HISTORIC FRANKLIN TENNESSEE

MEMORANDUM

DATE: April 20, 2016

TO: Franklin Municipal Planning Commission

FROM: Amy Diaz-Barriga, Current Planning Supervisor
Bob Martin, Interim Director of Planning and Sustainability

Subject

..title

Consideration Of Ordinance 2016-008, To Be Entitled, "An Ordinance To Rezone 30.39 Acres From General Commercial (GC) District To Specific Development-Residential (SD-R 11.7) District For The Property Located West Of Interstate 65, At 840 And 880 Oak Meadow Drive."

..body

Project Information

COF Project Number: 6085
Applicant: **Adam Crunk, Crunk Engineering**
Owner: **Warner Bass**

Background/Staff Comments

Any request for an SD zoning district is required to be accompanied by a PUD Development Plan. Neither the Planning nor Engineering Departments support the PUD Development Plan associated with this rezoning, and therefore cannot support this rezoning request. There are conceptual flaws on the site design of the Development Plan. The plan will cater to cars and not residents, and will have little regard for creating open spaces and a site experience to benefit its residents. Engineering is skeptical that the conceptual design of its stormwater detention and water quality will be sufficient in size to handle the run-off of the site.

Further, the proposed use at the requested density will ignite traffic concerns for the area, which at this point are unresolved in the applicant's provided traffic study. The intersection of South Royal Oaks Boulevard and Riverside Drive is currently at an unacceptable level, and the applicant's study is lacking the documentation and analysis of how their proposed off-site improvements will alleviate some of the current congestion. Without data to support the study's claims, this rezoning request seems premature.

Project Considerations

Project Considerations are not conditions of this approval, but are intended to highlight issues that should be considered in the overall site design or may be required when more detailed plans are submitted for review. These items are not meant to be exhaustive and all City requirements and ordinances must be met with each plan submittal.

Regarding the requested analysis for South Royal Oaks & Center Point/Riverside to investigate protected/permitted left turn phasing for the side streets, this was not performed. Furthermore, the Synchro technical analyses using permitted left turns on the side streets show errors. The applicant shall correct the errors and investigate the protected/permitted left turn phasing for the side streets. Staff has informed the applicant that the City of Franklin's preliminary investigation of such phasing shows improvements in intersection operations. The applicant shall also address the 3rd party review comments as approved by the City Traffic Engineer and uploaded into IDT.

Recommendation

..recommendation

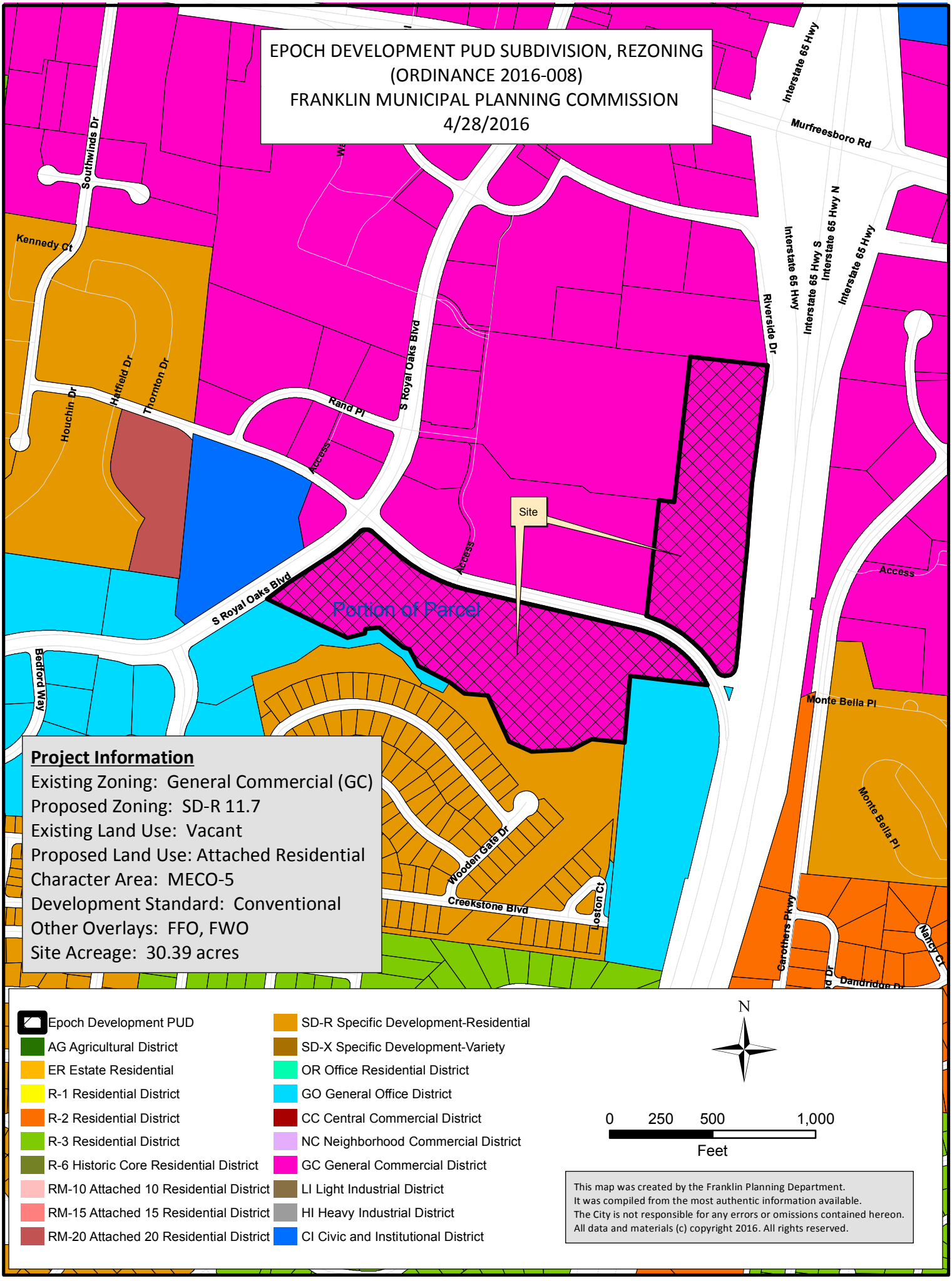
Disapproval.

..end

See attached pages for a list of staff recommended conditions of approval.

PROCEDURAL REQUIREMENTS:

1. The city's project identification number shall be included on all correspondence with any city department relative to this project.


EPOCH DEVELOPMENT PUD SUBDIVISION, REZONING
(ORDINANCE 2016-008)
FRANKLIN MUNICIPAL PLANNING COMMISSION
4/28/2016
Project Information
Existing Zoning: General Commercial (GC)
Proposed Zoning: SD-R 11.7
Existing Land Use: Vacant
Proposed Land Use: Attached Residential
Character Area: MECO-5
Development Standard: Conventional
Other Overlays: FFO, FWO
Site Acreage: 30.39 acres
Site
Portion of Parcel
Southwinds Dr
Kennedy Ct
Houchin Dr
Hatfield Dr
Thornton Dr
Rand Pl
S Royal Oaks Blvd
Access
Bedford Way
Murfreesboro Rd
Interstate 65 Hwy
Interstate 65 Hwy S
Interstate 65 Hwy N
Riverside Dr
Monte Bella Pl
Wooden Gate Dr
Creekstone Blvd
Loston Ct
Carothers Pkwy
Nancy Ct
Dandridge Dr
Epoch Development PUD
AG Agricultural District
ER Estate Residential
R-1 Residential District
R-2 Residential District
R-3 Residential District
R-6 Historic Core Residential District
RM-10 Attached 10 Residential District
RM-15 Attached 15 Residential District
RM-20 Attached 20 Residential District
SD-R Specific Development-Residential
SD-X Specific Development-Variety
OR Office Residential District
GO General Office District
CC Central Commercial District
NC Neighborhood Commercial District
GC General Commercial District
LI Light Industrial District
HI Heavy Industrial District
CI Civic and Institutional District
N
0 250 500 1,000
Feet
This map was created by the Franklin Planning Department.
It was compiled from the most authentic information available.
The City is not responsible for any errors or omissions contained hereon.
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ORDINANCE 2016-008

TO BE ENTITLED, "AN ORDINANCE TO REZONE 30.39 ACRES FROM GENERAL COMMERCIAL (GC) DISTRICT TO SPECIFIC DEVELOPMENT-RESIDENTIAL (SD-R 12) DISTRICT FOR THE PROPERTY LOCATED WEST OF INTERSTATE 65, AT 840 AND 880 OAK MEADOW DRIVE."

WHEREAS, the City of Franklin, Tennessee, encourages responsible growth and the sensible transition of land uses and densities; and

WHEREAS, the Specific Development-Residential district provides zoning for land uses compatible with both the Franklin Land Use Plan and surrounding development; and

WHEREAS, the Board of Mayor and Alderman (BOMA) of the City of Franklin, Tennessee, adopted Resolution 2016-20, approving a Plan Unit Development (PUD) Development Plan as required by the Franklin Zoning Ordinance; and

WHEREAS, the zoning has been reviewed and approved by BOMA after a public hearing and a recommendation by the Franklin Municipal Planning Commission.

NOW THEREFORE BE IT ORDAINED BY THE BOARD OF MAYOR AND ALDERMAN OF THE CITY OF FRANKLIN, TENNESSEE, AS FOLLOWS:

SECTION I. That the following described property shall be, and is hereby, rezoned from its present zoning classification of **GC** District to **SD-R (12.0)** District:

PREMISES CONSIDERED

Map-Parcel	Acres
79-88 (portion of)	13.06
79-101.19	17.33
Total	30.39

LOT 24
MAP 79, PORTION OF PARCEL 88.00
SURVEY TRACT 1

A TRACT OF LAND IN THE NINTH CIVIL DISTRICT OF WILLIAMSON COUNTY, CITY OF FRANKLIN, TENNESSEE AND BEING GENERALLY BOUNDED ON THE NORTH BY OAK MEADOW DRIVE, (RIGHT-OF-WAY WIDTH VARIES), ON THE EAST BY NASHVILLE LODGE NO. 72, B.P.O. ELKS, RECORDED IN DEED BOOK 1708, PAGE 12, REGISTER'S OFFICE FOR WILLIAMSON COUNTY, TENNESSEE (R.O.W.C.,T.) ON THE SOUTH BY OPEN SPACE LOT 808 AS SHOWN ON THE PLAN ENTITLED "CREEKSTONE COMMONS, P.U.D SUBDIVISION, SECTION FOUR" OF RECORD IN PLAT BOOK P58, PAGE 10, R.O.W.C.,T. AND LOT 27 AS SHOWN ON THE PLAN ENTITLED "CREEKSTONE COMMONS, REVISION FOUR" OF RECORD IN PLAT BOOK P49, PAGE 110, R.O.W.C.,T. AND ON THE WEST BY THE REMAINDER OF LOT 24 OF FINAL PLAN OF WATSON GLEN SUBDIVISION, SECTION 1, REVISION 10, OF RECORD IN PLAT BOOK 29, PAGE 139, R.O.W.C.T AND BEING DESCRIBED ACCORDING TO A SURVEY DATED OCTOBER 15, 2015 AND PREPARED BY KEVIN L. BIRDWELL, R.L.S. NO. 1797 WHOSE ADDRESS IS RAGAN SMITH ASSOCIATES, 315 WOODLAND STREET, NASHVILLE, TN 37206 AND BEING MORE

PARTICULARLY DESCRIBED AS FOLLOWS:
COMMENCING IN THE EAST RIGHT-OF-WAY LINE OF SOUTH ROYAL OAKS BOULEVARD AND BEING THE SOUTH END OF A CURVE AT THE INTERSECTION OF THE EAST RIGHT-OF-WAY LINE OF SOUTH ROYAL OAKS BOULEVARD AND THE SOUTH RIGHT-OF-WAY LINE OF OAK MEADOW DRIVE AND PROCEEDING AS FOLLOWS:
THENCE, WITH A CURVE TO THE RIGHT HAVING A RADIUS OF 50.00 FEET, AN ARC LENGTH OF 72.76 FEET, A CENTRAL ANGLE OF 83 DEGREES 22 MINUTES 19 SECONDS, AND A CHORD BEARING AND DISTANCE OF NORTH 89 DEGREES 31 MINUTES 21 SECONDS EAST, 66.50 FEET TO AN IRON ROD (NEW) WITH CAP STAMPED (RSA) IN THE SOUTH RIGHT-OF-WAY LINE OF OAK MEADOW DRIVE;
THENCE, WITH THE SOUTH RIGHT-OF-WAY LINE OF OAK MEADOW DRIVE THE FOLLOWING TWO CALLS:
1. SOUTH 48 DEGREES 47 MINUTES 29 SECONDS EAST, 121.81 FEET;
2. WITH A CURVE TO THE LEFT HAVING A RADIUS OF 820.00 FEET, AN ARC LENGTH OF 71.61 FEET, A CENTRAL ANGLE OF 05 DEGREES 00 MINUTES 12 SECONDS, AND A CHORD BEARING AND DISTANCE OF SOUTH 51 DEGREES 17 MINUTES 35 SECONDS EAST, 71.58 FEET TO AN IRON ROD (NEW) WITH CAP STAMPED (RSA), THE **POINT OF BEGINNING** OF THE HEREIN DESCRIBED TRACT OF LAND AND PROCEEEDING AS FOLLOWS:
THENCE, WITH SAID SOUTH RIGHT-OF-WAY LINE OF OAK MEADOW DRIVE THE FOLLOWING THREE CALLS:
1. WITH A CURVE TO THE LEFT HAVING A RADIUS OF 820.00 FEET, AN ARC LENGTH OF 330.94 FEET, A CENTRAL ANGLE OF 23 DEGREES 07 MINUTES 24 SECONDS, AND A CHORD BEARING AND DISTANCE OF SOUTH 65 DEGREES 21 MINUTES 21 SECONDS EAST, 328.69 FEET TO AN IRON ROD (OLD) WITH CAP STAMPED (RSA);
2. SOUTH 76 DEGREES 55 MINUTES 03 SECONDS EAST, 834.46 FEET TO AN IRON ROD (NEW)WITH CAP STAMPED (RSA);
3. WITH A CURVE TO THE RIGHT HAVING A RADIUS OF 537.96 FEET, AN ARC LENGTH OF 464.57 FEET, A CENTRAL ANGLE OF 49 DEGREES 28 MINUTES 46 SECONDS, AND A CHORD BEARING AND DISTANCE OF SOUTH 52 DEGREES 10 MINUTES 40 SECONDS EAST, 450.27 FEET TO AN IRON ROD (NEW)WITH CAP STAMPED (RSA);
THENCE, LEAVING THE SOUTH RIGHT-OF-WAY LINE OF OAK MEADOW DRIVE AND WITH THE NORTH LINE OF THE NASHVILLE LODGE NO. 72, B.P.O. ELKS PROPERTY, NORTH 83 DEGREES 59 MINUTES 15 SECONDS WEST, 376.29 FEET TO A 1/2 INCH DIAMETER IRON ROD (OLD),
THENCE, WITH THE WEST LINE OF THE NASHVILLE LODGE NO. 72, B.P.O. ELKS PROPERTY, SOUTH 05 DEGREES 14 MINUTES 00 SECONDS WEST, PASSING A WITNESS IRON ROD (NEW) ON THE NORTH SIDE OF WATSON BRANCH AT A DISTANCE OF 298.26 AND A TOTAL DISTANCE OF 323.26 FEET TO A POINT IN THE CENTER OF WATSON BRANCH, SAID POINT BEING THE NORTHEAST CORNER OF LOT 808 ON SAID PLAN OF CREEKSTONE COMMONS P.U.D. SUDIVISION, SECTION FOUR;
THENCE, WITH THE CENTERLINE OF WATSON BRANCH AND THE NORTH LINE OF LOT 808 OF SAID CREEKSTONE COMMONS P.U.D. SUBDIVISION, SECTION FOUR AND THE NORTH LINE OF LOT 27 ON SAID PLAN OF CREEKSTONE COMMONS SUBDIVISION, REVISION 4 THE FOLLOWING SIXTEEN BEARINGS AND DISTANCES:
1. NORTH 83 DEGREES 48 MINUTES 10 SECONDS WEST, 161.22 FEET;
2. SOUTH 61 DEGREES 46 MINUTES 08 SECONDS WEST, 106.65 FEET;
3. SOUTH 86 DEGREES 48 MINUTES 30 SECONDS WEST, 198.12 FEET;
4. NORTH 65 DEGREES 28 MINUTES 52 SECONDS WEST, 120.02 FEET;
5. NORTH 24 DEGREES 43 MINUTES 04 SECONDS WEST, 244.21 FEET;
6. NORTH 84 DEGREES 36 MINUTES 00 SECONDS WEST, 115.35 FEET;
7. NORTH 52 DEGREES 04 MINUTES 01 SECONDS WEST, 87.70 FEET;
8. NORTH 57 DEGREES 18 MINUTES 12 SECONDS WEST, 163.19 FEET;
9. NORTH 29 DEGREES 52 MINUTES 55 SECONDS WEST, 101.80 FEET;
10. NORTH 74 DEGREES 02 MINUTES 09 SECONDS WEST, 41.15 FEET;
11. NORTH 48 DEGREES 56 MINUTES 27 SECONDS WEST, 137.25 FEET;
12. SOUTH 88 DEGREES 57 MINUTES 25 SECONDS WEST, 67.60 FEET,

13. SOUTH 10 DEGREES 32 MINUTES 54 SECONDS WEST, 26.12 FEET,
14. SOUTH 74 DEGREES 19 MINUTES 35 SECONDS WEST, 89.75 FEET,
15. NORTH 75 DEGREES 22 MINUTES 06 SECONDS WEST, 55.08 FEET,
16. NORTH 62 DEGREES 35 MINUTES 03 SECONDS WEST, 10.27 FEET,
THENCE, LEAVING WATSON BRANCH WITH A THE CENTERLINE OF A DRAINAGE DITCH AND SEVERING SAID LOT 24 OF FINAL PLAN OF WATSON GLEN SUBDIVISION, SECTION 1, REVISION 10, THE FOLLOWING SEVEN BEARINGS AND DISTANCES:
1. NORTH 39 DEGREES 40 MINUTES 55 SECONDS EAST, 27.30 FEET,
2. SOUTH 89 DEGREES 07 MINUTES 57 SECONDS EAST, 31.47 FEET,
3. NORTH 25 DEGREES 32 MINUTES 12 SECONDS EAST, 70.78 FEET,
4. NORTH 10 DEGREES 00 MINUTES 40 SECONDS WEST, 49.37 FEET,
5. NORTH 54 DEGREES 59 MINUTES 41 SECONDS EAST, 103.02 FEET,
6. NORTH 40 DEGREES 36 MINUTES 36 SECONDS EAST, 74.71 FEET,
7. NORTH 53 DEGREES 28 MINUTES 05 SECONDS EAST, 164.68 FEET TO THE POINT OF BEGINNING AND CONTAINING 754,942 SQUARE FEET OR 17.33 ACRES, MORE OR LESS.

and

LOT 32
MAP 79, PARCEL 101.00

A TRACT OF LAND IN THE NINTH CIVIL DISTRICT OF WILLIAMSON COUNTY, CITY OF FRANKLIN, TENNESSEE, AND BEING LOT 32 AS SHOWN ON THE FINAL PLAT ENTITLED “WATSON GLEN SUBDIVISION, SECTION 2, REVISION 1, RESUBDIVISION OF LOT 31” OF RECORD IN PLAT BOOK P62, PAGE 45, REGISTER'S OFFICE FOR WILLIAMSON COUNTY TENNESSEE (R.O.W.C.T.). AND BEING GENERALLY BOUNDED ON THE NORTH BY LOT 10 AS SHOWN ON PLAN ENTITLED “WATSON GLEN SUBDIVISION, SECTION 2” OF RECORD IN PLAT BOOK 13, PAGE 85, R.O.W.C.T., ON THE EAST BY RIVERSIDE DRIVE (IMPROVED AND UNIMPROVED ROAD, RIGHT-OF-WAY WIDTH VARIES), ON THE SOUTH BY OAK MEADOW DRIVE (RIGHT-OF-WAY WITH VARIES), AND ON THE WEST BY LOT 2 AS SHOWN ON THE PLAN ENTITLED “WATSON GLEN SUBDIVISION, SECTION 1, REVISION 10, (RESUBDIVISION OF LOT 2 AND OF RIVERSIDE BUSINESS PARK SUBDIVISION, SECTION 1, REVISION 4, LOT 11) OF RECORD IN PLAT BOOK 29, PAGE 139, R.O.W.C.T. AND LOT 31 ON SAID PLAN ENTITLED “WATSON GLEN SUBDIVISION, SECTION 2, REVISION 1, RESUBDIVISION OF LOT 31” OF RECORD IN PLAT BOOK P62, PAGE 45, R.OW.C.T., AND BEING DESCRIBED ACCORDING TO A SURVEY DATED OCTOBER 15, 2015 AND PREPARED BY KEVIN L BIRDWELL, R.L.S. NO. 1797 WHOSE ADDRESS IS RAGAN SMITH ASSOCIATES, 315 WOODLAND STREET, NASHVILLE, TN 37206 AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:
COMMENCING AT AN IRON ROD (OLD) WITH CAP STAMPED “RAGAN-SMITH ASSOCIATES” (RSA), SAID PIN BEING IN THE EASTERLY RIGHT-OF-WAY OF SOUTH ROYAL OAKS BOULEVARD AND BEING THE NORTH END OF A CURVE AT THE INTERSECTION OF THE EAST RIGHT-OF-WAY LINE OF SOUTH ROYAL OAKS BOULEVARD AND THE NORTH RIGHT-OF-WAY LINE OF OAK MEADOW DRIVE AND BEING A WESTERLY CORNER OF LOT 30 OF THE FINAL PLAT ENTITLED “WATSON GLEN SUBDIVISION, SECTION 2 OF RECORD IN PLAT BOOK P43, PAGE 40, R.O.W.C.T.;
THENCE, WITH A CURVE TO THE LEFT HAVING A RADIUS OF 50.00 FEET, AN ARC LENGTH OF 73.83 FEET, A CENTRAL ANGLE OF 84 DEGREES 35 MINUTES 53 SECONDS, AND A CHORD BEARING AND DISTANCE OF SOUTH 06 DEGREES 29 MINUTES 38 SECONDS EAST, 67.30 FEET TO AN IRON ROD (OLD) WITH CAP STAMPED (RSA) IN THE NORTHERLY RIGHT-OF-WAY OF OAK MEADOW DRIVE (RIGHT-OF-WAY WIDTH VARIES);
THENCE, CONTINUING WITH SAID RIGHT-OF-WAY AND WITH THE SOUTHERLY LINE OF SAID LOT 30 THE FOLLOWING TWO CALLS:
1. SOUTH 48 DEGREES 47 MINUTES 29 SECONDS EAST, 157.42 FEET IRON ROD (OLD) WITH CAP STAMPED (RSA);
2. WITH A CURVE TO THE LEFT HAVING A RADIUS OF 750.00 FEET, AN ARC LENGTH OF 251.97 FEET, A CENTRAL ANGLE OF 19 DEGREES 14 MINUTES 55 SECONDS, AND A CHORD BEARING AND DISTANCE OF SOUTH 58 DEGREES 24 MINUTES 57 SECONDS EAST, 250.78 FEET TO AN IRON ROD (OLD) WITH CAP STAMPED (RSA) AT THE SOUTHWEST CORNER OF LOT 31 ON THE PLAN ENTITLED “WATSON GLEN SUBDIVISION, SECTION 2, REVISON 1, RESUBDIVISION OF LOT 31” OF RECORD IN PLAT BOOK P62, PAGE 45, R.O.W.C.T.;
THENCE, CONTINUING WITH SAID RIGHT-OF-WAY AND WITH THE SOUTHERLY LINE OF SAID LOT 31 THE FOLLOWING THREE CALLS:
1. WITH A CURVE TO THE LEFT HAVING A RADIUS OF 750.00 FEET, AN ARC LENGTH OF 116.20 FEET,

A CENTRAL ANGLE OF 08 DEGREES 52 MINUTES 38 SECONDS, AND A CHORD BEARING AND DISTANCE OF SOUTH 72 DEGREES 28 MINUTES 44 SECONDS EAST, 116.09 FEET TO AN IRON ROD (OLD) WITH CAP STAMPED (RSA);
2. SOUTH 76 DEGREES 55 MINUTES 03 SECONDS EAST, 811.13 FEET TO AN IRON ROD (OLD);
3. WITH A CURVE TO THE RIGHT HAVING A RADIUS OF 607.96 FEET, AN ARC LENGTH OF 43.08 FEET, A CENTRAL ANGLE OF 04 DEGREES 03 MINUTES 37 SECONDS, AND A CHORD BEARING AND DISTANCE OF SOUTH 74 DEGREES 53 MINUTES 15 SECONDS EAST, 43.07 FEET TO A PK NAIL (OLD) IN THE CENTERLINE OF AN ACCESS DRIVE, THE **POINT OF BEGINNING** OF THE HEREIN DESCRIBED TRACT OF LAND AND PROCEEEDING AS FOLLOWS:
4. THENCE, LEAVING SAID RIGHT-OF-WAY OF OAK MEADOW DRIVE WITH THE CENTERLINE OF SAID ACCESS DRIVE AND THE EAST LINE OF SAID LOT 31 ON THE PLAN ENTITLED "WATSON GLEN SUBDIVISION, SECTION 2, REVISON 1, RESUBDIVISION OF LOT 31" OF RECORD IN PLAT BOOK P62, PAGE 45, R.O.W.C.T.;NORTH 06 DEGREES 14 MINUTES 29 SECONDS EAST, 564.50 FEET TO A PK NAIL (OLD) IN THE SOUTH LINE OF LOT 2 AS SHOWN ON THE PLAN ENTITLED "WATSON GLEN SUBDIVISION, SECTION 1, REVISION 10, (RESUBDIVISION OF LOT 2 AND OF RIVERSIDE BUSINESS PARK SUBDIVISION, SECTION 1, REVISION 4, LOT 11);
THENCE, WITH THE SOUTH AND EAST LINE OF SAID LOT 2, THE FOLLOWING TWO BEARINGS AND DISTANCES:
1. SOUTH 83 DEGREES 35 MINUTES 44 SECONDS EAST, 73.68 FEET TO AN IRON ROD (OLD) WITH CAP STAMPED (RSA);
2. NORTH 06 DEGREES 24 MINUTES 16 SECONDS EAST, 708.89 FEET TO PUNCH HOLE IN A LIGHT BASE IN THE SOUTH LINE OF SAID LOT 10 OF FINAL PLAT ENTITLED "WATSON GLEN SUBDIVISION, SECTION 2";
THENCE, WITH THE SOUTH LINE OF SAID LOT 10, SOUTH 83 DEGREES 32 MINUTES 35 SECONDS EAST, 377.77 FEET TO CONCRETE MONUMENT OLD IN THE WESTERLY RIGHT-OF-WAY OF RIVERSIDE DRIVE (RIGHT-OF-WAY WIDTH VARIES);
THENCE, WITH THE WESTERLY RIGHT-OF-WAY OF RIVERSIDE DRIVE (IMPROVED AND UNIMPROVED ROAD), THE FOLLOWING FOUR CALLS:
1. SOUTH 07 DEGREES 40 MINUTES 29 SECONDS WEST, 577.88 FEET TO AN IRON ROD (OLD);
2. SOUTH 04 DEGREES 01 MINUTES 39 SECONDS WEST, 310.67 FEET TO AN IRON ROD (OLD);
3. WITH A CURVE TO THE LEFT HAVING A RADIUS OF 11300.00 FEET, AN ARC LENGTH OF 470.04 FEET, A CENTRAL ANGLE OF 02 DEGREES 23 MINUTES 00 SECONDS, AND A CHORD BEARING AND DISTANCE OF SOUTH 05 DEGREES 13 MINUTES 09 SECONDS WEST, 470.01 FEET TO A CONCRETE MONUMENT (OLD);
4. WITH A CURVE TO THE LEFT HAVING A RADIUS OF 11300.00 FEET, AN ARC LENGTH OF 112.73 FEET, A CENTRAL ANGLE OF 00 DEGREES 34 MINUTES 18 SECONDS, AND A CHORD BEARING AND DISTANCE OF SOUTH 06 DEGREES 41 MINUTES 48 SECONDS WEST, 112.73 FEET TO A CONCRETE MONUMENT (OLD);
THENCE, LEAVING SAID RIGHT-OF-WAY OF RIVERSIDE DRIVE AND WITH THE NORTH RIGHT-OF-WAY OF OAK MEADOW DRIVE (RIGHT-OF-WAY WIDTH VARIES) THE FOLLOWING TWO CALLS:
1. WITH A CURVE TO THE RIGHT HAVING A RADIUS OF 50.00 FEET, AN ARC LENGTH OF 123.89 FEET, A CENTRAL ANGLE OF 141 DEGREES 58 MINUTES 19 SECONDS, AND A CHORD BEARING AND DISTANCE OF SOUTH 77 DEGREES 58 MINUTES 06 SECONDS WEST, 94.54 FEET TO AN IRON ROD (OLD);
2. WITH A CURVE TO THE LEFT HAVING A RADIUS OF 607.96 FEET, AN ARC LENGTH OF 443.66 FEET, A CENTRAL ANGLE OF 41 DEGREES 48 MINUTES 42 SECONDS, AND A CHORD BEARING AND DISTANCE OF NORTH 51 DEGREES 57 MINUTES 06 SECONDS WEST, 433.88 FEET TO THE **POINT OF BEGINNING** AND CONTAINING 569,021 SQUARE FEET OR 13.06 ACRES, MORE OR LESS.

SECTION II: That the attached Location Map shall serve the purpose of further delimiting the geographical boundaries as described by this Ordinance.

SECTION III. BE IT FINALLY ORDAINED by the Board of Mayor and Aldermen of the City of Franklin, Tennessee, that this Ordinance shall take effect from and after its passage on third and final reading, the health, safety, and welfare of the citizens requiring it.

ATTEST:

By: _____
Eric Stuckey
City Administrator/Recorder

CITY OF FRANKLIN, TENNESSEE:

By: _____
Dr. Ken Moore
Mayor

Approved as to form by:

_____
Shauna R. Billingsley
City Attorney

PLANNING COMMISSION RECOMMENDED: _____

PASSED FIRST READING: _____

PUBLIC HEARING HELD: _____

PASSED SECOND READING: _____

PASSED THIRD READING: _____

F i s c h b a c h
Transportation Group, LLC
Traffic Engineering and Planning

Traffic Impact Study

Epoch Apartments
Oak Meadow Drive
Franklin, TN

Prepared March 2016
(Revised April 2016)
For Epoch Residential

FTG, LLC
P.O. Box 682736
Franklin, TN 37068
(615) 771-8022 phone
Gillian@FTGtraffic.com

Traffic Impact Study

Epoch Apartments
Oak Meadow Drive

Franklin, Tennessee

Prepared March 2016
(Revised April 2016)

PREPARED FOR:
Epoch Residential
359 Carolina Avenue
Winter Park, FL 32789

PREPARED BY:
Ms. Gillian L. Fischbach, P.E., PTOE
Fischbach Transportation Group (FTG, LLC)
P.O. Box 682736
Franklin, TN 37068
Phone: (615) 771-8022
FTG Project Number: 10728

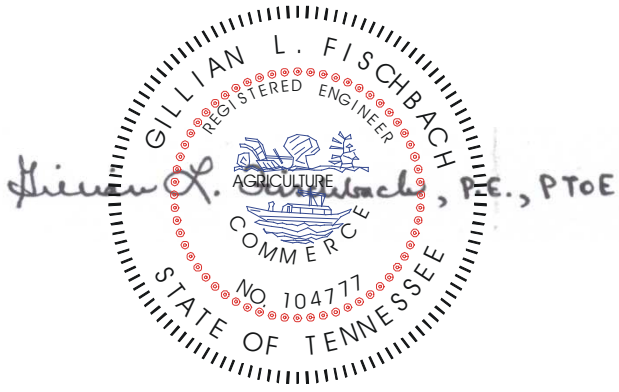

Table of Contents

1. INTRODUCTION

This traffic study has been prepared in order to identify the traffic impacts of a multi-family residential development that is proposed to be constructed on the north and south sides of Oak Meadow Drive, east of S. Royal Oaks Boulevard, in Franklin, Tennessee.

For the purposes of this study, existing and background traffic volumes were established, and capacity analyses were conducted for these conditions. Also, trip generation calculations were performed, and the trips which are expected to be generated by the proposed project were distributed to the roadway system and added to the background traffic volumes. The roadways and intersections which provide access to the site were then re-evaluated to determine the traffic impacts of the proposed project. Access needs for the project were evaluated, and the necessary roadway and/or traffic control improvements were identified. This report presents the results of these analyses and the subsequent recommendations.

It is important to note that the scope of this Traffic Impact Study was provided by the City of Franklin Engineering Department and their third-party private consultant, Neel-Schaffer, Inc. The approved scope is included in in Appendix A.

2. PROJECT DESCRIPTION

The location of the proposed project is shown in Figure 1. As shown, the project site is located on the north and south sides of Oak Meadow Drive, east of S. Royal Oaks Boulevard, in Franklin, Tennessee. The current project site plan is shown in Figure 2. As shown, the proposed plan includes 115 apartments on the south side of Oak Meadow Drive and 240 apartments on the north side of Oak Meadow Drive. Access for the southern portion of the site will be provided at two locations on Oak Meadow Drive, directly opposite two existing accesses for the Home Depot shopping center on the north side of Oak Meadow Drive. Access for the northern portion of the site will be provided at one location on the eastern access for the Home Depot shopping center on the north side of Oak Meadow Drive. Also, secondary access will be provided at the existing terminus of Riverside Drive.

In large part, economic and market considerations will dictate the pace and timing with which the proposed project is actually completed. The analyses conducted within this study are based on the estimation that the entire project will be completed within two years.

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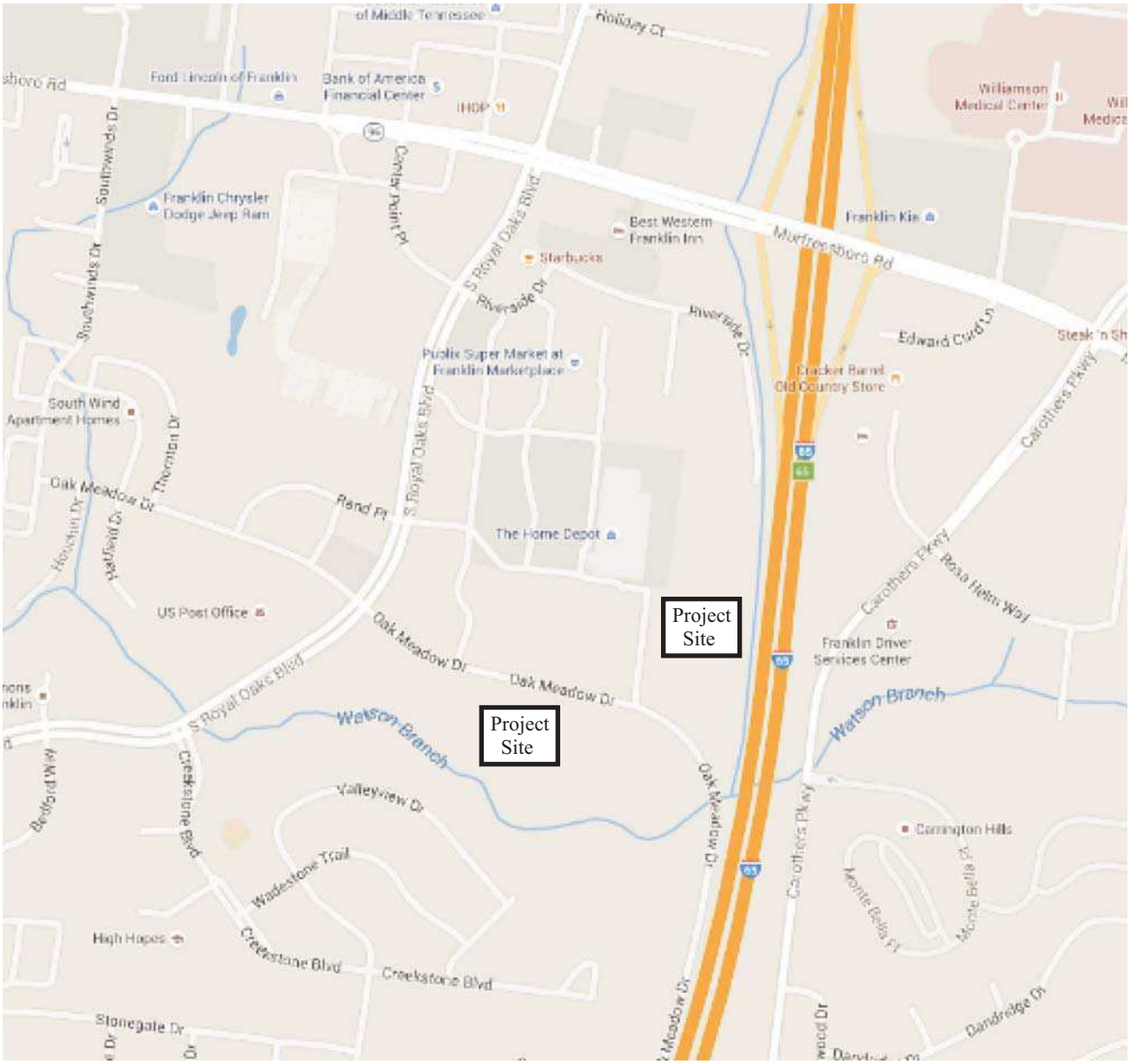
F i s c h b a c h
Transportation Group, LLC
Traffic Engineering and Planning



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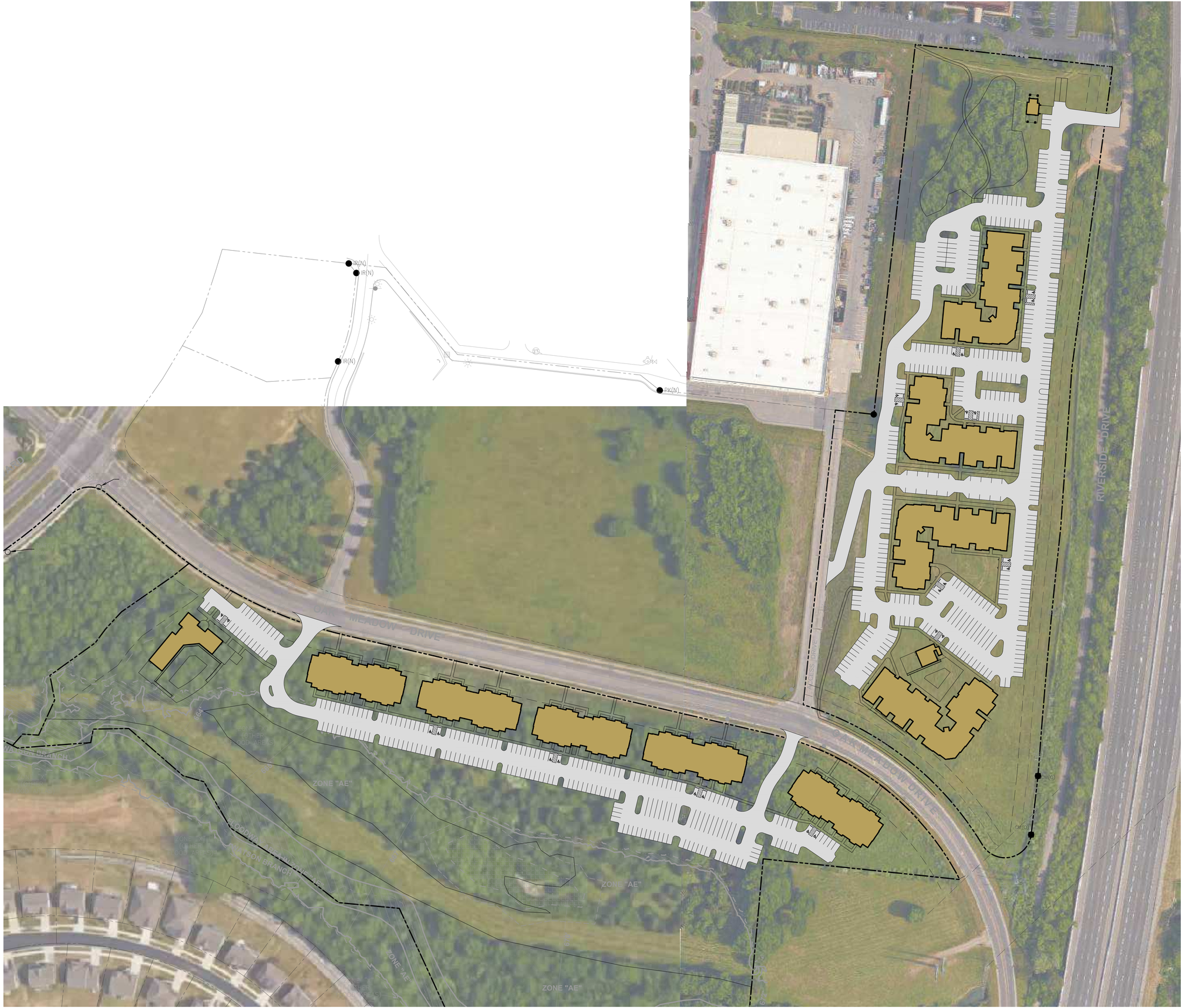
No Scale

Figure 1.
Location of the Project Site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OAK MEADOW DRIVE
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CM(O)
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ZONE "X" (OTHER FLOOD AREAS)
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FLOODWAY AREA IN ZONE "AE"
WATSON BRANCH
ZONE "X" (OTHER FLOOD AREAS)
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672

3. EXISTING TRAFFIC VOLUMES

In order to quantify the impact of the traffic that will be generated by the proposed project, peak hour traffic volumes were counted at the following locations:

1. Oak Meadow Drive and the project accesses
2. S. Royal Oaks Boulevard and Oak Meadow Drive
3. S. Royal Oaks Boulevard and Rand Place / Access for Home Depot
4. S. Royal Oaks Boulevard and Riverside Drive / Center Point Place

Also, the City of Franklin requested that peak hour traffic counts be collected for signal timing purposes at the following intersections:

5. Murfreesboro Road and Royal Oaks Boulevard
6. Murfreesboro Road and the Ramps for Southbound I-65
7. Murfreesboro Road and the Ramps for Northbound I-65

This data was collected during the morning and afternoon peak hours on typical weekdays in February 2016 when schools were in session. The raw traffic volumes are included in Appendix B. The existing laneage at the intersections within the study area is shown in Figure 3, and the existing peak hour traffic volumes are shown in Figure 4.

