach Delay	Intersection Delay/LOS	Approach Delay	Intersection Delay/LOS	Approach Delay	Intersecti Delay
'edington Drive	SB	29.8	213.8/F	29.1	178.2/F	-0.7	-35.5	32.3	71.2/E	2.5	-142.6
	WB	268.4		197.7		-70.7		43.3		-225.1	
	NB	355.4		346.5		-8.9		46.3		-309.1	
	EB	185.3		140.0		-45.3		122.6		-62.7	
ersimmon Street	SB	37.4	217.9/F	34.9	283.7/F	-2.5	65.8	19.8	22.7/C	-17.6	-195.2
	WB	63.8		70.3		6.5		45.3		-18.5	
	NB	575.3		739.2		163.9		14.5		-560.8	
	EB	65.8		71.0		5.1		38.3		-27.5	
undabout 1	SB	32.1	193.5/F	15.9	118.1/F	-16.2	-75.3	9.2	22.2/C	-22.9	-171.3
	WB	397.0		245.2		-151.9		43.0		-354.1	
	NB	378.8		221.8		-157.0		4.2		-374.5	
	EB	144.1		77.7		-66.4		53.3		-90.9	
undabout 2	SB	113.6	158.6/F	6.1	8.4/A	-107.5	-150.2	6.8	10.1/B	-106.8	-148.5
	WB	190.9		8.2		-182.7		7.5		-183.3	
	NB	255.6		5.4		-250.1		5.6		-250.0	
	EB	140.1		18.4		-121.7		28.9		-111.2	
in Street / MLK oulevard	SB	28.6	27.8/C	21.2	18.5/B	-7.4	-9.3	21.8	20.0/B	-6.8	-7.7
	WB	34.3		15.7		-18.7		17.5		-16.9	
	-	-		-		-		-		-	
	EB	21.8		16.3		-5.6		18.9		-2.9	

In addition to intersection operations, the travel time along the corridor and network wide performance were also assessed for each Build alternative. The travel time results are summarized in **Table 14**, while the opening year and design year network wide performance measures are presented in **Tables 15** and **16**, respectively.

Table 14 – Rupple Road Travel Times

Analysis Year Alternative	Travel Direction	From	To	Travel Time (minutes)
Opening Year 2013 2-lane Build	SB	Wedington Drive	Main Street / MLK Boulevard	5.7
	NB	Main Street / MLK Boulevard	Wedington Drive	6.1
Opening Year 2013 4-lane Build	SB	Wedington Drive	Main Street / MLK Boulevard	5.3
	NB	Main Street / MLK Boulevard	Wedington Drive	5.9
Design Year 2033 2-lane Build	SB	Wedington Drive	Main Street / MLK Boulevard	8.1
	NB	Main Street / MLK Boulevard	Wedington Drive	32.1
Design Year 2033 4-lane Build	SB	Wedington Drive	Main Street / MLK Boulevard	5.8
	NB	Main Street / MLK Boulevard	Wedington Drive	27.4
Design Year 2033 4-lane to Wedington Drive Build	SB	Wedington Drive	Main Street / MLK Boulevard	5.4
	NB	Main Street / MLK Boulevard	Wedington Drive	6.1

Demand and processed volume comparisons, as well as detailed travel time and vehicle delay results for all three (3) Build Alternatives have been provided in the appendix for further reference.

Table 15 – Opening Year 2013 Network Wide Performance Measures

Measure of Effectiveness	2 Lane Build	4 Lane Build
Number of Active Vehicles (veh)	117	126
Number of Arrived Vehicles (veh)	3,790	3,814
Number of Processed Vehicles (veh)	3,906	3,940
Latent Demand (veh)	0	0
% Latent Demand	0%	0%
Total Delay Time (hrs)	33	29
Average Delay Time (sec/veh)	30	27
Average Speed (mph)	22	22.5

Table 16 – Design Year 2033 Network Wide Performance Measures

Measure of Effectiveness	2 Lane Build	4 Lane Build	4 Lane to Wedington Drive Build
Number of Active Vehicles (veh)	772	686	306
Number of Arrived Vehicles (veh)	5,144	5,261	6,112
Number of Processed Vehicles (veh)	5,916	5,948	6,418
Latent Demand (veh)	1,230	1,177	480
% Latent Demand	17%	17%	7%
Total Delay Time (hrs)	529	456	125
Average Delay Time (sec/veh)	322	276	70
Average Speed (mph)	6.3	7.3	17

With respect to travel time along the study corridor, the travel time along the two-lane and four-lane extension of Rupple Road between Martin Luther King Jr. Boulevard and Wedington Drive is relatively the same in both the northbound and southbound directions in 2013, about 6 minutes; however, in 2033, the travel time is much longer in the northbound direction, about 32 minutes for the 2-lane Build alternative and 27 minutes for the 4-lane Build alternative. The travel time is improved considerably when the four-lane section is extended to Wedington Drive, reducing the average northbound travel time to 6 minutes in 2033.

Likewise, the network wide performance measures show noticeable improvement in Year 2033 when comparing the 2-lane Build to the 4-lane to Wedington Drive Build. The average speed is almost doubled, the latent demand is reduced in half, and the total network wide delay is decreased from approximately 500 seconds to 100 seconds. It should be noted that from a network wide standpoint, the 4-lane Build alternative does provide a minimal benefit in terms of total delay and average speed over the 2-lane Build alternative; however, the true benefit of providing a four-lane extension is diminished by the lane reduction at Persimmon Street which exists in the 4-lane Build alternative.

Based on the operation along the network with expected volumes in the opening year design, the 2-lane Build and the operation along the network with expected volumes in the design year, the 4-lane to Wedington Drive Build, the network should operate with acceptable total delay and average speed until the corridor is developed to approximately 50 to 75% built out. Determining when this level of development would occur would be difficult to approximate. Given the need for the connection, the close proximity to the school and I-540, the development could conceivably reach a 50 to 75% build out in 10 years.

Appendix

Opening Year 2013

2-Lane Build

RUPPLE ROAD
INTERSECTION ANALYSIS

Intersection	Approach Direction	Movement	Delay by movement (sec)	Processed Volume (vph)	Processed Approach Volume (vph)	Processed Intersection Volume (vph)	Movement % Approach Volume	Approach % Total Volume	Movement Delay Weighted by Volume (sec/veh)	Weighted Delay by Approach (sec/veh)	Intersection Delay (sec/veh)	Demand Volume (vph)	Demand Approach Volume (vph)	Difference	% Difference
Rupple Rd & Wedington Dr	SB	R	7.7	48	354	2431	14%	15%	1.0	25.8	26.0	45	352	2	0%
		T	27.9	143			41%		11.3			143			
		L	29.4	162			46%		13.5			164			
	WB	R	11.6	82	514		16%	21%	1.9	20.0		82	513	1	0%
		T	18.6	217			42%		7.8			215			
		L	24.7	215			42%		10.4			216			
	NB	R	31.1	201	362		56%	15%	17.3	36.4		185	335	27	8%
		T	44.0	113			31%		13.7			105			
		L	40.7	48			13%		5.4			45			
	EB	R	23.4	128	1202		11%	49%	2.5	25.5		130	1201	1	0%
		T	27.0	904			75%		20.3			899			
		L	19.1	170			14%		2.7			172			
Rupple Rd & Persimmon St	SB	R	8.0	82	501	1374	16%	36%	1.3	10.3	10.8	78	496	5	1%
		T	9.4	293			58%		5.5			292			
		L	14.0	126			25%		3.5			126			
	WB	R	6.7	14	158		9%	12%	0.6	12.9		13	158	0	0%
		T	10.4	67			42%		4.4			66			
		L	16.2	78			49%		7.9			79			
	NB	R	7.4	149	387		38%	28%	2.8	9.6		124	321	66	21%
		T	9.8	160			41%		4.1			135			
		L	13.3	78			20%		2.7			62			
	EB	R	8.6	45	328		14%	24%	1.2	11.9		46	326	2	0%
		T	11.9	181			55%		6.6			175			
		L	13.4	101			31%		4.1			105			
Rupple Rd & Roundabout 1	SB	R	4.8	19	435	920	4%	47%	0.2	5.3	5.1	20	422	13	3%
		T	5.4	396			91%		4.9			382			
		L	4.7	20			5%		0.2			20			
	WB	R	3.0	49	95		51%	10%	1.6	3.0		50	95	0	0%
		T	3.3	22			23%		0.8			20			
		L	2.8	24			26%		0.7			25			
	NB	R	6.0	19	288		6%	31%	0.4	5.4		15	214	74	35%
		T	5.4	247			86%		4.7			184			
		L	4.9	22			8%		0.4			15			
	EB	R	4.5	24	102		24%	11%	1.1	4.8		25	102	0	0%
		T	5.3	20			20%		1.1			20			
		L	4.7	57			56%		2.6			57			
Rupple Rd & Roundabout 2	SB	R	5.6	24	446	854	5%	52%	0.3	6.5	5.4	20	422	24	6%
		T	6.5	402			90%		5.9			382			
		L	6.3	20			5%		0.3			20			
	WB	R	2.7	50	95		53%	11%	1.4	2.7		50	95	0	0%
		T	2.8	21			22%		0.6			20			
		L	2.5	24			25%		0.6			25			
	NB	R	4.3	16	212		7%	25%	0.3	4.5		15	214	-2	-1%
		T	4.6	182			86%		4.0			184			
		L	4.0	14			7%		0.3			15			
	EB	R	5.1	26	102		25%	12%	1.3	4.9		25	102	0	0%
		T	4.9	21			20%		1.0			20			
		L	4.9	55			54%		2.7			57			