Using the existing peak hour traffic volumes shown in Figure 4, capacity analyses were conducted for the intersections counted. Specifically, in order to identify current peak hour levels of operation within the study area, the capacity calculations were performed according to the methods outlined in the Highway Capacity Manual 2010 (HCM2010). These analyses result in the determination of a Level of Service (LOS), which is a measure of evaluation is used to describe how well an intersection or roadway operates. LOS A represents free flow traffic operations, and LOS F suggests that the traffic demand exceeds the available capacity. In an urbanized area, LOS D is typically considered to be the minimum acceptable LOS. Table 1 presents the descriptions of LOS for signalized intersections, and Table 2 presents the descriptions of LOS for unsignalized intersections.

It is important to note that the City of Franklin Engineering Department provided the Synchro software files that were used to identify existing operations at the signalized intersections within the study area. Specifically, the files were updated to include the February 2016 traffic volumes. Also, the files were updated to reflect the recently-approved City ordinance that prohibits right-turns-on-red for the northbound right turns on S. Royal Oaks Boulevard at Murfreesboro Road.

The results of the capacity analyses for the existing peak hour traffic volumes are shown in Table 3, and Appendix C includes the capacity analyses worksheets.

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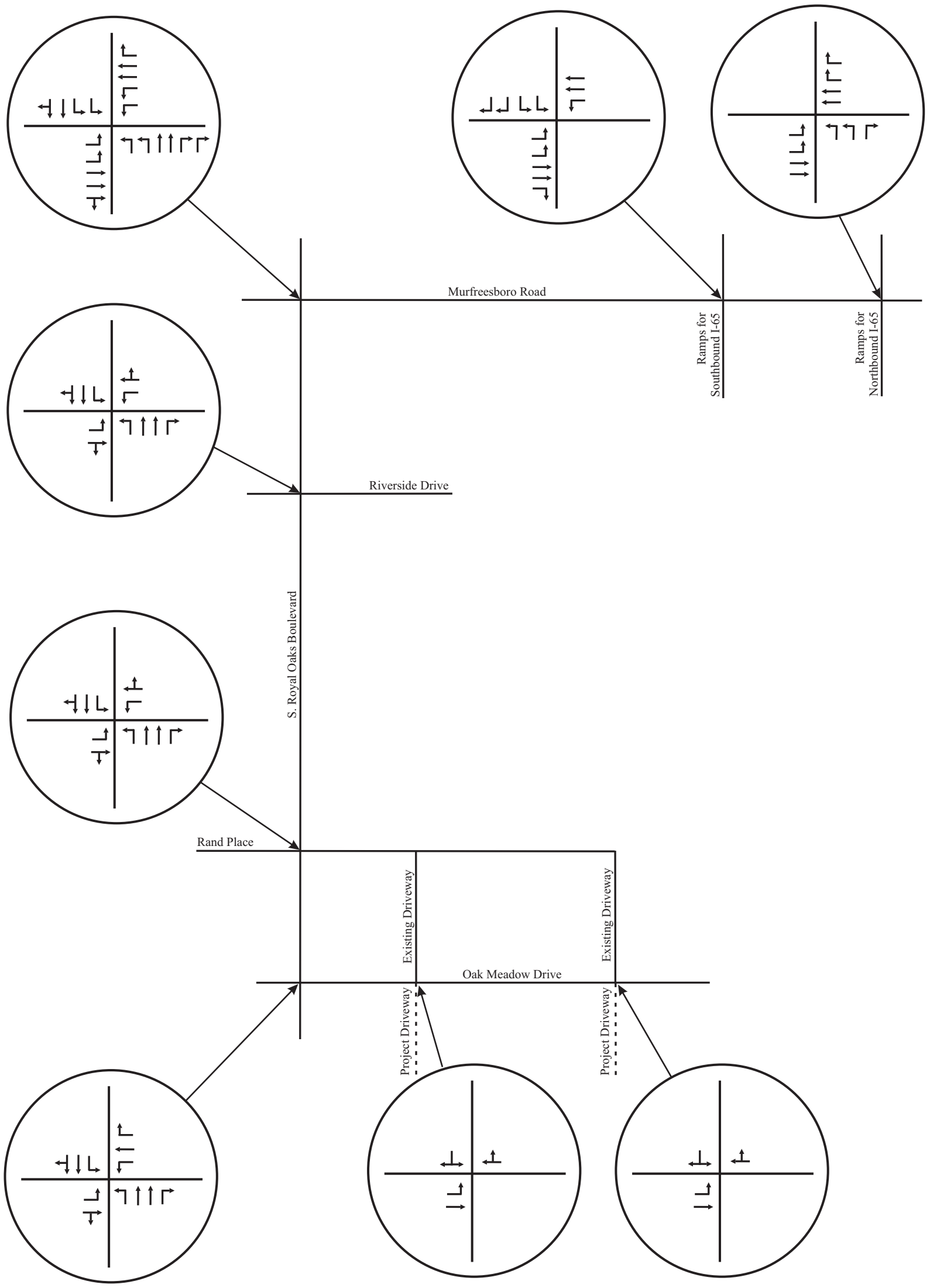

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Figure 3.
Existing Laneage at the Intersections within the Study Area

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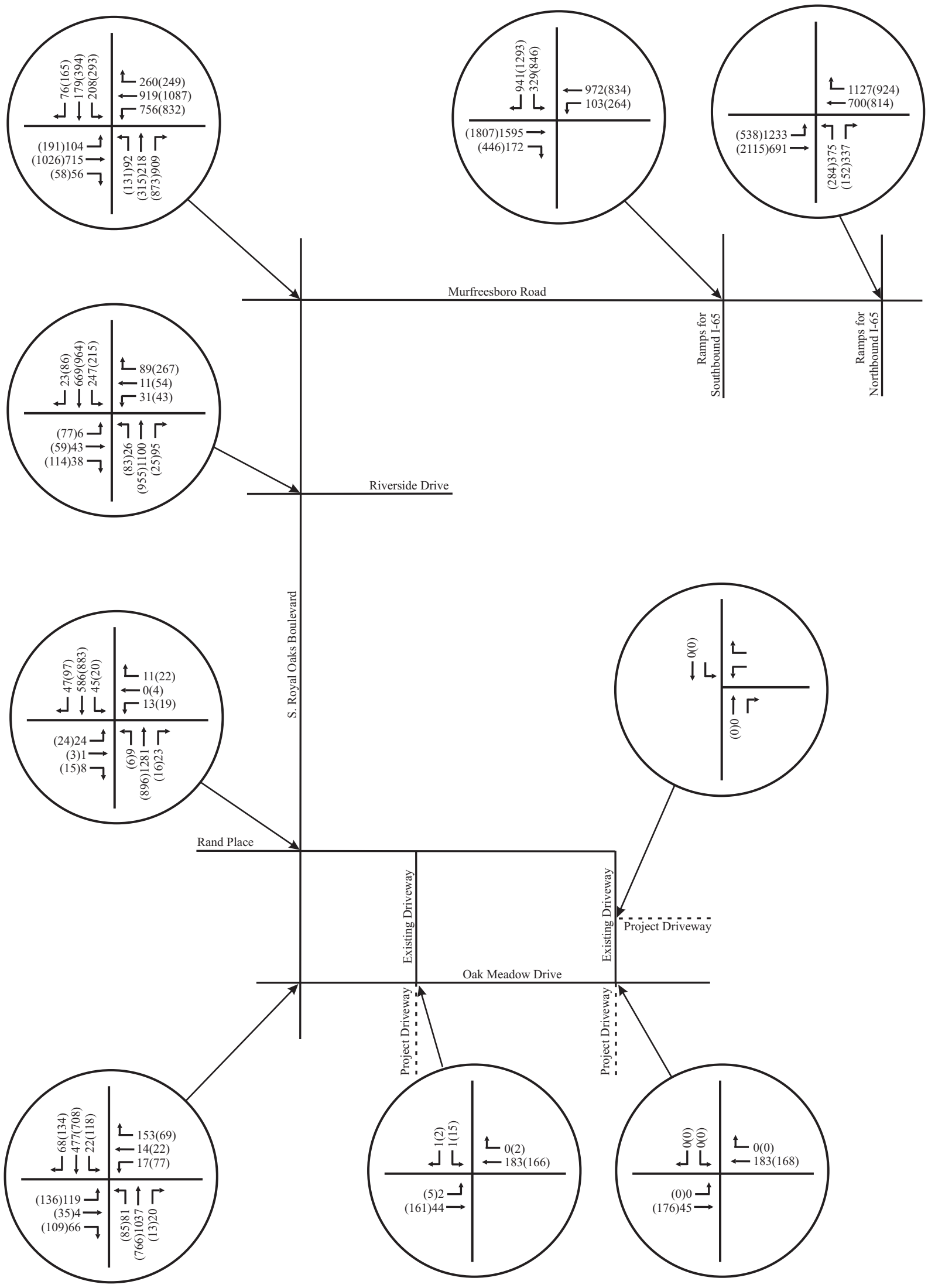

No Scale

XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes

Figure 4.
Existing Peak Hour Traffic Volumes within the Study Area

TABLE 1. DESCRIPTIONS OF LOS FOR SIGNALIZED INTERSECTIONS

Level of Service	Description	Average Control Delay per Vehicle (sec)
A	Operations with very low control delay. Progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	≤ 10
B	Operations with stable flows. This generally occurs with good progression, short cycle lengths, or both. More vehicles stop than for LOS A, causing higher levels of average delay.	> 10 and ≤ 20
C	Operations with stable flow. Occurs with fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, although many still pass through the intersection without stopping.	> 20 and ≤ 35
D	Approaching unstable flow. The influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, or high v/c ratios. Many vehicles stop.	> 35 and ≤ 55
E	Unstable flow. In many cases, this is considered to be the limit for acceptable delay. These high delays generally indicate poor progression, long cycle lengths, and high v/c ratios.	> 55 and ≤ 80
F	Unacceptable delay. This condition often occurs with oversaturation or with high v/c ratios. Poor progression and long cycle lengths may also cause such delay levels.	> 80

Source: Highway Capacity Manual 2010 (HCM2010)

TABLE 2. DESCRIPTIONS OF LOS FOR UNSIGNALIZED INTERSECTIONS

Level of Service	Description	Average Control Delay (sec/veh)
A	Minimal delay	≤ 10
B	Brief delay	> 10 and ≤ 15
C	Average delay	> 15 and ≤ 25
D	Significant delay	> 25 and ≤ 35
E	Long delay	> 35 and ≤ 50
F	Extreme delay	> 50

Source: Highway Capacity Manual 2010 (HCM 2010)

TABLE 3. EXISTING PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	AM PEAK HOUR		PM PEAK HOUR	
		LEVEL OF SERVICE	95TH %-ILE QUEUE	LEVEL OF SERVICE	95TH %-ILE QUEUE
Oak Meadow Drive and the Eastern Access for Home Depot	Eastbound Left Turns	LOS A	1 veh	LOS A	1 veh
	Southbound Left and Right Turns	LOS A	1 veh	LOS A	1 veh
Oak Meadow Drive and the Western Access for Home Depot	Eastbound Left Turns	LOS A	1 veh	LOS A	1 veh
	Southbound Left and Right Turns	LOS A	1 veh	LOS B	1 veh
S. Royal Oaks Boulevard and Oak Meadow Drive (signalized)	Northbound Left Turns	LOS A	32 feet	LOS B	47 feet
	Northbound Thrus	LOS B	308 feet	LOS B	268 feet
	Northbound Right Turns	LOS A	0 feet	LOS A	0 feet
	Southbound Left Turns	LOS A	12 feet	LOS A	64 feet
	Southbound Thrus/Right Turns	LOS A	130 feet	LOS C	356 feet
	Eastbound Left Turns	LOS D	120 feet	LOS D	137 feet
	Eastbound Thrus/Right Turns	LOS B	13 feet	LOS C	63 feet
	Westbound Left Turns	LOS C	27 feet	LOS D	82 feet
	Westbound Thrus	LOS D	25 feet	LOS D	35 feet
	Westbound Right Turns	LOS B	88 feet	LOS A	33 feet
	Overall Intersection	**LOS B**		**LOS C**	
S. Royal Oaks Boulevard and Rand Place / Home Depot Access	Northbound Left Turns	LOS A	1 veh	LOS B	1 veh
	Southbound Left Turns	LOS B	1 veh	LOS B	1 veh
	Eastbound Left Turns	LOS D	1 veh	LOS D	1 veh
	Eastbound Thrus/Right Turns	LOS B	1 veh	LOS B	1 veh

	Westbound Left Turns	LOS E	1 veh	LOS D	1 veh
	Westbound Thrus/Right Turns	LOS B	1 veh	LOS B	1 veh
S. Royal Oaks Boulevard and Riverside Drive / Center Point Place (signalized)	Northbound Left Turns	LOS A	10 feet	LOS B	55 feet
	Northbound Thrus	LOS B	386 feet	LOS C	577 feet
	Northbound Right Turns	LOS A	24 feet	LOS A	0 feet
	Southbound Left Turns	LOS D	142 feet	LOS C	80 feet
	Southbound Thrus/Right Turns	LOS A	246 feet	LOS A	411 feet
	Eastbound Left Turns	LOS E	17 feet	LOS F	209 feet
	Eastbound Thrus/Right Turns	LOS E	75 feet	LOS D	82 feet
	Westbound Left Turns	LOS E	58 feet	LOS D	66 veh
	Westbound Thrus/Right Turns	LOS C	25 feet	LOS D	258 veh
	Overall Intersection	**LOS F**		**LOS F**	
Murfreesboro Road and Royal Oaks Boulevard (signalized)	Eastbound Left Turns	LOS E	80 feet	LOS E	141 feet
	Eastbound Thrus / Right Turns	LOS D	306 feet	LOS D	431 feet
	Westbound Left Turns	LOS D	412 feet	LOS F	499 feet
	Westbound Thrus	LOS D	539 feet	LOS D	492 feet
	Westbound Right Turns	LOS A	80 feet	LOS B	120 feet
	Northbound Left Turns	LOS D	68 feet	LOS E	92 feet
	Northbound Thrus	LOS D	142 feet	LOS D	211 feet
	Northbound Right Turns	LOS D	598 feet	LOS D	623 feet
	Southbound Left Turns	LOS E	148 feet	LOS F	242 feet

	Southbound Thrus / Right Turns	LOS D	141 feet	LOS E	398 feet
	Overall Intersection	**LOS D**		**LOS E**	
Murfreesboro Road and Ramps for Southbound I-65 (signalized)	Eastbound Thrus	LOS C	346 feet	LOS E	612 feet
	Eastbound Right Turns	LOS A	51 feet	LOS C	265 feet
	Westbound Left Turns	LOS E	156 feet	LOS F	465 feet
	Westbound Thrus	LOS B	273 feet	LOS C	337 feet
	Southbound Left Turns	LOS D	164 feet	LOS D	465 feet
	Southbound Right Turns	LOS E	617 feet	LOS F	1065 feet
	Overall Intersection	**LOS C**		**LOS E**	
Murfreesboro Road and Ramps for Northbound I-65 (signalized)	Eastbound Left Turns	LOS F	914 feet	LOS E	341 feet
	Eastbound Thrus	LOS A	71 feet	LOS C	368 feet
	Westbound Thrus	LOS D	337 feet	LOS C	305 feet
	Westbound Right Turns	LOS C	502 feet	LOS A	150 feet
	Northbound Left Turns	LOS F	302 feet	LOS E	148 feet
	Northbound Right Turns	LOS C	225 feet	LOS D	97 feet
	Overall Intersection	**LOS E**		**LOS C**	

4. PROJECTION OF BACKGROUND TRAFFIC VOLUMES

In order to account for the traffic growth which will occur within the study area because of typical growth, background traffic volumes were established for the intersections within the study area. Specifically, in order to account for typical growth within the study area, consideration was given to the historical traffic volumes near the project site. The Tennessee Department of Transportation (TDOT) conducts an annual count program throughout the state. This count program includes the annual collection of average daily traffic (ADT) counts at numerous fixed locations. As shown in Table 4, the daily traffic volumes within the study area have increased 2.65% per year since 2006. Based on this information, for the purposes of this study, the existing traffic volumes at the intersections within the study area were increased by 8% to represent initial background traffic volumes in the Year 2018, as shown in Figure 5A.

TABLE 4. HISTORICAL TRAFFIC VOLUMES IN THE STUDY AREA

Year	Station 164 S. Royal Oaks Blvd ADT	Annual Growth	
2006	18,274		
2007	17,787	-2.66%	
2008	20,374	14.54%	
2009	19,666	-3.48%	
2010	19,324	-1.74%	
2011	19,090	-1.21%	
2012	19,435	1.81%	
2013	20,343	4.67%	
2014	22,118	8.73%	**Overall Growth**
2015	22,638	2.35%	**2.65%**

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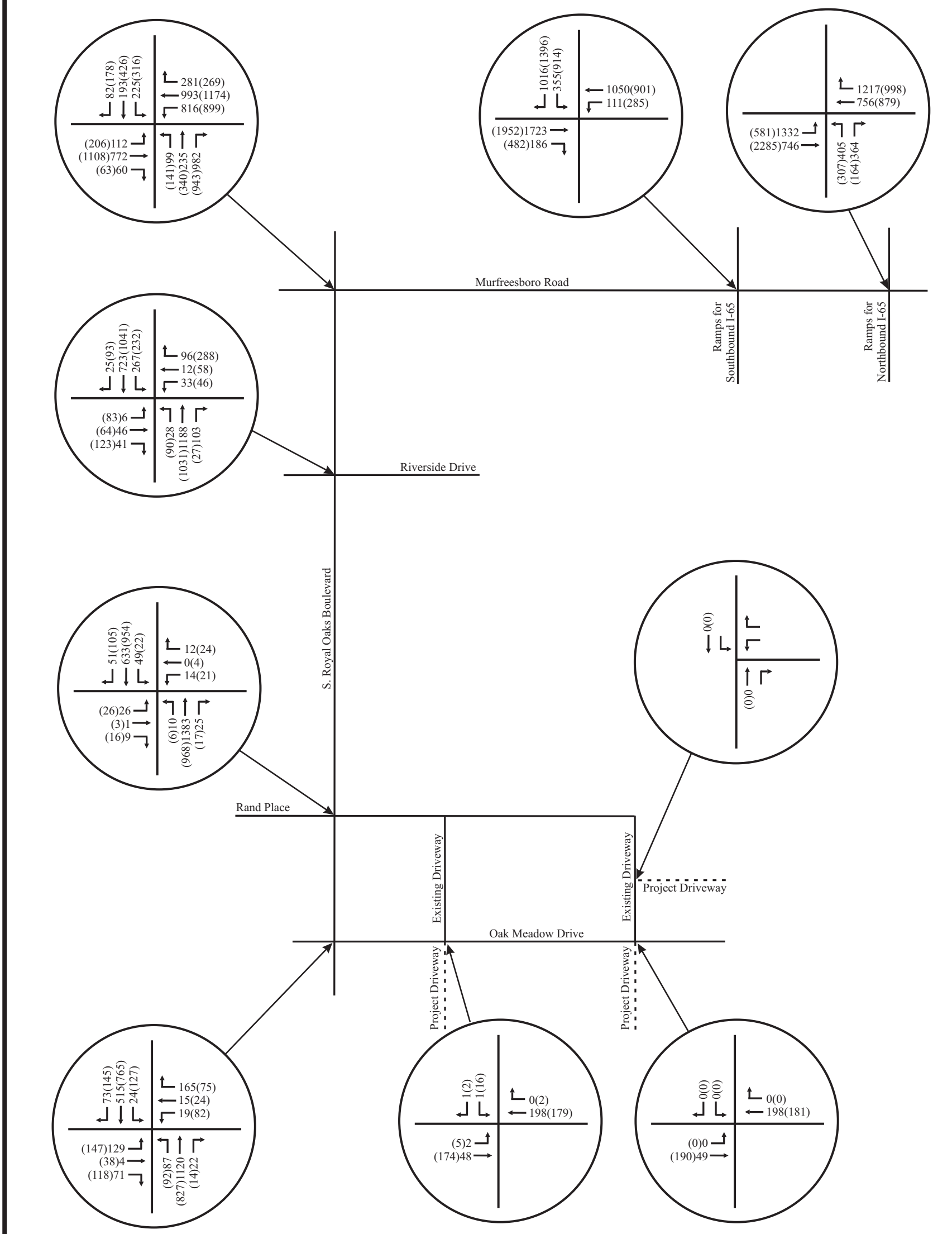

No Scale

XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes

Figure 5A.
Initial Background Peak Hour Traffic Volumes within the Study Area

It is important to note that a day care center is under construction on the north side of S. Royal Oaks Boulevard at Mack Hatcher Parkway, southwest of the proposed project. It is likely that a significant portion of the traffic that will be generated by the day care center will be pass-by traffic that is already traveling on the S. Royal Oaks Boulevard corridor. The 8% growth rate applied to the existing traffic volumes will account for the additional traffic that will be generated by the day care center.

Also, it is important to note that an assisted living facility with 208 beds is under construction on the north side of Oak Meadow Drive, opposite the southern project site for the proposed project. For the purposes of this study, trip generation calculations were conducted in order to identify how much traffic is expected to be generated by the assisted living facility. Trip generation data for daily and peak hour trips were identified from Trip Generation, Ninth Edition, which was published by the Institute of Transportation Engineers (ITE) in 2012. Table 5 presents the daily and peak hour trip generations, and these calculations are included in Appendix D.

TABLE 5. TRIP GENERATION (SOMERBY ASSISTED LIVING FACILITY)

LAND USE	SIZE	DAILY TRAFFIC	GENERATED TRAFFIC			
			AM PEAK HOUR		PM PEAK HOUR	
			ENTER	EXIT	ENTER	EXIT
Assisted Living Facility (LUC 254)	208 beds	570	34	13	30	47

Figures 5B and 5C include the directional distribution and assignment of peak hour traffic volumes that are expected to be generated by the assisted living facility.

The peak hour traffic volumes shown in Figures 5B and 5C were added to the traffic volumes shown in Figure 5A in order to establish the final background traffic volumes shown in Figure 5D. Using the background peak hour traffic volumes, capacity analyses were conducted for the intersections within the study area. For these analyses, it was assumed that all existing laneage and traffic control will be maintained and no improvements will be provided. The results of the capacity analyses for the background peak hour traffic volumes are shown in Table 5, and Appendix C includes the capacity analyses worksheets. These analyses indicate that the background conditions are consistent with the existing conditions within the study area.

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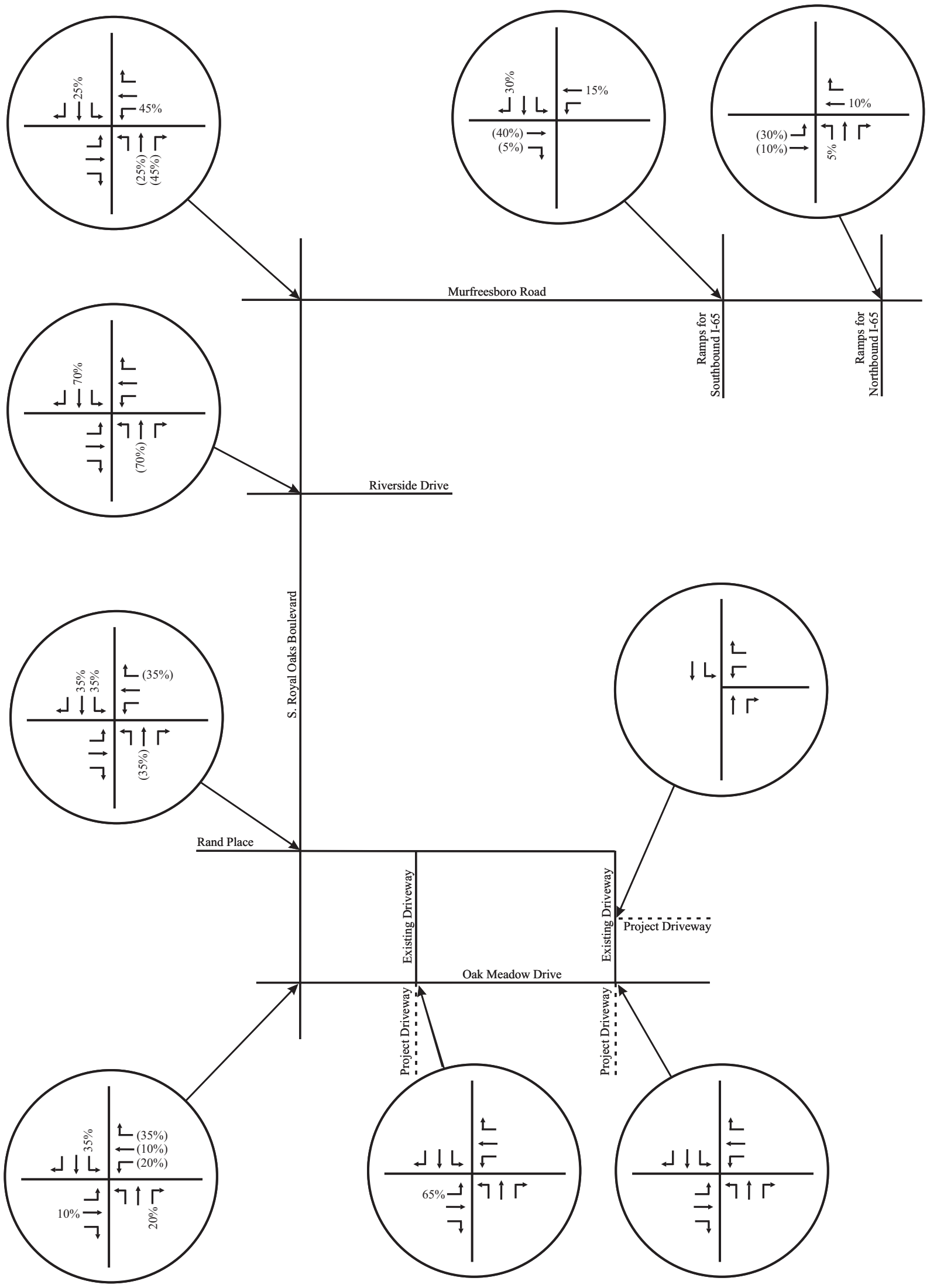

No Scale

XX - Entering Volumes
(XX) - Exiting Volumes

Figure 5B.
Directional Distribution of Peak Hour Traffic Generated by the Somerby Assisted Living Facility

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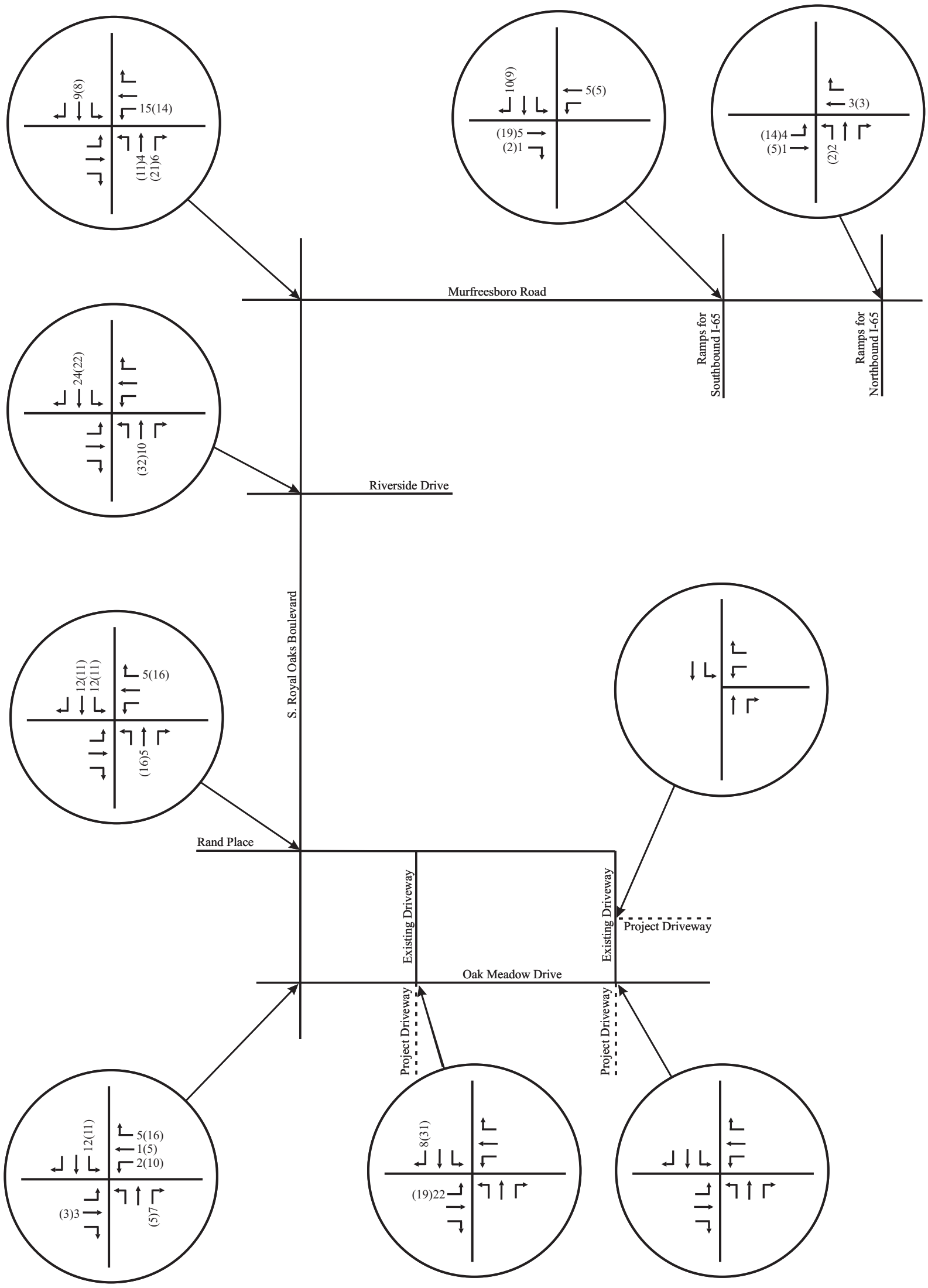

No Scale

XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes

Figure 5C.
Peak Hour Traffic Generated by the Somerby Assisted Living Facility

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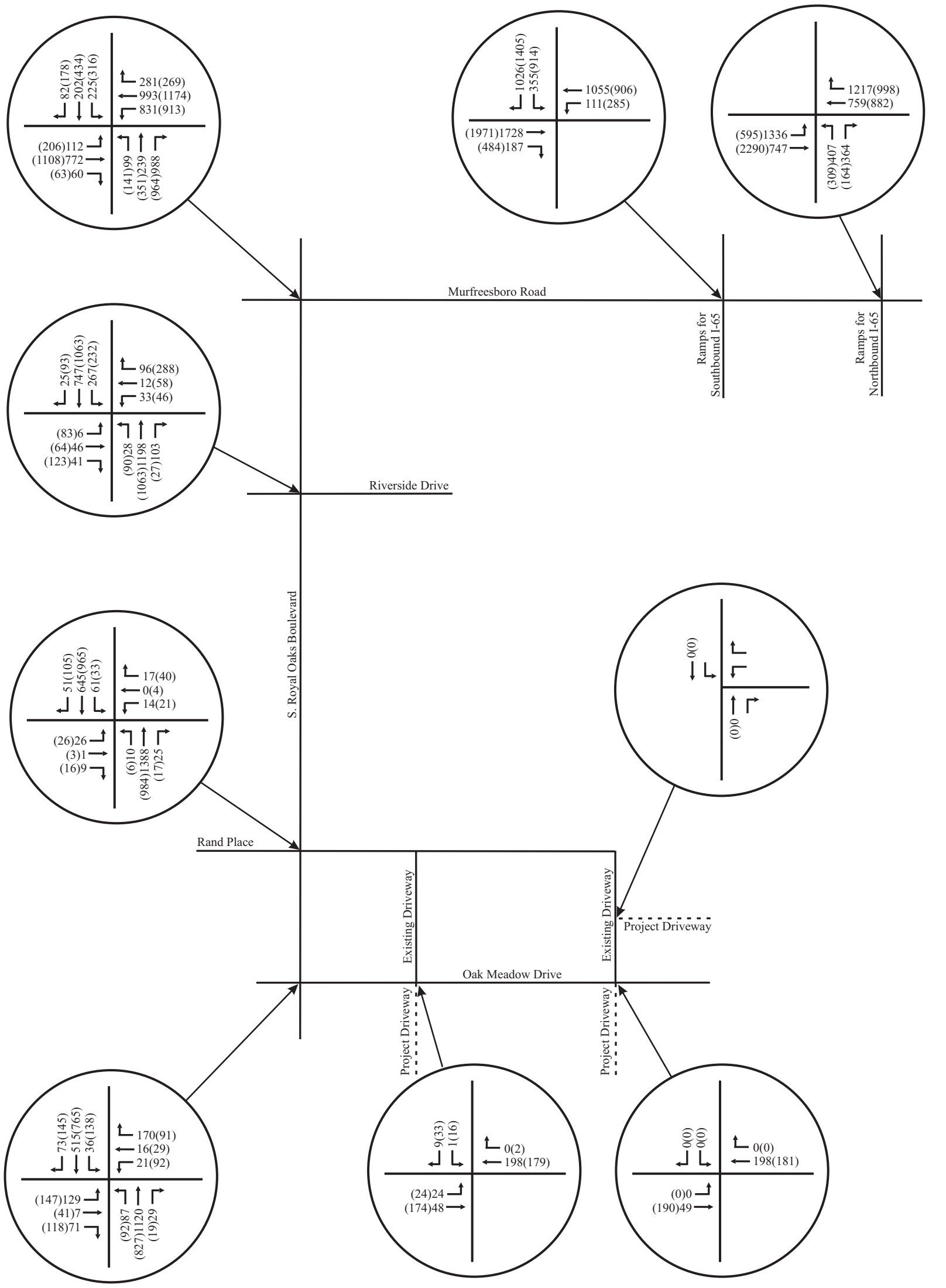

No Scale

XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes

Figure 5D.
Final Background Peak Hour Traffic Volumes within the Study Area

TABLE 5. BACKGROUND PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	AM PEAK HOUR		PM PEAK HOUR	
		LEVEL OF SERVICE	95TH %-ILE QUEUE	LEVEL OF SERVICE	95TH %-ILE QUEUE
Oak Meadow Drive and the Eastern Access for Home Depot	Eastbound Left Turns	LOS A	1 veh	LOS A	1 veh
	Southbound Left and Right Turns	LOS A	1 veh	LOS A	1 veh
Oak Meadow Drive and the Western Access for Home Depot	Eastbound Left Turns	LOS A	1 veh	LOS A	1 veh
	Southbound Left and Right Turns	LOS A	1 veh	LOS B	1 veh
S. Royal Oaks Boulevard and Oak Meadow Drive (signalized)	Northbound Left Turns	LOS A	35 feet	LOS C	56 feet
	Northbound Thrus	LOS B	351 feet	LOS B	308 feet
	Northbound Right Turns	LOS A	0 feet	LOS A	0 feet
	Southbound Left Turns	LOS A	13 feet	LOS B	78 feet
	Southbound Thrus/Right Turns	LOS B	147 feet	LOS C	423 feet
	Eastbound Left Turns	LOS D	127 feet	LOS D	142 feet
	Eastbound Thrus/Right Turns	LOS B	15 feet	LOS D	80 feet
	Westbound Left Turns	LOS C	30 feet	LOS D	92 feet
	Westbound Thrus	LOS D	27 feet	LOS D	41 feet
	Westbound Right Turns	LOS B	110 feet	LOS A	37 feet
	Overall Intersection	**LOS B**		**LOS C**	
S. Royal Oaks Boulevard and Rand Place / Home Depot Access	Northbound Left Turns	LOS A	1 veh	LOS B	1 veh
	Southbound Left Turns	LOS B	1 veh	LOS B	1 veh
	Eastbound Left Turns	LOS D	1 veh	LOS D	1 veh
	Eastbound Thrus/Right Turns	LOS B	1 veh	LOS C	1 veh

	Westbound Left Turns	LOS E	1 veh	LOS D	1 veh
	Westbound Thrus/Right Turns	LOS C	1 veh	LOS B	1 veh
S. Royal Oaks Boulevard and Riverside Drive / Center Point Place (signalized)	Northbound Left Turns	LOS A	10 feet	LOS B	58 feet
	Northbound Thrus	LOS B	459 feet	LOS D	692 feet
	Northbound Right Turns	LOS A	28 feet	LOS A	0 feet
	Southbound Left Turns	LOS E	163 feet	LOS D	114 feet
	Southbound Thrus/Right Turns	LOS A	336 feet	LOS B	571 feet
	Eastbound Left Turns	LOS E	17 feet	LOS F	214 feet
	Eastbound Thrus/Right Turns	LOS E	79 feet	LOS D	88 feet
	Westbound Left Turns	LOS E	61 feet	LOS F	70 veh
	Westbound Thrus/Right Turns	LOS C	24 feet	LOS D	293 veh
	Overall Intersection	**LOS F**		**LOS F**	
Murfreesboro Road and Royal Oaks Boulevard (signalized)	Eastbound Left Turns	LOS E	85 feet	LOS E	151 feet
	Eastbound Thrus / Right Turns	LOS D	335 feet	LOS D	475 feet
	Westbound Left Turns	LOS E	435 feet	LOS F	521 feet
	Westbound Thrus	LOS D	554 feet	LOS D	521 feet
	Westbound Right Turns	LOS A	109 feet	LOS B	130 feet
	Northbound Left Turns	LOS E	72 feet	LOS E	100 feet
	Northbound Thrus	LOS D	150 feet	LOS D	237 feet
	Northbound Right Turns	LOS D	632 feet	LOS D	692 feet
	Southbound Left Turns	LOS E	159 feet	LOS F	272 feet

	Southbound Thrus / Right Turns	LOS D	159 feet	LOS E	465 feet
	Overall Intersection	**LOS D**		**LOS E**	
Murfreesboro Road and Ramps for Southbound I-65 (signalized)	Eastbound Thrus	LOS C	388 feet	LOS E	672 feet
	Eastbound Right Turns	LOS A	50 feet	LOS C	295 feet
	Westbound Left Turns	LOS E	163 feet	LOS F	520 feet
	Westbound Thrus	LOS B	294 feet	LOS C	407 feet
	Southbound Left Turns	LOS D	178 feet	LOS D	515 feet
	Southbound Right Turns	LOS F	738 feet	LOS F	1235 feet
	Overall Intersection	**LOS D**		**LOS F**	
Murfreesboro Road and Ramps for Northbound I-65 (signalized)	Eastbound Left Turns	LOS F	1028 feet	LOS E	340 feet
	Eastbound Thrus	LOS A	76 feet	LOS C	518 feet
	Westbound Thrus	LOS D	372 feet	LOS C	467 feet
	Westbound Right Turns	LOS C	573 feet	LOS B	311 feet
	Northbound Left Turns	LOS F	337 feet	LOS E	218 feet
	Northbound Right Turns	LOS D	341 feet	LOS D	190 feet
	Overall Intersection	**LOS F**		**LOS C**	

5. IMPACTS OF PROPOSED DEVELOPMENT

5.1 TRIP GENERATION

Trip generation calculations were conducted in order to identify how much traffic will be generated by the proposed project. Trip generation data for daily and peak hour trips were identified from Trip Generation, Ninth Edition, which was published by the Institute of Transportation Engineers (ITE) in 2012. Table 6 presents the daily and peak hour trip generations for proposed townhomes, and these calculations are included in Appendix D.

TABLE 6. TRIP GENERATION

LAND USE	SIZE	DAILY TRAFFIC	GENERATED TRAFFIC			
			AM PEAK HOUR		PM PEAK HOUR	
			ENTER	EXIT	ENTER	EXIT
Multi-Family (LUC 220) **South Site**	115 units	764	12	47	46	25
Multi-Family (LUC 220) **North Site**	240 units	1,596	24	98	97	52
TOTAL	**355 units**	**2,360**	**36**	**145**	**143**	**77**

5.2 TRIP DISTRIBUTION AND TRAFFIC ASSIGNMENT

For the purposes of this study, it was estimated that the trips generated by the proposed project will access the project site according to the directional distribution shown in Figures 6A and 6B. It is important to note that these directional distributions were prepared with input and approval from the City of Franklin Engineering Department and their third-party private consultant, Neel-Schaffer, Inc. The development of these distributions was based on the following factors:

- existing land use characteristics,
- the directions of approach of the existing traffic,
- the access proposed for the project, and
- the locations of population centers in the area.

The peak hour trip generations and directional distributions were used to add the site-generated trips to the roadway system. Figures 7A, 7B, and 7C include the peak hour traffic volumes that are expected to be generated by the proposed project.

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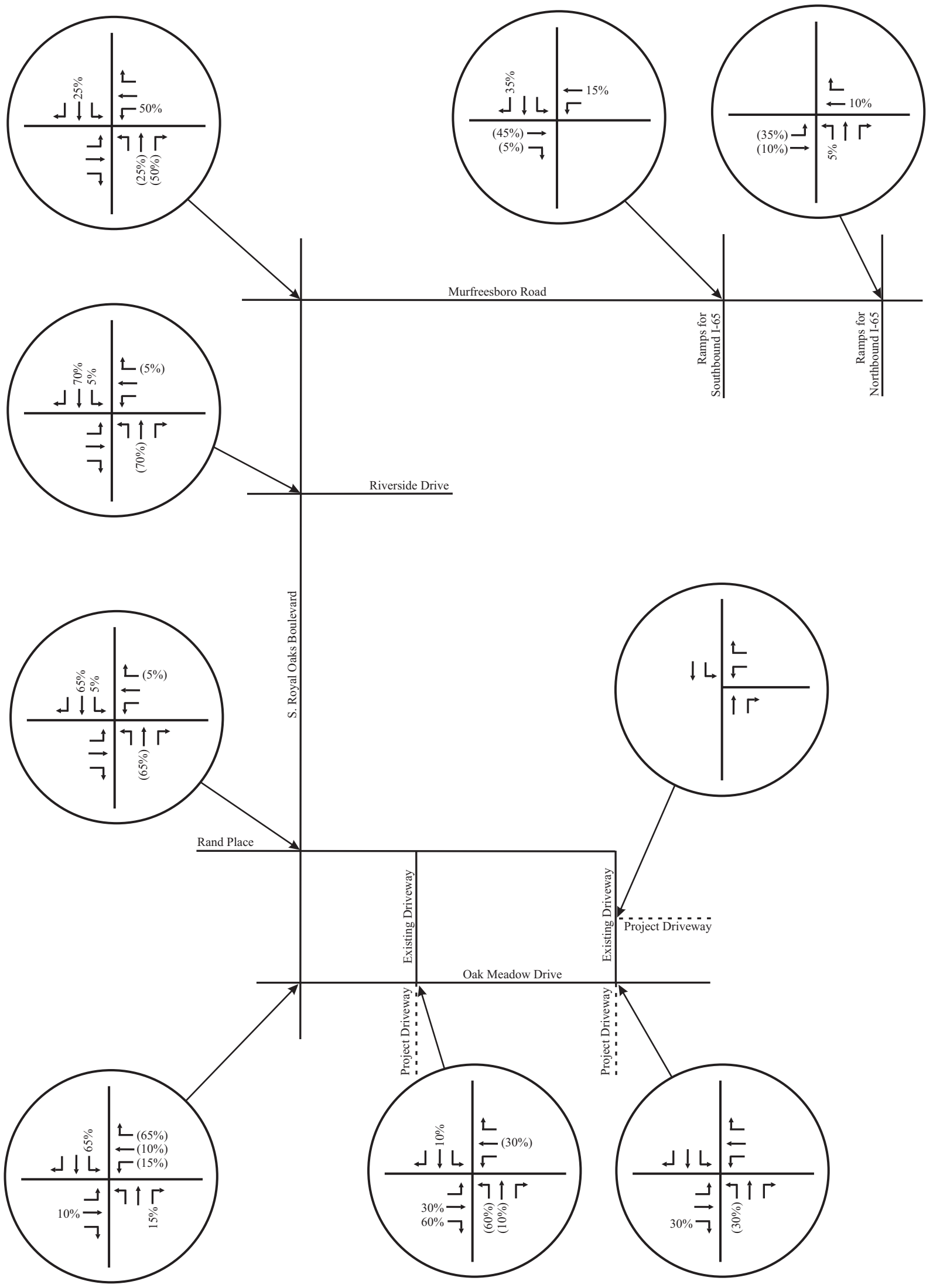

No Scale

XX - Entering Volumes
(XX) - Exiting Volumes

N

Figure 6A.
Directional Distribution of Peak Hour Traffic Volumes Generated by the Proposed Apartments (Southern Site)

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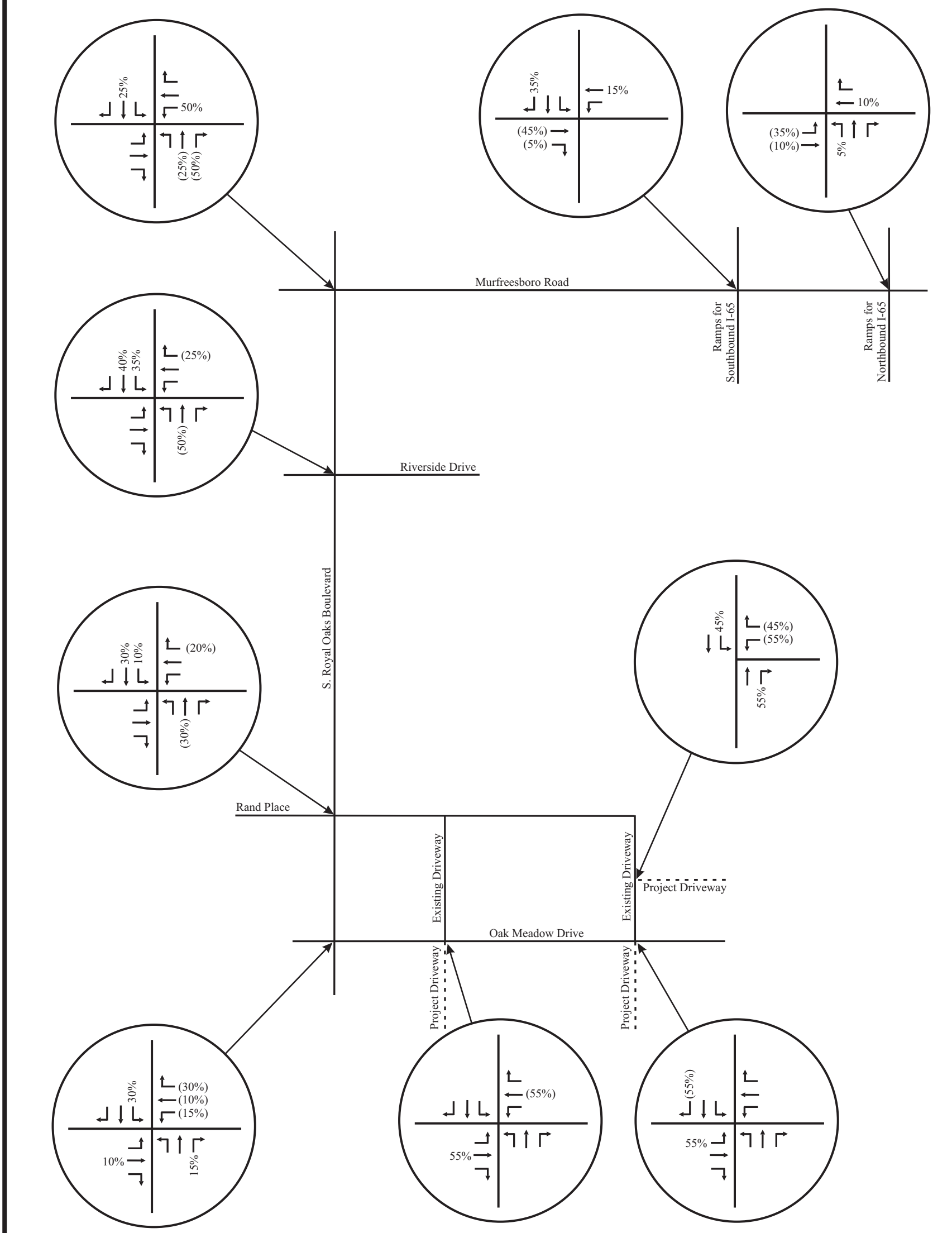

No Scale

XX - Entering Volumes
(XX) - Exiting Volumes

Figure 6B.
Directional Distribution of Peak Hour Traffic Volumes Generated by the Proposed Apartments (Northern Site)

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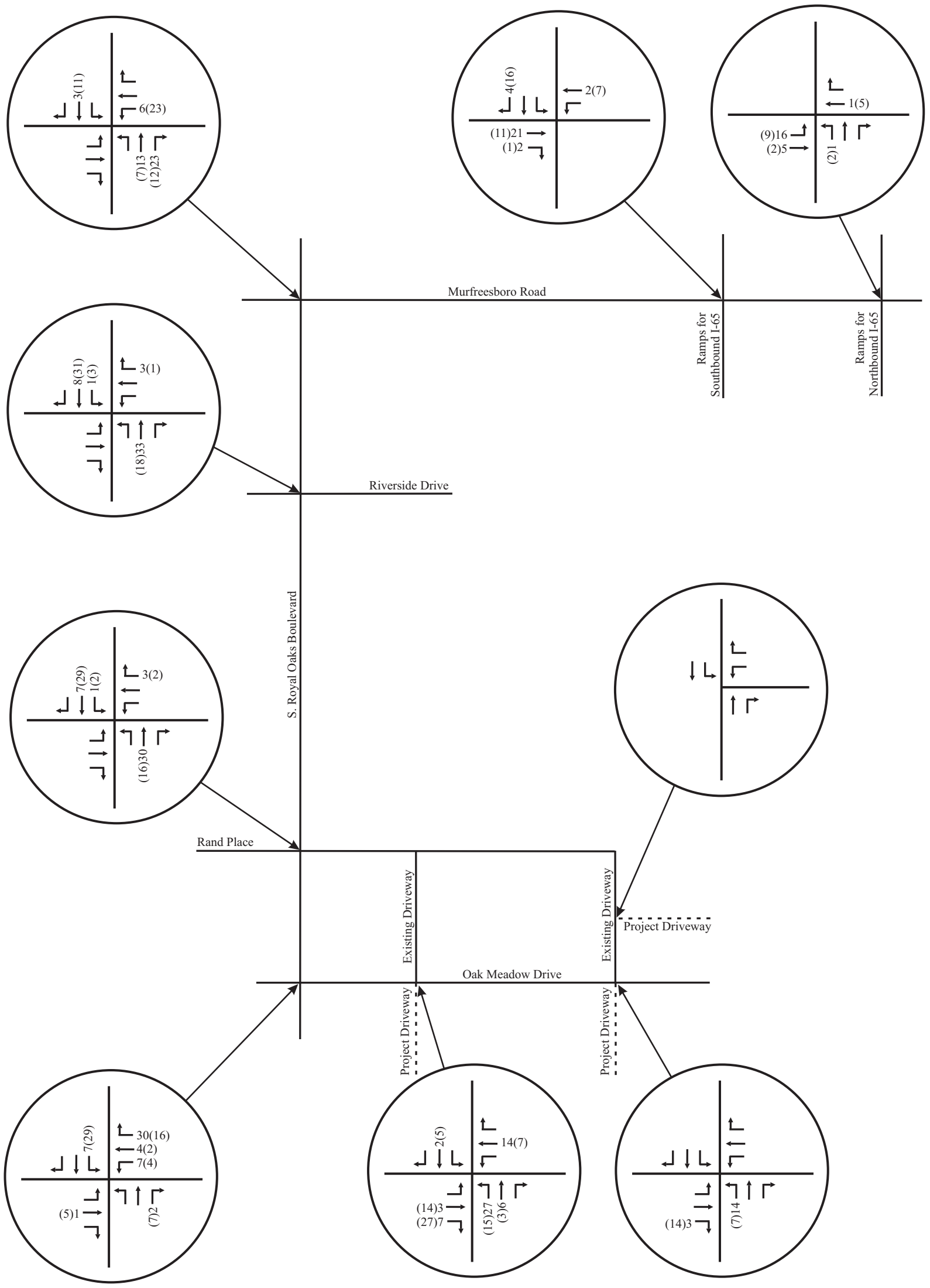

No Scale

XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes

Figure 7A.
Peak Hour Traffic Volumes
Generated by the Proposed Apartments (Southern Site)

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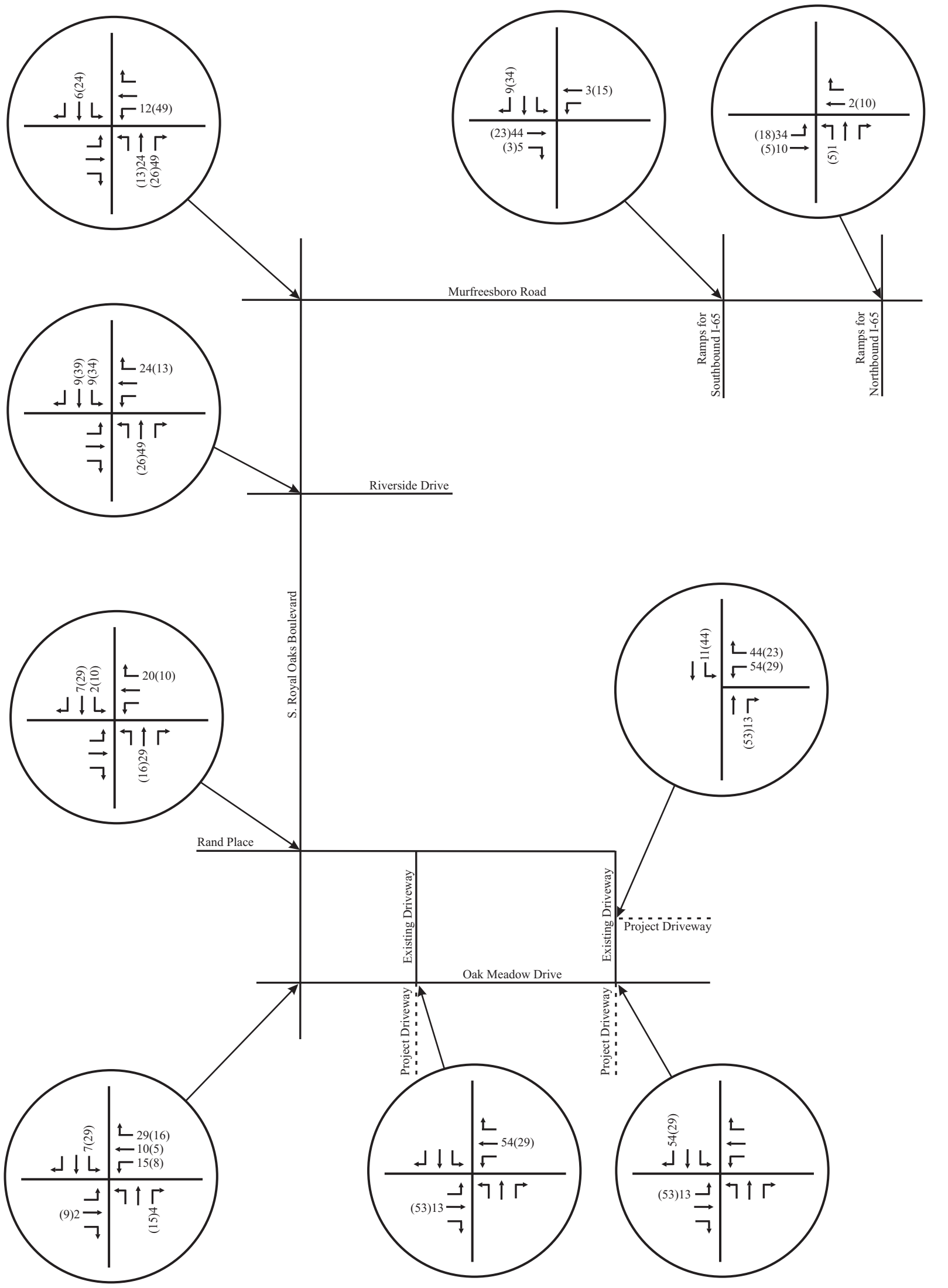
Traffic Engineering and Planning

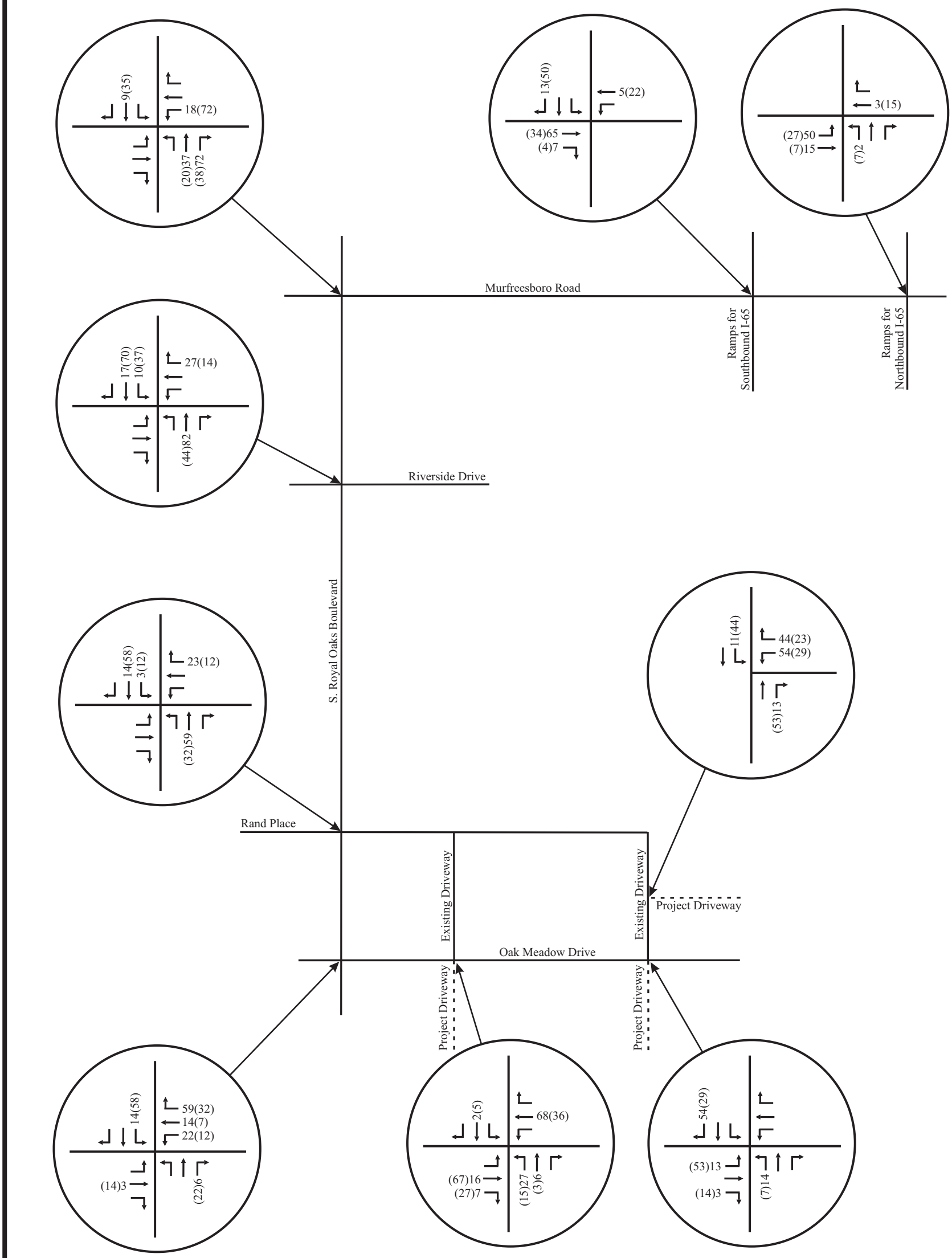


No Scale

XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes

Figure 7B.
Peak Hour Traffic Volumes
Generated by the Proposed Apartments (Northern Site)

Fischbach
Transportation Group, LLC
Traffic Engineering and Planning



No Scale

XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes

Figure 7C.
Total Peak Hour Traffic Volumes
Generated by the Proposed Apartments (Total Both Sites)

5.3 CAPACITY ANALYSES

In order to identify the projected peak hour traffic volumes at the completion of the proposed project, the trips generated by the project were added to the background peak hour traffic volumes. The resulting peak hour volumes are shown in Figure 8.

Using the total projected peak hour traffic volumes, capacity analyses were conducted in order to determine the impact of the project on the roadway system. Specifically, these capacity analyses were used to evaluate the need for roadway and traffic control improvements within the study area. For these analyses, the following assumptions were made:

- All existing laneage and traffic control will be maintained and no improvements will be provided.

- Each of the project accesses will be constructed to include one entering lane and one exiting lane.

The results of the capacity analyses for the total projected peak hour traffic volumes are shown in Table 7, and Appendix C includes the capacity analyses worksheets. These analyses indicate that the total projected conditions with full build-out of the project are consistent with the existing and background conditions within the study area.

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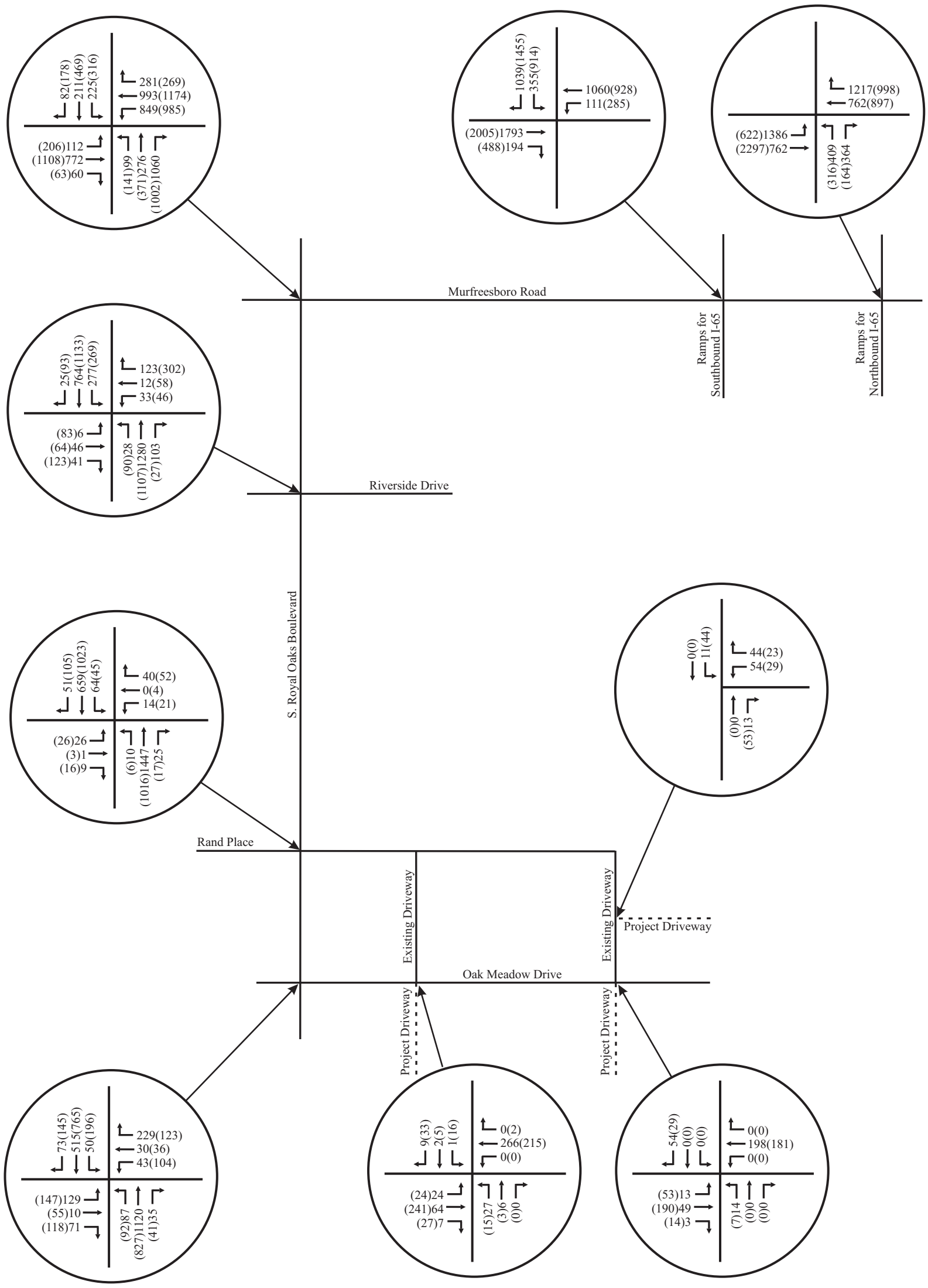


N

No Scale

XX - AM Peak Hour Volumes
(XX) - PM Peak Hour Volumes

Figure 8.
Total Projected Peak Hour Traffic Volumes at the Completion of the Proposed Apartments

TABLE 7. PROJECTED PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	AM PEAK HOUR		PM PEAK HOUR	
		LEVEL OF SERVICE	95TH %-ILE QUEUE	LEVEL OF SERVICE	95TH %-ILE QUEUE
Oak Meadow Drive and the Western Access for Home Depot / Apartments	Eastbound Left Turns	LOS A	1 veh	LOS A	1 veh
	Westbound Left Turns	LOS A	1 veh	LOS A	1 veh
	Northbound Left/Thru/Right Turns	LOS B	1 veh	LOS B	1 veh
	Southbound Left/Thru/Right Turns	LOS A	1 veh	LOS B	1 veh
Oak Meadow Drive and the Eastern Access for Home Depot / Apartments	Eastbound Left Turns	LOS A	1 veh	LOS A	1 veh
	Westbound Left Turns	LOS A	1 veh	LOS A	1 veh
	Northbound Left/Thru/Right Turns	LOS B	1 veh	LOS B	1 veh
	Southbound Left/Thru/Right Turns	LOS A	1 veh	LOS A	1 veh
Eastern Access for Home Depot / Access for Northern Apartments	Southbound Left Turns / Thrus	LOS A	1 veh	LOS A	1 veh
	Westbound Left and Right Turns	LOS A	1 veh	LOS A	1 veh
S. Royal Oaks Boulevard and Oak Meadow Drive (signalized)	Northbound Left Turns	LOS A	35 feet	LOS C	69 feet
	Northbound Thrus	LOS B	361 feet	LOS C	327 feet
	Northbound Right Turns	LOS A	0 feet	LOS A	0 feet
	Southbound Left Turns	LOS A	23 feet	LOS C	118 feet
	Southbound Thrus/Right Turns	LOS B	149 feet	LOS C	446 feet
	Eastbound Left Turns	LOS D	126 feet	LOS D	135 feet
	Eastbound Thrus/Right Turns	LOS B	17 feet	LOS D	107 feet
	Westbound Left Turns	LOS C	50 feet	LOS D	98 feet

	Westbound Thrus	LOS D	42 feet	LOS D	46 feet
	Westbound Right Turns	LOS C	161 feet	LOS A	40 feet
	Overall Intersection	**LOS B**		**LOS C**	
S. Royal Oaks Boulevard and Rand Place / Home Depot Access	Northbound Left Turns	LOS A	1 veh	LOS B	1 veh
	Southbound Left Turns	LOS B	1 veh	LOS B	1 veh
	Eastbound Left Turns	LOS D	1 veh	LOS E	1 veh
	Eastbound Thrus/Right Turns	LOS B	1 veh	LOS C	1 veh
	Westbound Left Turns	LOS E	1 veh	LOS D	1 veh
	Westbound Thrus/Right Turns	LOS C	1 veh	LOS C	1 veh
S. Royal Oaks Boulevard and Riverside Drive / Center Point Place (signalized)	Northbound Left Turns	LOS A	10 feet	LOS C	58 feet
	Northbound Thrus	LOS B	525 feet	LOS D	776 feet
	Northbound Right Turns	LOS A	28 feet	LOS A	0 feet
	Southbound Left Turns	LOS F	233 feet	LOS E	165 feet
	Southbound Thrus/Right Turns	LOS A	339 feet	LOS B	562 feet
	Eastbound Left Turns	LOS E	17 feet	LOS F	215 feet
	Eastbound Thrus/Right Turns	LOS E	79 feet	LOS D	88 feet
	Westbound Left Turns	LOS E	61 feet	LOS F	70 veh
	Westbound Thrus/Right Turns	LOS C	21 feet	LOS D	305 veh
	Overall Intersection	**LOS F**		**LOS F**	
Murfreesboro Road and Royal Oaks Boulevard (signalized)	Eastbound Left Turns	LOS E	85 feet	LOS E	151 feet
	Eastbound Thrus / Right Turns	LOS D	335 feet	LOS D	475 feet

	Westbound Left Turns	LOS E	446 feet	LOS F	573 feet
	Westbound Thrus	LOS D	547 feet	LOS D	517 feet
	Westbound Right Turns	LOS A	123 feet	LOS B	125 feet
	Northbound Left Turns	LOS E	71 feet	LOS E	100 feet
	Northbound Thrus	LOS D	165 feet	LOS D	252 feet
	Northbound Right Turns	LOS D	680 feet	LOS D	717 feet
	Southbound Left Turns	LOS E	159 feet	LOS F	272 feet
	Southbound Thrus / Right Turns	LOS D	165 feet	LOS F	512 feet
	Overall Intersection	**LOS D**		**LOS F**	
Murfreesboro Road and Ramps for Southbound I-65 (signalized)	Eastbound Thrus	LOS C	408 feet	LOS E	695 feet
	Eastbound Right Turns	LOS A	46 feet	LOS C	294 feet
	Westbound Left Turns	LOS E	162 feet	LOS F	521 feet
	Westbound Thrus	LOS B	296 feet	LOS C	433 feet
	Southbound Left Turns	LOS D	178 feet	LOS D	515 feet
	Southbound Right Turns	LOS F	754 feet	LOS F	1305 feet
	Overall Intersection	**LOS D**		**LOS F**	
Murfreesboro Road and Ramps for Northbound I-65 (signalized)	Eastbound Left Turns	LOS F	1083 feet	LOS E	343 feet
	Eastbound Thrus	LOS A	75 feet	LOS C	495 feet
	Westbound Thrus	LOS D	373 feet	LOS C	487 feet
	Westbound Right Turns	LOS C	573 feet	LOS B	330 feet
	Northbound Left Turns	LOS F	340 feet	LOS E	222 feet

	Northbound Right Turns	LOS E	353 feet	LOS D	190 feet
	Overall Intersection	**LOS F**		**LOS D**	

5.4 CAPACITY ANALYSES

The results of the capacity analyses for the existing, background, and total projected peak hour traffic volumes are included in Tables 8 and 9 for comparison purposes. Also, the levels of service that worsen from background conditions to total projected conditions with the proposed project are highlighted in red. Finally, additional analyses were conducted in order to identify how well the intersections within the study area would operate if a third northbound through lane were provided on S. Royal Oaks between Oak Meadow Drive and Murfreesboro Road. Specifically, for these analyses, the northbound right turn lanes at Oak Meadow Drive, Rand Place, and Riverside Drive were converted to shared through/right turn lanes. The results of these additional analyses are shown in Tables 8 and 9. These comparisons and analyses that reveal poor levels of service are described below:

S. Royal Oaks Boulevard and Rand Place / Access for Home Depot
At this intersection, the westbound left turns from the Home Depot access operate at LOS E during the AM peak hour during the existing, background, and total projected conditions. Also, the eastbound left turns from the Rand Place operate at LOS E during the PM peak hour under total projected conditions. These results are typical at unsignalized intersections on major arterial roadways. Also, this intersection is not an appropriate location for a traffic signal installation because of its proximity to the existing traffic signal at Oak Meadow Drive. Therefore, the existing and projected levels of service for motorists on the side streets are reasonable and appropriate, and mitigation is not necessary.

S. Royal Oaks Boulevard and Riverside Drive / Center Point Place
This intersection operates at LOS F under existing, background, and total projected conditions. Specifically, these results occur because the northbound right turn volume at Murfreesboro Road, north of Riverside Drive, is significantly high during both peak hours, and these vehicles queue south toward Riverside Drive.

It is important to note that the eastbound and westbound turning movements operate with a single phase, without protected left turn signal phases. Capacity and simulation software indicates that a single phase operates more efficiently than protected-plus-permitted phases for the side streets. However, field observations indicate that the single phase is confusing for eastbound and westbound motorists, resulting in unnecessary delays and potential for vehicle conflicts. If the existing traffic signal were modified to include protected-plus-permitted signal phases rather than a single signal phase, eastbound and westbound motorists would likely experience longer delays but safer conditions. If the total time dedicated to the protected-plus-permitted signal phases does not exceed the single signal phase currently provided, this change would have a negligible impact on the northbound and southbound vehicle delays and queues.

Murfreesboro Road and Royal Oaks Boulevard
This intersection operates poorly during the PM peak hour under existing, background, and total projected conditions. Specifically, the traffic volumes for the eastbound throughs, westbound throughs, westbound left turns, and northbound right turns are all approximately equal during

both peak hours. Although some of these turning movements can operate during the same signal phases, the total time needed to serve all of the turning movements is significantly high. These conditions will persist unless the Murfreesboro Road corridor is widened to include three travel lanes in each direction.