RUPPLE ROAD
INTERSECTION ANALYSIS

Intersection	Approach Direction	Movement	Delay by movement (sec)	Processed Volume (vph)	Processed Approach Volume (vph)	Processed Intersection Volume (vph)	Movement % Approach Volume	Approach % Total Volume	Movement Delay Weighted by Volume (sec/veh)	Weighted Delay by Approach (sec/veh)	Intersection Delay (sec/veh)	Demand Volume (vph)	Demand Approach Volume (vph)	Difference	% Difference
Rupple Rd & Main St / MLK Blvd	SB	R	12.5	80	447	1094	18%	41%	2.2	23.7	13.9	75	432	15	4%
		-	-	-			-		-			0			
		L	26.1	367			82%		21.4			357			
	WB	R	5.4	123	239		52%	22%	2.8	7.6		125	239	0	0%
		T	9.9	116			48%		4.8			114			
		-	-	-			-		-			0			
	EB	-	-	-	407		-	37%	-	6.9		0	405	2	1%
		T	6.9	318			78%		5.3			316			
		L	7.2	90			22%		1.6			89			

Travel Time Evaluation AM - Southbound

CP	From Intersection Crossing Intersection	VISSIM (Sec)	VISSIM (Min)
1	Wedington Dr	79.41	1.3
2	Persimmon St		
2	Persimmon St	96.84	1.6
3	Roundabout 1		
3	Roundabout 1	75.74	1.3
4	Roundabout 2		
4	Roundabout 2	92.42	1.5
5	Main St / MLK Blvd		
	Total	344.4	5.7

Travel Time Evaluation AM - Northbound

CP	From Intersection / Crossing Intersection	VISSIM (sec)	VISSIM (min)
5	Main St / MLK Blvd	79.8	1.3
4	Roundabout 2		
4	Roundabout 2	73.6	1.2
3	Roundabout 1		
3	Roundabout 1	100.2	1.7
2	Persimmon St		
2	Persimmon St	111.8	1.9
1	Wedington Dr		
	Total	365.4	6.1

Opening Year 2013

4-Lane Build

RUPPLE ROAD
INTERSECTION ANALYSIS

Intersection	Approach Direction	Movement	Delay by movement (sec)	Processed Volume (vph)	Processed Approach Volume (vph)	Processed Intersection Volume (vph)	Movement % Approach Volume	Approach % Total Volume	Movement Delay Weighted by Volume (sec/veh)	Weighted Delay by Approach (sec/veh)	Intersection Delay (sec/veh)	Demand Volume (vph)	Demand Approach Volume (vph)	Difference	% Difference
Rupple Rd & Wedington Dr	SB	R	7.8	47	357	2436	13%	15%	1.0	26.8	26.3	45	352	5	1%
		T	27.5	146			41%		11.2			143			
		L	31.6	164			46%		14.5			164			
	WB	R	10.8	80	508		16%	21%	1.7	20.4		82	513	-5	-1%
		T	18.5	216			42%		7.9			215			
		L	25.9	212			42%		10.8			216			
	NB	R	30.6	208	372		56%	15%	17.2	34.5		185	335	37	11%
		T	40.3	115			31%		12.4			105			
		L	37.8	49			13%		4.9			45			
	EB	R	23.5	128	1200		11%	49%	2.5	26.1		130	1201	-1	0%
		T	27.6	903			75%		20.8			899			
		L	20.4	170			14%		2.9			172			
Rupple Rd & Persimmon St	SB	R	7.5	81	499	1389	16%	36%	1.2	9.1	10.6	78	496	3	1%
		T	7.3	292			58%		4.3			292			
		L	14.3	126			25%		3.6			126			
	WB	R	6.4	14	165		9%	12%	0.6	13.0		13	158	7	4%
		T	10.6	70			42%		4.5			66			
		L	16.2	81			49%		7.9			79			
	NB	R	7.4	148	389		38%	28%	2.8	10.0		124	321	68	21%
		T	10.5	165			43%		4.5			135			
		L	14.3	75			19%		2.8			62			
	EB	R	8.4	48	336		14%	24%	1.2	12.2		46	326	10	3%
		T	12.4	184			55%		6.8			175			
		L	13.6	105			31%		4.2			105			
Rupple Rd & Roundabout 1	SB	R	3.1	19	439	931	4%	47%	0.1	2.9	2.8	20	422	17	4%
		T	2.8	400			91%		2.6			382			
		L	3.6	20			5%		0.2			20			
	WB	R	2.0	49	97		51%	10%	1.0	3.4		50	95	2	2%
		T	6.7	23			23%		1.6			20			
		L	3.0	25			26%		0.8			25			
	NB	R	1.0	19	291		7%	31%	0.1	1.2		15	214	77	36%
		T	1.2	251			86%		1.0			184			
		L	1.9	21			7%		0.1			15			
	EB	R	3.7	25	104		24%	11%	0.9	6.0		25	102	2	2%
		T	7.1	21			20%		1.4			20			
		L	6.6	58			56%		3.7			57			
Rupple Rd & Roundabout 2	SB	R	1.6	19	450	863	4%	52%	0.1	1.9	2.0	20	422	28	7%
		T	1.8	408			91%		1.7			382			
		L	2.5	23			5%		0.1			20			
	WB	R	1.6	49	94		52%	11%	0.8	2.0		50	95	-1	-1%
		T	2.6	21			22%		0.6			20			
		L	2.2	24			26%		0.6			25			
	NB	R	1.2	15	215		7%	25%	0.1	1.5		15	214	1	1%
		T	1.5	186			86%		1.3			184			
		L	2.7	14			7%		0.2			15			
	EB	R	3.2	26	104		25%	12%	0.8	3.7		25	102	2	1%
		T	4.3	21			20%		0.9			20			
		L	3.7	57			55%		2.0			57			

RUPPLE ROAD
INTERSECTION ANALYSIS

Intersection	Approach Direction	Movement	Delay by movement (sec)	Processed Volume (vph)	Processed Approach Volume (vph)	Processed Intersection Volume (vph)	Movement % Approach Volume	Approach % Total Volume	Movement Delay Weighted by Volume (sec/veh)	Weighted Delay by Approach (sec/veh)	Intersection Delay (sec/veh)	Demand Volume (vph)	Demand Approach Volume (vph)	Difference	% Difference
Rupple Rd & Main St / MLK Blvd	SB	R	8.1	113	456	1105	25%	41%	2.0	20.5	12.1	75	432	24	6%
		-	-	-			-		-			0			
		L	24.6	343			75%		18.5			357			
	WB	R	4.8	126	244		51%	22%	2.5	6.4		125	239	5	2%
		T	8.2	119			49%		4.0			114			
		-	-	-			-		-			0			
	EB	-	-	-	405		-	37%	-	6.1		0	405	0	0%
		T	6.1	316			78%		4.7			316			
		L	6.1	89			22%		1.3			89			

Travel Time Evaluation AM - Southbound

CP	From Intersection Crossing Intersection	VISSIM (Sec)	VISSIM (Min)
1	Wedington Dr	79.14	1.3
2	Persimmon St		
2	Persimmon St	89.76	1.5
3	Roundabout 1		
3	Roundabout 1	68.1	1.1
4	Roundabout 2		
4	Roundabout 2	81.87	1.4
5	Main St / MLK Blvd		
	Total	318.9	5.3

Travel Time Evaluation AM - Northbound

CP	From Intersection Crossing Intersection	VISSIM (sec)	VISSIM (min)
5	Main St / MLK Blvd	74.6	1.2
4	Roundabout 2		
4	Roundabout 2	67.1	1.1
3	Roundabout 1		
3	Roundabout 1	96.1	1.6
2	Persimmon St		
2	Persimmon St	114.8	1.9
1	Wedington Dr		
	Total	352.6	5.9

Design Year 2033

2-Lane Build

RUPPLE ROAD
INTERSECTION ANALYSIS

Intersection	Approach Direction	Movement	Delay by movement (sec)	Processed Volume (vph)	Processed Approach Volume (vph)	Processed Intersection Volume (vph)	Movement % Approach Volume	Approach % Total Volume	Movement Delay Weighted by Volume (sec/veh)	Weighted Delay by Approach (sec/veh)	Intersection Delay (sec/veh)	Demand Volume (vph)	Demand Approach Volume (vph)	Difference	% Difference
Rupple Rd & Wedington Dr	SB	R	7.8	68	550	3258	12%	17%	1.0	29.8	213.8	66	553	-3	-1%
		T	25.5	242			44%		11.2			248			
		L	40.4	239			44%		17.6			239			
	WB	R	157.5	108	702		15%	22%	24.3	268.4		117	798	-96	-12%
		T	179.8	271			39%		69.4			307			
		L	379.8	323			46%		174.8			374			
	NB	R	353.8	431	706		61%	22%	216.3	355.4		674	1102	-396	-36%
		T	360.5	171			24%		87.2			269			
		L	353.4	104			15%		51.9			159			
	EB	R	181.9	150	1300		12%	40%	21.0	185.3		201	1731	-431	-25%
		T	185.4	970			75%		138.2			1284			
		L	187.8	181			14%		26.1			246			
Rupple Rd & Persimmon St	SB	R	30.4	113	729	1975	15%	37%	4.7	37.4	217.9	125	810	-81	-10%
		T	32.8	452			62%		20.3			498			
		L	55.0	164			23%		12.4			187			
	WB	R	45.8	17	201		8%	10%	3.8	63.8		17	203	-2	-1%
		T	43.6	88			44%		19.0			85			
		L	85.2	97			48%		40.9			101			
	NB	R	538.5	91	631		14%	32%	77.7	575.3		159	1084	-453	-42%
		T	585.3	492			78%		456.0			845			
		L	543.3	48			8%		41.7			80			
	EB	R	38.6	59	415		14%	21%	5.5	65.8		59	418	-3	-1%
		T	48.8	224			54%		26.4			224			
		L	107.4	131			32%		33.9			135			
Rupple Rd & Roundabout 1	SB	R	28.7	69	637	1645	11%	39%	3.1	32.1	193.5	86	782	-145	-19%
		T	32.5	498			78%		25.4			610			
		L	32.9	70			11%		3.6			86			
	WB	R	395.8	93	164		57%	10%	225.5	397.0		233	403	-239	-59%
		T	380.5	11			6%		24.7			26			
		L	401.9	60			37%		146.9			144			
	NB	R	390.8	39	474		8%	29%	32.3	378.8		59	693	-219	-32%
		T	376.4	390			82%		309.7			572			
		L	389.0	45			9%		36.7			62			
	EB	R	134.6	131	370		35%	23%	47.7	144.1		144	411	-41	-10%
		T	128.1	23			6%		8.0			26			
		L	151.7	216			58%		88.4			241			
Rupple Rd & Roundabout 2	SB	R	114.7	49	714	1518	7%	47%	7.9	113.6	158.6	60	900	-186	-21%
		T	113.2	620			87%		98.3			780			
		L	118.3	44			6%		7.4			60			
	WB	R	205.5	117	199		59%	13%	120.2	190.9		201	339	-140	-41%
		T	134.9	16			8%		10.6			26			
		L	178.4	67			34%		60.0			112			
	NB	R	262.4	41	320		13%	21%	33.2	255.6		55	437	-117	-27%
		T	253.3	239			75%		189.2			324			
		L	262.1	40			13%		33.1			58			
	EB	R	122.9	110	285		39%	19%	47.5	140.1		112	306	-21	-7%
		T	132.7	26			9%		12.1			26			
		L	154.1	149			52%		80.5			168			

RUPPLE ROAD
INTERSECTION ANALYSIS

Intersection	Approach Direction	Movement	Delay by movement (sec)	Processed Volume (vph)	Processed Approach Volume (vph)	Processed Intersection Volume (vph)	Movement % Approach Volume	Approach % Total Volume	Movement Delay Weighted by Volume (sec/veh)	Weighted Delay by Approach (sec/veh)	Intersection Delay (sec/veh)	Demand Volume (vph)	Demand Approach Volume (vph)	Difference	% Difference
Rupple Rd & Main St / MLK Blvd	SB	R - L	21.3 - 30.4	152 - 644	796	1749	19% - 81%	45%	4.1 - 24.6	28.6	27.8	186 0 818	1004	-209	-21%
	WB	R T -	34.8 33.4 -	260 143 -	403		65% 35% -	23%	22.5 11.8 -	34.3		288 148 0	436	-33	-8%
	EB	- T L	- 15.4 40.6	- 411 140	551		- 75% 25%	31%	- 11.5 10.3	21.8		0 409 149	558	-7	-1%

Travel Time Evaluation: 2033 AM - Southbound

CP	From Intersection	VISSIM	
	Crossing Intersection	(sec)	(min)
1	Wedington Dr	91.13	1.5
2	Persimmon St		
2	Persimmon St	120.31	2.0
3	Roundabout 1		
3	Roundabout 1	178.08	3.0
4	Roundabout 2		
4	Roundabout 2	97.06	1.6
5	Main St / MLK Blvd		
	Total	486.6	8.1

Travel Time Evaluation 2033 AM - Northbound

CP	From Intersection	VISSIM	
	Crossing Intersection	(sec)	(min)
5	Main St / MLK Blvd	337.5	5.6
4	Roundabout 2		
4	Roundabout 2	482.6	8.0
3	Roundabout 1		
3	Roundabout 1	702.2	11.7
2	Persimmon St		
2	Persimmon St	406.6	6.8
1	Wedington Dr		
	Total	1928.9	32.1

Design Year 2033

4-Lane Build

RUPPLE ROAD
INTERSECTION ANALYSIS

Intersection	Approach Direction	Movement	Delay by movement (sec)	Processed Volume (vph)	Processed Approach Volume (vph)	Processed Intersection Volume (vph)	Movement % Approach Volume	Approach % Total Volume	Movement Delay Weighted by Volume (sec/veh)	Weighted Delay by Approach (sec/veh)	Intersection Delay (sec/veh)	Demand Volume (vph)	Demand Approach Volume (vph)	Difference	% Difference
Rupple Rd & Wedington Dr	SB	R	9.1	64	561	3252	11%	17%	1.0	29.1	178.2	66	553	8	1%
		T	24.7	268			48%		11.8			248			
		L	39.8	230			41%		16.3			239			
	WB	R	122.2	107	694		15%	21%	18.8	197.7		117	798	-104	-13%
		T	135.3	271			39%		52.7			307			
		L	276.4	317			46%		126.2			374			
	NB	R	341.5	433	710		61%	22%	208.2	346.5		674	1102	-393	-36%
		T	350.5	172			24%		85.0			269			
		L	360.8	105			15%		53.3			159			
	EB	R	139.6	155	1287		12%	40%	16.8	140.0		201	1731	-444	-26%
		T	140.4	954			74%		104.0			1284			
		L	138.4	179			14%		19.2			246			
Rupple Rd & Persimmon St	SB	R	26.8	113	732	2066	15%	35%	4.1	34.9	283.7	125	810	-78	-10%
		T	29.6	453			62%		18.3			498			
		L	55.1	166			23%		12.4			187			
	WB	R	42.7	18	210		8%	10%	3.6	70.3		17	203	7	3%
		T	42.9	90			43%		18.4			85			
		L	99.0	102			49%		48.3			101			
	NB	R	679.3	97	697		14%	34%	94.7	739.2		159	1084	-387	-36%
		T	761.2	546			78%		595.8			845			
		L	625.7	54			8%		48.7			80			
	EB	R	43.6	61	427		14%	21%	6.3	71.0		59	418	9	2%
		T	51.6	231			54%		27.9			224			
		L	116.8	134			31%		36.8			135			
Rupple Rd & Roundabout 1	SB	R	12.6	33	627	1755	5%	36%	0.7	15.9	118.1	86	782	-156	-20%
		T	14.7	564			90%		13.3			610			
		L	42.3	29			5%		2.0			86			
	WB	R	219.4	83	142		59%	8%	128.5	245.2		233	403	-261	-65%
		T	320.6	9			6%		20.7			26			
		L	274.4	50			35%		95.9			144			
	NB	R	187.3	48	596		8%	34%	15.2	221.8		59	693	-97	-14%
		T	223.9	490			82%		184.0			572			
		L	232.8	58			10%		22.5			62			
	EB	R	52.4	141	391		36%	22%	18.9	77.7		144	411	-20	-5%
		T	77.8	24			6%		4.8			26			
		L	93.5	226			58%		54.0			241			
Rupple Rd & Roundabout 2	SB	R	5.0	49	756	1842	6%	41%	0.3	6.1	8.4	60	900	-145	-16%
		T	6.0	658			87%		5.2			780			
		L	8.4	49			6%		0.5			60			
	WB	R	7.6	198	337		59%	18%	4.5	8.2		201	339	-3	-1%
		T	9.4	26			8%		0.7			26			
		L	8.9	112			33%		2.9			112			
	NB	R	4.3	56	436		13%	24%	0.6	5.4		55	437	-1	0%
		T	5.1	322			74%		3.8			324			
		L	8.1	58			13%		1.1			58			
	EB	R	16.7	119	314		38%	17%	6.4	18.4		112	306	8	2%
		T	18.9	28			9%		1.7			26			
		L	19.5	166			53%		10.3			168			

Design Year - 4 Lane

2033

RUPPLE ROAD
INTERSECTION ANALYSIS

Intersection	Approach Direction	Movement	Delay by movement (sec)	Processed Volume (vph)	Processed Approach Volume (vph)	Processed Intersection Volume (vph)	Movement % Approach Volume	Approach % Total Volume	Movement Delay Weighted by Volume (sec/veh)	Weighted Delay by Approach (sec/veh)	Intersection Delay (sec/veh)	Demand Volume (vph)	Demand Approach Volume (vph)	Difference	% Difference
Rupple Rd & Main St / MLK Blvd	SB	R - L	10.5 - 23.7	166 - 734	900	1900	18% - 82%	47%	1.9 - 19.3	21.2	18.5	186 0 818	1004	-104	-10%
	WB	R T -	12.5 21.8 -	290 154 -	443		65% 35% -	23%	8.1 7.5 -	15.7		288 148 0	436	7	2%
	EB	- T L	- 15.8 17.6	- 408 149	557		- 73% 27%	29%	- 11.5 4.7	16.3		0 409 149	558	-1	0%

Design Year - 4 Lane

2033

C. 3
Rupple Road Cross Section
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Travel Time Evaluation: 2033 AM - Southbound

CP	From Intersection / Crossing Intersection	VISSIM (sec)	VISSIM (min)
1	Wedington Dr	84.1	1.4
2	Persimmon St		
2	Persimmon St	102.35	1.7
3	Roundabout 1		
3	Roundabout 1	74.22	1.2
4	Roundabout 2		
4	Roundabout 2	85.07	1.4
5	Main St / MLK Blvd		
	Total	345.7	5.8

Travel Time Evaluation 2033 AM - Northbound

CP	From Intersection Crossing Intersection	VISSIM (sec)	VISSIM (min)
5	Main St / MLK Blvd	79.5	1.3
4	Roundabout 2		
4	Roundabout 2	278.7	4.6
3	Roundabout 1		
3	Roundabout 1	905.5	15.1
2	Persimmon St		
2	Persimmon St	381.7	6.4
1	Wedington Dr		
	Total	1645.4	27.4