Murfreesboro Road and the Ramps for Southbound I-65

This intersection operates poorly during the PM peak hour under existing, background, and total projected conditions. Specifically, the traffic volumes for the eastbound throughs, westbound throughs, and southbound right turns are all significantly high during both peak hours, and the traffic volume for the southbound left turns are significantly high during the PM peak hour. Although some of these turning movements can operate during the same signal phases, the total time needed to serve all of the turning movements is significantly high. These conditions will persist unless the Murfreesboro Road corridor is widened to include three travel lanes in each direction.

Murfreesboro Road and the Ramps for Northbound I-65

This intersection operates poorly during the AM peak hour under existing, background, and total projected conditions. Specifically, the traffic volumes for the eastbound left turns and westbound right turns are significantly high during the AM peak hour, and the traffic volumes for the eastbound throughs and westbound right turns are significantly high during the PM peak hour. These turning movements cannot operate during the same signal phases, and the total time needed to serve all of the turning movements is significantly high. These conditions will persist unless the Murfreesboro Road corridor is widened to include three travel lanes in each direction.

TABLE 8. COMPARISON OF AM PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	LEVELS OF SERVICE			
		EXISTING CONDITIONS	BACKGROUND CONDITIONS	TOTAL PROJECTED CONDITIONS	WITH THIRD NORTHBOUND TRAVEL LANE
S. Royal Oaks Boulevard and Oak Meadow Drive	Overall Intersection	LOS B (13.9 sec/veh)	LOS B (15.4 sec/veh)	LOS B (17.3 sec/veh)	LOS B (14.7 sec/veh)
S. Royal Oaks Boulevard and Rand Place / Home Depot Access	Northbound Left Turns	LOS A (8.8 sec/veh)	LOS A (9.1 sec/veh)	LOS A (9.1 sec/veh)	LOS A (9.1 sec/veh)
	Southbound Left Turns	LOS B (12.6 sec/veh)	LOS B (13.8 sec/veh)	LOS B (14.5 sec/veh)	LOS B (14.5 sec/veh)
	Eastbound Left Turns	LOS D (0.4 sec/veh)	LOS D (31.0 sec/veh)	LOS D (34.8 sec/veh)	LOS D (30.0 sec/veh)
	Eastbound Thrus/Right Turns	LOS B (0.1 sec/veh)	LOS B (13.9 sec/veh)	LOS B (14.4 sec/veh)	LOS B (14.5 sec/veh)
	Westbound Left Turns	LOS E (0.3 sec/veh)	LOS E (43.1 sec/veh)	LOS E (47.0 sec/veh)	LOS E (47.8 sec/veh)
	Westbound Thrus/Right Turns	LOS B (0.1 sec/veh)	LOS C (15.0 sec/veh)	LOS C (16.3 sec/veh)	LOS C (16.5 sec/veh)
S. Royal Oaks Boulevard and Riverside Drive / Center Point Place	Overall Intersection	LOS F (undefined)	LOS F (undefined)	LOS F (undefined)	LOS F (undefined)
Murfreesboro Road and Royal Oaks Boulevard	Overall Intersection	LOS D (43.8 sec/veh)	LOS D (46.3 sec/veh)	LOS D (45.7 sec/veh)	LOS D (44.8 sec/veh)
Murfreesboro Road and Ramps for Southbound I-65	Overall Intersection	LOS C (32.4 sec/veh)	LOS D (40.4 sec/veh)	LOS D (41.9 sec/veh)	LOS D (37.8 sec/veh)
Murfreesboro Road and Ramps for Northbound I-65	Overall Intersection	LOS E (64.7 sec/veh)	LOS F (81.2 sec/veh)	LOS F (88.7 sec/veh)	LOS E (75.7 sec/veh)

TABLE 9. COMPARISON OF PM PEAK HOUR LEVELS OF SERVICE

INTERSECTION	TURNING MOVEMENT	LEVELS OF SERVICE			
		EXISTING CONDITIONS	BACKGROUND CONDITIONS	TOTAL PROJECTED CONDITIONS	TOTAL PROJECTED CONDITIONS
S. Royal Oaks Boulevard and Oak Meadow Drive	Overall Intersection	LOS C (22.0 sec/veh)	LOS C (25.3 sec/veh)	LOS C (27.8 sec/veh)	LOS C (22.5 sec/veh)
S. Royal Oaks Boulevard and Rand Place / Home Depot Access	Northbound Left Turns	LOS B (10.3 sec/veh)	LOS B (10.7 sec/veh)	LOS B (11.0 sec/veh)	LOS B (11.0 sec/veh)
	Southbound Left Turns	LOS B (10.1 sec/veh)	LOS B (10.6 sec/veh)	LOS B (10.9 sec/veh)	LOS B (10.9 sec/veh)
	Eastbound Left Turns	LOS D (27.7 sec/veh)	**LOS D** (34.1 sec/veh)	**LOS E** (39.7 sec/veh)	LOS E (37.4 sec/veh)
	Eastbound Thrus/Right Turns	LOS B (14.7 sec/veh)	LOS C (15.7 sec/veh)	LOS C (16.6 sec/veh)	LOS C (16.7 sec/veh)
	Westbound Left Turns	LOS D (25.1 sec/veh)	LOS D (29.2 sec/veh)	LOS D (31.6 sec/veh)	LOS D (31.9 sec/veh)
	Westbound Thrus/Right Turns	LOS B (14.4 sec/veh)	**LOS B** (14.7 sec/veh)	**LOS C** (15.0 sec/veh)	LOS C (15.1 sec/veh)
S. Royal Oaks Boulevard and Riverside Drive / Center Point Place	Overall Intersection	LOS F (undefined)	LOS F (undefined)	LOS F (undefined)	LOS F (undefined)
Murfreesboro Road and Royal Oaks Boulevard	Overall Intersection	LOS E (62.6 sec/veh)	**LOS E** (73.0 sec/veh)	**LOS F** (82.3 sec/veh)	LOS E (78.6 sec/veh)
Murfreesboro Road and Ramps for Southbound I-65	Overall Intersection	LOS E (78.6 sec/veh)	LOS F (97.6 sec/veh)	LOS F (104.8 sec/veh)	LOS F (98.6 sec/veh)
Murfreesboro Road and Ramps for Northbound I-65	Overall Intersection	LOS C (29.5 sec/veh)	**LOS C** (34.2 sec/veh)	**LOS D** (35.2 sec/veh)	LOS D (35.6 sec/veh)

6. CONCLUSIONS AND RECOMMENDATIONS

The analyses presented in this study indicate the following information for the intersections that provide direct access to the project sites:

Oak Meadow Drive and the Eastern Project Access / Home Depot Access
At this intersection, the new project access should be constructed to include one entering lane and one exiting lane, and a stop sign should be installed on the northbound approach of the new access. The capacity analyses indicate that all of the vehicle queues and vehicle delays at this intersection will be very low.

Oak Meadow Drive and the Western Project Access / Home Depot Access
At this intersection, the new project access should be constructed to include one entering lane and one exiting lane, and a stop sign should be installed on the northbound approach of the new access. The capacity analyses indicate that all of the vehicle queues and vehicle delays at this intersection will be very low.

Eastern Home Depot Access and the Project Access for the Northern Apartments
At this intersection, the new project access should be constructed to include one entering lane and one exiting lane, and a stop sign should be installed on the westbound approach of the new access. The capacity analyses indicate that all of the vehicle queues and vehicle delays at this intersection will be very low.

S. Royal Oaks Boulevard and Oak Meadow Drive
The capacity analyses indicate that all of the turning movements at this intersection will operate at acceptable levels of service. Also, the existing lengths of the turn lanes are adequate to accommodate the total projected traffic volumes with the completion of the proposed project. Finally, it is important to note that the westbound approach of Oak Meadow Drive already includes separate left, through, and right turn lanes at the intersection with S. Royal Oaks Boulevard, and the existing traffic signal already includes a right turn overlap signal phase for westbound motorists. Therefore, there are no additional dedicated turn lanes or traffic control modifications that can be provided at this location. Field observations and traffic counts confirm that the northbound and southbound through volumes are significant, particularly the northbound through movement during the AM peak hour. However, the proposed project will have a minimal impact on these conditions.

S. Royal Oaks Boulevard and Rand Place / Access for Home Depot
The capacity analyses indicate that all of the critical turning movements at this unsignalized intersection will operate at acceptable levels of service. Also, the existing lengths of the turn lanes are adequate to accommodate the total projected traffic volumes with the completion of the proposed project. Field observations and traffic counts confirm that the northbound and southbound through volumes are significant, particularly the northbound through movement during the AM peak hour. Also, the field observations and traffic counts confirm that the eastbound and westbound left turn volumes are relatively low, presumably because left turns are challenging when the northbound and southbound through volumes are high. Also, the eastbound

and westbound motorists have access to the existing traffic signal at Oak Meadow Drive. It is important to note that proposed project will have a minimal impact on these conditions. Also, it is important to note that this intersection is not an appropriate location for a traffic signal installation because of its proximity to the existing traffic signal at Oak Meadow Drive.

S. Royal Oaks Boulevard and Riverside Drive / Center Point Place

The capacity analyses indicate that several turning movements at this intersection will operate at poor levels of service under existing, background, and total projected conditions. In particular, the southbound left turns, eastbound turns, and westbound left turns are expected to operate at poor levels of service but with reasonable vehicle queues. The vehicle delays for these turning movements can only be reduced by increasing the delays for northbound and southbound through vehicles. Specifically, the traffic signal would have to allocate more "green time" to the southbound left turns by reducing the "green time" for northbound throughs. Also, the traffic signal would have to allocate more "green time" to the eastbound and westbound turning movements by reducing the "green time" for northbound and southbound throughs. Field observations and traffic counts confirm that the northbound and southbound through volumes are significant, particularly the northbound through movement during the AM peak hour. Therefore, it is recommended that the northbound and southbound through movements be prioritized during the peak hours in order to minimize overall delays within the study area.

APPENDIX A
TRAFFIC IMPACT STUDY SCOPE PROVIDED BY
THE CITY OF FRANKLIN AND NEEL-SCHAFFER, INC.

Exhibit B

City of Franklin
Engineering Department

APPLICATION FORM
REQUEST FOR APPROVED TRANSPORTATION IMPACT ANALYSIS REPORT

Applicant Name:	Crunk Engineering .	Applicant Name:	Epoch Residential .
Address:	1894 Gen. George Patton.	Address:	359 Carolina Avenue .
	Franklin, TN 37067 .		Winter Park, FL 32789 .
Phone #:	(615) 873-1795 .	Phone #:	(321) 316-6005 .
e-mail address:	adam@crunkeng.com .	e-mail address:	mccarley@epochresidential.com .

PROCESS OVERVIEW

A Transportation Impact Analysis shall be prepared by the Applicant's Consultant or the City's Traffic Consultant using the standard format specified by the Institute of Transportation Engineers in accordance with the following:

(i) The applicant shall submit a completed *Request for Transportation Impact Analysis Application Form* to the Engineering Department.

(ii) Scope of Services
   a. Following initial review of the application form, the Engineering Department shall prepare and submit a Scope of Services and schedule to the Applicant. If necessary a meeting will be scheduled to review and discuss the Scope of Services in detail.
   b. Following approval the applicant will pay the City 90% of the estimated cost of the traffic impact study. At the completion of the study the City shall reimburse the applicant all remaining fees.

(iii) Transportation impact analyses shall be prepared utilizing traffic data that are consistent with:
   a. The land use and density data as referenced in the most current edition of Trip Generation, published by the Institute of Transportation Engineers;
   b. Current city and state traffic counts for surrounding streets;
   c. Any additional traffic counts performed as a part of preparing the study.

Attachment A

City of Franklin Review Process for Transportation Impact Analysis

Step 1 – Preliminary discussion with Consultant/Developer on project description including site plan.
Step 2 – Scoping of Transportation Impact Analysis between the City of Franklin and Consultant/Developer.
Step 3 – Consultant, Traffic Engineer and Director of Engineering execute a MOU (Fees may apply per COF Ordinance 2015-64.
Step 4 – Consultant/Developer pays review fee and submits Transportation Impact Analysis.
Step 5 – City of Franklin prepares initial comments on the transportation impact analysis, if necessary.

Step 6 – Consultant submits corrections/revisions to the transportation impact analysis, if necessary.
Step 7 – City of Franklin prepares initial comments on proposed mitigation measures, if necessary
Step 8 – Consultant submits corrections/revisions on proposed mitigation measures, if necessary and electronic copy of the transportation impact analysis.
Step 9 – City of Franklin issues an assessment letter

Attachment B

Transportation Impact Analysis – Memorandum of Understanding (MOU)

This MOU acknowledges that the transportation impact analysis for the following project will be prepared in accordance with the latest version of City of Franklin Zoning Ordinance.

Project Name: Epoch Franklin .
Project Address: Oak Meadow Drive, east of S. Royal Oaks Boulevard .
Project Description: 352 apartments (240 units on north side, 112 apts on the south side) .

Attach a site map and a trip generation table with a description of the proposed land uses, ITE rates, estimated daily, morning, midday and afternoon peak hour volumes (ins/outs/totals), proposed trip credits, etc.

Project Buildout Year: 2018 Ambient or CMP Growth Rate: : 4 % Per Yr.

Study Intersections:

1. Oak Meadow Drive and Private Road for Home Depot / western project access	9. Oak Meadow Drive and the eastern project accesses
2. S. Royal Oaks Blvd and Oak Meadow Dr	10.
3. S. Royal Oaks Blvd and Center Point Pl / Riverside Dr	11.
4. Highway 96E and Royal Oaks Blvd (for data collection and signal timing purposes only)	12.
5. Highway 96E and Ramps for SB I-65(for data collection and signal timing purposes only)	13.
6. Highway 96E and Ramps for NB I-65(for data collection and signal timing purposes only)	14.

Trip Credits: (Exact amount of credit subject to approval by City of Franklin)

	Yes	No
Transit Usage		X
Existing Active Land Use		X
Previous Land Use		X
Internal Trip		X
Pass-By Trip		X

Exhibit B

Consultant:	FTG, LLC	Developer:	Epoch Residential
Address:	PO Box 682736	Address:	359 Carolina Avenue
	Franklin, TN 37068		Winter Park, FL 32789
Phone #:	(615) 771-8022	Phone #:	(321) 316-6005
e-mail address:	Gillian@FTGtraffic.com	e-mail address:	mccarley@epochresidential.com

Approved By: _____ _____

City of Franklin Traffic Engineer Director of Engineering

Reason for Request: (Planned Unit Development, Site Plan, Rezoning)

site plan

Description of Proposed Project (Address, Map/Parcel Number, etc.) (Attach a conceptual development plans showing all access points and adjacent streets.):

079 08800 00009079

079 10105 00109079

Existing Land Use (be specific):

undeveloped

Proposed Land Use (be specific):

240 apartments on 13.06 acres (north) and 112 apartments on 18.87 acres (south)

Potential Development Yield (number of residential units; building square footage, projected number of employees, hours of operations):

352 apartments

As applicant, I agree to pay to the City of Franklin 90% of the entire cost of the Transportation Impact Analysis.

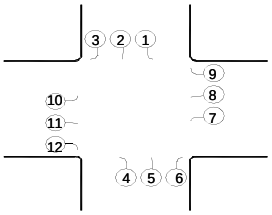
Property Owner Signature: _____

Property Owner Title: _____

Date: _____

The information above shall be submitted to the Engineering Department (109 3rd Ave South; Franklin, TN 37064) to review and provide estimated cost along with a proposed scope of services. All questions should be directed to Carl Baughman, Traffic Engineer III (615-791-3218).

APPENDIX B
EXISTING TRAFFIC COUNTS

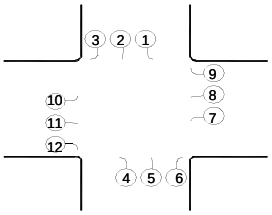


INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Oak Meadow Dr and Eastern Home Depot Access
DATE: 23-Feb-16 Tue
RECORDER: FTG
NOTES: unsignalized

LOCATION	S/B Home Depot Access			N/B			W/B Oak Meadow Dr			E/B Oak Meadow Dr				
TIME	1	2	3	4	5	6	7	8	9	10	11	12		
6:30-6:45								24			7		209	31
6:45-7:00								**54**			**13**		**228**	**67**
7:00-7:15								**50**			**13**		209	63
7:15-7:30								**36**			**12**		189	48
7:30-7:45								**43**			**7**		179	50
7:45-8:00								41			7			48
8:00-8:15								33			10			43
8:15-8:30								29			9			38
4:30-4:45								**46**			**33**		**344**	79
4:45-5:00								**33**			**49**		336	82
5:00-5:15								**41**			**48**		346	89
5:15-5:30								**48**			**46**		329	**94**
5:30-5:45								33			38		309	71
5:45-6:00								34			58			92
6:00-6:15								25			47			72
6:15-6:30								32			42			74
TOTAL								**602**			**439**			
AM PK HR								183			45		**6:45-7:45**	
PM PK HR								168			176		**4:30-5:30**	

AM PK PHF								0.85			0.87		**0.85**
PM PK PHF								0.88			0.90		**0.91**

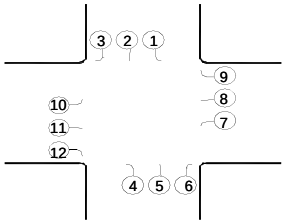


INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Oak Meadow Dr and Western Home Depot Access
DATE: 23-Feb-16 Tue
RECORDER: FTG
NOTES: unsignalized

LOCATION	S/B Home Depot Access			N/B			W/B Oak Meadow Dr			E/B Oak Meadow Dr				
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**		
6:30-6:45			1					24			7		213	32
6:45-7:00								**54**			**13**		**231**	**67**
7:00-7:15								**50**		**1**	**13**		213	64
7:15-7:30			**1**					**36**		**1**	**12**		192	50
7:30-7:45	**1**							**43**			**6**		180	50
7:45-8:00								41		1	7			49
8:00-8:15	1							33			9			43
8:15-8:30								29			9			38
4:30-4:45	**3**							**46**		**1**	**30**		**351**	80
4:45-5:00	**4**							**33**		**1**	**45**		343	83
5:00-5:15	**3**		**1**					**40**	**1**	**2**	**45**		354	92
5:15-5:30	**5**		**1**					**47**	**1**	**1**	**41**		335	**96**
5:30-5:45	3							33		1	35		314	72
5:45-6:00	6							34		2	52			94
6:00-6:15	7							25		1	40			73
6:15-6:30	5							32		1	37			75
TOTAL	**38**		**4**					**600**	**2**	**13**	**401**			
AM PK HR	1		1					183		2	44		**6:45-7:45**	
PM PK HR	15		2					166	2	5	161		**4:30-5:30**	

AM PK PHF	0.25		0.25					0.85		0.50	0.85		**0.86**
PM PK PHF	0.75		0.50					0.88	0.50	0.63	0.89		**0.91**

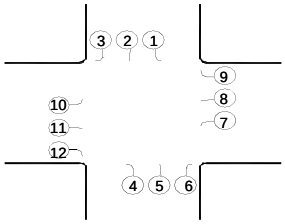


INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: S. Royal Oaks Blvd and Oak Meadow Dr
DATE: 4-Feb-16 Thu
RECORDER: Burns
NOTES: signalized

LOCATION	S/B S. Royal Oaks Blvd			N/B S. Royal Oaks Blvd			W/B Oak Meadow Dr			E/B Oak Meadow Dr			
TIME	1	2	3	4	5	6	7	8	9	10	11	12	
6:30-6:45	1	96	15	17	231	2	2	2	21	28	4	9	1,978
6:45-7:00	**4**	**88**	**17**	**17**	**270**	**7**	**1**	**4**	**49**	**31**	**2**	**12**	**2,078**
7:00-7:15	**6**	**115**	**15**	**14**	**300**	**6**	**5**	**2**	**43**	**26**	**2**	**16**	2,071
7:15-7:30	**9**	**117**	**15**	**23**	**242**	**4**	**4**		**33**	**34**		**17**	1,995
7:30-7:45	**3**	**157**	**21**	**27**	**225**	**3**	**7**	**8**	**28**	**28**		**21**	1,972
7:45-8:00	5	172	15	17	199	2	8	4	29	30	1	13	
8:00-8:15	3	123	22	22	214	4	8	8	17	29	2	22	
8:15-8:30	6	142	19	18	213	3	7	3	19	24		21	
4:30-4:45	**25**	**187**	**40**	**17**	**169**		**20**	**9**	**17**	**44**	**6**	**26**	**2,272**
4:45-5:00	**29**	**179**	**29**	**18**	**200**	**6**	**17**	**2**	**14**	**25**	**11**	**31**	2,225
5:00-5:15	**32**	**170**	**33**	**28**	**222**	**5**	**19**	**5**	**17**	**35**	**10**	**29**	2,170
5:15-5:30	**32**	**172**	**32**	**22**	**175**	**2**	**21**	**6**	**21**	**32**	**8**	**23**	2,016
5:30-5:45	27	150	29	16	188	4	14	3	16	33	5	28	1,932
5:45-6:00	33	158	33	8	162	11	12	7	15	35	10	22	
6:00-6:15	34	164	16	20	138	3	10	9	6	22	4	25	
6:15-6:30	33	175	18	9	148	1	17	6	9	23	4	19	
TOTAL	**282**	**2,365**	**369**	**293**	**3,296**	**63**	**172**	**78**	**354**	**479**	**69**	**334**	
AM PK HR	22	477	68	81	1,037	20	17	14	153	119	4	66	**6:45-7:45**
PM PK HR	118	708	134	85	766	13	77	22	69	136	35	109	**4:30-5:30**

AM PK PHF	0.61	0.76	0.81	0.75	0.86	0.71	0.61	0.44	0.78	0.88	0.50	0.79	**0.94**
PM PK PHF	0.92	0.95	0.84	0.76	0.86	0.54	0.92	0.61	0.82	0.77	0.80	0.88	**0.94**

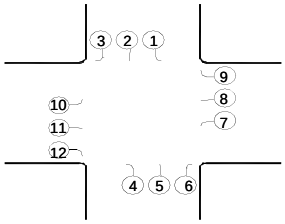


INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: S. Royal Oaks Blvd and Rand Place / Home Depot
DATE: 23-Feb-16 Tue
RECORDER: Burns
NOTES: unsignalized

LOCATION	S/B S. Royal Oaks Blvd			N/B S. Royal Oaks Blvd			W/B Home Depot Access			E/B Rand Place			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:30-6:45	13	93	10	3	279	11	2	1	2	6	1		1,934
6:45-7:00	**10**	**132**	**8**	**2**	**358**	**6**	**2**		**1**	**5**		**1**	**2,048**
7:00-7:15	**15**	**119**	**12**		**364**	**5**	**1**		**1**	**8**	**1**	**1**	2,029
7:15-7:30	**9**	**153**	**9**	**4**	**264**	**5**	**2**		**7**	**4**		**4**	1,968
7:30-7:45	**11**	**182**	**18**	**3**	**295**	**7**	**8**		**2**	**7**		**2**	1,986
7:45-8:00	6	188	6	4	279	9	3		5	2		4	
8:00-8:15	13	172	14	4	240	6	2	1	3	5		6	
8:15-8:30	11	123	11	7	307	7	2		4	7			
4:30-4:45	**5**	**207**	**19**	**1**	**218**	**5**	**11**		**6**	**8**	**1**	**4**	**2,005**
4:45-5:00	**5**	**211**	**27**	**1**	**209**	**3**	**3**		**8**	**6**	**1**	**6**	1,987
5:00-5:15	**5**	**228**	**26**	**2**	**235**	**4**	**4**	**3**	**3**	**5**		**2**	1,967
5:15-5:30	**5**	**237**	**25**	**2**	**234**	**4**	**1**	**1**	**5**	**5**	**1**	**3**	1,888
5:30-5:45	2	262	17	4	156	1	5	1	3	12		4	1,720
5:45-6:00	3	211	23	4	196	2	3	1	4	7		6	
6:00-6:15	3	213	18	2	168	3	5	1	4	12	2	7	
6:15-6:30	1	204	17	2	115	3	2			8		3	
TOTAL	**117**	**2,935**	**260**	**45**	**3,917**	**81**	**56**	**9**	**58**	**107**	**7**	**53**	
AM PK HR	45	586	47	9	1,281	23	13		11	24	1	8	**6:45-7:45**
PM PK HR	20	883	97	6	896	16	19	4	22	24	3	15	**4:30-5:30**

AM PK PHF	0.75	0.80	0.65	0.56	0.88	0.82	0.41		0.39	0.75	0.25	0.50	**0.97**
PM PK PHF	1.00	0.93	0.90	0.75	0.95	0.80	0.43	0.33	0.69	0.75	0.75	0.63	**0.96**

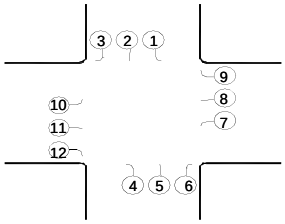


INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: S. Royal Oaks Blvd and Center Point Pl and Riverside Dr
DATE: 4-Feb-16 Thu
RECORDER: Burns
NOTES: signalized

LOCATION	S/B S. Royal Oaks Blvd			N/B S. Royal Oaks Blvd			W/B Riverside Dr			E/B Cener Point Pl			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:30-6:45	50	105	4	3	226	24	6	2	13	0	3	6	2,202
6:45-7:00	45	113	5	2	335	22	5	0	23	2	9	3	2,321
7:00-7:15	**63**	**130**	**4**	**3**	**306**	**22**	**4**	**4**	**26**	**0**	**7**	**10**	**2,378**
7:15-7:30	**59**	**161**	**8**	**7**	**297**	**30**	**10**	**4**	**20**	**0**	**14**	**7**	2,372
7:30-7:45	**63**	**158**	**4**	**8**	**253**	**16**	**12**	**2**	**21**	**3**	**12**	**9**	2,375
7:45-8:00	**62**	**220**	**7**	**8**	**244**	**27**	**5**	**1**	**22**	**3**	**10**	**12**	
8:00-8:15	74	161	8	7	232	19	11	3	33	4	14	7	
8:15-8:30	70	194	6	7	231	25	13	5	31	10	10	18	
4:30-4:45	**56**	**255**	**24**	**19**	**240**	**6**	**11**	**15**	**59**	**21**	**14**	**38**	**2,942**
4:45-5:00	**48**	**243**	**16**	**30**	**228**	**4**	**13**	**14**	**67**	**15**	**15**	**29**	2,865
5:00-5:15	**47**	**233**	**28**	**12**	**247**	**7**	**11**	**20**	**71**	**28**	**13**	**30**	2,829
5:15-5:30	**64**	**233**	**18**	**22**	**240**	**8**	**8**	**5**	**70**	**13**	**17**	**17**	2,730
5:30-5:45	60	223	25	14	221	9	8	8	47	15	29	22	2,571
5:45-6:00	55	206	23	20	228	13	6	7	52	25	22	29	
6:00-6:15	61	200	19	19	199	6	7	10	63	25	14	25	
6:15-6:30	37	184	21	17	166	6	11	10	33	25	17	29	
TOTAL	**914**	**3,019**	**220**	**198**	**3,893**	**244**	**141**	**110**	**651**	**189**	**220**	**291**	
AM PK HR	247	669	23	26	1,100	95	31	11	89	6	43	38	**7:00-8:00**
PM PK HR	215	964	86	83	955	25	43	54	267	77	59	114	**4:30-5:30**

AM PK PHF	0.98	0.76	0.72	0.81	0.90	0.79	0.65	0.69	0.86	0.50	0.77	0.79	**0.96**
PM PK PHF	0.84	0.95	0.77	0.69	0.97	0.78	0.83	0.68	0.94	0.69	0.87	0.75	**0.97**

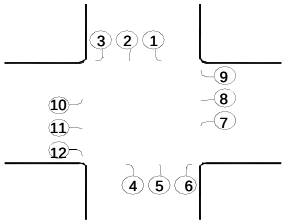


INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Murfreesboro Road and Royal Oaks Blvd
DATE: 11-Feb-16 Thu
RECORDER: Burns
NOTES: signalized

LOCATION	S/B N. Royal Oaks Blvd			N/B S. Royal Oaks Blvd			W/B Murfreesboro Road			E/B Murfreesboro Road			
TIME	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
6:30-6:45	21	26	8	14	38	211	99	137	37	4	118	7	3,669
6:45-7:00	29	17	4	24	80	244	123	193	43	15	168	8	4,005
7:00-7:15	48	27	5	28	119	253	107	159	37	20	166	13	4,252
7:15-7:30	51	25	14	22	53	236	160	204	57	21	163	13	4,384
7:30-7:45	**53**	**39**	**18**	**25**	**70**	**213**	**162**	**210**	**58**	**29**	**165**	**14**	**4,492**
7:45-8:00	**50**	**43**	**20**	**26**	**56**	**267**	**210**	**234**	**72**	**25**	**181**	**11**	
8:00-8:15	**53**	**36**	**19**	**14**	**48**	**205**	**193**	**249**	**61**	**23**	**202**	**11**	
8:15-8:30	**52**	**61**	**19**	**27**	**44**	**224**	**191**	**226**	**69**	**27**	**167**	**20**	
4:30-4:45	**71**	**94**	**37**	**28**	**90**	**220**	**195**	**284**	**54**	**45**	**238**	**15**	**5,614**
4:45-5:00	**67**	**103**	**47**	**32**	**78**	**213**	**198**	**252**	**61**	**50**	**275**	**17**	5,552
5:00-5:15	**78**	**90**	**39**	**38**	**74**	**235**	**222**	**272**	**60**	**41**	**267**	**12**	5,358
5:15-5:30	**77**	**107**	**42**	**33**	**73**	**205**	**217**	**279**	**74**	**55**	**246**	**14**	5,160
5:30-5:45	81	101	41	22	74	187	199	271	60	42	211	20	4,965
5:45-6:00	68	78	47	25	72	157	175	208	119	33	197	20	
6:00-6:15	80	89	44	32	65	169	169	234	60	42	229	17	
6:15-6:30	72	87	38	19	54	175	183	260	58	49	219	13	
TOTAL	**951**	**1,023**	**442**	**409**	**1,088**	**3,414**	**2,803**	**3,672**	**980**	**521**	**3,212**	**225**	
AM PK HR	208	179	76	92	218	909	756	919	260	104	715	56	**7:30-8:30**
PM PK HR	293	394	165	131	315	873	832	1,087	249	191	1,026	58	**4:30-5:30**

AM PK PHF	0.98	0.73	0.95	0.85	0.78	0.85	0.90	0.92	0.90	0.90	0.88	0.70	**0.94**
PM PK PHF	0.94	0.92	0.88	0.86	0.88	0.93	0.94	0.96	0.84	0.87	0.93	0.85	**0.98**

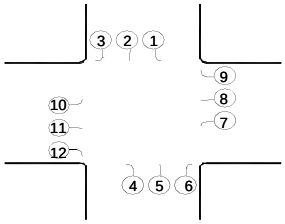


INTERSECTION TRAFFIC VOLUME COUNTS

LOCATION: Murfreesboro Road and the Ramps for Southbound I-65
DATE: 11-Feb-16 Thu
RECORDER: Burns
NOTES: signalized

LOCATION	S/B Ramps			N/B			W/B Murfreesboro Road			E/B Murfreesboro Road			
TIME	1	2	3	4	5	6	7	8	9	10	11	12	
6:30-6:45	63		148				11				369	34	2,929
6:45-7:00	69		181				31				406	47	3,112
7:00-7:15	66		139				30				471	49	3,159
7:15-7:30	**73**		**196**				**37**				**452**	**57**	**3,168**
7:30-7:45	**61**		**237**				**32**				**432**	**46**	3,140
7:45-8:00	**91**		**245**				**18**				**385**	**42**	
8:00-8:15	**86**		**219**				**29**				**385**	**45**	
8:15-8:30	91		240				24				393	39	
4:30-4:45	**205**		**299**				**71**				**480**	**114**	**4,656**
4:45-5:00	**222**		**322**				**48**				**388**	**95**	4,524
5:00-5:15	**197**		**298**				**76**				**470**	**119**	4,499
5:15-5:30	**222**		**374**				**69**				**469**	**118**	4,376
5:30-5:45	175		319				56				385	102	4,089
5:45-6:00	181		349				44				383	93	
6:00-6:15	196		290				43				408	100	
6:15-6:30	178		256				40				414	77	
TOTAL	**2,176**		**4,112**				**659**				**6,690**	**1,177**	
AM PK HR	311		897				116				1,654	190	**7:15-8:15**
PM PK HR	846		1,293				264				1,807	446	**4:30-5:30**

AM PK PHF	0.85		0.92				0.91				0.96	1.03	**0.97**
PM PK PHF	0.95		0.86				0.87				0.94	0.94	**0.93**



INTERSECTION TRAFFIC VOLUME COUNTS

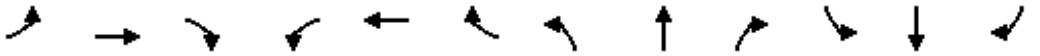
LOCATION: Murfreesboro Road and the Ramps for Northbound I-65
DATE: 11-Feb-16 Thu
RECORDER: Burns
NOTES: signalized

LOCATION	S/B Ramps			N/B			W/B Murfreesboro Road			E/B Murfreesboro Road			
TIME	1	2	3	4	5	6	7	8	9	10	11	12	
6:30-6:45				74		78		144	286	278			3,695
6:45-7:00				**109**		**94**		**150**	**306**	**319**			**3,772**
7:00-7:15				**65**		**66**		**183**	**306**	**331**			3,689
7:15-7:30				**94**		**92**		**154**	**267**	**299**			3,592
7:30-7:45				**107**		**85**		**213**	**248**	**284**			3,508
7:45-8:00				72		101		243	236	243			
8:00-8:15				108		82		182	223	259			
8:15-8:30				91		67		234	223	207			
4:30-4:45				**80**		**40**		**229**	**138**	**215**			**2,712**
4:45-5:00				**75**		**39**		**231**	**134**	**187**			2,597
5:00-5:15				**63**		**39**		**251**	**123**	**208**			2,490
5:15-5:30				**66**		**34**		**213**	**143**	**204**			2,376
5:30-5:45				49		40		200	105	193			2,230
5:45-6:00				79		46		161	101	172			
6:00-6:15				71		44		183	106	166			
6:15-6:30				52		44		176	89	153			
TOTAL				**1,255**		**991**		**1,503**	**3,034**	**3,718**			
AM PK HR				375		337		700	1,127	1,233			**6:45-7:45**
PM PK HR				284		152		814	924	538			**4:30-5:30**

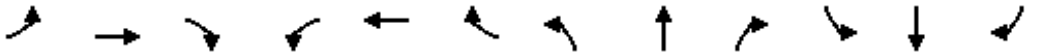
AM PK PHF				0.86		0.90		0.82	0.92	0.93	#DIV/0!		**0.96**
PM PK PHF				0.89		0.95		0.95	0.92	0.94	#DIV/0!		**0.97**

APPENDIX C
CAPACITY ANALYSES

EXISTING CONDITIONS



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	104	715	56	756	919	260	92	218	909	208	179	76
Future Volume (vph)	104	715	56	756	919	260	92	218	909	208	179	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	12	11	12	13	12	13	13	11	11	11
Grade (%)		0%			0%			1%			0%	
Storage Length (ft)	200		300	285		0	195		450	220		650
Storage Lanes	2		1	2		1	2		2	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.91	0.91	0.97	0.95	1.00	0.97	0.95	0.88	0.97	0.95	0.95
Frt		0.988				0.850			0.850		0.958	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3400	4688	0	3286	3406	1620	3350	3639	2865	3319	3232	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3400	4688	0	3286	3406	1620	3350	3639	2865	3319	3232	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		10				201					36	
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		350			691			792			964	
Travel Time (s)		6.0			11.8			18.0			21.9	
Peak Hour Factor	0.80	0.90	0.80	0.93	0.91	0.88	0.82	0.80	0.93	0.92	0.74	0.81
Heavy Vehicles (%)	3%	6%	2%	3%	6%	3%	4%	2%	2%	2%	4%	2%
Adj. Flow (vph)	130	794	70	813	1010	295	112	273	977	226	242	94
Shared Lane Traffic (%)												
Lane Group Flow (vph)	130	864	0	813	1010	295	112	273	977	226	336	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		30			24			30			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.04	1.00	1.04	1.00	0.96	1.01	0.96	0.96	1.04	1.04	1.04
Turning Speed (mph)	18		10	18		10	18		10	18		10
Number of Detectors	1	1		1	1	0	1	2	1	1	2	
Detector Template												
Leading Detector (ft)	42	236		42	236	0	42	146	42	42	146	
Trailing Detector (ft)	-3	230		-3	230	0	-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	230		-3	230	230	-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	6		45	6	6	45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								140			140	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	