Design Year 2033

4-Lane to Wedington Drive Build

RUPPLE ROAD
INTERSECTION ANALYSIS

Intersection	Approach Direction	Movement	Delay by movement (sec)	Processed Volume (vph)	Processed Approach Volume (vph)	Processed Intersection Volume (vph)	Movement % Approach Volume	Approach % Total Volume	Movement Delay Weighted by Volume (sec/veh)	Weighted Delay by Approach (sec/veh)	Intersection Delay (sec/veh)	Demand Volume (vph)	Demand Approach Volume (vph)	Difference	% Difference
Rupple Rd & Wedington Dr	SB	R	29.1	64	562	3855	11%	15%	3.3	32.3	71.2	66	553	9	2%
		T	28.3	270			48%		13.6			248			
		L	37.9	228			41%		15.4			239			
	WB	R	20.4	120	798		15%	21%	3.1	43.3		117	798	-1	0%
		T	25.2	309			39%		9.8			307			
		L	65.9	369			46%		30.5			374			
	NB	R	41.1	676	1100		61%	29%	25.3	46.3		674	1102	-2	0%
		T	52.6	267			24%		12.8			269			
		L	57.6	157			14%		8.2			159			
	EB	R	123.2	167	1396		12%	36%	14.8	122.6		201	1731	-335	-19%
		T	124.5	1,036			74%		92.4			1284			
		L	111.8	192			14%		15.4			246			
Rupple Rd & Persimmon St	SB	R	10.6	135	823	2537	16%	32%	1.7	19.8	22.7	125	810	13	2%
		T	12.6	501			61%		7.6			498			
		L	46.0	187			23%		10.4			187			
	WB	R	19.5	17	206		8%	8%	1.6	45.3		17	203	3	2%
		T	34.1	89			43%		14.8			85			
		L	59.8	100			48%		28.8			101			
	NB	R	13.1	160	1080		15%	43%	1.9	14.5		159	1084	-4	0%
		T	14.2	840			78%		11.0			845			
		L	20.0	80			7%		1.5			80			
	EB	R	30.1	61	427		14%	17%	4.3	38.3		59	418	9	2%
		T	37.6	231			54%		20.3			224			
		L	43.2	136			32%		13.7			135			
Rupple Rd & Roundabout 1	SB	R	7.7	38	687	2192	6%	31%	0.4	9.2	22.2	86	782	-95	-12%
		T	9.3	616			90%		8.3			610			
		L	10.8	33			5%		0.5			86			
	WB	R	41.5	237	411		58%	19%	23.9	43.0		233	403	8	2%
		T	44.5	27			6%		2.9			26			
		L	45.1	147			36%		16.2			144			
	NB	R	4.0	55	687		8%	31%	0.3	4.2		59	693	-6	-1%
		T	4.1	567			83%		3.4			572			
		L	5.4	66			10%		0.5			62			
	EB	R	50.8	144	407		35%	19%	18.0	53.3		144	411	-4	-1%
		T	56.0	25			6%		3.5			26			
		L	54.4	238			58%		31.8			241			
Rupple Rd & Roundaboul 2	SB	R	5.8	59	908	1999	7%	45%	0.4	6.8	10.1	60	900	8	1%
		T	6.7	791			87%		5.8			780			
		L	9.4	59			6%		0.6			60			
	WB	R	7.1	200	339		59%	17%	4.2	7.5		201	339	0	0%
		T	8.3	27			8%		0.6			26			
		L	8.1	113			33%		2.7			112			
	NB	R	4.7	57	438		13%	22%	0.6	5.6		55	437	1	0%
		T	5.3	323			74%		3.9			324			
		L	8.0	59			13%		1.1			58			
	EB	R	27.4	120	313		38%	16%	10.5	28.9		112	306	7	2%
		T	31.0	28			9%		2.7			26			
		L	29.6	166			53%		15.7			168			

RUPPLE ROAD
INTERSECTION ANALYSIS

Intersection	Approach Direction	Movement	Delay by movement (sec)	Processed Volume (vph)	Processed Approach Volume (vph)	Processed Intersection Volume (vph)	Movement % Approach Volume	Approach % Total Volume	Movement Delay Weighted by Volume (sec/veh)	Weighted Delay by Approach (sec/veh)	Intersection Delay (sec/veh)	Demand Volume (vph)	Demand Approach Volume (vph)	Difference	% Difference
Rupple Rd & Main St / MLK Blvd	SB	R - L	10.3 - 24.4	191 - 835	1027	2028	19% - 81%	51%	1.9 - 19.9	21.8	20.0	186 0 818	1004	23	2%
	WB	R T -	13.2 25.6 -	289 154 -	443		65% 35% -	22%	8.6 8.9 -	17.5		288 148 0	436	7	2%
	EB	- T L	- 18.6 19.5	- 410 149	559		- 73% 27%	28%	- 13.7 5.2	18.9		0 409 149	558	1	0%

Travel Time Evaluation: 2033 AM - Southbound

CP	From Intersection	VISSIM	
	Crossing Intersection	(sec)	(min)
1	Wedington Dr	72.46	1.2
2	Persimmon St		
2	Persimmon St	94.7	1.6
3	Roundabout 1		
3	Roundabout 1	73.87	1.2
4	Roundabout 2		
4	Roundabout 2	85.04	1.4
5	Main St / MLK Blvd		
	Total	326.1	5.4

Travel Time Evaluation 2033 AM - Northbound

CP	From Intersection / Crossing Intersection	VISSIM (sec)	VISSIM (min)
5	Main St / MLK Blvd	79.8	1.3
4	Roundabout 2		
4	Roundabout 2	71.1	1.2
3	Roundabout 1		
3	Roundabout 1	101.0	1.7
2	Persimmon St		
2	Persimmon St	115.7	1.9
1	Wedington Dr		
	Total	367.6	6.1

Turning Movement Counts

Persimmon Street / Rupple Road

And

Wedington Drive / Rupple Road

JACOBS ENGINEERING, INC.
10816 Executive Center Dr. Ste. 300
Little Rock, AR 72211

File Name : Persimmon-Rupple
Site Code : Count 1
Start Date : 10/8/2013
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Groups Printed- Cars - Bank 1

	RUPPLE From North					PERSIMMON From East					RUPPLE From South					PERSIMMON From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
07:00 AM	19	20	6	0	45	1	15	11	0	27	9	11	7	0	27	6	22	18	0	46	145
07:15 AM	18	50	26	0	94	6	17	32	0	55	34	15	10	0	59	11	51	20	2	84	292
07:30 AM	19	45	37	0	101	2	24	20	0	46	53	33	10	0	96	8	52	22	1	83	326
07:45 AM	7	12	37	0	56	4	10	16	0	30	28	13	5	0	46	2	50	30	0	82	214
Total	63	127	106	0	296	13	66	79	0	158	124	72	32	0	228	27	175	90	3	295	977
08:00 AM	16	5	16	0	37	1	8	1	0	10	4	7	1	0	12	0	26	15	0	41	100
08:15 AM	8	3	6	0	17	4	5	0	0	9	3	5	0	0	8	0	16	15	0	31	65
08:30 AM	7	7	7	0	21	3	6	1	0	10	0	3	1	0	4	1	23	7	0	31	66
08:45 AM	5	4	7	0	16	0	5	1	0	6	0	5	0	0	5	1	11	9	0	21	48
Total	36	19	36	0	91	8	24	3	0	35	7	20	2	0	29	2	76	46	0	124	279
*** BREAK ***																					
11:00 AM	3	3	6	0	12	0	7	3	0	10	3	3	0	0	6	0	10	6	1	17	45
11:15 AM	5	9	1	0	15	3	5	1	1	10	0	5	0	0	5	0	11	5	0	16	46
11:30 AM	7	4	8	0	19	2	10	2	0	14	1	5	3	0	9	1	8	9	0	18	60
11:45 AM	14	1	8	0	23	4	5	1	0	10	3	6	0	0	9	1	9	8	0	18	60
Total	29	17	23	0	69	9	27	7	1	44	7	19	3	0	29	2	38	28	1	69	211
12:00 PM	8	4	7	0	19	2	10	0	0	12	2	5	1	0	8	0	13	4	0	17	56
12:15 PM	5	5	4	0	14	3	6	0	0	9	0	5	0	0	5	0	10	8	0	18	46
12:30 PM	7	11	7	0	25	2	7	2	2	13	2	4	0	0	6	0	10	4	0	14	58
12:45 PM	6	10	5	0	21	1	4	1	0	6	2	6	1	0	9	1	11	4	0	16	52
Total	26	30	23	0	79	8	27	3	2	40	6	20	2	0	28	1	44	20	0	65	212
*** BREAK ***																					
02:30 PM	12	16	5	0	33	3	16	7	0	26	7	9	1	0	17	3	10	12	0	25	101
02:45 PM	16	19	10	0	45	4	7	14	0	25	11	16	3	1	31	4	12	7	1	24	125
Total	28	35	15	0	78	7	23	21	0	51	18	25	4	1	48	7	22	19	1	49	226
03:00 PM	6	5	13	0	24	5	16	6	0	27	29	34	6	124	193	2	30	28	5	65	309
03:15 PM	9	8	12	0	29	4	8	4	0	16	12	16	2	50	80	0	17	13	0	30	155
03:30 PM	13	4	6	1	24	3	30	3	0	36	6	10	1	2	19	1	20	12	0	33	112
03:45 PM	19	11	7	0	37	8	16	3	0	27	1	8	4	3	16	2	14	9	9	34	114
Total	47	28	38	1	114	20	70	16	0	106	48	68	13	179	308	5	81	62	14	162	690
04:00 PM	8	6	9	0	23	5	22	1	0	28	5	8	1	0	14	2	17	9	0	28	93
04:15 PM	13	3	9	2	27	9	18	2	0	29	5	5	0	0	10	0	8	17	0	25	91
04:30 PM	14	14	9	1	38	7	29	5	2	43	6	4	1	4	15	2	13	17	2	34	130
04:45 PM	12	24	12	0	48	8	23	7	2	40	3	8	1	0	12	2	15	12	0	29	129
Total	47	47	39	3	136	29	92	15	4	140	19	25	3	4	51	6	53	55	2	116	443
05:00 PM	11	16	9	0	36	0	19	4	1	24	0	4	0	0	4	0	12	14	2	28	92
05:15 PM	13	14	7	0	34	0	15	5	0	20	0	6	1	0	7	0	9	11	0	20	81
Grand Total	300	333	296	4	933	94	363	153	8	618	229	259	60	184	732	50	510	345	23	928	3211
Apprch %	32.2	35.7	31.7	0.4		15.2	58.7	24.8	1.3		31.3	35.4	8.2	25.1		5.4	55	37.2	2.5		
Total %	9.3	10.4	9.2	0.1	29.1	2.9	11.3	4.8	0.2	19.2	7.1	8.1	1.9	5.7	22.8	1.6	15.9	10.7	0.7	28.9	
Cars	300	333	296	4	933	94	363	153	8	618	229	259	60	184	732	50	510	345	23	928	3211
% Cars	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