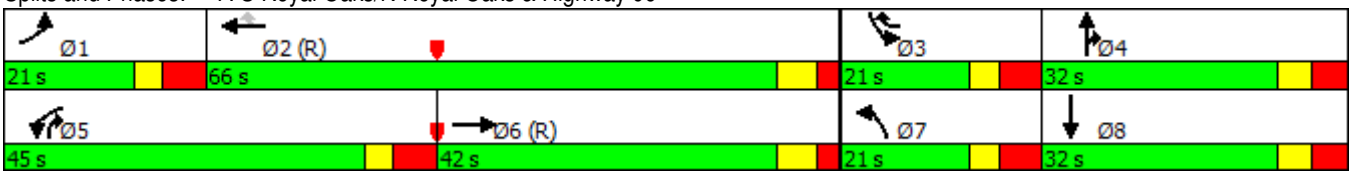


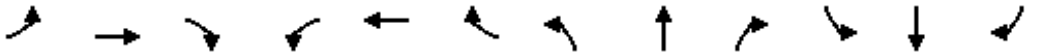
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	
Protected Phases	1	6		5	2	3	7	4	4 5	3	8	
Permitted Phases						2						
Detector Phase	1	6		5	2	3	7	4	4 5	3	8	
Switch Phase												
Minimum Initial (s)	6.0	13.0		6.0	13.0	6.0	6.0	10.0		6.0	10.0	
Minimum Split (s)	21.0	42.0		45.0	66.0	21.0	21.0	32.0		21.0	32.0	
Total Split (s)	21.0	42.0		45.0	66.0	21.0	21.0	32.0		21.0	32.0	
Total Split (%)	15.0%	30.0%		32.1%	47.1%	15.0%	15.0%	22.9%		15.0%	22.9%	
Maximum Green (s)	13.5	35.5		37.5	59.5	13.5	13.5	24.5		13.5	24.5	
Yellow Time (s)	3.0	4.0		3.0	4.0	3.0	3.0	3.5		3.0	3.5	
All-Red Time (s)	4.5	2.5		4.5	2.5	4.5	4.5	4.0		4.5	4.0	
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5	-2.0	-2.0	-3.0		-2.0	-3.0	
Total Lost Time (s)	5.0	4.0		5.0	4.0	5.5	5.5	4.5		5.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	6.0		3.0	6.0	3.0	3.0	4.5		3.0	4.5	
Recall Mode	None	C-Min		None	C-Min	None	None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		37.0			24.0			36.0			36.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	13.2	38.9		39.8	65.4	84.3	12.0	27.5	71.8	14.9	30.3	
Actuated g/C Ratio	0.09	0.28		0.28	0.47	0.60	0.09	0.20	0.51	0.11	0.22	
v/c Ratio	0.40	0.66		0.87	0.63	0.28	0.39	0.38	0.67	0.64	0.46	
Control Delay	63.0	47.3		49.2	40.8	6.0	54.6	44.0	40.9	68.9	45.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	63.0	47.3		49.2	40.8	6.0	54.6	44.0	40.9	68.9	45.0	
LOS	E	D		D	D	A	D	D	D	E	D	
Approach Delay		49.3			39.2			42.6			54.6	
Approach LOS		D			D			D			D	
90th %ile Green (s)	13.5	35.5		37.5	59.5	13.5	12.9	24.5		13.5	25.1	
90th %ile Term Code	Max	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
70th %ile Green (s)	12.0	35.5		37.5	61.0	13.5	11.2	24.5		13.5	26.8	
70th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
50th %ile Green (s)	10.8	35.5		37.5	62.2	13.5	10.0	24.5		13.5	28.0	
50th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
30th %ile Green (s)	9.6	35.9		37.5	63.8	13.1	8.9	24.5		13.1	28.7	
30th %ile Term Code	Gap	Coord		Max	Coord	Gap	Gap	Max		Gap	Hold	
10th %ile Green (s)	7.8	39.4		36.4	68.0	10.7	7.2	24.5		10.7	28.0	
10th %ile Term Code	Gap	Coord		Gap	Coord	Gap	Gap	Max		Gap	Hold	
Stops (vph)	95	661		657	884	60	85	189	779	196	196	
Fuel Used(gal)	3	16		20	24	3	2	4	17	6	5	
CO Emissions (g/hr)	176	1101		1407	1661	210	144	304	1222	389	373	
NOx Emissions (g/hr)	34	214		274	323	41	28	59	238	76	73	
VOC Emissions (g/hr)	41	255		326	385	49	33	70	283	90	86	
Dilemma Vehicles (#)	0	28		0	34	0	0	0	0	0	0	
Queue Length 50th (ft)	58	255		352	503	50	50	117	447	103	125	
Queue Length 95th (ft)	80	306		m412	m539	m80	68	142	598	148	141	
Internal Link Dist (ft)		270			611			712			884	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	200			285			195		450	220		
Base Capacity (vph)	388	1308		938	1591	1061	370	714	1473	367	728	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.34	0.66		0.87	0.63	0.28	0.30	0.38	0.66	0.62	0.46	

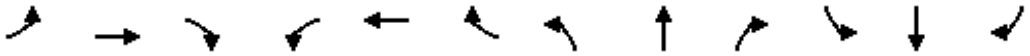
Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 116 (83%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 43.8		Intersection LOS: D	
Intersection Capacity Utilization 66.7%		ICU Level of Service C	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 7: S Royal Oaks/N Royal Oaks & Highway 96





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1595	172	103	972	0	0	0	0	329	0	941
Future Volume (vph)	0	1595	172	103	972	0	0	0	0	329	0	941
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	12	12	12	12	12	12	11
Grade (%)		0%			0%			0%			1%	
Storage Length (ft)	0		0	420		0	0		0	350		0
Storage Lanes	0		1	0		0	0		0	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.86	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.88
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	6346	1509	1787	3388	0	0	0	0	3287	0	2654
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	6346	1509	1787	3388	0	0	0	0	3287	0	2654
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			181									147
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		501			556			756			888	
Travel Time (s)		8.5			9.5			20.6			24.2	
Peak Hour Factor	1.00	0.91	0.90	0.86	0.87	1.00	1.00	1.00	1.00	0.85	1.00	0.94
Heavy Vehicles (%)	2%	3%	7%	1%	3%	2%	2%	2%	2%	6%	2%	3%
Adj. Flow (vph)	0	1753	191	120	1117	0	0	0	0	387	0	1001
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1753	191	120	1117	0	0	0	0	387	0	1001
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.01	1.01	1.05
Turning Speed (mph)	15		12	15		9	15		9	18		12
Number of Detectors		1	0	1	1					1		1
Detector Template												
Leading Detector (ft)		300	0	42	300					42		42
Trailing Detector (ft)		294	0	-3	294					-3		-3
Detector 1 Position(ft)		294	-3	-3	294					-3		-3
Detector 1 Size(ft)		6	45	45	6					45		45
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0		0.0
Turn Type		NA	Perm	Prot	NA					Prot		Prot
Protected Phases		6		5	2					4		4
Permitted Phases			6									
Detector Phase		6	6	5	2					4		4
Switch Phase												



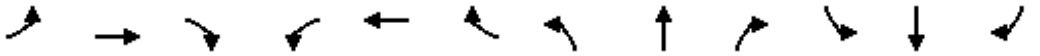
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)		25.0	25.0	5.0	25.0					15.0		15.0
Minimum Split (s)		62.0	62.0	23.0	85.0					55.0		55.0
Total Split (s)		62.0	62.0	23.0	85.0					55.0		55.0
Total Split (%)		44.3%	44.3%	16.4%	60.7%					39.3%		39.3%
Maximum Green (s)		56.0	56.0	17.0	79.0					47.5		47.5
Yellow Time (s)		4.0	4.0	3.0	4.0					4.0		4.0
All-Red Time (s)		2.0	2.0	3.0	2.0					3.5		3.5
Lost Time Adjust (s)		-2.0	-2.0	-1.0	-2.0					-2.0		-2.0
Total Lost Time (s)		4.0	4.0	5.0	4.0					5.5		5.5
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		4.5	4.5	3.0	4.5					3.0		3.0
Recall Mode		C-Min	C-Min	None	C-Min					None		None
Act Effct Green (s)		60.9	60.9	15.1	81.0					49.5		49.5
Actuated g/C Ratio		0.44	0.44	0.11	0.58					0.35		0.35
v/c Ratio		0.64	0.25	0.62	0.57					0.33		0.97
Control Delay		25.6	4.8	69.3	18.2					34.2		59.3
Queue Delay		0.1	0.0	0.0	0.3					1.2		0.0
Total Delay		25.7	4.8	69.3	18.5					35.3		59.3
LOS		C	A	E	B					D		E
Approach Delay		23.6			23.5							
Approach LOS		C			C							
90th %ile Green (s)		56.0	56.0	17.0	79.0					47.5		47.5
90th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
70th %ile Green (s)		56.0	56.0	17.0	79.0					47.5		47.5
70th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
50th %ile Green (s)		58.2	58.2	14.8	79.0					47.5		47.5
50th %ile Term Code		Coord	Coord	Gap	Coord					Max		Max
30th %ile Green (s)		60.5	60.5	12.5	79.0					47.5		47.5
30th %ile Term Code		Coord	Coord	Gap	Coord					Max		Max
10th %ile Green (s)		63.7	63.7	9.3	79.0					47.5		47.5
10th %ile Term Code		Coord	Coord	Gap	Coord					Max		Max
Stops (vph)		937	33	103	466					235		753
Fuel Used(gal)		30	2	3	12					6		21
CO Emissions (g/hr)		2126	132	199	828					397		1494
NOx Emissions (g/hr)		414	26	39	161					77		291
VOC Emissions (g/hr)		493	30	46	192					92		346
Dilemma Vehicles (#)		39	0	0	24					0		0
Queue Length 50th (ft)		282	24	116	273					132		451
Queue Length 95th (ft)		346	51	m156	m273					164		#617
Internal Link Dist (ft)		421			476			676			808	
Turn Bay Length (ft)				420						350		
Base Capacity (vph)		2759	758	229	1960					1162		1033
Starvation Cap Reductn		0	0	0	305					0		0
Spillback Cap Reductn		150	0	0	0					537		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.67	0.25	0.52	0.67					0.62		0.97

Intersection Summary

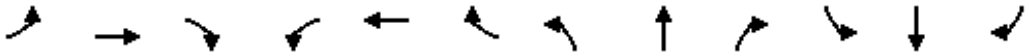
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 106 (76%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.97			
Intersection Signal Delay: 32.4		Intersection LOS: C	
Intersection Capacity Utilization 100.3%		ICU Level of Service G	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Ent ramp to I-65/Exit ramp from I-65 & Highway 96



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1233	691	0	0	700	1127	375	0	337	0	0	0
Future Volume (vph)	1233	691	0	0	700	1127	375	0	337	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	12	12	11	12	13	12	12	12
Grade (%)		1%			0%			1%			0%	
Storage Length (ft)	0		0	0		0	270		0	0		0
Storage Lanes	2		0	0		2	2		1	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3302	3307	0	0	3539	2814	3302	0	1628	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3302	3307	0	0	3539	2814	3302	0	1628	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						23			289			
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		556			1845			685			941	
Travel Time (s)		9.5			31.4			18.7			25.7	
Peak Hour Factor	0.88	0.86	0.95	1.00	0.95	0.98	0.95	0.25	0.92	1.00	1.00	0.95
Heavy Vehicles (%)	2%	5%	2%	2%	2%	1%	2%	0%	2%	2%	2%	2%
Adj. Flow (vph)	1401	803	0	0	737	1150	395	0	366	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1401	803	0	0	737	1150	395	0	366	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		22			26			22			22	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.05	1.05	1.01	1.00	1.00	1.00	1.05	1.01	0.96	1.00	1.00	1.00
Turning Speed (mph)	18		9	15		10	15		15	15		9
Number of Detectors	1	1			1	0	1		1			
Detector Template												
Leading Detector (ft)	42	300			300	0	42		50			
Trailing Detector (ft)	-3	294			294	0	-3		0			
Detector 1 Position(ft)	-3	294			294	0	-3		0			
Detector 1 Size(ft)	45	6			6	50	45		50			
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Queue (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Delay (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Turn Type	Prot	NA			NA	custom	Prot		Perm			
Protected Phases	1	6			2	2 4	4					
Permitted Phases									4			
Detector Phase	1	6			2	2 4	4		4			
Switch Phase												



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	12.0	18.0			18.0		7.0		7.0			
Minimum Split (s)	56.0	116.0			60.0		24.0		24.0			
Total Split (s)	56.0	116.0			60.0		24.0		24.0			
Total Split (%)	40.0%	82.9%			42.9%		17.1%		17.1%			
Maximum Green (s)	50.0	110.0			53.5		16.5		16.5			
Yellow Time (s)	3.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	3.0	2.0			2.5		3.5		3.5			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.5		7.5		7.5			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.5			4.5		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Act Effct Green (s)	50.0	110.0			53.5	79.5	16.5		16.5			
Actuated g/C Ratio	0.36	0.79			0.38	0.57	0.12		0.12			
v/c Ratio	1.19	0.31			0.55	0.72	1.02		0.82			
Control Delay	144.4	2.7			35.6	24.7	109.7		29.7			
Queue Delay	0.3	0.1			0.0	0.0	0.0		0.0			
Total Delay	144.7	2.8			35.6	24.7	109.7		29.7			
LOS	F	A			D	C	F		C			
Approach Delay		93.0			28.9							
Approach LOS		F			C							
90th %ile Green (s)	50.0	110.0			53.5		16.5		16.5			
90th %ile Term Code	Max	Coord			Coord		Max		Max			
70th %ile Green (s)	50.0	110.0			53.5		16.5		16.5			
70th %ile Term Code	Max	Coord			Coord		Max		Max			
50th %ile Green (s)	50.0	110.0			53.5		16.5		16.5			
50th %ile Term Code	Max	Coord			Coord		Max		Max			
30th %ile Green (s)	50.0	110.0			53.5		16.5		16.5			
30th %ile Term Code	Max	Coord			Coord		Max		Max			
10th %ile Green (s)	50.0	110.0			53.5		16.5		16.5			
10th %ile Term Code	Max	Coord			Coord		Max		Max			
Stops (vph)	895	79			533	785	332		80			
Fuel Used(gal)	50	4			19	27	12		4			
CO Emissions (g/hr)	3474	263			1333	1921	827		301			
NOx Emissions (g/hr)	676	51			259	374	161		59			
VOC Emissions (g/hr)	805	61			309	445	192		70			
Dilemma Vehicles (#)	0	18			25	0	0		0			
Queue Length 50th (ft)	~756	47			273	409	~195		66			
Queue Length 95th (ft)	#914	71			337	502	#302		#225			
Internal Link Dist (ft)		476			1765			605			861	
Turn Bay Length (ft)							270					
Base Capacity (vph)	1179	2598			1352	1607	389		446			
Starvation Cap Reductn	67	590			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	1.26	0.40			0.55	0.72	1.02		0.82			

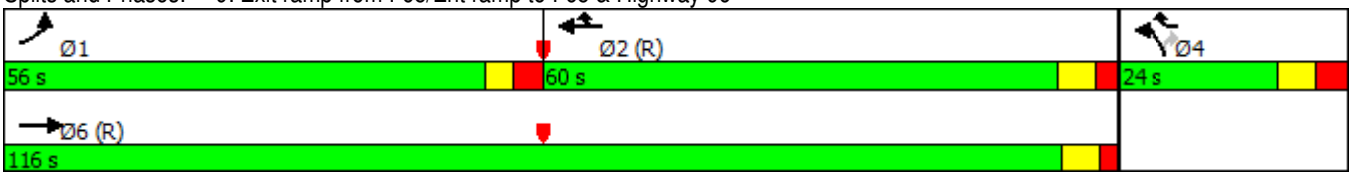
Intersection Summary

Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 122 (87%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.19			
Intersection Signal Delay: 64.7		Intersection LOS: E	
Intersection Capacity Utilization 100.3%		ICU Level of Service G	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: Exit ramp from I-65/Ent ramp to I-65 & Highway 96



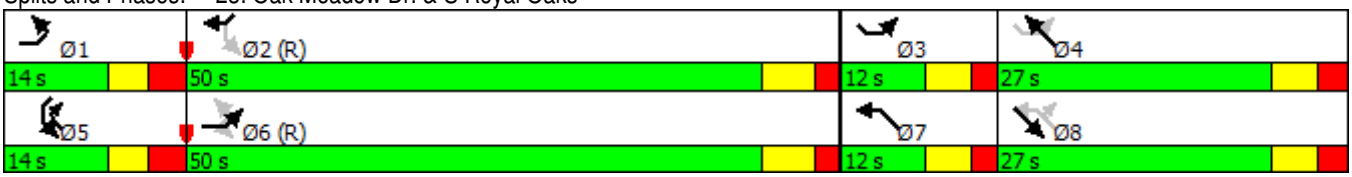
Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Lane Configurations												
Traffic Volume (vph)	81	1037	20	119	4	66	17	14	153	22	477	68
Future Volume (vph)	81	1037	20	119	4	66	17	14	153	22	477	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	8	11	11	11	11	12	12	13	12	12	12	12
Storage Length (ft)		70	150	75		0	100		195	180	0	
Storage Lanes		3	0	1		0	1		1	1	2	
Taper Length (ft)		50		50			50			50		
Lane Util. Factor	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00
Frt			0.850		0.861				0.850		0.850	
Flt Protected	0.950	0.950		0.950			0.950			0.950		
Satd. Flow (prot)	1534	3319	1531	1711	1550	0	1770	1925	1583	1770	2787	0
Flt Permitted	0.308	0.950		0.742			0.583			0.208		
Satd. Flow (perm)	497	3319	1531	1336	1550	0	1086	1925	1583	387	2787	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			154		90				101		154	
Link Speed (mph)		30			25			40		30		
Link Distance (ft)		1875			721			918		1624		
Travel Time (s)		42.6			19.7			15.6		36.9		
Peak Hour Factor	0.67	0.94	0.63	0.79	0.58	0.73	0.75	0.58	0.92	0.75	0.75	0.69
Adj. Flow (vph)	121	1103	32	151	7	90	23	24	166	29	636	99
Shared Lane Traffic (%)												
Lane Group Flow (vph)	121	1103	32	151	97	0	23	24	166	29	735	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Right	Right
Median Width(ft)		30			12			12		12		
Link Offset(ft)		0			0			0		0		
Crosswalk Width(ft)		16			16			16		16		
Two way Left Turn Lane												
Headway Factor	1.20	1.04	1.04	1.04	1.04	1.00	1.00	0.96	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15	9	15		9	15		9	15	9	9
Number of Detectors	1	1	1	1	1		1	1	1	1	1	
Detector Template												
Leading Detector (ft)	42	42	42	42	42		42	42	42	42	42	
Trailing Detector (ft)	-3	-3	-3	-3	-3		-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	-3	-3	-3	-3		-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	45	45	45	45		45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	Prot	Perm	D.P+P	NA		D.P+P	NA	custom	pm+pt	Prot	
Protected Phases	1	6		3	8		7	4	5	5	2	
Permitted Phases	6		6	4			8		8	2		
Detector Phase	1	6		3	8		7	4	5	5	2	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	7.0		7.0	7.0	7.0	7.0	20.0	
Minimum Split (s)	13.0	26.0	26.0	12.5	20.0		12.5	20.0	13.0	13.0	26.0	

Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Total Split (s)	14.0	50.0	50.0	12.0	27.0		12.0	27.0	14.0	14.0	50.0	
Total Split (%)	13.6%	48.5%	48.5%	11.7%	26.2%		11.7%	26.2%	13.6%	13.6%	48.5%	
Maximum Green (s)	8.0	44.0	44.0	6.5	21.0		6.5	21.0	8.0	8.0	44.0	
Yellow Time (s)	3.0	4.0	4.0	3.5	3.5		3.5	3.5	3.0	3.0	4.0	
All-Red Time (s)	3.0	2.0	2.0	2.0	2.5		2.0	2.5	3.0	3.0	2.0	
Lost Time Adjust (s)	-2.5	-1.5	-1.5	-2.5	-2.5		-2.5	-2.5	-2.5	-2.5	-1.5	
Total Lost Time (s)	3.5	4.5	4.5	3.0	3.5		3.0	3.5	3.5	3.5	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	5.0	5.0	1.5	3.5		1.5	3.5	1.5	1.5	5.0	
Recall Mode	None	C-Min	C-Min	None	None		None	None	None	None	C-Min	
Act Effct Green (s)	77.4	66.6	66.6	14.7	10.8		14.7	10.8	21.2	76.9	66.4	
Actuated g/C Ratio	0.75	0.65	0.65	0.14	0.10		0.14	0.10	0.21	0.75	0.64	
v/c Ratio	0.26	0.51	0.03	0.67	0.40		0.11	0.12	0.41	0.07	0.40	
Control Delay	5.3	12.0	0.1	54.1	15.7		34.1	42.2	16.9	4.5	8.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	5.3	12.0	0.1	54.1	15.7		34.1	42.2	16.9	4.5	8.6	
LOS	A	B	A	D	B		C	D	B	A	A	
Approach Delay		11.1			39.0			21.6		8.4		
Approach LOS		B			D			C		A		
90th %ile Green (s)	8.0	54.3	54.3	6.5	11.7		6.5	11.7	7.0	7.0	53.3	
90th %ile Term Code	Max	Coord	Coord	Max	Gap		Max	Hold	Min	Min	Coord	
70th %ile Green (s)	7.3	57.4	57.4	6.5	8.6		6.5	8.6	7.0	7.0	57.1	
70th %ile Term Code	Gap	Coord	Coord	Max	Gap		Max	Hold	Min	Min	Coord	
50th %ile Green (s)	7.0	71.0	71.0	7.5	7.0		0.0	0.0	7.0	7.0	71.0	
50th %ile Term Code	Min	Coord	Coord	Hold	Min		Skip	Skip	Min	Min	Coord	
30th %ile Green (s)	7.0	71.0	71.0	7.5	7.0		0.0	0.0	7.0	7.0	71.0	
30th %ile Term Code	Min	Coord	Coord	Hold	Min		Skip	Skip	Min	Min	Coord	
10th %ile Green (s)	7.0	72.0	72.0	6.5	0.0		0.0	0.0	7.0	7.0	72.0	
10th %ile Term Code	Min	Coord	Coord	Max	Skip		Skip	Skip	Min	Min	Coord	
Stops (vph)	21	538	0	110	17		15	14	53	7	205	
Fuel Used(gal)	1	21	0	2	1		0	0	2	0	9	
CO Emissions (g/hr)	97	1445	20	172	50		26	24	140	24	628	
NOx Emissions (g/hr)	19	281	4	33	10		5	5	27	5	122	
VOC Emissions (g/hr)	22	335	5	40	12		6	6	32	5	146	
Dilemma Vehicles (#)	0	0	0	0	0		0	1	0	0	0	
Queue Length 50th (ft)	10	145	0	100	4		14	15	35	2	71	
Queue Length 95th (ft)	32	308	0	120	13		27	25	88	12	130	
Internal Link Dist (ft)		1795			641			838		1544		
Turn Bay Length (ft)	70	70	150	75			100		195	180		
Base Capacity (vph)	482	2147	1044	224	423		214	439	420	433	1850	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.25	0.51	0.03	0.67	0.23		0.11	0.05	0.40	0.07	0.40	

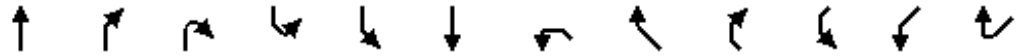
Intersection Summary	
Area Type:	Other
Cycle Length: 103	

Actuated Cycle Length: 103	
Offset: 0 (0%), Referenced to phase 2:SWL and 6:EBL, Start of Green	
Natural Cycle: 75	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.67	
Intersection Signal Delay: 13.9	Intersection LOS: B
Intersection Capacity Utilization 59.1%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 23: Oak Meadow Dr. & S Royal Oaks



Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	26	1100	95	6	43	38	31	11	89	247	669	23
Future Volume (vph)	26	1100	95	6	43	38	31	11	89	247	669	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	11	11	12	12	11	12	12	11	12
Grade (%)	1%					-1%	2%				-2%	
Storage Length (ft)		135			100		120	0			220	0
Storage Lanes		3			1		1	1			2	0
Taper Length (ft)					50		50				50	
Lane Util. Factor	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95
Frt		0.850	0.850					0.850			0.993	
Flt Protected				0.950	0.950		0.950			0.950	0.955	
Satd. Flow (prot)	1764	2707	1607	1754	1580	0	1787	1486	0	1787	3343	0
Flt Permitted	0.386			0.461	0.950		0.712			0.162	0.955	
Satd. Flow (perm)	681	2707	1607	851	1580	0	1339	1486	0	305	3343	0
Right Turn on Red			Yes						Yes			Yes
Satd. Flow (RTOR)			82					103			82	
Link Speed (mph)	30					30	30				30	
Link Distance (ft)	1624					433	515				792	
Travel Time (s)	36.9					9.8	11.7				18.0	
Peak Hour Factor	0.63	0.92	0.87	0.58	0.68	0.77	0.67	0.63	0.86	0.80	0.99	0.67
Heavy Vehicles (%)	0%	1%	0%	0%	11%	0%	0%	10%	3%	2%	2%	4%
Adj. Flow (vph)	41	1196	109	10	63	49	46	17	103	309	676	34
Shared Lane Traffic (%)												
Lane Group Flow (vph)	41	1196	109	10	63	49	46	120	0	309	710	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Left	Left	Right	Right	Left	Left	Right
Median Width(ft)	22					22	12				35	
Link Offset(ft)	0					0	0				0	
Crosswalk Width(ft)	16					16	16				16	
Two way Left Turn Lane												
Headway Factor	1.10	1.05	1.01	1.04	1.04	0.99	1.01	1.06	1.01	0.99	1.03	0.99
Turning Speed (mph)		9	9	15	15		15	9	9	15	15	9
Number of Detectors	1	1	0	1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	42	226	0	42	42	50	42	42		42	226	
Trailing Detector (ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Position(ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Size(ft)	45	6	50	45	45	50	45	45		45	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	NA	custom	custom	custom	Prot	NA	D.Pm	Prot		pm+pt	Prot	
Protected Phases	1	6			4			8		5	2	
Permitted Phases	6		6	8			4			2		
Detector Phase	1	6		8	4		4	8		5	2	
Switch Phase												



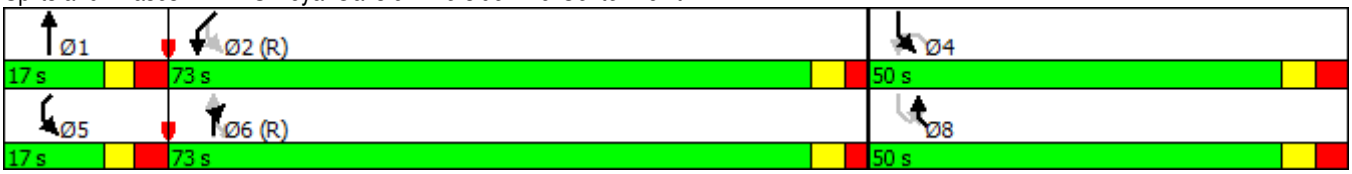
Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Minimum Initial (s)	5.0	10.0	10.0	7.0	7.0		7.0	7.0		5.0	10.0	
Minimum Split (s)	17.0	73.0	73.0	50.0	50.0		50.0	50.0		17.0	73.0	
Total Split (s)	17.0	73.0	73.0	50.0	50.0		50.0	50.0		17.0	73.0	
Total Split (%)	12.1%	52.1%	52.1%	35.7%	35.7%		35.7%	35.7%		12.1%	52.1%	
Maximum Green (s)	10.5	67.0	67.0	43.0	43.0		43.0	43.0		10.5	67.0	
Yellow Time (s)	3.0	3.5	3.5	3.5	3.5		3.5	3.5		3.0	3.5	
All-Red Time (s)	3.5	2.5	2.5	3.5	3.5		3.5	3.5		3.5	2.5	
Lost Time Adjust (s)	-1.0	-3.0	-3.0	-2.5	-2.5		-2.5	-2.5		-1.0	-3.0	
Total Lost Time (s)	5.5	3.0	3.0	4.5	4.5		4.5	4.5		5.5	3.0	
Lead/Lag	Lead	Lag	Lag							Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
Recall Mode	None	C-Min	C-Min	None	None		None	None		None	C-Min	
Walk Time (s)		7.0	7.0	8.0	8.0		8.0	8.0			7.0	
Flash Dont Walk (s)		16.0	16.0	35.0	32.0		32.0	35.0			20.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0			0	
Act Effct Green (s)	106.6	101.5	101.5	14.0	14.0	0.0	14.0	14.0		114.6	107.9	
Actuated g/C Ratio	0.76	0.72	0.72	0.10	0.10	0.00	0.10	0.10		0.82	0.77	
v/c Ratio	0.07	0.61	0.09	0.12	0.40	no cap	0.35	0.50		0.83	0.27	
Control Delay	3.1	11.5	2.3	58.5	65.7		64.7	21.5		44.1	5.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	3.1	11.5	2.3	58.5	65.7	Error	64.7	21.5		44.1	5.6	
LOS	A	B	A	E	E	F	E	C		D	A	
Approach Delay	10.5					Err	33.4				17.3	
Approach LOS	B					F	C				B	
90th %ile Green (s)	7.4	93.9	93.9	16.1	16.1		16.1	16.1		10.5	97.0	
90th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
70th %ile Green (s)	6.8	96.7	96.7	13.3	13.3		13.3	13.3		10.5	100.4	
70th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
50th %ile Green (s)	6.5	98.6	98.6	11.4	11.4		11.4	11.4		10.5	102.6	
50th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
30th %ile Green (s)	6.3	100.4	100.4	9.6	9.6		9.6	9.6		10.5	104.6	
30th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
10th %ile Green (s)	0.0	103.0	103.0	7.0	7.0		7.0	7.0		10.5	120.0	
10th %ile Term Code	Skip	Coord	Coord	Min	Hold		Hold	Min		Max	Coord	
Stops (vph)	6	524	9	6	40	0	28	23		190	252	
Fuel Used(gal)	0	19	1	0	1	0	1	1		5	6	
CO Emissions (g/hr)	26	1357	91	9	66	9	48	67		335	451	
NOx Emissions (g/hr)	5	264	18	2	13	2	9	13		65	88	
VOC Emissions (g/hr)	6	314	21	2	15	2	11	16		78	105	
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0		0	0	
Queue Length 50th (ft)	5	273	6	8	55	0	40	14		135	59	
Queue Length 95th (ft)	10	386	24	17	75	0	58	25		m#142	m246	
Internal Link Dist (ft)	1544					353	435				712	
Turn Bay Length (ft)		135	135	100	100		120			220	220	
Base Capacity (vph)	626	1962	1187	276	513	1	435	552		371	2595	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	

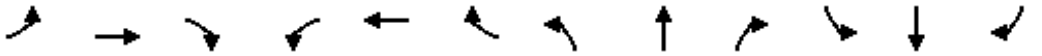
Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Reduced v/c Ratio	0.07	0.61	0.09	0.04	0.12	49.00	0.11	0.22		0.83	0.27	

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 139 (99%), Referenced to phase 2:SWL and 6:NBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: Err			
Intersection Signal Delay: Err		Intersection LOS: F	
Intersection Capacity Utilization Err%		ICU Level of Service H	
Analysis Period (min) 15			

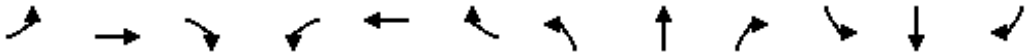
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: S Royal Oaks & Riverside Dr & Center Point Pl





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	191	1026	58	832	1087	249	131	315	873	293	394	165
Future Volume (vph)	191	1026	58	832	1087	249	131	315	873	293	394	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	12	11	12	13	12	13	13	11	11	11
Grade (%)		0%			0%			1%			0%	
Storage Length (ft)	200		300	285		0	195		450	220		650
Storage Lanes	2		1	2		1	2		2	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.91	0.91	0.97	0.95	1.00	0.97	0.95	0.88	0.97	0.95	0.95
Frt		0.991				0.850			0.850		0.950	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3467	4923	0	3351	3539	1652	3484	3712	2894	3385	3315	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3467	4923	0	3351	3539	1652	3484	3712	2894	3385	3315	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		7				106					51	
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		350			691			792			964	
Travel Time (s)		6.0			11.8			18.0			21.9	
Peak Hour Factor	0.92	0.93	0.81	0.87	0.91	0.89	0.74	0.83	0.89	0.83	0.95	0.80
Heavy Vehicles (%)	1%	1%	0%	1%	2%	1%	0%	0%	1%	0%	0%	0%
Adj. Flow (vph)	208	1103	72	956	1195	280	177	380	981	353	415	206
Shared Lane Traffic (%)												
Lane Group Flow (vph)	208	1175	0	956	1195	280	177	380	981	353	621	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		30			24			30			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.04	1.00	1.04	1.00	0.96	1.01	0.96	0.96	1.04	1.04	1.04
Turning Speed (mph)	18		10	18		10	18		10	18		10
Number of Detectors	1	1		1	1	0	1	2	1	1	2	
Detector Template												
Leading Detector (ft)	42	236		42	236	0	42	146	42	42	146	
Trailing Detector (ft)	-3	230		-3	230	0	-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	230		-3	230	230	-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	6		45	6	6	45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								140			140	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	

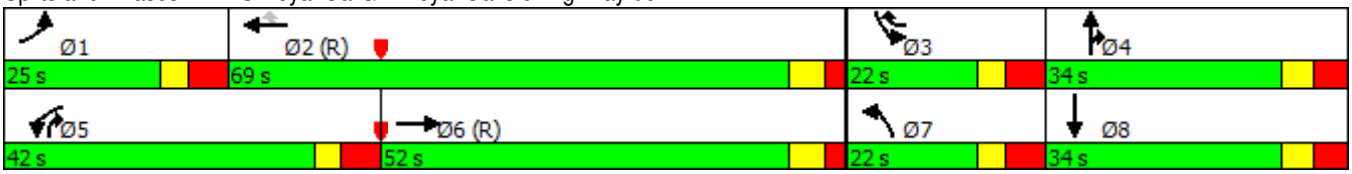


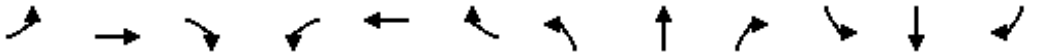
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	
Protected Phases	1	6		5	2	3	7	4	4 5	3	8	
Permitted Phases						2						
Detector Phase	1	6		5	2	3	7	4	4 5	3	8	
Switch Phase												
Minimum Initial (s)	6.0	13.0		6.0	13.0	6.0	6.0	10.0		6.0	10.0	
Minimum Split (s)	25.0	52.0		42.0	69.0	22.0	22.0	34.0		22.0	34.0	
Total Split (s)	25.0	52.0		42.0	69.0	22.0	22.0	34.0		22.0	34.0	
Total Split (%)	16.7%	34.7%		28.0%	46.0%	14.7%	14.7%	22.7%		14.7%	22.7%	
Maximum Green (s)	17.5	45.5		34.5	62.5	14.5	14.5	26.5		14.5	26.5	
Yellow Time (s)	3.0	4.0		3.0	4.0	3.0	3.0	3.5		3.0	3.5	
All-Red Time (s)	4.5	2.5		4.5	2.5	4.5	4.5	4.0		4.5	4.0	
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5	-2.0	-2.0	-3.0		-2.0	-3.0	
Total Lost Time (s)	5.0	4.0		5.0	4.0	5.5	5.5	4.5		5.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	6.0		3.0	6.0	3.0	3.0	4.5		3.0	4.5	
Recall Mode	None	C-Min		None	C-Min	None	None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		37.0			24.0			36.0			36.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	16.7	48.0		37.0	68.3	88.8	14.5	29.5	71.0	16.5	31.5	
Actuated g/C Ratio	0.11	0.32		0.25	0.46	0.59	0.10	0.20	0.47	0.11	0.21	
v/c Ratio	0.54	0.74		1.16	0.74	0.27	0.53	0.52	0.72	0.95	0.84	
Control Delay	68.0	48.7		119.7	46.5	14.5	60.0	50.1	46.5	100.9	63.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	68.0	48.7		119.7	46.5	14.5	60.0	50.1	46.5	100.9	63.9	
LOS	E	D		F	D	B	E	D	D	F	E	
Approach Delay		51.6			71.6			49.0			77.3	
Approach LOS		D			E			D			E	
90th %ile Green (s)	17.5	45.5		34.5	62.5	14.5	14.5	26.5		14.5	26.5	
90th %ile Term Code	Max	Coord		Max	Coord	Max	Max	Max		Max	Max	
70th %ile Green (s)	15.9	45.5		34.5	64.1	14.5	14.4	26.5		14.5	26.6	
70th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
50th %ile Green (s)	14.4	45.5		34.5	65.6	14.5	12.9	26.5		14.5	28.1	
50th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
30th %ile Green (s)	12.8	45.5		34.5	67.2	14.5	11.5	26.5		14.5	29.5	
30th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
10th %ile Green (s)	10.5	45.5		34.5	69.5	14.5	9.4	26.5		14.5	31.6	
10th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
Stops (vph)	176	942		714	982	166	122	276	771	266	474	
Fuel Used(gal)	5	23		34	29	4	3	7	18	10	14	
CO Emissions (g/hr)	337	1578		2378	2008	306	216	467	1253	677	985	
NOx Emissions (g/hr)	66	307		463	391	60	42	91	244	132	192	
VOC Emissions (g/hr)	78	366		551	465	71	50	108	290	157	228	
Dilemma Vehicles (#)	0	36		0	37	0	0	0	0	0	0	
Queue Length 50th (ft)	100	374		~580	551	113	87	175	539	179	287	
Queue Length 95th (ft)	141	431		m#499	m492	m120	m92	m211	m623	#242	#398	
Internal Link Dist (ft)		270			611			712			884	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	200			285			195		450	220		
Base Capacity (vph)	462	1580		826	1610	1021	383	730	1369	372	735	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.45	0.74		1.16	0.74	0.27	0.46	0.52	0.72	0.95	0.84	

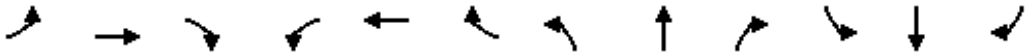
Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 133 (89%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.16			
Intersection Signal Delay: 62.6		Intersection LOS: E	
Intersection Capacity Utilization 81.9%		ICU Level of Service D	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 7: S Royal Oaks/N Royal Oaks & Highway 96





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1807	446	264	834	0	0	0	0	846	0	1293
Future Volume (vph)	0	1807	446	264	834	0	0	0	0	846	0	1293
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	12	12	12	12	12	12	11
Grade (%)		0%			0%			0%			1%	
Storage Length (ft)	0		0	420		0	0		0	350		0
Storage Lanes	0		1	0		0	0		0	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.86	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.88
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	6408	1583	1787	3455	0	0	0	0	3450	0	2707
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	6408	1583	1787	3455	0	0	0	0	3450	0	2707
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			405									177
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		501			556			756			888	
Travel Time (s)		8.5			9.5			20.6			24.2	
Peak Hour Factor	1.00	0.93	0.78	0.71	0.86	1.00	1.00	1.00	1.00	0.87	1.00	0.88
Heavy Vehicles (%)	2%	2%	2%	1%	1%	2%	2%	2%	2%	1%	2%	1%
Adj. Flow (vph)	0	1943	572	372	970	0	0	0	0	972	0	1469
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1943	572	372	970	0	0	0	0	972	0	1469
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.01	1.01	1.05
Turning Speed (mph)	15		12	15		9	15		9	18		12
Number of Detectors		1	0	1	1					1		1
Detector Template												
Leading Detector (ft)		300	0	42	300					42		42
Trailing Detector (ft)		294	0	-3	294					-3		-3
Detector 1 Position(ft)		294	-3	-3	294					-3		-3
Detector 1 Size(ft)		6	45	45	6					45		45
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0		0.0
Turn Type		NA	Perm	Prot	NA					Prot		Prot
Protected Phases		6		5	2					4		4
Permitted Phases			6									
Detector Phase		6	6	5	2					4		4
Switch Phase												