JACOBS ENGINEERING, INC.
10816 Executive Center Dr. Ste. 300
Little Rock, AR 72211

File Name : Persimmon-Rupple
Site Code : Count 1
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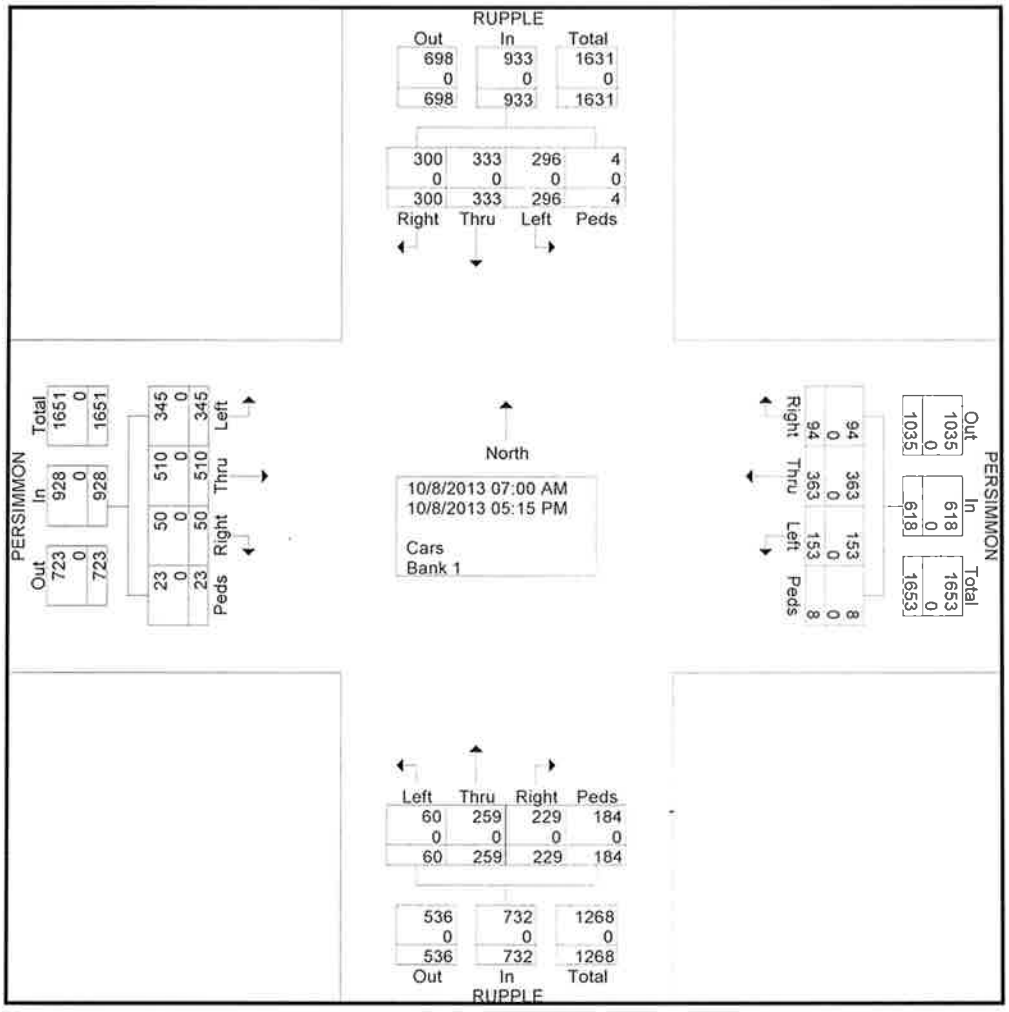
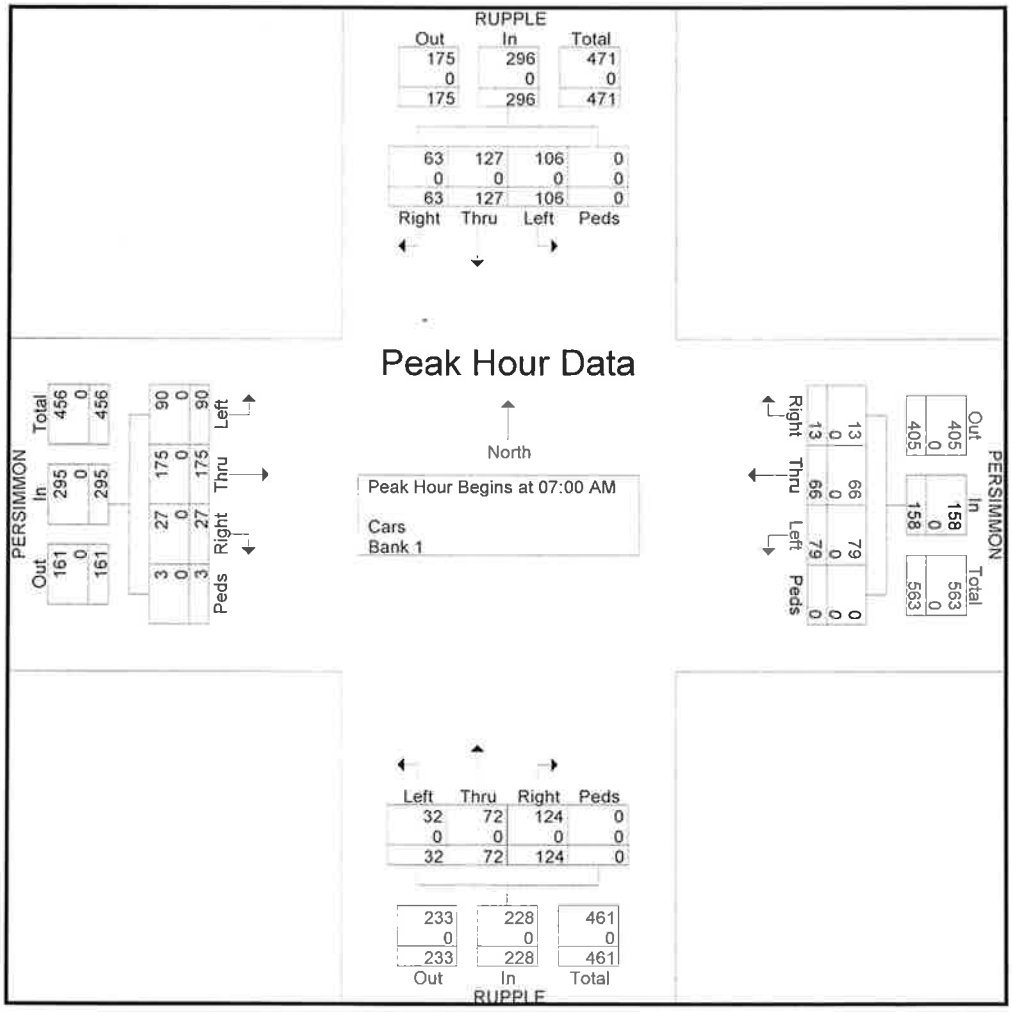


JACOBS ENGINEERING, INC.
10816 Executive Center Dr. Ste. 300
Little Rock, AR 72211

File Name : Persimmon-Rupple
Site Code : Count 1
Start Date : 10/8/2013
Page No : 3

	RUPPLE From North					PERSIMMON From East					RUPPLE From South					PERSIMMON From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	**19**	20	6	0	45	1	15	11	0	27	9	11	7	0	27	6	22	18	0	46	145
07:15 AM	18	**50**	26	0	94	**6**	17	**32**	0	**55**	34	15	**10**	0	59	**11**	51	20	**2**	**84**	292
07:30 AM	19	45	**37**	0	**101**	2	**24**	20	0	46	**53**	**33**	10	0	**96**	8	**52**	22	1	83	**326**
07:45 AM	7	12	37	0	56	4	10	16	0	30	28	13	5	0	46	2	50	**30**	0	82	214
Total Volume	63	127	106	0	296	13	66	79	0	158	124	72	32	0	228	27	175	90	3	295	977
% App. Total	21.3	42.9	35.8	0		8.2	41.8	50	0		54.4	31.6	14	0		9.2	59.3	30.5	1		
PHF	.829	.635	.716	.000	.733	.542	.688	.617	.000	.718	.585	.545	.800	.000	.594	.614	.841	.750	.375	.878	.749
Cars	63	127	106	0	296	13	66	79	0	158	124	72	32	0	228	27	175	90	3	295	977
% Cars	100	100	100	0	100	100	100	100	0	100	100	100	100	0	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