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)		25.0	25.0	5.0	25.0					15.0		15.0
Minimum Split (s)		55.0	55.0	30.0	85.0					65.0		65.0
Total Split (s)		55.0	55.0	30.0	85.0					65.0		65.0
Total Split (%)		36.7%	36.7%	20.0%	56.7%					43.3%		43.3%
Maximum Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
Yellow Time (s)		4.0	4.0	3.0	4.0					4.0		4.0
All-Red Time (s)		2.0	2.0	3.0	2.0					3.5		3.5
Lost Time Adjust (s)		-2.0	-2.0	-1.0	-2.0					-2.0		-2.0
Total Lost Time (s)		4.0	4.0	5.0	4.0					5.5		5.5
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		4.5	4.5	3.0	4.5					3.0		3.0
Recall Mode		C-Min	C-Min	None	C-Min					None		None
Act Effct Green (s)		51.0	51.0	25.0	81.0					59.5		59.5
Actuated g/C Ratio		0.34	0.34	0.17	0.54					0.40		0.40
v/c Ratio		0.89	0.71	1.25	0.52					0.71		1.24
Control Delay		63.5	27.3	190.8	21.8					41.5		151.8
Queue Delay		0.0	0.0	0.0	0.3					0.2		0.0
Total Delay		63.5	27.3	190.8	22.1					41.8		151.8
LOS		E	C	F	C					D		F
Approach Delay		55.3			68.9							
Approach LOS		E			E							
90th %ile Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
90th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
70th %ile Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
70th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
50th %ile Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
50th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
30th %ile Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
30th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
10th %ile Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
10th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
Stops (vph)		1680	414	205	393					695		956
Fuel Used(gal)		54	10	13	11					16		53
CO Emissions (g/hr)		3808	710	927	748					1134		3733
NOx Emissions (g/hr)		741	138	180	146					221		726
VOC Emissions (g/hr)		882	164	215	173					263		865
Dilemma Vehicles (#)		109	0	0	34					0		0
Queue Length 50th (ft)		564	279	~464	239					409		~953
Queue Length 95th (ft)		m612	265	#465	337					465		#1065
Internal Link Dist (ft)		421			476			676			808	
Turn Bay Length (ft)				420						350		
Base Capacity (vph)		2178	805	297	1865					1368		1180
Starvation Cap Reductn		0	0	0	353					0		0
Spillback Cap Reductn		0	0	0	0					57		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.89	0.71	1.25	0.64					0.74		1.24

Intersection Summary

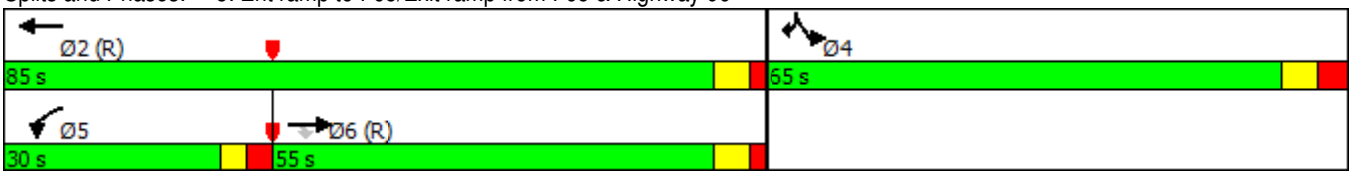
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 104 (69%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.25			
Intersection Signal Delay: 78.6		Intersection LOS: E	
Intersection Capacity Utilization 79.1%		ICU Level of Service D	
Analysis Period (min) 15			

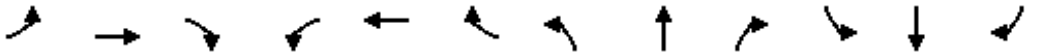
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

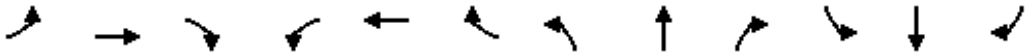
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Ent ramp to I-65/Exit ramp from I-65 & Highway 96





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	538	2115	0	0	814	924	284	0	152	0	0	0
Future Volume (vph)	538	2115	0	0	814	924	284	0	152	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	12	12	11	12	13	12	12	12
Grade (%)		1%			0%			1%			0%	
Storage Length (ft)	0		0	0		0	270		0	0		0
Storage Lanes	2		0	0		2	2		1	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3270	3371	0	0	3539	2787	3302	0	1597	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3270	3371	0	0	3539	2787	3302	0	1597	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						301			69			
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		556			1845			685			941	
Travel Time (s)		9.5			31.4			18.7			25.7	
Peak Hour Factor	0.97	0.98	1.00	0.25	0.91	0.93	0.92	1.00	0.87	1.00	1.00	1.00
Heavy Vehicles (%)	3%	3%	2%	0%	2%	2%	2%	2%	4%	2%	2%	2%
Adj. Flow (vph)	555	2158	0	0	895	994	309	0	175	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	555	2158	0	0	895	994	309	0	175	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		22			26			22			22	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.05	1.05	1.01	1.00	1.00	1.00	1.05	1.01	0.96	1.00	1.00	1.00
Turning Speed (mph)	18		9	15		10	15		15	15		9
Number of Detectors	1	1			1	0	1		1			
Detector Template												
Leading Detector (ft)	42	300			300	0	42		50			
Trailing Detector (ft)	-3	294			294	0	-3		0			
Detector 1 Position(ft)	-3	294			294	0	-3		0			
Detector 1 Size(ft)	45	6			6	50	45		50			
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Queue (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Delay (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Turn Type	Prot	NA			NA	custom	Prot		Perm			
Protected Phases	1	6			2	2 4	4					
Permitted Phases									4			
Detector Phase	1	6			2	2 4	4		4			
Switch Phase												

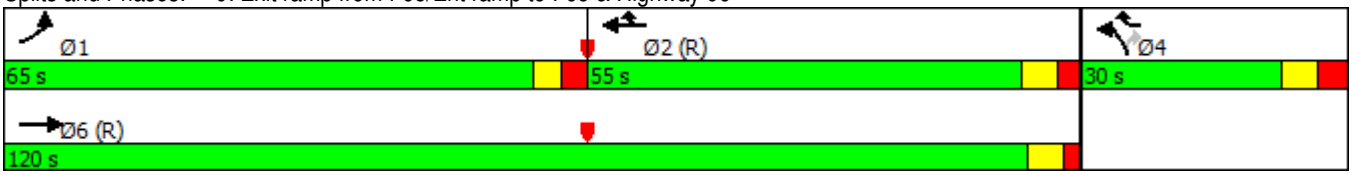


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	12.0	18.0			18.0		7.0		7.0			
Minimum Split (s)	65.0	120.0			55.0		30.0		30.0			
Total Split (s)	65.0	120.0			55.0		30.0		30.0			
Total Split (%)	43.3%	80.0%			36.7%		20.0%		20.0%			
Maximum Green (s)	59.0	114.0			48.5		22.5		22.5			
Yellow Time (s)	3.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	3.0	2.0			2.5		3.5		3.5			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.5		7.5		7.5			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.5			4.5		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Act Effct Green (s)	33.1	115.2			75.6	106.4	21.3		21.3			
Actuated g/C Ratio	0.22	0.77			0.50	0.71	0.14		0.14			
v/c Ratio	0.77	0.83			0.50	0.48	0.66		0.61			
Control Delay	78.3	19.8			27.0	7.5	68.0		45.7			
Queue Delay	0.0	1.5			0.0	0.0	0.0		0.0			
Total Delay	78.3	21.3			27.0	7.5	68.0		45.7			
LOS	E	C			C	A	E		D			
Approach Delay		33.0			16.8							
Approach LOS		C			B							
90th %ile Green (s)	40.9	114.0			66.6		22.5		22.5			
90th %ile Term Code	Gap	Coord			Coord		Max		Max			
70th %ile Green (s)	36.1	114.0			71.4		22.5		22.5			
70th %ile Term Code	Gap	Coord			Coord		Max		Max			
50th %ile Green (s)	33.3	114.0			74.2		22.5		22.5			
50th %ile Term Code	Gap	Coord			Coord		Max		Max			
30th %ile Green (s)	29.6	114.7			78.6		21.8		21.8			
30th %ile Term Code	Gap	Coord			Coord		Gap		Gap			
10th %ile Green (s)	25.4	119.3			87.4		17.2		17.2			
10th %ile Term Code	Gap	Coord			Coord		Gap		Gap			
Stops (vph)	537	1522			532	278	266		86			
Fuel Used(gal)	16	31			20	16	7		3			
CO Emissions (g/hr)	1110	2200			1390	1099	462		184			
NOx Emissions (g/hr)	216	428			270	214	90		36			
VOC Emissions (g/hr)	257	510			322	255	107		43			
Dilemma Vehicles (#)	0	77			27	0	0		0			
Queue Length 50th (ft)	297	362			305	150	148		97			
Queue Length 95th (ft)	m341	368			406	234	201		172			
Internal Link Dist (ft)		476			1765			605			861	
Turn Bay Length (ft)							270					
Base Capacity (vph)	1286	2588			1784	2085	495		298			
Starvation Cap Reductn	0	244			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.43	0.92			0.50	0.48	0.62		0.59			

Intersection Summary

Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 138 (92%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 29.5		Intersection LOS: C	
Intersection Capacity Utilization 79.1%		ICU Level of Service D	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 9: Exit ramp from I-65/Ent ramp to I-65 & Highway 96



Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Lane Configurations												
Traffic Volume (vph)	85	766	13	136	35	109	77	22	69	118	708	134
Future Volume (vph)	85	766	13	136	35	109	77	22	69	118	708	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	8	11	11	11	11	12	12	13	12	12	12	12
Storage Length (ft)		70	150	75		0	100		195	180	0	
Storage Lanes		3	0	1		0	1		1	1	2	
Taper Length (ft)		50		50			50			50		
Lane Util. Factor	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00
Frt			0.850		0.893				0.850		0.850	
Flt Protected	0.950	0.950		0.950			0.950			0.950		
Satd. Flow (prot)	1534	3319	1531	1711	1608	0	1770	1925	1583	1770	2787	0
Flt Permitted	0.127	0.950		0.732			0.317			0.295		
Satd. Flow (perm)	205	3319	1531	1318	1608	0	590	1925	1583	550	2787	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			132		101				77		132	
Link Speed (mph)		30			25			40		30		
Link Distance (ft)		552			721			918		1624		
Travel Time (s)		12.5			19.7			15.6		36.9		
Peak Hour Factor	0.67	0.94	0.63	0.79	0.58	0.73	0.75	0.58	0.92	0.75	0.75	0.69
Adj. Flow (vph)	127	815	21	172	60	149	103	38	75	157	944	194
Shared Lane Traffic (%)												
Lane Group Flow (vph)	127	815	21	172	209	0	103	38	75	157	1138	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Right	Right
Median Width(ft)		30			12			12		12		
Link Offset(ft)		0			0			0		0		
Crosswalk Width(ft)		16			16			16		16		
Two way Left Turn Lane												
Headway Factor	1.20	1.04	1.04	1.04	1.04	1.00	1.00	0.96	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15	9	15		9	15		9	15	9	9
Number of Detectors	1	1	1	1	1		1	1	1	1	1	
Detector Template												
Leading Detector (ft)	42	42	42	42	42		42	42	42	42	42	
Trailing Detector (ft)	-3	-3	-3	-3	-3		-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	-3	-3	-3	-3		-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	45	45	45	45		45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	Prot	Perm	D.P+P	NA		D.P+P	NA	custom	pm+pt	Prot	
Protected Phases	1	6		3	8		7	4	5	5	2	
Permitted Phases	6		6	4			8		8	2		
Detector Phase	1	6		3	8		7	4	5	5	2	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	7.0		7.0	7.0	7.0	7.0	20.0	
Minimum Split (s)	18.0	57.0	57.0	14.0	35.0		14.0	35.0	14.0	14.0	53.0	

Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Total Split (s)	18.0	57.0	57.0	14.0	35.0		14.0	35.0	14.0	14.0	53.0	
Total Split (%)	15.0%	47.5%	47.5%	11.7%	29.2%		11.7%	29.2%	11.7%	11.7%	44.2%	
Maximum Green (s)	12.0	51.0	51.0	8.5	29.0		8.5	29.0	8.0	8.0	47.0	
Yellow Time (s)	3.0	4.0	4.0	3.5	3.5		3.5	3.5	3.0	3.0	4.0	
All-Red Time (s)	3.0	2.0	2.0	2.0	2.5		2.0	2.5	3.0	3.0	2.0	
Lost Time Adjust (s)	-2.5	-1.5	-1.5	-2.5	-2.5		-2.5	-2.5	-2.5	-2.5	-1.5	
Total Lost Time (s)	3.5	4.5	4.5	3.0	3.5		3.0	3.5	3.5	3.5	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	5.0	5.0	1.5	3.5		1.5	3.5	1.5	1.5	5.0	
Recall Mode	None	C-Min	C-Min	None	None		None	None	None	None	C-Min	
Act Effct Green (s)	80.6	67.8	67.8	29.4	17.1		28.2	16.3	30.6	76.7	65.7	
Actuated g/C Ratio	0.67	0.56	0.56	0.24	0.14		0.24	0.14	0.26	0.64	0.55	
v/c Ratio	0.47	0.43	0.02	0.46	0.66		0.42	0.15	0.16	0.35	0.72	
Control Delay	13.5	17.0	0.1	39.6	34.2		38.6	43.7	7.1	10.0	22.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	13.5	17.0	0.1	39.6	34.2		38.6	43.7	7.1	10.0	22.5	
LOS	B	B	A	D	C		D	D	A	A	C	
Approach Delay		16.2			36.6			28.6		20.9		
Approach LOS		B			D			C		C		
90th %ile Green (s)	12.0	57.5	57.5	8.5	22.5		8.5	22.5	8.0	8.0	53.5	
90th %ile Term Code	Max	Coord	Coord	Max	Gap		Max	Hold	Max	Max	Coord	
70th %ile Green (s)	12.0	62.2	62.2	8.5	17.8		8.5	17.8	8.0	8.0	58.2	
70th %ile Term Code	Max	Coord	Coord	Max	Gap		Max	Hold	Max	Max	Coord	
50th %ile Green (s)	9.6	65.9	65.9	8.5	14.5		8.5	14.5	7.6	7.6	63.9	
50th %ile Term Code	Gap	Coord	Coord	Max	Gap		Max	Hold	Gap	Gap	Coord	
30th %ile Green (s)	7.2	70.2	70.2	25.3	11.2		8.1	0.0	7.0	7.0	70.0	
30th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Skip	Min	Min	Coord	
10th %ile Green (s)	7.0	75.5	75.5	20.0	7.0		7.0	0.0	7.0	7.0	75.5	
10th %ile Term Code	Min	Coord	Coord	Hold	Min		Min	Skip	Min	Min	Coord	
Stops (vph)	29	432	0	111	70		58	19	10	45	563	
Fuel Used(gal)	1	8	0	2	2		2	1	1	2	18	
CO Emissions (g/hr)	53	583	4	165	151		116	36	44	139	1232	
NOx Emissions (g/hr)	10	113	1	32	29		23	7	9	27	240	
VOC Emissions (g/hr)	12	135	1	38	35		27	8	10	32	285	
Dilemma Vehicles (#)	0	0	0	0	0		0	1	0	0	0	
Queue Length 50th (ft)	31	180	0	109	79		63	26	0	38	321	
Queue Length 95th (ft)	47	268	0	137	63		82	35	33	64	356	
Internal Link Dist (ft)		472			641			838		1544		
Turn Bay Length (ft)	70	70	150	75			100		195	180		
Base Capacity (vph)	301	1874	921	377	496		248	505	467	460	1585	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.42	0.43	0.02	0.46	0.42		0.42	0.08	0.16	0.34	0.72	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	

Actuated Cycle Length: 120	
Offset: 117 (98%), Referenced to phase 2:SWL and 6:EBL, Start of Green	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.72	
Intersection Signal Delay: 22.0	Intersection LOS: C
Intersection Capacity Utilization 56.5%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 23: Oak Meadow Dr. & S Royal Oaks

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	83	955	25	77	59	114	43	54	267	215	964	86
Future Volume (vph)	83	955	25	77	59	114	43	54	267	215	964	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	11	11	12	12	11	12	12	11	12
Grade (%)	1%					-1%	2%				-2%	
Storage Length (ft)		135			100		120	0			220	0
Storage Lanes		3			1		1	1			2	0
Taper Length (ft)					50		50				50	
Lane Util. Factor	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95
Frt		0.850	0.850					0.850			0.986	
Flt Protected				0.950	0.950		0.950			0.950	0.957	
Satd. Flow (prot)	1764	2707	1575	1736	1754	0	1752	1546	0	1805	3365	0
Flt Permitted	0.202			0.147	0.950		0.677			0.171	0.957	
Satd. Flow (perm)	356	2707	1575	269	1754	0	1248	1546	0	325	3365	0
Right Turn on Red			Yes						Yes			Yes
Satd. Flow (RTOR)			124					159			76	
Link Speed (mph)	30					30	30				30	
Link Distance (ft)	1624					433	515				792	
Travel Time (s)	36.9					9.8	11.7				18.0	
Peak Hour Factor	0.79	0.95	0.64	0.86	0.71	0.82	0.75	0.88	0.94	0.75	0.90	0.76
Heavy Vehicles (%)	0%	1%	2%	1%	0%	0%	2%	0%	0%	1%	1%	0%
Adj. Flow (vph)	105	1005	39	90	83	139	57	61	284	287	1071	113
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	1005	39	90	83	139	57	345	0	287	1184	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Left	Left	Right	Right	Left	Left	Right
Median Width(ft)	22					22	12				35	
Link Offset(ft)	0					0	0				0	
Crosswalk Width(ft)	16					16	16				16	
Two way Left Turn Lane												
Headway Factor	1.10	1.05	1.01	1.04	1.04	0.99	1.01	1.06	1.01	0.99	1.03	0.99
Turning Speed (mph)		9	9	15	15		15	9	9	15	15	9
Number of Detectors	1	1	0	1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	42	226	0	42	42	50	42	42		42	226	
Trailing Detector (ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Position(ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Size(ft)	45	6	50	45	45	50	45	45		45	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	NA	custom	custom	custom	Prot	NA	D.Pm	Prot		pm+pt	Prot	
Protected Phases	1	6			4	2!		8		5	2!	
Permitted Phases	6		6	8			4			2		
Detector Phase	1	6		8	4	2	4	8		5	2	
Switch Phase												

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Minimum Initial (s)	5.0	10.0	10.0	7.0	7.0	10.0	7.0	7.0		5.0	10.0	
Minimum Split (s)	15.0	70.0	70.0	50.0	50.0	85.0	50.0	50.0		30.0	85.0	
Total Split (s)	14.0	72.0	72.0	49.0	49.0	87.0	49.0	49.0		29.0	87.0	
Total Split (%)	9.3%	48.0%	48.0%	32.7%	32.7%	58.0%	32.7%	32.7%		19.3%	58.0%	
Maximum Green (s)	7.5	66.0	66.0	42.0	42.0	81.0	42.0	42.0		22.5	81.0	
Yellow Time (s)	3.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.0	3.5	
All-Red Time (s)	3.5	2.5	2.5	3.5	3.5	2.5	3.5	3.5		3.5	2.5	
Lost Time Adjust (s)	-1.0	-3.0	-3.0	-2.5	-2.5		-2.5	-2.5		-1.0	-3.0	
Total Lost Time (s)	5.5	3.0	3.0	4.5	4.5		4.5	4.5		5.5	3.0	
Lead/Lag	Lead	Lag	Lag			Lag				Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
Recall Mode	None	C-Min	C-Min	None	None	C-Min	None	None		None	C-Min	
Walk Time (s)		7.0	7.0	8.0	8.0	7.0	8.0	8.0			7.0	
Flash Dont Walk (s)		16.0	16.0	35.0	32.0	20.0	32.0	35.0			20.0	
Pedestrian Calls (#/hr)		0	0	0	0	0	0	0			0	
Act Effct Green (s)	92.8	86.9	86.9	32.0	32.0	0.0	32.0	32.0		107.3	96.6	
Actuated g/C Ratio	0.62	0.58	0.58	0.21	0.21	0.00	0.21	0.21		0.72	0.64	
v/c Ratio	0.35	0.64	0.04	1.58	0.22	no cap	0.21	0.76		0.70	0.54	
Control Delay	12.9	26.8	0.1	368.0	47.0		46.8	38.9		23.9	9.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.9	
Total Delay	12.9	26.8	0.1	368.0	47.0	Error	46.8	38.9		23.9	9.9	
LOS	B	C	A	F	D	F	D	D		C	A	
Approach Delay	24.6					Err	40.0				12.6	
Approach LOS	C					F	D				B	
90th %ile Green (s)	7.5	66.0	66.0	42.0	42.0	81.0	42.0	42.0		22.5	81.0	
90th %ile Term Code	Max	Coord	Coord	Max	Hold	Coord	Hold	Max		Max	Coord	
70th %ile Green (s)	7.5	71.0	71.0	37.0	37.0	86.0	37.0	37.0		22.5	86.0	
70th %ile Term Code	Max	Coord	Coord	Gap	Hold	Coord	Hold	Gap		Max	Coord	
50th %ile Green (s)	7.5	82.0	82.0	30.6	30.6	92.4	30.6	30.6		17.9	92.4	
50th %ile Term Code	Max	Coord	Coord	Gap	Hold	Coord	Hold	Gap		Gap	Coord	
30th %ile Green (s)	7.5	93.3	93.3	24.0	24.0	99.0	24.0	24.0		13.2	99.0	
30th %ile Term Code	Max	Coord	Coord	Gap	Hold	Coord	Hold	Gap		Gap	Coord	
10th %ile Green (s)	6.6	107.4	107.4	14.1	14.1	109.8	14.1	14.1		9.0	109.8	
10th %ile Term Code	Gap	Coord	Coord	Gap	Hold	Coord	Hold	Gap		Gap	Coord	
Stops (vph)	35	653	0	56	46	0	34	167		134	592	
Fuel Used(gal)	1	21	0	6	1	0	1	5		3	12	
CO Emissions (g/hr)	102	1461	22	443	71	27	54	332		218	817	
NOx Emissions (g/hr)	20	284	4	86	14	5	10	65		42	159	
VOC Emissions (g/hr)	24	339	5	103	16	6	12	77		50	189	
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0		0	0	
Queue Length 50th (ft)	29	372	0	~122	67	0	46	176		115	163	
Queue Length 95th (ft)	55	577	0	#209	82	0	66	258		m80	m411	
Internal Link Dist (ft)	1544					353	435				712	
Turn Bay Length (ft)		135	135	100	100		120			220	220	
Base Capacity (vph)	300	1568	964	79	520	1	370	570		465	2194	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	654	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Reduced v/c Ratio	0.35	0.64	0.04	1.14	0.16	139.00	0.15	0.61		0.62	0.77	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 123 (82%), Referenced to phase 2:SBSW and 6:NBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: Err			
Intersection Signal Delay: Err		Intersection LOS: F	
Intersection Capacity Utilization Err%		ICU Level of Service H	
Analysis Period (min) 15			

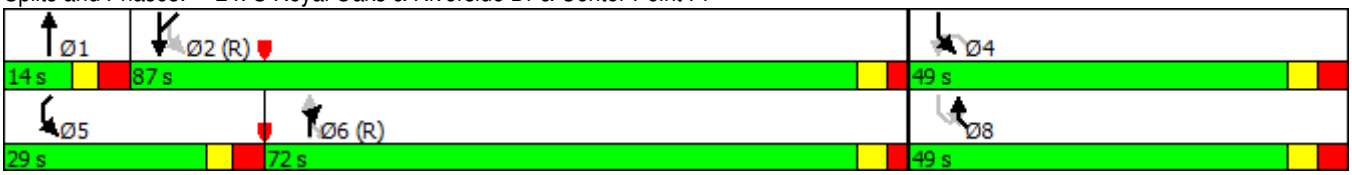
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

! Phase conflict between lane groups.

Splits and Phases: 24: S Royal Oaks & Riverside Dr & Center Point Pl



HCS 2010 Two-Way Stop Control Summary Report

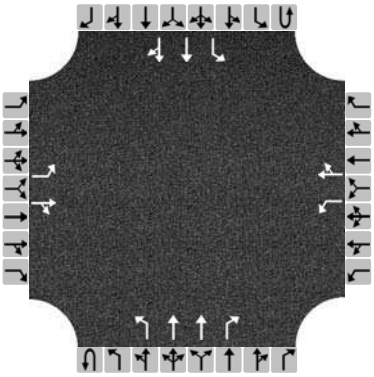
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Intersection Orientation	North-South
Project Description	10728 (Existing)

Site Information

Intersection	S. Royal Oaks and Rand
Jurisdiction	Franklin, TN
East/West Street	Rand Pl / Home Depot
North/South Street	S. Royal Oaks Blvd
Peak Hour Factor	0.97
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		1	1	0		1	1	0	0	1	2	1	0	1	2	0
Configuration		L		TR		L		TR		L	T	R		L	T	TR
Volume (veh/h)		24	1	8		13	0	11		9	1281	23		45	586	47
Percent Heavy Vehicles		0	0	0		0	0	0		0				0		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left + Thru															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		25		9		13		11		9				46		
Capacity		203		461		130		410		944				519		
v/c Ratio		0.12		0.02		0.10		0.03		0.01				0.09		
95% Queue Length		0.4		0.1		0.3		0.1		0.0				0.3		
Control Delay (s/veh)		25.2		13.0		35.8		14.0		8.8				12.6		
Level of Service (LOS)		D		B		E		B		A				B		
Approach Delay (s/veh)	21.9				25.8				0.1				0.8			
Approach LOS	C				D				A				A			

HCS 2010 Two-Way Stop Control Summary Report

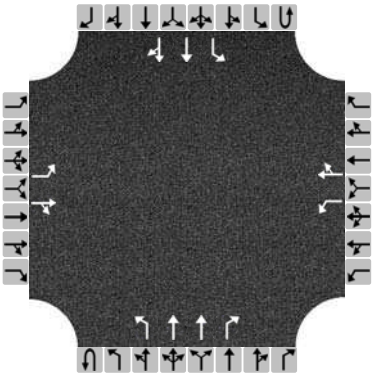
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	PM Peak Hour
Intersection Orientation	North-South
Project Description	10728 (Existing)

Site Information

Intersection	S. Royal Oaks and Rand
Jurisdiction	Franklin, TN
East/West Street	Rand Pl / Home Depot
North/South Street	S. Royal Oaks Blvd
Peak Hour Factor	0.96
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		1	1	0		1	1	0	0	1	2	1	0	1	2	0
Configuration		L		TR		L		TR		L	T	R		L	T	TR
Volume (veh/h)		24	3	15		19	4	22		6	896	16		20	883	97
Percent Heavy Vehicles		0	0	0		0	0	0		0				0		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left + Thru															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		25		19		20		27		6				21		
Capacity		183		391		199		411		688				731		
v/c Ratio		0.14		0.05		0.10		0.07		0.01				0.03		
95% Queue Length		0.5		0.2		0.3		0.2		0.0				0.1		
Control Delay (s/veh)		27.7		14.7		25.1		14.4		10.3				10.1		
Level of Service (LOS)		D		B		D		B		B				B		
Approach Delay (s/veh)	22.1				18.9				0.1				0.2			
Approach LOS	C				C				A				A			

HCS 2010 Two-Way Stop Control Summary Report

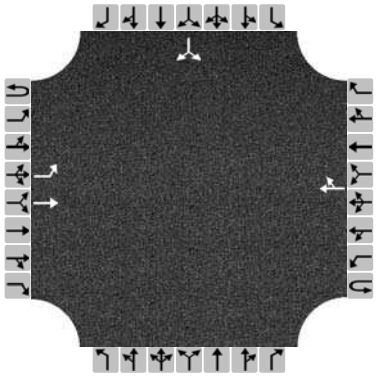
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	10728 (Existing)

Site Information

Intersection	Oak Meadow Dr and dwy
Jurisdiction	Franklin, TN
East/West Street	Oak Meadow Drive
North/South Street	Western Home Depot dwy
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume (veh/h)		2	44				183	0						1		1
Percent Heavy Vehicles		0												0		0
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		2													2	
Capacity		1351													761	
v/c Ratio		0.00													0.00	
95% Queue Length		0.0													0.0	
Control Delay (s/veh)		7.7													9.7	
Level of Service (LOS)		A													A	
Approach Delay (s/veh)	0.3												9.7			
Approach LOS	A												A			

HCS 2010 Two-Way Stop Control Summary Report

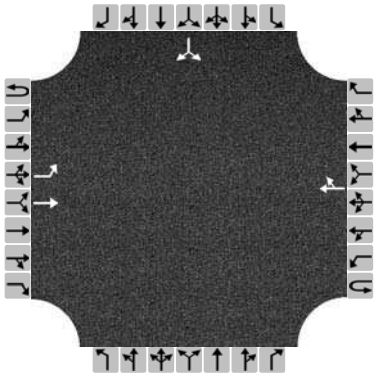
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	PM Peak Hour
Intersection Orientation	East-West
Project Description	10728 (Existing)

Site Information

Intersection	Oak Meadow Dr and dwy
Jurisdiction	Franklin, TN
East/West Street	Oak Meadow Drive
North/South Street	Western Home Depot dwy
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

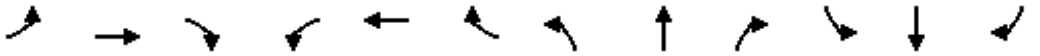
Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume (veh/h)		5	161				166	2						15		2
Percent Heavy Vehicles		0												0		0
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		6													21	
Capacity		1373													660	
v/c Ratio		0.00													0.03	
95% Queue Length		0.0													0.1	
Control Delay (s/veh)		7.6													10.6	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)	0.2												10.6			
Approach LOS	A												B			

BACKGROUND CONDITIONS



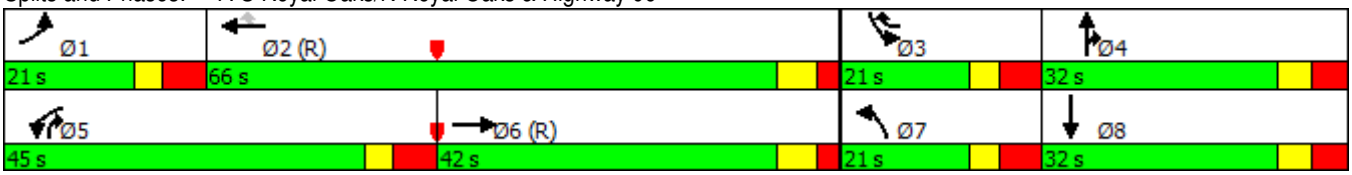
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	112	772	60	831	993	281	99	239	988	225	202	82
Future Volume (vph)	112	772	60	831	993	281	99	239	988	225	202	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	12	11	12	13	12	13	13	11	11	11
Grade (%)		0%			0%			1%			0%	
Storage Length (ft)	200		300	285		0	195		450	220		650
Storage Lanes	2		1	2		1	2		2	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.91	0.91	0.97	0.95	1.00	0.97	0.95	0.88	0.97	0.95	0.95
Frt		0.988				0.850			0.850		0.959	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3400	4688	0	3286	3406	1620	3350	3639	2865	3319	3235	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3400	4688	0	3286	3406	1620	3350	3639	2865	3319	3235	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		10				173					34	
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		350			691			792			964	
Travel Time (s)		6.0			11.8			18.0			21.9	
Peak Hour Factor	0.80	0.90	0.80	0.93	0.91	0.88	0.82	0.80	0.93	0.92	0.74	0.81
Heavy Vehicles (%)	3%	6%	2%	3%	6%	3%	4%	2%	2%	2%	4%	2%
Adj. Flow (vph)	140	858	75	894	1091	319	121	299	1062	245	273	101
Shared Lane Traffic (%)												
Lane Group Flow (vph)	140	933	0	894	1091	319	121	299	1062	245	374	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		30			24			30			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.04	1.00	1.04	1.00	0.96	1.01	0.96	0.96	1.04	1.04	1.04
Turning Speed (mph)	18		10	18		10	18		10	18		10
Number of Detectors	1	1		1	1	0	1	2	1	1	2	
Detector Template												
Leading Detector (ft)	42	236		42	236	0	42	146	42	42	146	
Trailing Detector (ft)	-3	230		-3	230	0	-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	230		-3	230	230	-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	6		45	6	6	45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								140			140	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	

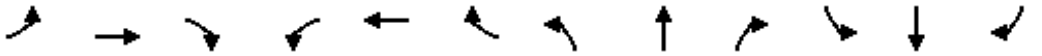
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	
Protected Phases	1	6		5	2	3	7	4	4 5	3	8	
Permitted Phases						2						
Detector Phase	1	6		5	2	3	7	4	4 5	3	8	
Switch Phase												
Minimum Initial (s)	6.0	13.0		6.0	13.0	6.0	6.0	10.0		6.0	10.0	
Minimum Split (s)	21.0	42.0		45.0	66.0	21.0	21.0	32.0		21.0	32.0	
Total Split (s)	21.0	42.0		45.0	66.0	21.0	21.0	32.0		21.0	32.0	
Total Split (%)	15.0%	30.0%		32.1%	47.1%	15.0%	15.0%	22.9%		15.0%	22.9%	
Maximum Green (s)	13.5	35.5		37.5	59.5	13.5	13.5	24.5		13.5	24.5	
Yellow Time (s)	3.0	4.0		3.0	4.0	3.0	3.0	3.5		3.0	3.5	
All-Red Time (s)	4.5	2.5		4.5	2.5	4.5	4.5	4.0		4.5	4.0	
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5	-2.0	-2.0	-3.0		-2.0	-3.0	
Total Lost Time (s)	5.0	4.0		5.0	4.0	5.5	5.5	4.5		5.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	6.0		3.0	6.0	3.0	3.0	4.5		3.0	4.5	
Recall Mode	None	C-Min		None	C-Min	None	None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		37.0			24.0			36.0			36.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	13.5	38.4		40.0	64.9	84.0	12.4	27.5	72.0	15.1	30.2	
Actuated g/C Ratio	0.10	0.27		0.29	0.46	0.60	0.09	0.20	0.51	0.11	0.22	
v/c Ratio	0.43	0.72		0.95	0.69	0.31	0.41	0.42	0.72	0.69	0.52	
Control Delay	63.3	49.3		57.0	40.9	7.8	56.3	41.6	43.5	70.7	47.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	63.3	49.3		57.0	40.9	7.8	56.3	41.6	43.5	70.7	47.1	
LOS	E	D		E	D	A	E	D	D	E	D	
Approach Delay		51.1			42.6			44.2			56.4	
Approach LOS		D			D			D			E	
90th %ile Green (s)	13.5	35.5		37.5	59.5	13.5	13.3	24.5		13.5	24.7	
90th %ile Term Code	Max	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
70th %ile Green (s)	12.4	35.5		37.5	60.6	13.5	11.6	24.5		13.5	26.4	
70th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
50th %ile Green (s)	11.2	35.5		37.5	61.8	13.5	10.4	24.5		13.5	27.6	
50th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
30th %ile Green (s)	9.9	35.5		37.5	63.1	13.5	9.2	24.5		13.5	28.8	
30th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
10th %ile Green (s)	8.1	37.6		37.5	67.0	11.4	7.5	24.5		11.4	28.4	
10th %ile Term Code	Gap	Coord		Max	Coord	Gap	Gap	Max		Gap	Hold	
Stops (vph)	103	730		736	955	86	89	206	937	214	225	
Fuel Used(gal)	3	17		24	26	4	2	5	20	6	6	
CO Emissions (g/hr)	190	1223		1650	1796	249	156	324	1401	427	427	
NOx Emissions (g/hr)	37	238		321	349	48	30	63	273	83	83	
VOC Emissions (g/hr)	44	283		382	416	58	36	75	325	99	99	
Dilemma Vehicles (#)	0	29		0	36	0	0	0	0	0	0	
Queue Length 50th (ft)	62	281		409	535	65	55	127	573	112	144	
Queue Length 95th (ft)	85	335		m435	m554	m109	72	150	632	159	159	
Internal Link Dist (ft)		270			611			712			884	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	200			285			195		450	220		
Base Capacity (vph)	388	1293		938	1578	1045	370	714	1473	367	724	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.36	0.72		0.95	0.69	0.31	0.33	0.42	0.72	0.67	0.52	

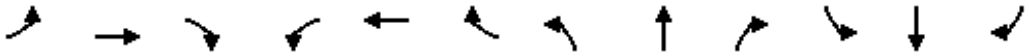
Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 116 (83%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 46.3		Intersection LOS: D	
Intersection Capacity Utilization 70.5%		ICU Level of Service C	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 7: S Royal Oaks/N Royal Oaks & Highway 96





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1728	187	111	1055	0	0	0	0	355	0	1026
Future Volume (vph)	0	1728	187	111	1055	0	0	0	0	355	0	1026
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	12	12	12	12	12	12	11
Grade (%)		0%			0%			0%			1%	
Storage Length (ft)	0		0	420		0	0		0	350		0
Storage Lanes	0		1	0		0	0		0	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.86	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.88
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	6346	1509	1787	3388	0	0	0	0	3287	0	2654
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	6346	1509	1787	3388	0	0	0	0	3287	0	2654
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			182									117
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		501			556			756			888	
Travel Time (s)		8.5			9.5			20.6			24.2	
Peak Hour Factor	1.00	0.91	0.90	0.86	0.87	1.00	1.00	1.00	1.00	0.85	1.00	0.94
Heavy Vehicles (%)	2%	3%	7%	1%	3%	2%	2%	2%	2%	6%	2%	3%
Adj. Flow (vph)	0	1899	208	129	1213	0	0	0	0	418	0	1091
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1899	208	129	1213	0	0	0	0	418	0	1091
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.01	1.01	1.05
Turning Speed (mph)	15		12	15		9	15		9	18		12
Number of Detectors		1	0	1	1					1		1
Detector Template												
Leading Detector (ft)		300	0	42	300					42		42
Trailing Detector (ft)		294	0	-3	294					-3		-3
Detector 1 Position(ft)		294	-3	-3	294					-3		-3
Detector 1 Size(ft)		6	45	45	6					45		45
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0		0.0
Turn Type		NA	Perm	Prot	NA					Prot		Prot
Protected Phases		6		5	2					4		4
Permitted Phases			6									
Detector Phase		6	6	5	2					4		4
Switch Phase												