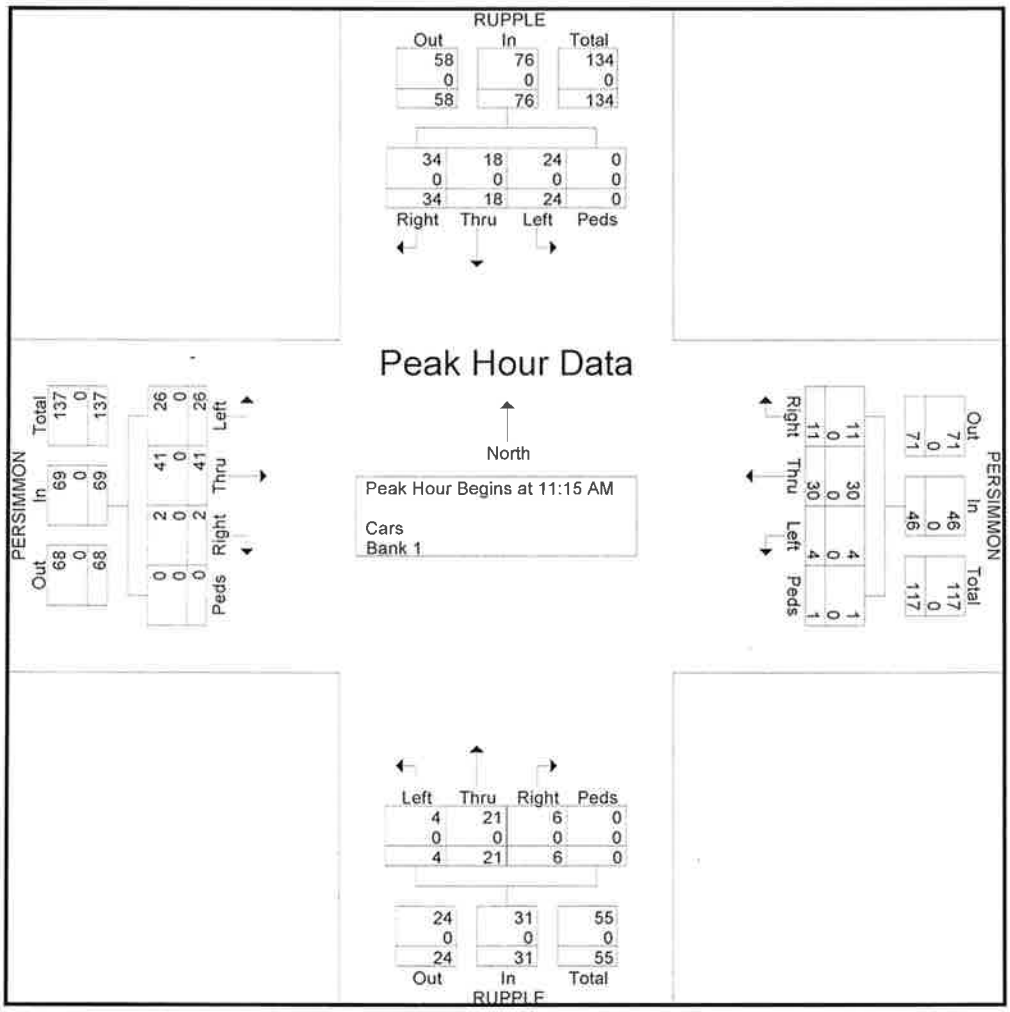


JACOBS ENGINEERING, INC.

10816 Executive Center Dr. Ste. 300
Little Rock, AR 72211

File Name : Persimmon-Rupple
Site Code : Count 1
Start Date : 10/8/2013
Page No : 4

	RUPPLE From North					PERSIMMON From East					RUPPLE From South					PERSIMMON From West					
Start Time	Right	Thru	Left	Peds	App Total	Right	Thru	Left	Peds	App Total	Right	Thru	Left	Peds	App Total	Right	Thru	Left	Peds	App Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:15 AM																					
11:15 AM	5	9	1	0	15	3	5	1	1	10	0	5	0	0	5	0	11	5	0	16	46
11:30 AM	7	4	8	0	19	2	10	2	0	14	1	5	3	0	9	1	8	9	0	18	60
11:45 AM	14	1	8	0	23	4	5	1	0	10	3	6	0	0	9	1	9	8	0	18	60
12:00 PM	8	4	7	0	19	2	10	0	0	12	2	5	1	0	8	0	13	4	0	17	56
Total Volume	34	18	24	0	76	11	30	4	1	46	6	21	4	0	31	2	41	26	0	69	222
% App. Total	44.7	23.7	31.6	0		23.9	65.2	8.7	2.2		19.4	67.7	12.9	0		2.9	59.4	37.7	0		
PHF	.607	.500	.750	.000	.826	.688	.750	.500	.250	.821	.500	.875	.333	.000	.861	.500	.788	.722	.000	.958	.925
Cars	34	18	24	0	76	11	30	4	1	46	6	21	4	0	31	2	41	26	0	69	222
% Cars	100	100	100	0	100	100	100	100	100	100	100	100	100	0	100	100	100	100	0	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

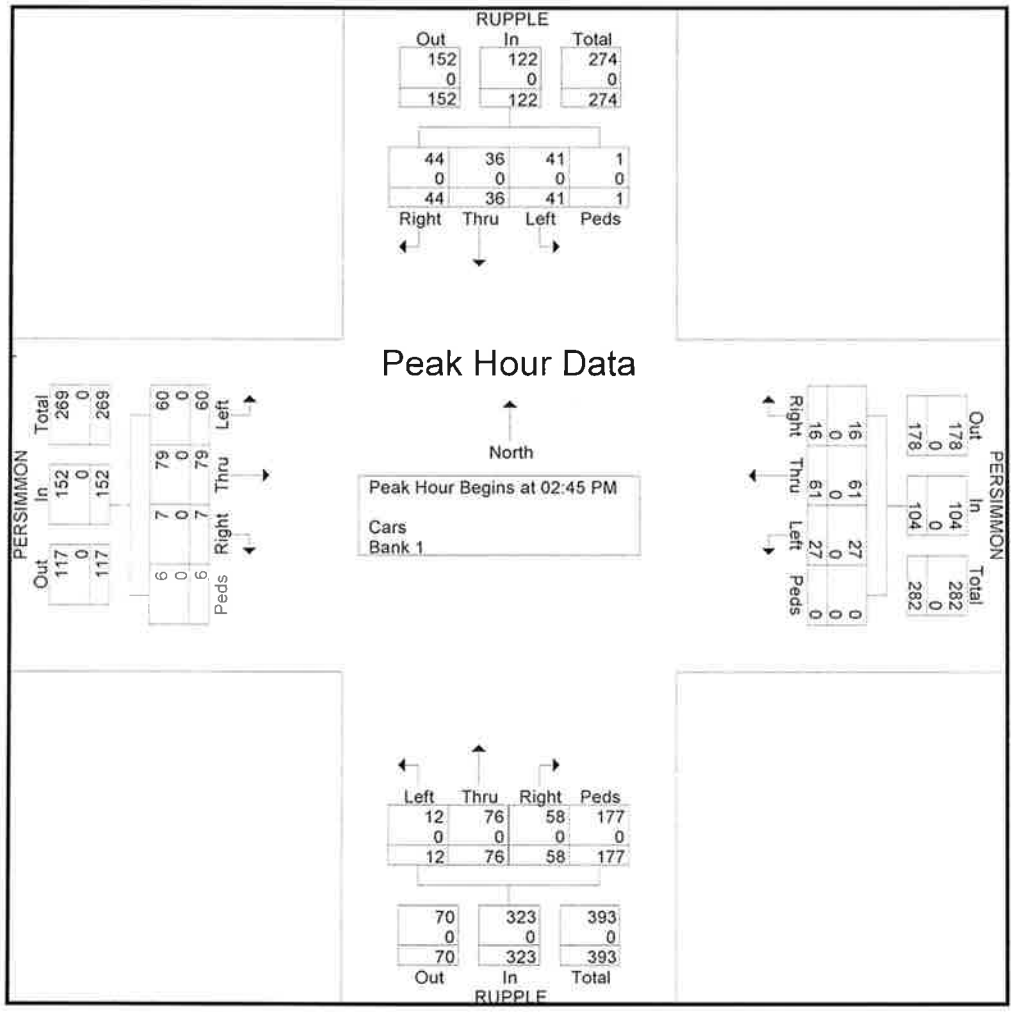


JACOBS ENGINEERING, INC.

10816 Executive Center Dr. Ste. 300
Little Rock, AR 72211

File Name : Persimmon-Rupple
Site Code : Count 1
Start Date : 10/8/2013
Page No : 5

	RUPPLE From North					PERSIMMON From East					RUPPLE From South					PERSIMMON From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 02:45 PM																					
02:45 PM	**16**	**19**	10	0	**45**	4	7	**14**	0	25	11	16	3	1	31	**4**	12	7	1	24	125
03:00 PM	6	5	**13**	0	24	**5**	16	6	0	27	**29**	**34**	**6**	**124**	**193**	2	**30**	**28**	**5**	**65**	**309**
03:15 PM	9	8	12	0	29	4	8	4	0	16	12	16	2	50	80	0	17	13	0	30	155
03:30 PM	13	4	6	1	24	3	**30**	3	0	**36**	6	10	1	2	19	1	20	12	0	33	112
Total Volume	44	36	41	1	122	16	61	27	0	104	58	76	12	177	323	7	79	60	6	152	701
% App. Total	36.1	29.5	33.6	0.8		15.4	58.7	26	0		18	23.5	3.7	54.8		4.6	52	39.5	3.9		
PHF	.688	.474	.788	.250	.678	.800	.508	.482	.000	.722	.500	.559	.500	.357	.418	.438	.658	.536	.300	.585	.567
Cars	44	36	41	1	122	16	61	27	0	104	58	76	12	177	323	7	79	60	6	152	701
% Cars	100	100	100	100	100	100	100	100	0	100	100	100	100	100	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



JACOBS ENGINEERING, INC.

10816 Executive Center Dr. Ste. 300
Little Rock, AR 72211

Weddington-Rupple
Count 2

File Name : WEDDIN~1
Site Code : Count 2
Start Date : 10/9/2013
Page No : 1

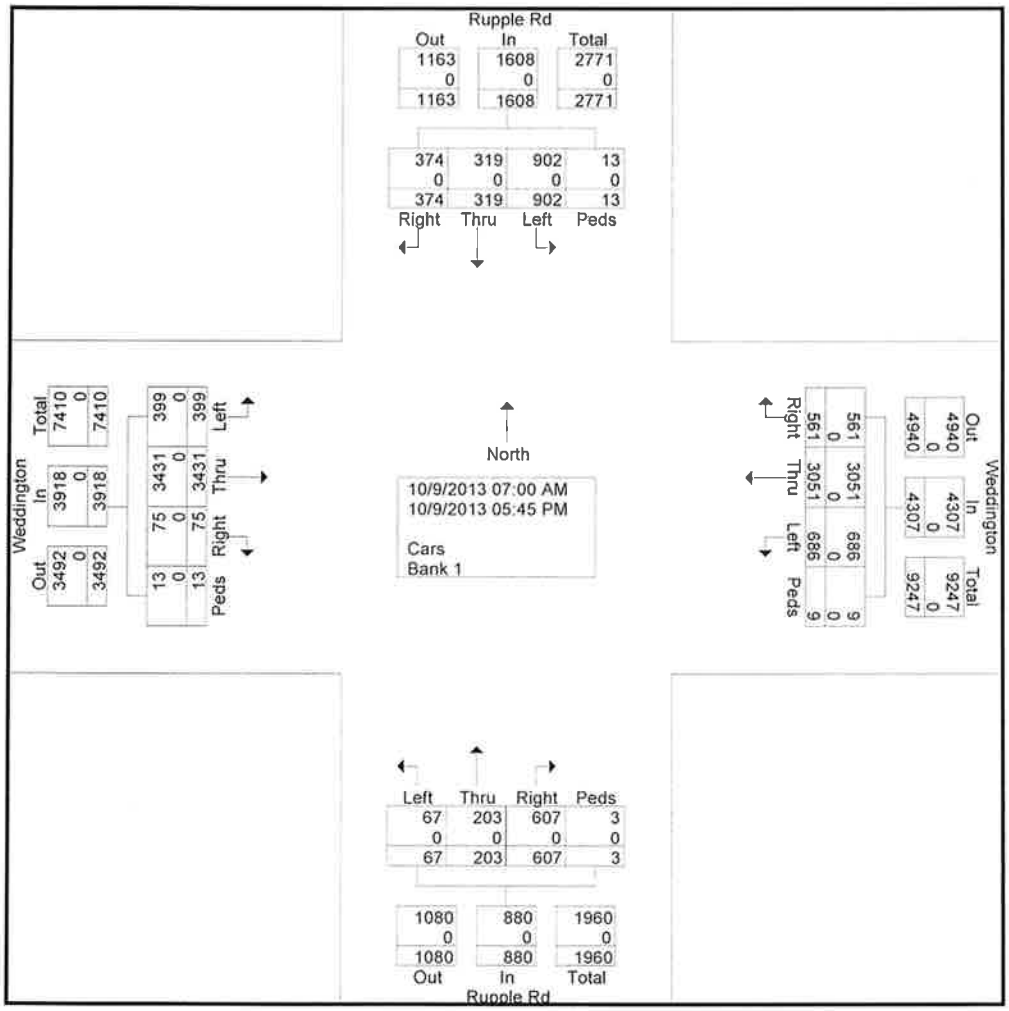
Groups Printed- Cars - Bank 1

	Rupple Rd From North				Weddington From East				Rupple Rd From South				Weddington From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
07:00 AM	10	21	40	0	15	61	31	0	41	9	1	0	3	250	27	0	509
07:15 AM	10	27	49	0	21	49	64	0	32	22	3	0	6	261	43	1	588
07:30 AM	10	32	41	0	25	56	51	0	44	25	2	0	7	231	65	0	589
07:45 AM	15	27	52	0	21	73	26	0	44	18	8	0	9	257	37	0	587
Total	45	107	182	0	82	239	172	0	161	74	14	0	25	999	172	1	2273
08:00 AM	9	13	47	0	22	88	20	0	46	8	0	0	7	198	24	0	482
08:15 AM	3	2	36	0	20	96	19	0	18	5	1	0	5	143	17	0	365
08:30 AM	10	4	32	0	17	78	10	0	14	3	1	0	0	142	13	0	324
08:45 AM	8	13	28	0	16	68	13	0	19	3	1	0	2	144	13	1	329
Total	30	32	143	0	75	330	62	0	97	19	3	0	14	627	67	1	1500
*** BREAK ***																	
11:00 AM	10	6	23	0	14	88	24	0	19	5	2	0	2	91	7	0	291
11:15 AM	5	4	30	0	26	118	16	0	26	6	2	0	1	109	5	0	348
11:30 AM	12	2	40	0	20	102	23	0	24	4	0	0	1	121	9	0	358
11:45 AM	9	13	37	1	24	143	23	0	19	5	2	1	2	108	3	0	390
Total	36	25	130	1	84	451	86	0	88	20	6	1	6	429	24	0	1387
12:00 PM	8	7	30	0	33	134	31	0	20	4	3	0	2	100	10	0	382
12:15 PM	12	5	44	1	24	127	20	1	20	9	2	0	1	127	10	1	404
12:30 PM	12	8	49	2	24	146	12	1	17	3	1	1	2	116	6	0	400
12:45 PM	9	7	41	2	22	132	18	1	18	4	2	0	2	109	12	0	379
Total	41	27	164	5	103	539	81	3	75	20	8	1	7	452	38	1	1565
*** BREAK ***																	
04:00 PM	12	10	39	5	38	211	30	1	21	7	3	1	1	120	16	7	522
04:15 PM	25	10	39	0	44	202	25	5	21	10	5	0	5	135	17	1	544
04:30 PM	23	6	48	0	24	218	32	0	19	6	7	0	4	130	11	0	528
04:45 PM	36	24	38	0	34	200	61	0	25	8	4	0	1	126	12	0	569
Total	96	50	164	5	140	831	148	6	86	31	19	1	11	511	56	8	2163
05:00 PM	31	20	43	0	41	182	48	0	35	15	9	0	5	129	11	1	570
05:15 PM	44	28	41	0	15	210	39	0	31	16	3	0	4	131	12	0	574
05:30 PM	47	29	32	2	20	243	46	0	30	7	4	0	3	141	16	1	621
05:45 PM	4	1	3	0	1	26	4	0	4	1	1	0	0	12	3	0	60
Total	126	78	119	2	77	661	137	0	100	39	17	0	12	413	42	2	1825
Grand Total	374	319	902	13	561	3051	686	9	607	203	67	3	75	3431	399	13	10713
Apprch %	23.3	19.8	56.1	0.8	13	70.8	15.9	0.2	69	23.1	7.6	0.3	1.9	87.6	10.2	0.3	
Total %	3.5	3	8.4	0.1	5.2	28.5	6.4	0.1	5.7	1.9	0.6	0	0.7	32	3.7	0.1	
Cars	374	319	902	13	561	3051	686	9	607	203	67	3	75	3431	399	13	10713
% Cars	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

JACOBS ENGINEERING, INC.