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)		25.0	25.0	5.0	25.0					15.0		15.0
Minimum Split (s)		62.0	62.0	23.0	85.0					55.0		55.0
Total Split (s)		62.0	62.0	23.0	85.0					55.0		55.0
Total Split (%)		44.3%	44.3%	16.4%	60.7%					39.3%		39.3%
Maximum Green (s)		56.0	56.0	17.0	79.0					47.5		47.5
Yellow Time (s)		4.0	4.0	3.0	4.0					4.0		4.0
All-Red Time (s)		2.0	2.0	3.0	2.0					3.5		3.5
Lost Time Adjust (s)		-2.0	-2.0	-1.0	-2.0					-2.0		-2.0
Total Lost Time (s)		4.0	4.0	5.0	4.0					5.5		5.5
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		4.5	4.5	3.0	4.5					3.0		3.0
Recall Mode		C-Min	C-Min	None	C-Min					None		None
Act Effct Green (s)		60.5	60.5	15.5	81.0					49.5		49.5
Actuated g/C Ratio		0.43	0.43	0.11	0.58					0.35		0.35
v/c Ratio		0.69	0.28	0.65	0.62					0.36		1.08
Control Delay		27.8	5.1	71.1	19.1					34.6		89.4
Queue Delay		0.5	0.0	0.0	0.3					2.1		0.0
Total Delay		28.3	5.1	71.1	19.4					36.7		89.4
LOS		C	A	E	B					D		F
Approach Delay		26.0			24.3							
Approach LOS		C			C							
90th %ile Green (s)		56.0	56.0	17.0	79.0					47.5		47.5
90th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
70th %ile Green (s)		56.0	56.0	17.0	79.0					47.5		47.5
70th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
50th %ile Green (s)		57.6	57.6	15.4	79.0					47.5		47.5
50th %ile Term Code		Coord	Coord	Gap	Coord					Max		Max
30th %ile Green (s)		59.8	59.8	13.2	79.0					47.5		47.5
30th %ile Term Code		Coord	Coord	Gap	Coord					Max		Max
10th %ile Green (s)		63.2	63.2	9.8	79.0					47.5		47.5
10th %ile Term Code		Coord	Coord	Gap	Coord					Max		Max
Stops (vph)		1097	39	111	500					256		827
Fuel Used(gal)		35	2	3	13					6		30
CO Emissions (g/hr)		2415	146	218	908					431		2069
NOx Emissions (g/hr)		470	28	42	177					84		403
VOC Emissions (g/hr)		560	34	50	211					100		480
Dilemma Vehicles (#)		50	0	0	33					0		0
Queue Length 50th (ft)		340	27	125	282					144		~586
Queue Length 95th (ft)		388	m50	m163	m294					178		#738
Internal Link Dist (ft)		421			476			676			808	
Turn Bay Length (ft)				420						350		
Base Capacity (vph)		2743	755	229	1960					1162		1014
Starvation Cap Reductn		0	0	0	217					0		0
Spillback Cap Reductn		379	0	0	0					581		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.80	0.28	0.56	0.70					0.72		1.08

Intersection Summary

Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 106 (76%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.08			
Intersection Signal Delay: 40.4		Intersection LOS: D	
Intersection Capacity Utilization 107.3%		ICU Level of Service G	
Analysis Period (min) 15			

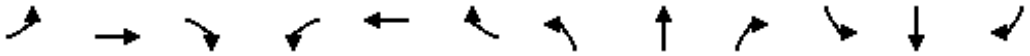
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Ent ramp to I-65/Exit ramp from I-65 & Highway 96

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1336	747	0	0	759	1217	407	0	364	0	0	0
Future Volume (vph)	1336	747	0	0	759	1217	407	0	364	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	12	12	11	12	13	12	12	12
Grade (%)		1%			0%			1%			0%	
Storage Length (ft)	0		0	0		0	270		0	0		0
Storage Lanes	2		0	0		2	2		1	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3302	3307	0	0	3539	2814	3302	0	1628	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3302	3307	0	0	3539	2814	3302	0	1628	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						23			258			
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		556			1845			685			941	
Travel Time (s)		9.5			31.4			18.7			25.7	
Peak Hour Factor	0.88	0.86	0.95	1.00	0.95	0.98	0.95	0.25	0.92	1.00	1.00	0.95
Heavy Vehicles (%)	2%	5%	2%	2%	2%	1%	2%	0%	2%	2%	2%	2%
Adj. Flow (vph)	1518	869	0	0	799	1242	428	0	396	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1518	869	0	0	799	1242	428	0	396	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		22			26			22			22	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.05	1.05	1.01	1.00	1.00	1.00	1.05	1.01	0.96	1.00	1.00	1.00
Turning Speed (mph)	18		9	15		10	15		15	15		9
Number of Detectors	1	1			1	0	1		1			
Detector Template												
Leading Detector (ft)	42	300			300	0	42		50			
Trailing Detector (ft)	-3	294			294	0	-3		0			
Detector 1 Position(ft)	-3	294			294	0	-3		0			
Detector 1 Size(ft)	45	6			6	50	45		50			
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Queue (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Delay (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Turn Type	Prot	NA			NA	custom	Prot		Perm			
Protected Phases	1	6			2	2 4	4					
Permitted Phases									4			
Detector Phase	1	6			2	2 4	4		4			
Switch Phase												



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	12.0	18.0			18.0		7.0		7.0			
Minimum Split (s)	56.0	116.0			60.0		24.0		24.0			
Total Split (s)	56.0	116.0			60.0		24.0		24.0			
Total Split (%)	40.0%	82.9%			42.9%		17.1%		17.1%			
Maximum Green (s)	50.0	110.0			53.5		16.5		16.5			
Yellow Time (s)	3.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	3.0	2.0			2.5		3.5		3.5			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.5		7.5		7.5			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.5			4.5		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Act Effct Green (s)	50.0	110.0			53.5	79.5	16.5		16.5			
Actuated g/C Ratio	0.36	0.79			0.38	0.57	0.12		0.12			
v/c Ratio	1.29	0.33			0.59	0.77	1.10		0.95			
Control Delay	186.0	3.2			36.7	27.0	131.0		53.3			
Queue Delay	0.7	0.1			0.0	0.0	0.0		0.0			
Total Delay	186.7	3.3			36.7	27.0	131.0		53.3			
LOS	F	A			D	C	F		D			
Approach Delay		119.9			30.8							
Approach LOS		F			C							
90th %ile Green (s)	50.0	110.0			53.5		16.5		16.5			
90th %ile Term Code	Max	Coord			Coord		Max		Max			
70th %ile Green (s)	50.0	110.0			53.5		16.5		16.5			
70th %ile Term Code	Max	Coord			Coord		Max		Max			
50th %ile Green (s)	50.0	110.0			53.5		16.5		16.5			
50th %ile Term Code	Max	Coord			Coord		Max		Max			
30th %ile Green (s)	50.0	110.0			53.5		16.5		16.5			
30th %ile Term Code	Max	Coord			Coord		Max		Max			
10th %ile Green (s)	50.0	110.0			53.5		16.5		16.5			
10th %ile Term Code	Max	Coord			Coord		Max		Max			
Stops (vph)	967	101			591	899	348		115			
Fuel Used(gal)	65	4			21	31	15		7			
CO Emissions (g/hr)	4552	300			1467	2149	1018		455			
NOx Emissions (g/hr)	886	58			285	418	198		89			
VOC Emissions (g/hr)	1055	70			340	498	236		105			
Dilemma Vehicles (#)	0	17			27	0	0		0			
Queue Length 50th (ft)	~899	68			303	468	~227		135			
Queue Length 95th (ft)	#1028	76			372	573	#337		#341			
Internal Link Dist (ft)		476			1765			605			861	
Turn Bay Length (ft)							270					
Base Capacity (vph)	1179	2598			1352	1607	389		419			
Starvation Cap Reductn	163	612			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	1.49	0.44			0.59	0.77	1.10		0.95			

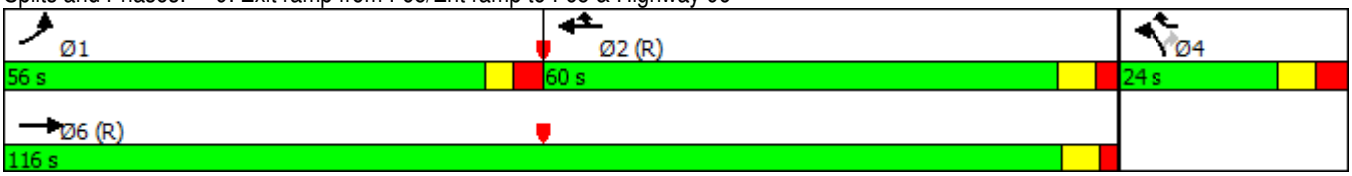
Intersection Summary

Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 122 (87%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.29			
Intersection Signal Delay: 81.2		Intersection LOS: F	
Intersection Capacity Utilization 107.3%		ICU Level of Service G	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: Exit ramp from I-65/Ent ramp to I-65 & Highway 96



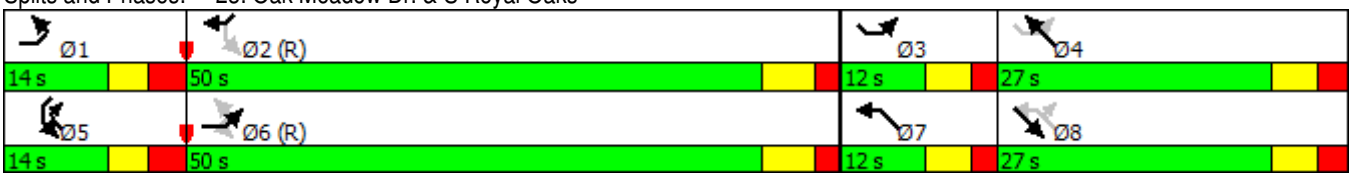
Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Lane Configurations												
Traffic Volume (vph)	87	1120	29	129	7	71	21	16	170	36	515	73
Future Volume (vph)	87	1120	29	129	7	71	21	16	170	36	515	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	8	11	11	11	11	12	12	13	12	12	12	12
Storage Length (ft)		70	150	75		0	100		195	180	0	
Storage Lanes		3	0	1		0	1		1	1	2	
Taper Length (ft)		50		50			50			50		
Lane Util. Factor	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00
Frt			0.850		0.867				0.850		0.850	
Flt Protected	0.950	0.950		0.950			0.950			0.950		
Satd. Flow (prot)	1534	3319	1531	1711	1561	0	1770	1925	1583	1770	2787	0
Flt Permitted	0.278	0.950		0.739			0.540			0.177		
Satd. Flow (perm)	449	3319	1531	1331	1561	0	1006	1925	1583	330	2787	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			154		97				90		154	
Link Speed (mph)		30			25			40		30		
Link Distance (ft)		1875			721			918		1624		
Travel Time (s)		42.6			19.7			15.6		36.9		
Peak Hour Factor	0.67	0.94	0.63	0.79	0.58	0.73	0.75	0.58	0.92	0.75	0.75	0.69
Adj. Flow (vph)	130	1191	46	163	12	97	28	28	185	48	687	106
Shared Lane Traffic (%)												
Lane Group Flow (vph)	130	1191	46	163	109	0	28	28	185	48	793	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Right	Right
Median Width(ft)		30			12			12		12		
Link Offset(ft)		0			0			0		0		
Crosswalk Width(ft)		16			16			16		16		
Two way Left Turn Lane												
Headway Factor	1.20	1.04	1.04	1.04	1.04	1.00	1.00	0.96	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15	9	15		9	15		9	15	9	9
Number of Detectors	1	1	1	1	1		1	1	1	1	1	
Detector Template												
Leading Detector (ft)	42	42	42	42	42		42	42	42	42	42	
Trailing Detector (ft)	-3	-3	-3	-3	-3		-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	-3	-3	-3	-3		-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	45	45	45	45		45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	Prot	Perm	D.P+P	NA		D.P+P	NA	custom	pm+pt	Prot	
Protected Phases	1	6		3	8		7	4	5	5	2	
Permitted Phases	6		6	4			8		8	2		
Detector Phase	1	6		3	8		7	4	5	5	2	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	7.0		7.0	7.0	7.0	7.0	20.0	
Minimum Split (s)	13.0	26.0	26.0	12.5	20.0		12.5	20.0	13.0	13.0	26.0	

Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Total Split (s)	14.0	50.0	50.0	12.0	27.0		12.0	27.0	14.0	14.0	50.0	
Total Split (%)	13.6%	48.5%	48.5%	11.7%	26.2%		11.7%	26.2%	13.6%	13.6%	48.5%	
Maximum Green (s)	8.0	44.0	44.0	6.5	21.0		6.5	21.0	8.0	8.0	44.0	
Yellow Time (s)	3.0	4.0	4.0	3.5	3.5		3.5	3.5	3.0	3.0	4.0	
All-Red Time (s)	3.0	2.0	2.0	2.0	2.5		2.0	2.5	3.0	3.0	2.0	
Lost Time Adjust (s)	-2.5	-1.5	-1.5	-2.5	-2.5		-2.5	-2.5	-2.5	-2.5	-1.5	
Total Lost Time (s)	3.5	4.5	4.5	3.0	3.5		3.0	3.5	3.5	3.5	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	5.0	5.0	1.5	3.5		1.5	3.5	1.5	1.5	5.0	
Recall Mode	None	C-Min	C-Min	None	None		None	None	None	None	C-Min	
Act Effct Green (s)	74.6	63.7	63.7	17.0	11.1		17.0	11.1	24.1	73.9	63.4	
Actuated g/C Ratio	0.72	0.62	0.62	0.17	0.11		0.17	0.11	0.23	0.72	0.62	
v/c Ratio	0.30	0.58	0.05	0.64	0.43		0.12	0.14	0.42	0.13	0.45	
Control Delay	6.5	14.4	0.1	48.7	16.3		32.2	42.1	19.9	5.6	10.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	6.5	14.4	0.1	48.7	16.3		32.2	42.1	19.9	5.6	10.3	
LOS	A	B	A	D	B		C	D	B	A	B	
Approach Delay		13.2			35.7			23.9		10.0		
Approach LOS		B			D			C		A		
90th %ile Green (s)	8.0	53.7	53.7	6.5	12.3		6.5	12.3	7.0	7.0	52.7	
90th %ile Term Code	Max	Coord	Coord	Max	Gap		Max	Hold	Min	Min	Coord	
70th %ile Green (s)	7.6	57.0	57.0	6.5	9.0		6.5	9.0	7.0	7.0	56.4	
70th %ile Term Code	Gap	Coord	Coord	Max	Gap		Max	Hold	Min	Min	Coord	
50th %ile Green (s)	7.0	58.5	58.5	6.5	7.5		6.5	7.5	7.0	7.0	58.5	
50th %ile Term Code	Min	Coord	Coord	Max	Hold		Max	Gap	Min	Min	Coord	
30th %ile Green (s)	7.0	71.0	71.0	7.5	7.0		0.0	0.0	7.0	7.0	71.0	
30th %ile Term Code	Min	Coord	Coord	Hold	Min		Skip	Skip	Min	Min	Coord	
10th %ile Green (s)	7.0	71.0	71.0	7.5	7.0		0.0	0.0	7.0	7.0	71.0	
10th %ile Term Code	Min	Coord	Coord	Hold	Min		Skip	Skip	Min	Min	Coord	
Stops (vph)	25	656	0	116	19		17	15	74	11	250	
Fuel Used(gal)	2	23	0	3	1		0	0	2	1	10	
CO Emissions (g/hr)	107	1628	30	176	57		30	27	173	39	703	
NOx Emissions (g/hr)	21	317	6	34	11		6	5	34	8	137	
VOC Emissions (g/hr)	25	377	7	41	13		7	6	40	9	163	
Dilemma Vehicles (#)	0	0	0	0	0		0	1	0	0	0	
Queue Length 50th (ft)	23	246	0	93	7		15	17	52	8	125	
Queue Length 95th (ft)	35	351	0	127	15		30	27	110	18	147	
Internal Link Dist (ft)		1795			641			838		1544		
Turn Bay Length (ft)	70	70	150	75			100		195	180		
Base Capacity (vph)	438	2054	1006	254	431		232	439	453	386	1775	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.30	0.58	0.05	0.64	0.25		0.12	0.06	0.41	0.12	0.45	

Intersection Summary	
Area Type:	Other
Cycle Length: 103	

Actuated Cycle Length: 103	
Offset: 0 (0%), Referenced to phase 2:SWL and 6:EBL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.64	
Intersection Signal Delay: 15.4	Intersection LOS: B
Intersection Capacity Utilization 62.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 23: Oak Meadow Dr. & S Royal Oaks



Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	28	1198	103	6	46	41	33	12	96	267	747	25
Future Volume (vph)	28	1198	103	6	46	41	33	12	96	267	747	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	11	11	12	12	11	12	12	11	12
Grade (%)	1%					-1%	2%				-2%	
Storage Length (ft)		135			100		120	0			220	0
Storage Lanes		3			1		1	1			2	0
Taper Length (ft)					50		50				50	
Lane Util. Factor	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95
Frt		0.850	0.850					0.850			0.993	
Flt Protected				0.950	0.950		0.950			0.950	0.955	
Satd. Flow (prot)	1764	2707	1607	1754	1580	0	1787	1486	0	1787	3343	0
Flt Permitted	0.351			0.423	0.950		0.691			0.137	0.955	
Satd. Flow (perm)	619	2707	1607	781	1580	0	1300	1486	0	258	3343	0
Right Turn on Red			Yes						Yes			Yes
Satd. Flow (RTOR)			82					112			82	
Link Speed (mph)	30					30	30				30	
Link Distance (ft)	1624					433	515				792	
Travel Time (s)	36.9					9.8	11.7				18.0	
Peak Hour Factor	0.63	0.92	0.87	0.58	0.68	0.77	0.67	0.63	0.86	0.80	0.99	0.67
Heavy Vehicles (%)	0%	1%	0%	0%	11%	0%	0%	10%	3%	2%	2%	4%
Adj. Flow (vph)	44	1302	118	10	68	53	49	19	112	334	755	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	44	1302	118	10	68	53	49	131	0	334	792	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Left	Left	Right	Right	Left	Left	Right
Median Width(ft)	22					22	12				35	
Link Offset(ft)	0					0	0				0	
Crosswalk Width(ft)	16					16	16				16	
Two way Left Turn Lane												
Headway Factor	1.10	1.05	1.01	1.04	1.04	0.99	1.01	1.06	1.01	0.99	1.03	0.99
Turning Speed (mph)		9	9	15	15		15	9	9	15	15	9
Number of Detectors	1	1	0	1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	42	226	0	42	42	50	42	42		42	226	
Trailing Detector (ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Position(ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Size(ft)	45	6	50	45	45	50	45	45		45	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	NA	custom	custom	custom	Prot	NA	D.Pm	Prot		pm+pt	Prot	
Protected Phases	1	6			4			8		5	2	
Permitted Phases	6		6	8			4			2		
Detector Phase	1	6		8	4		4	8		5	2	
Switch Phase												

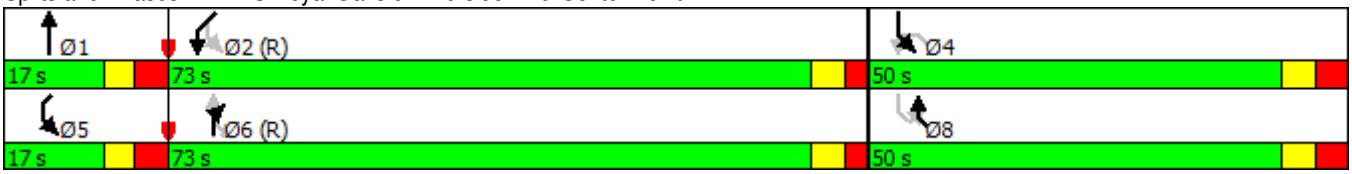
Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Minimum Initial (s)	5.0	10.0	10.0	7.0	7.0		7.0	7.0		5.0	10.0	
Minimum Split (s)	17.0	73.0	73.0	50.0	50.0		50.0	50.0		17.0	73.0	
Total Split (s)	17.0	73.0	73.0	50.0	50.0		50.0	50.0		17.0	73.0	
Total Split (%)	12.1%	52.1%	52.1%	35.7%	35.7%		35.7%	35.7%		12.1%	52.1%	
Maximum Green (s)	10.5	67.0	67.0	43.0	43.0		43.0	43.0		10.5	67.0	
Yellow Time (s)	3.0	3.5	3.5	3.5	3.5		3.5	3.5		3.0	3.5	
All-Red Time (s)	3.5	2.5	2.5	3.5	3.5		3.5	3.5		3.5	2.5	
Lost Time Adjust (s)	-1.0	-3.0	-3.0	-2.5	-2.5		-2.5	-2.5		-1.0	-3.0	
Total Lost Time (s)	5.5	3.0	3.0	4.5	4.5		4.5	4.5		5.5	3.0	
Lead/Lag	Lead	Lag	Lag							Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
Recall Mode	None	C-Min	C-Min	None	None		None	None		None	C-Min	
Walk Time (s)		7.0	7.0	8.0	8.0		8.0	8.0			7.0	
Flash Dont Walk (s)		16.0	16.0	35.0	32.0		32.0	35.0			20.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0			0	
Act Effct Green (s)	106.2	101.1	101.1	14.4	14.4	0.0	14.4	14.4		114.1	107.4	
Actuated g/C Ratio	0.76	0.72	0.72	0.10	0.10	0.00	0.10	0.10		0.82	0.77	
v/c Ratio	0.08	0.67	0.10	0.12	0.42	no cap	0.37	0.52		1.00	0.31	
Control Delay	3.3	13.0	2.6	58.5	65.8		65.1	21.2		70.3	8.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	3.3	13.0	2.6	58.5	65.8	Error	65.1	21.2		70.3	8.3	
LOS	A	B	A	E	E	F	E	C		E	A	
Approach Delay	11.9					Err	33.2				26.7	
Approach LOS	B					F	C				C	
90th %ile Green (s)	7.5	93.3	93.3	16.7	16.7		16.7	16.7		10.5	96.3	
90th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
70th %ile Green (s)	6.9	96.2	96.2	13.8	13.8		13.8	13.8		10.5	99.8	
70th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
50th %ile Green (s)	6.6	98.1	98.1	11.9	11.9		11.9	11.9		10.5	102.0	
50th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
30th %ile Green (s)	6.3	100.0	100.0	10.0	10.0		10.0	10.0		10.5	104.2	
30th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
10th %ile Green (s)	0.0	102.8	102.8	7.2	7.2		7.2	7.2		10.5	119.8	
10th %ile Term Code	Skip	Coord	Coord	Hold	Hold		Hold	Hold		Max	Coord	
Stops (vph)	6	624	11	6	41	0	30	25		205	368	
Fuel Used(gal)	0	22	1	0	1	0	1	1		7	8	
CO Emissions (g/hr)	28	1523	99	9	70	10	51	73		462	567	
NOx Emissions (g/hr)	6	296	19	2	14	2	10	14		90	110	
VOC Emissions (g/hr)	7	353	23	2	16	2	12	17		107	131	
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0		0	0	
Queue Length 50th (ft)	6	326	8	8	59	0	42	16		168	68	
Queue Length 95th (ft)	10	459	28	17	79	0	61	24		m#163	m336	
Internal Link Dist (ft)	1544					353	435				712	
Turn Bay Length (ft)		135	135	100	100		120			220	220	
Base Capacity (vph)	580	1954	1182	253	513	1	422	558		335	2583	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	

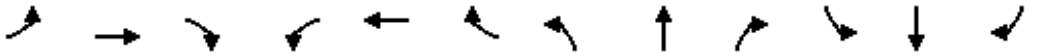
Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Reduced v/c Ratio	0.08	0.67	0.10	0.04	0.13	53.00	0.12	0.23		1.00	0.31	

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 139 (99%), Referenced to phase 2:SWL and 6:NBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: Err			
Intersection Signal Delay: Err		Intersection LOS: F	
Intersection Capacity Utilization Err%		ICU Level of Service H	
Analysis Period (min) 15			

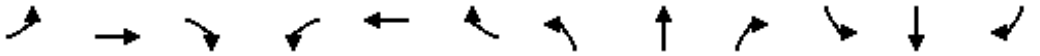
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: S Royal Oaks & Riverside Dr & Center Point Pl





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	206	1108	63	913	1174	269	141	351	964	316	434	178
Future Volume (vph)	206	1108	63	913	1174	269	141	351	964	316	434	178
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	12	11	12	13	12	13	13	11	11	11
Grade (%)		0%			0%			1%			0%	
Storage Length (ft)	200		300	285		0	195		450	220		650
Storage Lanes	2		1	2		1	2		2	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.91	0.91	0.97	0.95	1.00	0.97	0.95	0.88	0.97	0.95	0.95
Frt		0.991				0.850			0.850		0.951	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3467	4923	0	3351	3539	1652	3484	3712	2894	3385	3319	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3467	4923	0	3351	3539	1652	3484	3712	2894	3385	3319	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		7				87					49	
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		350			691			792			964	
Travel Time (s)		6.0			11.8			18.0			21.9	
Peak Hour Factor	0.92	0.93	0.81	0.87	0.91	0.89	0.74	0.83	0.89	0.83	0.95	0.80
Heavy Vehicles (%)	1%	1%	0%	1%	2%	1%	0%	0%	1%	0%	0%	0%
Adj. Flow (vph)	224	1191	78	1049	1290	302	191	423	1083	381	457	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	224	1269	0	1049	1290	302	191	423	1083	381	680	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		30			24			30			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.04	1.00	1.04	1.00	0.96	1.01	0.96	0.96	1.04	1.04	1.04
Turning Speed (mph)	18		10	18		10	18		10	18		10
Number of Detectors	1	1		1	1	0	1	2	1	1	2	
Detector Template												
Leading Detector (ft)	42	236		42	236	0	42	146	42	42	146	
Trailing Detector (ft)	-3	230		-3	230	0	-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	230		-3	230	230	-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	6		45	6	6	45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								140			140	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	

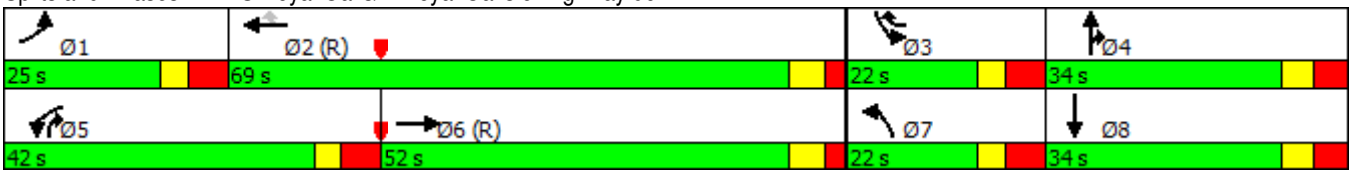


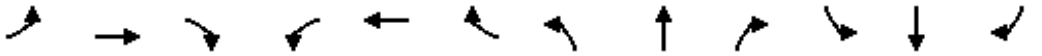
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	
Protected Phases	1	6		5	2	3	7	4	4 5	3	8	
Permitted Phases						2						
Detector Phase	1	6		5	2	3	7	4	4 5	3	8	
Switch Phase												
Minimum Initial (s)	6.0	13.0		6.0	13.0	6.0	6.0	10.0		6.0	10.0	
Minimum Split (s)	25.0	52.0		42.0	69.0	22.0	22.0	34.0		22.0	34.0	
Total Split (s)	25.0	52.0		42.0	69.0	22.0	22.0	34.0		22.0	34.0	
Total Split (%)	16.7%	34.7%		28.0%	46.0%	14.7%	14.7%	22.7%		14.7%	22.7%	
Maximum Green (s)	17.5	45.5		34.5	62.5	14.5	14.5	26.5		14.5	26.5	
Yellow Time (s)	3.0	4.0		3.0	4.0	3.0	3.0	3.5		3.0	3.5	
All-Red Time (s)	4.5	2.5		4.5	2.5	4.5	4.5	4.0		4.5	4.0	
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5	-2.0	-2.0	-3.0		-2.0	-3.0	
Total Lost Time (s)	5.0	4.0		5.0	4.0	5.5	5.5	4.5		5.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	6.0		3.0	6.0	3.0	3.0	4.5		3.0	4.5	
Recall Mode	None	C-Min		None	C-Min	None	None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		37.0			24.0			36.0			36.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	17.3	48.0		37.0	67.7	88.2	14.9	29.5	71.0	16.5	31.1	
Actuated g/C Ratio	0.12	0.32		0.25	0.45	0.59	0.10	0.20	0.47	0.11	0.21	
v/c Ratio	0.56	0.80		1.27	0.81	0.30	0.55	0.58	0.79	1.02	0.94	
Control Delay	68.2	51.1		163.5	48.8	16.5	57.4	48.2	51.9	117.0	74.6	
Queue Delay	0.0	0.3		0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.3	
Total Delay	68.2	51.4		163.6	48.8	16.5	57.4	48.2	51.9	117.0	74.9	
LOS	E	D		F	D	B	E	D	D	F	E	
Approach Delay		53.9			90.7			51.6			90.0	
Approach LOS		D			F			D			F	
90th %ile Green (s)	17.5	45.5		34.5	62.5	14.5	14.5	26.5		14.5	26.5	
90th %ile Term Code	Max	Coord		Max	Coord	Max	Max	Max		Max	Max	
70th %ile Green (s)	16.7	45.5		34.5	63.3	14.5	14.5	26.5		14.5	26.5	
70th %ile Term Code	Gap	Coord		Max	Coord	Max	Max	Max		Max	Max	
50th %ile Green (s)	15.1	45.5		34.5	64.9	14.5	13.5	26.5		14.5	27.5	
50th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
30th %ile Green (s)	13.4	45.5		34.5	66.6	14.5	12.0	26.5		14.5	29.0	
30th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
10th %ile Green (s)	11.1	45.5		34.5	68.9	14.5	9.8	26.5		14.5	31.2	
10th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
Stops (vph)	189	1046		743	1069	205	130	314	913	280	514	
Fuel Used(gal)	5	25		45	32	5	3	7	21	11	17	
CO Emissions (g/hr)	364	1765		3150	2214	356	226	514	1480	800	1171	
NOx Emissions (g/hr)	71	343		613	431	69	44	100	288	156	228	
VOC Emissions (g/hr)	84	409		730	513	83	52	119	343	185	271	
Dilemma Vehicles (#)	0	39		0	44	0	0	0	0	0	0	
Queue Length 50th (ft)	108	415		~680	582	137	92	201	625	~203	327	
Queue Length 95th (ft)	151	475		m#521	m521	m130	m100	m237	m692	#272	#465	
Internal Link Dist (ft)		270			611			712			884	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	200			285			195		450	220		
Base Capacity (vph)	462	1580		826	1598	1007	383	730	1369	372	727	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	48		20	0	0	0	0	0	0	2	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.48	0.83		1.30	0.81	0.30	0.50	0.58	0.79	1.02	0.94	

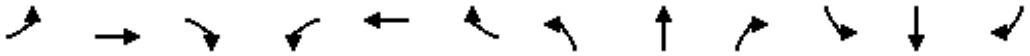
Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 133 (89%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.27			
Intersection Signal Delay: 73.0		Intersection LOS: E	
Intersection Capacity Utilization 87.4%		ICU Level of Service E	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 7: S Royal Oaks/N Royal Oaks & Highway 96





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1971	484	285	906	0	0	0	0	914	0	1405
Future Volume (vph)	0	1971	484	285	906	0	0	0	0	914	0	1405
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	12	12	12	12	12	12	11
Grade (%)		0%			0%			0%			1%	
Storage Length (ft)	0		0	420		0	0		0	350		0
Storage Lanes	0		1	0		0	0		0	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.86	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.88
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	6408	1583	1787	3455	0	0	0	0	3450	0	2707
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	6408	1583	1787	3455	0	0	0	0	3450	0	2707
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			403									143
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		501			556			756			888	
Travel Time (s)		8.5			9.5			20.6			24.2	
Peak Hour Factor	1.00	0.93	0.78	0.71	0.86	1.00	1.00	1.00	1.00	0.87	1.00	0.88
Heavy Vehicles (%)	2%	2%	2%	1%	1%	2%	2%	2%	2%	1%	2%	1%
Adj. Flow (vph)	0	2119	621	401	1053	0	0	0	0	1051	0	1597
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2119	621	401	1053	0	0	0	0	1051	0	1597
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.01	1.01	1.05
Turning Speed (mph)	15		12	15		9	15		9	18		12
Number of Detectors		1	0	1	1					1		1
Detector Template												
Leading Detector (ft)		300	0	42	300					42		42
Trailing Detector (ft)		294	0	-3	294					-3		-3
Detector 1 Position(ft)		294	-3	-3	294					-3		-3
Detector 1 Size(ft)		6	45	45	6					45		45
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0		0.0
Turn Type		NA	Perm	Prot	NA					Prot		Prot
Protected Phases		6		5	2					4		4
Permitted Phases			6									
Detector Phase		6	6	5	2					4		4
Switch Phase												



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)		25.0	25.0	5.0	25.0					15.0		15.0
Minimum Split (s)		55.0	55.0	30.0	85.0					65.0		65.0
Total Split (s)		55.0	55.0	30.0	85.0					65.0		65.0
Total Split (%)		36.7%	36.7%	20.0%	56.7%					43.3%		43.3%
Maximum Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
Yellow Time (s)		4.0	4.0	3.0	4.0					4.0		4.0
All-Red Time (s)		2.0	2.0	3.0	2.0					3.5		3.5
Lost Time Adjust (s)		-2.0	-2.0	-1.0	-2.0					-2.0		-2.0
Total Lost Time (s)		4.0	4.0	5.0	4.0					5.5		5.5
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		4.5	4.5	3.0	4.5					3.0		3.0
Recall Mode		C-Min	C-Min	None	C-Min					None		None
Act Effct Green (s)		51.0	51.0	25.0	81.0					59.5		59.5
Actuated g/C Ratio		0.34	0.34	0.17	0.54					0.40		0.40
v/c Ratio		0.97	0.77	1.35	0.56					0.77		1.38
Control Delay		70.4	31.0	226.6	25.0					43.9		207.9
Queue Delay		0.8	0.0	0.0	0.7					1.7		0.0
Total Delay		71.2	31.0	226.6	25.7					45.6		207.9
LOS		E	C	F	C					D		F
Approach Delay		62.1			81.1							
Approach LOS		E			F							
90th %ile Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
90th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
70th %ile Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
70th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
50th %ile Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
50th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
30th %ile Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
30th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
10th %ile Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
10th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
Stops (vph)		1850	520	222	472					776		985
Fuel Used(gal)		62	12	16	13					18		74
CO Emissions (g/hr)		4359	844	1147	886					1262		5163
NOx Emissions (g/hr)		848	164	223	172					246		1005
VOC Emissions (g/hr)		1010	196	266	205					292		1197
Dilemma Vehicles (#)		105	0	0	45					0		0
Queue Length 50th (ft)		628	328	~524	272					457		~1127
Queue Length 95th (ft)		m#672	m295	#520	407					515		#1235
Internal Link Dist (ft)		421			476			676			808	
Turn Bay Length (ft)				420						350		
Base Capacity (vph)		2178	804	297	1865					1368		1160
Starvation Cap Reductn		0	0	0	446					0		0
Spillback Cap Reductn		14	0	0	0					166		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.98	0.77	1.35	0.74					0.87		1.38

Intersection Summary

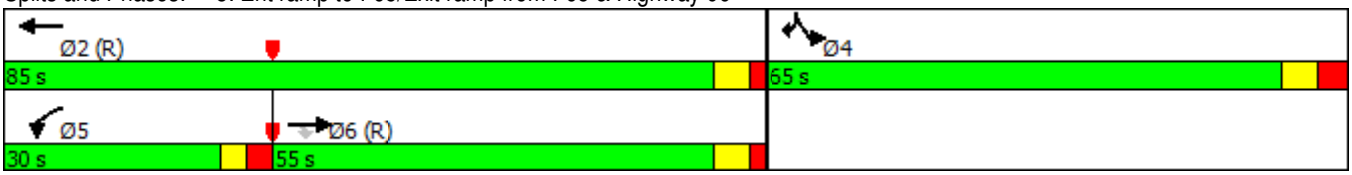
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 104 (69%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.38			
Intersection Signal Delay: 97.6		Intersection LOS: F	
Intersection Capacity Utilization 84.7%		ICU Level of Service E	
Analysis Period (min) 15			

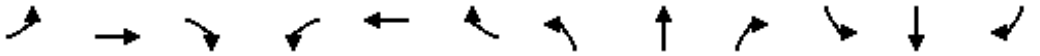
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

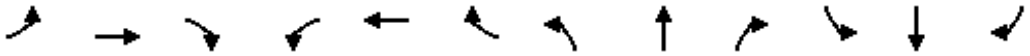
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Ent ramp to I-65/Exit ramp from I-65 & Highway 96





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	595	2290	0	0	882	998	309	0	164	0	0	0
Future Volume (vph)	595	2290	0	0	882	998	309	0	164	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	12	12	11	12	13	12	12	12
Grade (%)		1%			0%			1%			0%	
Storage Length (ft)	0		0	0		0	270		0	0		0
Storage Lanes	2		0	0		2	2		1	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3270	3371	0	0	3539	2787	3302	0	1597	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3270	3371	0	0	3539	2787	3302	0	1597	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						246			69			
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		556			1845			685			941	
Travel Time (s)		9.5			31.4			18.7			25.7	
Peak Hour Factor	0.97	0.98	1.00	0.25	0.91	0.93	0.92	1.00	0.87	1.00	1.00	1.00
Heavy Vehicles (%)	3%	3%	2%	0%	2%	2%	2%	2%	4%	2%	2%	2%
Adj. Flow (vph)	613	2337	0	0	969	1073	336	0	189	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	613	2337	0	0	969	1073	336	0	189	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		22			26			22			22	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.05	1.05	1.01	1.00	1.00	1.00	1.05	1.01	0.96	1.00	1.00	1.00
Turning Speed (mph)	18		9	15		10	15		15	15		9
Number of Detectors	1	1			1	0	1		1			
Detector Template												
Leading Detector (ft)	42	300			300	0	42		50			
Trailing Detector (ft)	-3	294			294	0	-3		0			
Detector 1 Position(ft)	-3	294			294	0	-3		0			
Detector 1 Size(ft)	45	6			6	50	45		50			
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Queue (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Delay (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Turn Type	Prot	NA			NA	custom	Prot		Perm			
Protected Phases	1	6			2	2 4	4					
Permitted Phases									4			
Detector Phase	1	6			2	2 4	4		4			
Switch Phase												