10816 Executive Center Dr. Ste. 300
Little Rock, AR 72211

File Name : WEDDIN~1
Site Code : Count 2
Start Date : 10/9/2013
Page No : 2

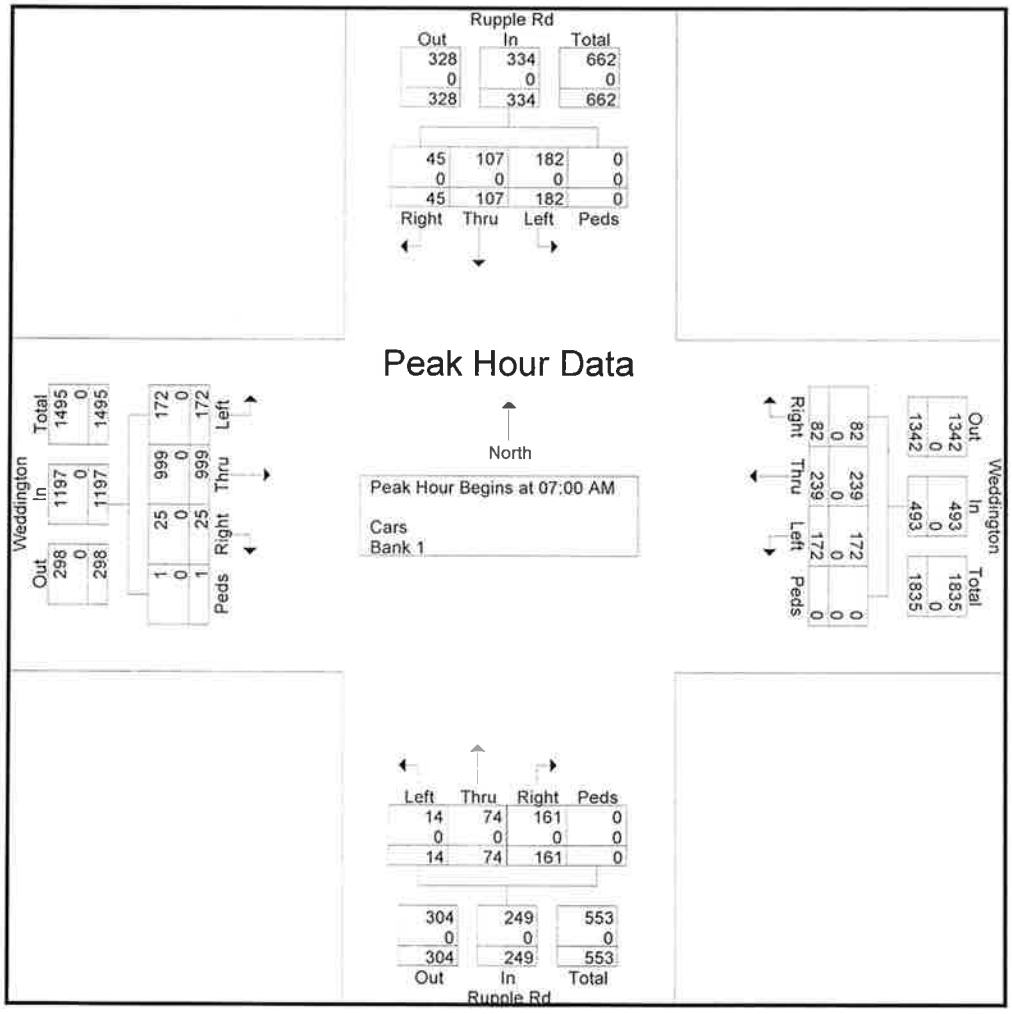


JACOBS ENGINEERING, INC.

10816 Executive Center Dr. Ste. 300
Little Rock, AR 72211

File Name : WEDDIN~1
Site Code : Count 2
Start Date : 10/9/2013
Page No : 3

	Rupple Rd From North					Weddington From East					Rupple Rd From South					Weddington From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 09:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	10	21	40	0	71	15	61	31	0	107	41	9	1	0	51	3	250	27	0	280	509
07:15 AM	10	27	49	0	86	21	49	**64**	0	**134**	32	22	3	0	57	6	**261**	43	**1**	**311**	588
07:30 AM	10	**32**	41	0	83	**25**	56	51	0	132	**44**	**25**	2	0	**71**	7	231	**65**	0	303	**589**
07:45 AM	**15**	27	**52**	0	**94**	21	**73**	26	0	120	44	18	**8**	0	70	**9**	257	37	0	303	587
Total Volume	45	107	182	0	334	82	239	172	0	493	161	74	14	0	249	25	999	172	1	1197	2273
% App. Total	13.5	32	54.5	0		16.6	48.5	34.9	0		64.7	29.7	5.6	0		2.1	83.5	14.4	0.1		
PHF	.750	.836	.875	.000	.888	.820	.818	.672	.000	.920	.915	.740	.438	.000	.877	.694	.957	.662	.250	.962	.965
Cars	45	107	182	0	334	82	239	172	0	493	161	74	14	0	249	25	999	172	1	1197	2273
% Cars	100	100	100	0	100	100	100	100	0	100	100	100	100	0	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



JACOBS ENGINEERING, INC.

10816 Executive Center Dr. Ste. 300
Little Rock, AR 72211

File Name : WEDDIN~1
Site Code : Count 2
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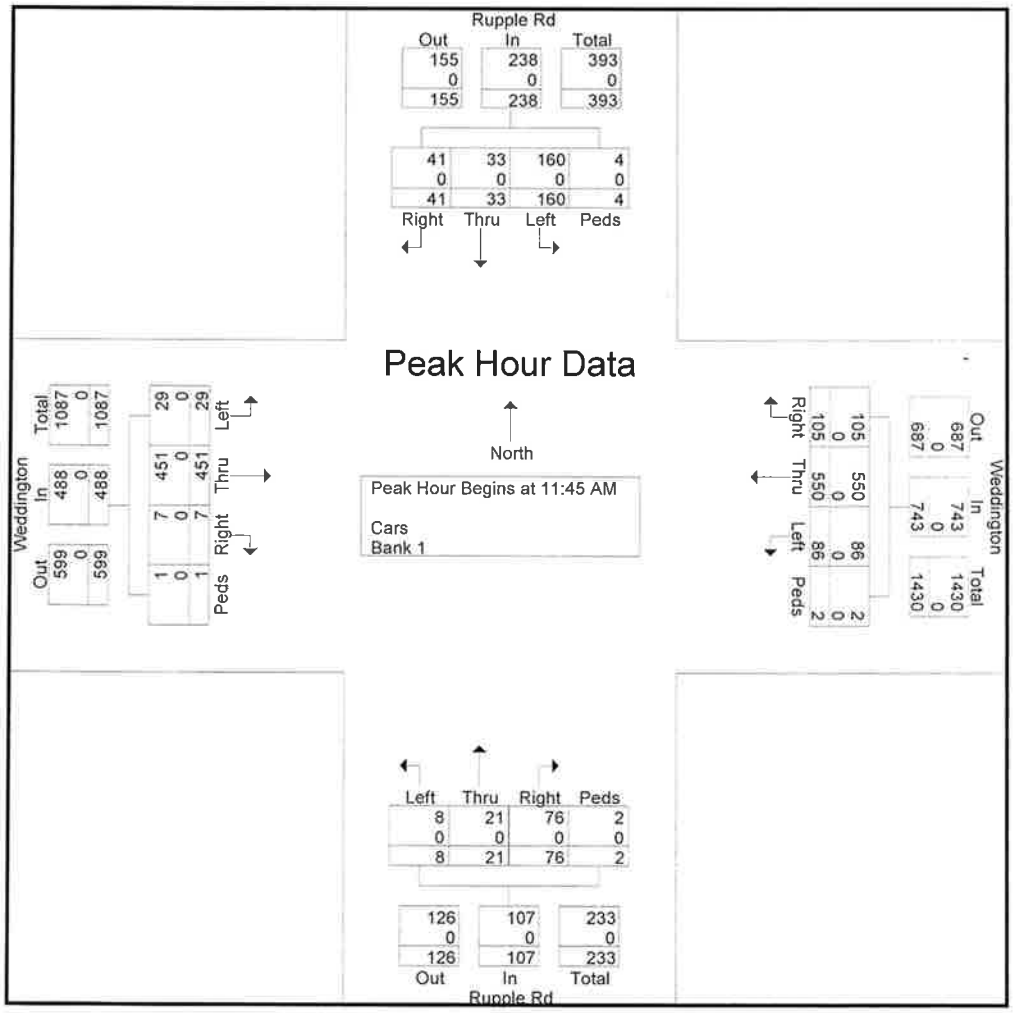
	Rupple Rd From North					Weddington From East					Rupple Rd From South					Weddington From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 11:45 AM																					
11:45 AM	9	**13**	37	1	60	24	143	23	0	190	19	5	2	**1**	27	**2**	108	3	0	113	390
12:00 PM	8	7	30	0	45	**33**	134	**31**	0	**198**	**20**	4	**3**	0	27	2	100	**10**	0	112	382
12:15 PM	**12**	5	44	1	62	24	127	20	**1**	172	20	**9**	2	0	**31**	1	**127**	10	**1**	**139**	**404**
12:30 PM	12	8	**49**	**2**	**71**	24	**146**	12	1	183	17	3	1	1	22	2	116	6	0	124	400
Total Volume	41	33	160	4	238	105	550	86	2	743	76	21	8	2	107	7	451	29	1	488	1576
% App. Total	17.2	13.9	67.2	1.7		14.1	74	11.6	0.3		71	19.6	7.5	1.9		1.4	92.4	5.9	0.2		
PHF	.854	.635	.816	.500	.838	.795	.942	.694	.500	.938	.950	.583	.667	.500	.863	.875	.888	.725	.250	.878	.975
Cars	41	33	160	4	238	105	550	86	2	743	76	21	8	2	107	7	451	29	1	488	1576
% Cars	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



JACOBS ENGINEERING, INC.

10816 Executive Center Dr. Ste. 300
Little Rock, AR 72211

File Name : WEDDIN~1
Site Code : Count 2
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	Rupple Rd From North					Weddington From East					Rupple Rd From South					Weddington From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	36	24	38	0	98	34	200	**61**	0	295	25	8	4	0	37	1	126	12	0	139	569
05:00 PM	31	20	**43**	0	94	**41**	182	48	0	271	**35**	15	**9**	0	**59**	**5**	129	11	**1**	146	570
05:15 PM	44	28	41	0	**113**	15	210	39	0	264	31	**16**	3	0	50	4	131	12	**0**	**147**	574
05:30 PM	**47**	**29**	32	**2**	110	**20**	**243**	46	0	**309**	30	7	4	0	41	3	**141**	**16**	1	**161**	**621**
Total Volume	158	101	154	2	415	110	835	194	0	1139	121	46	20	0	187	13	527	51	2	593	2334
% App. Total	38.1	24.3	37.1	0.5		9.7	73.3	17	0		64.7	24.6	10.7	0		2.2	88.9	8.6	0.3		
PHF	.840	.871	.895	.250	.918	.671	.859	.795	.000	.922	.864	.719	.556	.000	.792	.650	.934	.797	.500	.921	.940
Cars	158	101	154	2	415	110	835	194	0	1139	121	46	20	0	187	13	527	51	2	593	2334
% Cars	100	100	100	100	100	100	100	100	0	100	100	100	100	0	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0