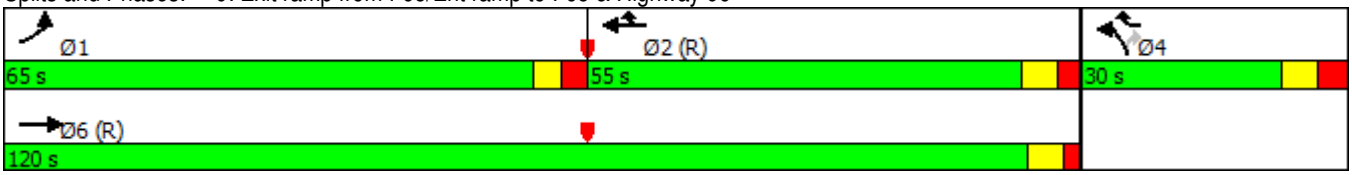


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	12.0	18.0			18.0		7.0		7.0			
Minimum Split (s)	65.0	120.0			55.0		30.0		30.0			
Total Split (s)	65.0	120.0			55.0		30.0		30.0			
Total Split (%)	43.3%	80.0%			36.7%		20.0%		20.0%			
Maximum Green (s)	59.0	114.0			48.5		22.5		22.5			
Yellow Time (s)	3.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	3.0	2.0			2.5		3.5		3.5			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.5		7.5		7.5			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.5			4.5		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Act Effct Green (s)	35.9	114.7			72.3	103.6	21.8		21.8			
Actuated g/C Ratio	0.24	0.76			0.48	0.69	0.15		0.15			
v/c Ratio	0.78	0.91			0.57	0.54	0.70		0.65			
Control Delay	79.7	23.8			30.4	10.0	69.4		49.0			
Queue Delay	0.0	4.8			0.0	0.0	0.0		0.0			
Total Delay	79.7	28.6			30.4	10.0	69.4		49.0			
LOS	E	C			C	B	E		D			
Approach Delay		39.2			19.7							
Approach LOS		D			B							
90th %ile Green (s)	43.9	114.0			63.6		22.5		22.5			
90th %ile Term Code	Gap	Coord			Coord		Max		Max			
70th %ile Green (s)	39.0	114.0			68.5		22.5		22.5			
70th %ile Term Code	Gap	Coord			Coord		Max		Max			
50th %ile Green (s)	36.0	114.0			71.5		22.5		22.5			
50th %ile Term Code	Gap	Coord			Coord		Max		Max			
30th %ile Green (s)	33.0	114.0			74.5		22.5		22.5			
30th %ile Term Code	Gap	Coord			Coord		Max		Max			
10th %ile Green (s)	27.8	117.5			83.2		19.0		19.0			
10th %ile Term Code	Gap	Coord			Coord		Gap		Gap			
Stops (vph)	588	1844			621	375	290		100			
Fuel Used(gal)	18	38			23	18	7		3			
CO Emissions (g/hr)	1236	2645			1580	1273	509		208			
NOx Emissions (g/hr)	240	515			307	248	99		40			
VOC Emissions (g/hr)	286	613			366	295	118		48			
Dilemma Vehicles (#)	0	83			29	0	0		0			
Queue Length 50th (ft)	329	582			353	205	162		112			
Queue Length 95th (ft)	m340	m518			467	311	218		190			
Internal Link Dist (ft)		476			1765			605			861	
Turn Bay Length (ft)							270					
Base Capacity (vph)	1286	2577			1704	2012	495		298			
Starvation Cap Reductn	0	197			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.48	0.98			0.57	0.53	0.68		0.63			

Intersection Summary

Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 138 (92%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 34.2		Intersection LOS: C	
Intersection Capacity Utilization 84.7%		ICU Level of Service E	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 9: Exit ramp from I-65/Ent ramp to I-65 & Highway 96



Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Lane Configurations												
Traffic Volume (vph)	92	827	19	147	41	118	92	29	91	138	765	145
Future Volume (vph)	92	827	19	147	41	118	92	29	91	138	765	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	8	11	11	11	11	12	12	13	12	12	12	12
Storage Length (ft)		70	150	75		0	100		195	180	0	
Storage Lanes		3	0	1		0	1		1	1	2	
Taper Length (ft)		50		50			50			50		
Lane Util. Factor	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00
Frt			0.850		0.896				0.850		0.850	
Flt Protected	0.950	0.950		0.950			0.950			0.950		
Satd. Flow (prot)	1534	3319	1531	1711	1613	0	1770	1925	1583	1770	2787	0
Flt Permitted	0.097	0.950		0.724			0.278			0.265		
Satd. Flow (perm)	157	3319	1531	1304	1613	0	518	1925	1583	494	2787	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			132		93				99		132	
Link Speed (mph)		30			25			40		30		
Link Distance (ft)		552			721			918		1624		
Travel Time (s)		12.5			19.7			15.6		36.9		
Peak Hour Factor	0.67	0.94	0.63	0.79	0.58	0.73	0.75	0.58	0.92	0.75	0.75	0.69
Adj. Flow (vph)	137	880	30	186	71	162	123	50	99	184	1020	210
Shared Lane Traffic (%)												
Lane Group Flow (vph)	137	880	30	186	233	0	123	50	99	184	1230	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Right	Right
Median Width(ft)		30			12			12		12		
Link Offset(ft)		0			0			0		0		
Crosswalk Width(ft)		16			16			16		16		
Two way Left Turn Lane												
Headway Factor	1.20	1.04	1.04	1.04	1.04	1.00	1.00	0.96	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15	9	15		9	15		9	15	9	9
Number of Detectors	1	1	1	1	1		1	1	1	1	1	
Detector Template												
Leading Detector (ft)	42	42	42	42	42		42	42	42	42	42	
Trailing Detector (ft)	-3	-3	-3	-3	-3		-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	-3	-3	-3	-3		-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	45	45	45	45		45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	Prot	Perm	D.P+P	NA		D.P+P	NA	custom	pm+pt	Prot	
Protected Phases	1	6		3	8		7	4	5	5	2	
Permitted Phases	6		6	4			8		8	2		
Detector Phase	1	6		3	8		7	4	5	5	2	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	7.0		7.0	7.0	7.0	7.0	20.0	
Minimum Split (s)	18.0	57.0	57.0	14.0	35.0		14.0	35.0	14.0	14.0	53.0	

Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Total Split (s)	18.0	57.0	57.0	14.0	35.0		14.0	35.0	14.0	14.0	53.0	
Total Split (%)	15.0%	47.5%	47.5%	11.7%	29.2%		11.7%	29.2%	11.7%	11.7%	44.2%	
Maximum Green (s)	12.0	51.0	51.0	8.5	29.0		8.5	29.0	8.0	8.0	47.0	
Yellow Time (s)	3.0	4.0	4.0	3.5	3.5		3.5	3.5	3.0	3.0	4.0	
All-Red Time (s)	3.0	2.0	2.0	2.0	2.5		2.0	2.5	3.0	3.0	2.0	
Lost Time Adjust (s)	-2.5	-1.5	-1.5	-2.5	-2.5		-2.5	-2.5	-2.5	-2.5	-1.5	
Total Lost Time (s)	3.5	4.5	4.5	3.0	3.5		3.0	3.5	3.5	3.5	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	5.0	5.0	1.5	3.5		1.5	3.5	1.5	1.5	5.0	
Recall Mode	None	C-Min	C-Min	None	None		None	None	None	None	C-Min	
Act Effct Green (s)	78.4	65.3	65.3	31.2	19.4		30.6	19.1	33.0	74.3	63.1	
Actuated g/C Ratio	0.65	0.54	0.54	0.26	0.16		0.26	0.16	0.28	0.62	0.53	
v/c Ratio	0.56	0.49	0.03	0.48	0.69		0.51	0.16	0.20	0.45	0.80	
Control Delay	22.4	19.3	0.1	38.4	38.0		39.3	41.7	6.4	12.4	27.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	22.4	19.3	0.1	38.4	38.0		39.3	41.7	6.4	12.4	27.4	
LOS	C	B	A	D	D		D	D	A	B	C	
Approach Delay		19.1			38.2			27.8		25.5		
Approach LOS		B			D			C		C		
90th %ile Green (s)	12.0	54.9	54.9	8.5	25.1		8.5	25.1	8.0	8.0	50.9	
90th %ile Term Code	Max	Coord	Coord	Max	Gap		Max	Hold	Max	Max	Coord	
70th %ile Green (s)	12.0	59.7	59.7	8.5	20.3		8.5	20.3	8.0	8.0	55.7	
70th %ile Term Code	Max	Coord	Coord	Max	Gap		Max	Hold	Max	Max	Coord	
50th %ile Green (s)	10.3	63.1	63.1	8.5	16.9		8.5	16.9	8.0	8.0	60.8	
50th %ile Term Code	Gap	Coord	Coord	Max	Gap		Max	Hold	Max	Max	Coord	
30th %ile Green (s)	7.7	67.2	67.2	8.5	13.5		8.5	13.5	7.3	7.3	66.8	
30th %ile Term Code	Gap	Coord	Coord	Max	Gap		Max	Hold	Gap	Gap	Coord	
10th %ile Green (s)	7.0	73.9	73.9	21.6	8.6		7.0	0.0	7.0	7.0	73.9	
10th %ile Term Code	Min	Coord	Coord	Hold	Gap		Min	Skip	Min	Min	Coord	
Stops (vph)	40	507	0	118	89		69	23	12	56	640	
Fuel Used(gal)	1	10	0	3	3		2	1	1	2	20	
CO Emissions (g/hr)	72	671	6	175	178		139	46	56	168	1408	
NOx Emissions (g/hr)	14	131	1	34	35		27	9	11	33	274	
VOC Emissions (g/hr)	17	156	1	41	41		32	11	13	39	326	
Dilemma Vehicles (#)	0	0	0	0	0		0	1	0	0	0	
Queue Length 50th (ft)	36	211	0	116	103		74	34	0	49	395	
Queue Length 95th (ft)	56	308	0	142	80		92	41	37	78	423	
Internal Link Dist (ft)		472			641			838		1544		
Turn Bay Length (ft)	70	70	150	75			100		195	180		
Base Capacity (vph)	270	1804	892	385	492		248	505	512	418	1528	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.51	0.49	0.03	0.48	0.47		0.50	0.10	0.19	0.44	0.80	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	

Actuated Cycle Length: 120	
Offset: 117 (98%), Referenced to phase 2:SWL and 6:EBL, Start of Green	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 25.3	Intersection LOS: C
Intersection Capacity Utilization 60.2%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 23: Oak Meadow Dr. & S Royal Oaks

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	90	1063	27	83	64	123	46	58	288	232	1063	93
Future Volume (vph)	90	1063	27	83	64	123	46	58	288	232	1063	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	11	11	12	12	11	12	12	11	12
Grade (%)	1%					-1%	2%				-2%	
Storage Length (ft)		135			100		120	0			220	0
Storage Lanes		3			1		1	1			2	0
Taper Length (ft)					50		50				50	
Lane Util. Factor	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95
Frt		0.850	0.850					0.850			0.986	
Flt Protected				0.950	0.950		0.950			0.950	0.957	
Satd. Flow (prot)	1764	2707	1575	1736	1754	0	1752	1546	0	1805	3365	0
Flt Permitted	0.166			0.168	0.950		0.670			0.116	0.957	
Satd. Flow (perm)	293	2707	1575	307	1754	0	1236	1546	0	220	3365	0
Right Turn on Red			Yes						Yes			Yes
Satd. Flow (RTOR)			124					158			76	
Link Speed (mph)	30					30	30				30	
Link Distance (ft)	1624					433	515				792	
Travel Time (s)	36.9					9.8	11.7				18.0	
Peak Hour Factor	0.79	0.95	0.64	0.86	0.71	0.82	0.75	0.88	0.94	0.75	0.90	0.76
Heavy Vehicles (%)	0%	1%	2%	1%	0%	0%	2%	0%	0%	1%	1%	0%
Adj. Flow (vph)	114	1119	42	97	90	150	61	66	306	309	1181	122
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	1119	42	97	90	150	61	372	0	309	1303	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Left	Left	Right	Right	Left	Left	Right
Median Width(ft)	22					22	12				35	
Link Offset(ft)	0					0	0				0	
Crosswalk Width(ft)	16					16	16				16	
Two way Left Turn Lane												
Headway Factor	1.10	1.05	1.01	1.04	1.04	0.99	1.01	1.06	1.01	0.99	1.03	0.99
Turning Speed (mph)		9	9	15	15		15	9	9	15	15	9
Number of Detectors	1	1	0	1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	42	226	0	42	42	50	42	42		42	226	
Trailing Detector (ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Position(ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Size(ft)	45	6	50	45	45	50	45	45		45	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	NA	custom	custom	custom	Prot	NA	D.Pm	Prot		pm+pt	Prot	
Protected Phases	1	6			4	2!		8		5	2!	
Permitted Phases	6		6	8			4			2		
Detector Phase	1	6		8	4	2	4	8		5	2	
Switch Phase												

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Minimum Initial (s)	5.0	10.0	10.0	7.0	7.0	10.0	7.0	7.0		5.0	10.0	
Minimum Split (s)	15.0	70.0	70.0	50.0	50.0	85.0	50.0	50.0		30.0	85.0	
Total Split (s)	14.0	72.0	72.0	49.0	49.0	87.0	49.0	49.0		29.0	87.0	
Total Split (%)	9.3%	48.0%	48.0%	32.7%	32.7%	58.0%	32.7%	32.7%		19.3%	58.0%	
Maximum Green (s)	7.5	66.0	66.0	42.0	42.0	81.0	42.0	42.0		22.5	81.0	
Yellow Time (s)	3.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.0	3.5	
All-Red Time (s)	3.5	2.5	2.5	3.5	3.5	2.5	3.5	3.5		3.5	2.5	
Lost Time Adjust (s)	-1.0	-3.0	-3.0	-2.5	-2.5		-2.5	-2.5		-1.0	-3.0	
Total Lost Time (s)	5.5	3.0	3.0	4.5	4.5		4.5	4.5		5.5	3.0	
Lead/Lag	Lead	Lag	Lag			Lag				Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
Recall Mode	None	C-Min	C-Min	None	None	C-Min	None	None		None	C-Min	
Walk Time (s)		7.0	7.0	8.0	8.0	7.0	8.0	8.0			7.0	
Flash Dont Walk (s)		16.0	16.0	35.0	32.0	20.0	32.0	35.0			20.0	
Pedestrian Calls (#/hr)		0	0	0	0	0	0	0			0	
Act Effct Green (s)	84.9	79.0	79.0	36.4	36.4	0.0	36.4	36.4		103.6	92.2	
Actuated g/C Ratio	0.57	0.53	0.53	0.24	0.24	0.00	0.24	0.24		0.69	0.61	
v/c Ratio	0.46	0.79	0.05	1.31	0.21	no cap	0.20	0.75		0.82	0.62	
Control Delay	17.9	35.9	0.1	250.3	44.0		43.8	38.5		41.1	13.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	1.5	
Total Delay	17.9	35.9	0.1	250.3	44.0	Error	43.8	38.5		41.1	14.6	
LOS	B	D	A	F	D	F	D	D		D	B	
Approach Delay	33.1					Err	39.3				19.7	
Approach LOS	C					F	D				B	
90th %ile Green (s)	7.5	66.0	66.0	42.0	42.0	81.0	42.0	42.0		22.5	81.0	
90th %ile Term Code	Max	Coord	Coord	Max	Hold	Coord	Hold	Max		Max	Coord	
70th %ile Green (s)	7.5	66.0	66.0	42.0	42.0	81.0	42.0	42.0		22.5	81.0	
70th %ile Term Code	Max	Coord	Coord	Max	Hold	Coord	Hold	Max		Max	Coord	
50th %ile Green (s)	7.5	70.5	70.5	37.5	37.5	85.5	37.5	37.5		22.5	85.5	
50th %ile Term Code	Max	Coord	Coord	Gap	Hold	Coord	Hold	Gap		Max	Coord	
30th %ile Green (s)	7.5	79.5	79.5	29.9	29.9	93.1	29.9	29.9		21.1	93.1	
30th %ile Term Code	Max	Coord	Coord	Gap	Hold	Coord	Hold	Gap		Gap	Coord	
10th %ile Green (s)	6.8	98.0	98.0	18.3	18.3	105.4	18.3	18.3		14.2	105.4	
10th %ile Term Code	Gap	Coord	Coord	Gap	Hold	Coord	Hold	Gap		Gap	Coord	
Stops (vph)	42	838	0	67	48	0	35	190		209	817	
Fuel Used(gal)	2	26	0	5	1	0	1	5		5	15	
CO Emissions (g/hr)	119	1808	24	341	74	29	55	360		317	1030	
NOx Emissions (g/hr)	23	352	5	66	14	6	11	70		62	200	
VOC Emissions (g/hr)	28	419	6	79	17	7	13	83		73	239	
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0		0	0	
Queue Length 50th (ft)	37	530	0	~114	69	0	46	195		162	645	
Queue Length 95th (ft)	58	#692	0	#214	88	0	70	293		m114	m571	
Internal Link Dist (ft)	1544					353	435				712	
Turn Bay Length (ft)		135	135	100	100		120			220	220	
Base Capacity (vph)	249	1425	888	91	520	1	366	569		400	2097	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	558	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Reduced v/c Ratio	0.46	0.79	0.05	1.07	0.17	150.00	0.17	0.65		0.77	0.85	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 123 (82%), Referenced to phase 2:SBSW and 6:NBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: Err			
Intersection Signal Delay: Err		Intersection LOS: F	
Intersection Capacity Utilization Err%		ICU Level of Service H	
Analysis Period (min) 15			

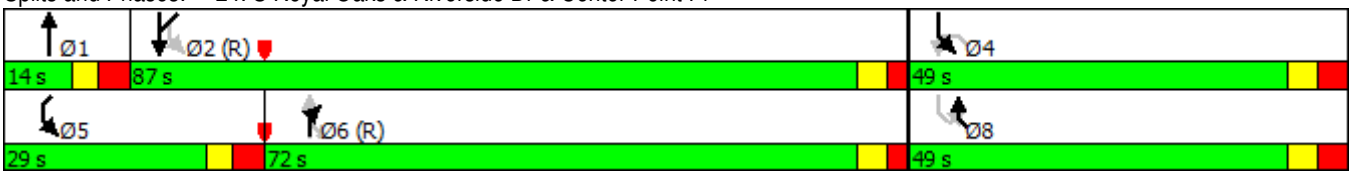
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

! Phase conflict between lane groups.

Splits and Phases: 24: S Royal Oaks & Riverside Dr & Center Point Pl



HCS 2010 Two-Way Stop Control Summary Report

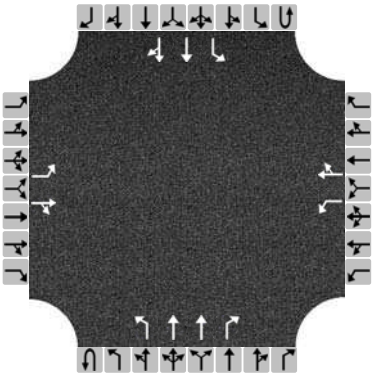
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Intersection Orientation	North-South
Project Description	10728 (Background)

Site Information

Intersection	S. Royal Oaks and Rand
Jurisdiction	Franklin, TN
East/West Street	Rand Pl / Home Depot
North/South Street	S. Royal Oaks Blvd
Peak Hour Factor	0.97
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		1	1	0		1	1	0	0	1	2	1	0	1	2	0
Configuration		L		TR		L		TR		L	T	R		L	T	TR
Volume (veh/h)		26	1	9		14	0	17		10	1388	25		61	645	51
Percent Heavy Vehicles		0	0	0		0	0	0		0				0		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left + Thru															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		27		10		14		18		10				63		
Capacity		165		416		108		377		893				470		
v/c Ratio		0.16		0.02		0.13		0.05		0.01				0.13		
95% Queue Length		0.6		0.1		0.4		0.1		0.0				0.5		
Control Delay (s/veh)		31.0		13.9		43.1		15.0		9.1				13.8		
Level of Service (LOS)		D		B		E		C		A				B		
Approach Delay (s/veh)	26.4				27.3				0.1				1.1			
Approach LOS	D				D				A				A			

HCS 2010 Two-Way Stop Control Summary Report

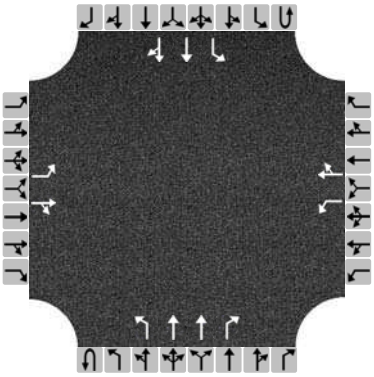
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	PM Peak Hour
Intersection Orientation	North-South
Project Description	10728 (Background)

Site Information

Intersection	S. Royal Oaks and Rand
Jurisdiction	Franklin, TN
East/West Street	Rand Pl / Home Depot
North/South Street	S. Royal Oaks Blvd
Peak Hour Factor	0.96
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		1	1	0		1	1	0	0	1	2	1	0	1	2	0
Configuration		L		TR		L		TR		L	T	R		L	T	TR
Volume (veh/h)		26	3	16		21	4	40		6	984	17		33	965	105
Percent Heavy Vehicles		0	0	0		0	0	0		0				0		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left + Thru															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		27		20		22		46		6				34		
Capacity		150		355		170		419		635				675		
v/c Ratio		0.18		0.06		0.13		0.11		0.01				0.05		
95% Queue Length		0.6		0.2		0.4		0.4		0.0				0.2		
Control Delay (s/veh)		34.1		15.7		29.2		14.7		10.7				10.6		
Level of Service (LOS)		D		C		D		B		B				B		
Approach Delay (s/veh)	26.3				19.4				0.1				0.3			
Approach LOS	D				C				A				A			

HCS 2010 Two-Way Stop Control Summary Report

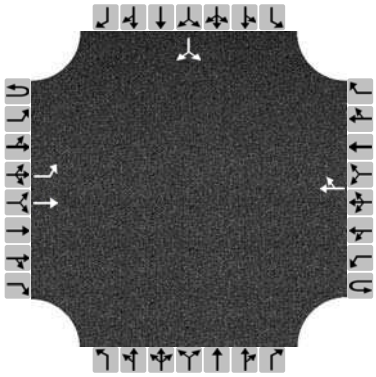
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	10728 (Background)

Site Information

Intersection	Oak Meadow Dr and dwy
Jurisdiction	Franklin, TN
East/West Street	Oak Meadow Drive
North/South Street	Western Home Depot dwy
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume (veh/h)		24	48				198	0						1		9
Percent Heavy Vehicles		0												0		0
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															

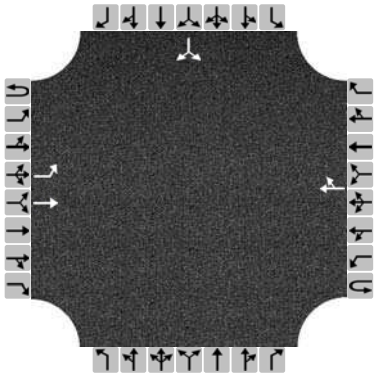
Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		30													12	
Capacity		1330													782	
v/c Ratio		0.02													0.02	
95% Queue Length		0.1													0.0	
Control Delay (s/veh)		7.8													9.7	
Level of Service (LOS)		A													A	
Approach Delay (s/veh)	2.6												9.7			
Approach LOS	A												A			

HCS 2010 Two-Way Stop Control Summary Report

General Information		Site Information	
Analyst	FTG	Intersection	Oak Meadow Dr and dwy
Agency/Co.	FTG	Jurisdiction	Franklin, TN
Date Performed	Mar 2016	East/West Street	Oak Meadow Drive
Analysis Year	2016	North/South Street	Western Home Depot dwy
Time Analyzed	PM Peak Hour	Peak Hour Factor	0.80
Intersection Orientation	East-West	Analysis Time Period (hrs)	0.25
Project Description	10728 (Background)		

Lanes



Major Street: East-West

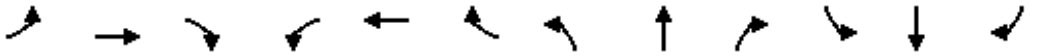
Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	0	1	0		0	0	0		0	0	0
Configuration		L	T					TR							LR	
Volume (veh/h)		24	174				179	2						16		33
Percent Heavy Vehicles		0												0		0
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		30													61	
Capacity		1355													726	
v/c Ratio		0.02													0.08	
95% Queue Length		0.1													0.3	
Control Delay (s/veh)		7.7													10.4	
Level of Service (LOS)		A													B	
Approach Delay (s/veh)	0.9												10.4			
Approach LOS	A												B			

TOTAL PROJECTED CONDITIONS



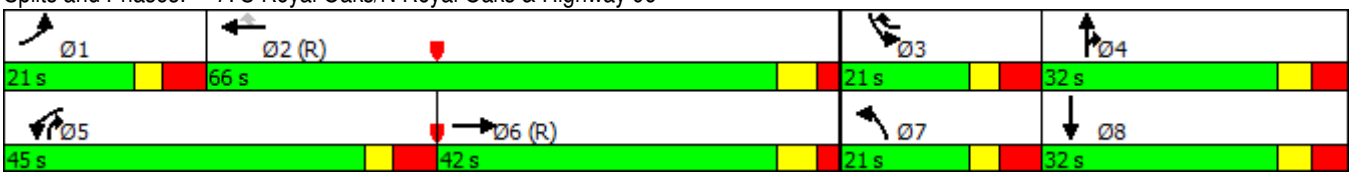
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	112	772	60	849	993	281	99	276	1060	225	211	82
Future Volume (vph)	112	772	60	849	993	281	99	276	1060	225	211	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	12	11	12	13	12	13	13	11	11	11
Grade (%)		0%			0%			1%			0%	
Storage Length (ft)	200		300	285		0	195		450	220		650
Storage Lanes	2		1	2		1	2		2	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.91	0.91	0.97	0.95	1.00	0.97	0.95	0.88	0.97	0.95	0.95
Frt		0.988				0.850			0.850		0.961	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3400	4688	0	3286	3406	1620	3350	3639	2865	3319	3241	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3400	4688	0	3286	3406	1620	3350	3639	2865	3319	3241	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		10				147					32	
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		350			691			792			964	
Travel Time (s)		6.0			11.8			18.0			21.9	
Peak Hour Factor	0.80	0.90	0.80	0.93	0.91	0.88	0.82	0.80	0.93	0.92	0.74	0.81
Heavy Vehicles (%)	3%	6%	2%	3%	6%	3%	4%	2%	2%	2%	4%	2%
Adj. Flow (vph)	140	858	75	913	1091	319	121	345	1140	245	285	101
Shared Lane Traffic (%)												
Lane Group Flow (vph)	140	933	0	913	1091	319	121	345	1140	245	386	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		30			24			30			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.04	1.00	1.04	1.00	0.96	1.01	0.96	0.96	1.04	1.04	1.04
Turning Speed (mph)	18		10	18		10	18		10	18		10
Number of Detectors	1	1		1	1	0	1	2	1	1	2	
Detector Template												
Leading Detector (ft)	42	236		42	236	0	42	146	42	42	146	
Trailing Detector (ft)	-3	230		-3	230	0	-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	230		-3	230	230	-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	6		45	6	6	45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								140			140	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	

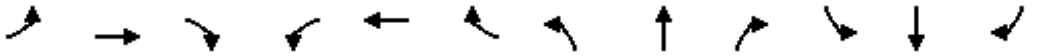
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	
Protected Phases	1	6		5	2	3	7	4	4 5	3	8	
Permitted Phases						2						
Detector Phase	1	6		5	2	3	7	4	4 5	3	8	
Switch Phase												
Minimum Initial (s)	6.0	13.0		6.0	13.0	6.0	6.0	10.0		6.0	10.0	
Minimum Split (s)	21.0	42.0		45.0	66.0	21.0	21.0	32.0		21.0	32.0	
Total Split (s)	21.0	42.0		45.0	66.0	21.0	21.0	32.0		21.0	32.0	
Total Split (%)	15.0%	30.0%		32.1%	47.1%	15.0%	15.0%	22.9%		15.0%	22.9%	
Maximum Green (s)	13.5	35.5		37.5	59.5	13.5	13.5	24.5		13.5	24.5	
Yellow Time (s)	3.0	4.0		3.0	4.0	3.0	3.0	3.5		3.0	3.5	
All-Red Time (s)	4.5	2.5		4.5	2.5	4.5	4.5	4.0		4.5	4.0	
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5	-2.0	-2.0	-3.0		-2.0	-3.0	
Total Lost Time (s)	5.0	4.0		5.0	4.0	5.5	5.5	4.5		5.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	6.0		3.0	6.0	3.0	3.0	4.5		3.0	4.5	
Recall Mode	None	C-Min		None	C-Min	None	None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		37.0			24.0			36.0			36.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	13.5	38.4		40.0	64.9	84.0	12.4	27.5	72.0	15.1	30.2	
Actuated g/C Ratio	0.10	0.27		0.29	0.46	0.60	0.09	0.20	0.51	0.11	0.22	
v/c Ratio	0.43	0.72		0.97	0.69	0.31	0.41	0.48	0.77	0.69	0.53	
Control Delay	63.3	49.3		60.9	40.3	8.7	57.6	42.1	37.4	70.7	47.9	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	63.3	49.3		60.9	40.3	8.7	57.6	42.1	37.4	70.7	47.9	
LOS	E	D		E	D	A	E	D	D	E	D	
Approach Delay		51.1			44.0			40.0			56.7	
Approach LOS		D			D			D			E	
90th %ile Green (s)	13.5	35.5		37.5	59.5	13.5	13.3	24.5		13.5	24.7	
90th %ile Term Code	Max	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
70th %ile Green (s)	12.4	35.5		37.5	60.6	13.5	11.6	24.5		13.5	26.4	
70th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
50th %ile Green (s)	11.2	35.5		37.5	61.8	13.5	10.4	24.5		13.5	27.6	
50th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
30th %ile Green (s)	9.9	35.5		37.5	63.1	13.5	9.2	24.5		13.5	28.8	
30th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
10th %ile Green (s)	8.1	37.6		37.5	67.0	11.4	7.5	24.5		11.4	28.4	
10th %ile Term Code	Gap	Coord		Max	Coord	Gap	Gap	Max		Gap	Hold	
Stops (vph)	103	730		759	946	99	88	239	1006	214	235	
Fuel Used(gal)	3	17		25	25	4	2	5	20	6	6	
CO Emissions (g/hr)	190	1223		1736	1781	262	158	377	1411	427	444	
NOx Emissions (g/hr)	37	238		338	346	51	31	73	275	83	86	
VOC Emissions (g/hr)	44	283		402	413	61	37	87	327	99	103	
Dilemma Vehicles (#)	0	29		0	36	0	0	0	0	0	0	
Queue Length 50th (ft)	62	281		419	535	79	51	148	610	112	151	
Queue Length 95th (ft)	85	335		m#446	m547	m123	m71	165	680	159	165	
Internal Link Dist (ft)		270			611			712			884	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	200			285			195		450	220		
Base Capacity (vph)	388	1293		938	1578	1035	370	714	1473	367	723	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.36	0.72		0.97	0.69	0.31	0.33	0.48	0.77	0.67	0.53	

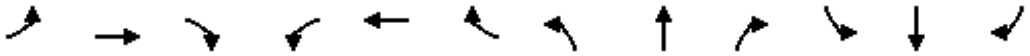
Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 116 (83%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.97			
Intersection Signal Delay: 45.7		Intersection LOS: D	
Intersection Capacity Utilization 71.8%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 7: S Royal Oaks/N Royal Oaks & Highway 96





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1793	194	111	1060	0	0	0	0	355	0	1039
Future Volume (vph)	0	1793	194	111	1060	0	0	0	0	355	0	1039
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	12	12	12	12	12	12	11
Grade (%)		0%			0%			0%			1%	
Storage Length (ft)	0		0	420		0	0		0	350		0
Storage Lanes	0		1	0		0	0		0	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.86	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.88
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	6346	1509	1787	3388	0	0	0	0	3287	0	2654
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	6346	1509	1787	3388	0	0	0	0	3287	0	2654
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			182									115
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		501			556			756			888	
Travel Time (s)		8.5			9.5			20.6			24.2	
Peak Hour Factor	1.00	0.91	0.90	0.86	0.87	1.00	1.00	1.00	1.00	0.85	1.00	0.94
Heavy Vehicles (%)	2%	3%	7%	1%	3%	2%	2%	2%	2%	6%	2%	3%
Adj. Flow (vph)	0	1970	216	129	1218	0	0	0	0	418	0	1105
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1970	216	129	1218	0	0	0	0	418	0	1105
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.01	1.01	1.05
Turning Speed (mph)	15		12	15		9	15		9	18		12
Number of Detectors		1	0	1	1					1		1
Detector Template												
Leading Detector (ft)		300	0	42	300					42		42
Trailing Detector (ft)		294	0	-3	294					-3		-3
Detector 1 Position(ft)		294	-3	-3	294					-3		-3
Detector 1 Size(ft)		6	45	45	6					45		45
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0		0.0
Turn Type		NA	Perm	Prot	NA					Prot		Prot
Protected Phases		6		5	2					4		4
Permitted Phases			6									
Detector Phase		6	6	5	2					4		4
Switch Phase												



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)		25.0	25.0	5.0	25.0					15.0		15.0
Minimum Split (s)		62.0	62.0	23.0	85.0					55.0		55.0
Total Split (s)		62.0	62.0	23.0	85.0					55.0		55.0
Total Split (%)		44.3%	44.3%	16.4%	60.7%					39.3%		39.3%
Maximum Green (s)		56.0	56.0	17.0	79.0					47.5		47.5
Yellow Time (s)		4.0	4.0	3.0	4.0					4.0		4.0
All-Red Time (s)		2.0	2.0	3.0	2.0					3.5		3.5
Lost Time Adjust (s)		-2.0	-2.0	-1.0	-2.0					-2.0		-2.0
Total Lost Time (s)		4.0	4.0	5.0	4.0					5.5		5.5
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		4.5	4.5	3.0	4.5					3.0		3.0
Recall Mode		C-Min	C-Min	None	C-Min					None		None
Act Effct Green (s)		60.5	60.5	15.5	81.0					49.5		49.5
Actuated g/C Ratio		0.43	0.43	0.11	0.58					0.35		0.35
v/c Ratio		0.72	0.29	0.65	0.62					0.36		1.09
Control Delay		28.3	5.1	71.7	19.3					34.6		94.9
Queue Delay		0.8	0.0	0.0	0.3					2.1		0.0
Total Delay		29.1	5.1	71.7	19.5					36.7		94.9
LOS		C	A	E	B					D		F
Approach Delay		26.7			24.5							
Approach LOS		C			C							
90th %ile Green (s)		56.0	56.0	17.0	79.0					47.5		47.5
90th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
70th %ile Green (s)		56.0	56.0	17.0	79.0					47.5		47.5
70th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
50th %ile Green (s)		57.6	57.6	15.4	79.0					47.5		47.5
50th %ile Term Code		Coord	Coord	Gap	Coord					Max		Max
30th %ile Green (s)		59.8	59.8	13.2	79.0					47.5		47.5
30th %ile Term Code		Coord	Coord	Gap	Coord					Max		Max
10th %ile Green (s)		63.2	63.2	9.8	79.0					47.5		47.5
10th %ile Term Code		Coord	Coord	Gap	Coord					Max		Max
Stops (vph)		1194	39	111	497					256		836
Fuel Used(gal)		37	2	3	13					6		31
CO Emissions (g/hr)		2555	150	219	912					431		2177
NOx Emissions (g/hr)		497	29	43	177					84		423
VOC Emissions (g/hr)		592	35	51	211					100		504
Dilemma Vehicles (#)		50	0	0	34					0		0
Queue Length 50th (ft)		359	28	125	283					144		~602
Queue Length 95th (ft)		408	m46	m162	m296					178		#754
Internal Link Dist (ft)		421			476			676			808	
Turn Bay Length (ft)				420						350		
Base Capacity (vph)		2743	755	229	1960					1162		1012
Starvation Cap Reductn		0	0	0	216					0		0
Spillback Cap Reductn		426	0	0	0					581		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.85	0.29	0.56	0.70					0.72		1.09

Intersection Summary

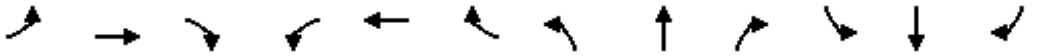
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 106 (76%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.09			
Intersection Signal Delay: 41.9		Intersection LOS: D	
Intersection Capacity Utilization 108.8%		ICU Level of Service G	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

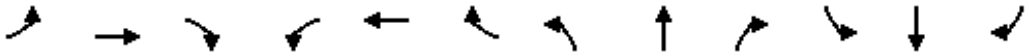
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Ent ramp to I-65/Exit ramp from I-65 & Highway 96



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1386	762	0	0	762	1217	409	0	364	0	0	0
Future Volume (vph)	1386	762	0	0	762	1217	409	0	364	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	12	12	11	12	13	12	12	12
Grade (%)		1%			0%			1%			0%	
Storage Length (ft)	0		0	0		0	270		0	0		0
Storage Lanes	2		0	0		2	2		1	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3302	3307	0	0	3539	2814	3302	0	1628	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3302	3307	0	0	3539	2814	3302	0	1628	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						23			251			
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		556			1845			685			941	
Travel Time (s)		9.5			31.4			18.7			25.7	
Peak Hour Factor	0.88	0.86	0.95	1.00	0.95	0.98	0.95	0.25	0.92	1.00	1.00	0.95
Heavy Vehicles (%)	2%	5%	2%	2%	2%	1%	2%	0%	2%	2%	2%	2%
Adj. Flow (vph)	1575	886	0	0	802	1242	431	0	396	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1575	886	0	0	802	1242	431	0	396	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		22			26			22			22	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.05	1.05	1.01	1.00	1.00	1.00	1.05	1.01	0.96	1.00	1.00	1.00
Turning Speed (mph)	18		9	15		10	15		15	15		9
Number of Detectors	1	1			1	0	1		1			
Detector Template												
Leading Detector (ft)	42	300			300	0	42		50			
Trailing Detector (ft)	-3	294			294	0	-3		0			
Detector 1 Position(ft)	-3	294			294	0	-3		0			
Detector 1 Size(ft)	45	6			6	50	45		50			
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Queue (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Delay (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Turn Type	Prot	NA			NA	custom	Prot		Perm			
Protected Phases	1	6			2	2 4	4					
Permitted Phases									4			
Detector Phase	1	6			2	2 4	4		4			
Switch Phase												



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	12.0	18.0			18.0		7.0		7.0			
Minimum Split (s)	56.0	116.0			60.0		24.0		24.0			
Total Split (s)	56.0	116.0			60.0		24.0		24.0			
Total Split (%)	40.0%	82.9%			42.9%		17.1%		17.1%			
Maximum Green (s)	50.0	110.0			53.5		16.5		16.5			
Yellow Time (s)	3.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	3.0	2.0			2.5		3.5		3.5			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.5		7.5		7.5			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.5			4.5		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Act Effct Green (s)	50.0	110.0			53.5	79.5	16.5		16.5			
Actuated g/C Ratio	0.36	0.79			0.38	0.57	0.12		0.12			
v/c Ratio	1.34	0.34			0.59	0.77	1.11		0.96			
Control Delay	206.7	3.4			36.8	27.0	133.3		57.3			
Queue Delay	0.7	0.1			0.0	0.0	0.0		0.0			
Total Delay	207.3	3.5			36.8	27.0	133.3		57.3			
LOS	F	A			D	C	F		E			
Approach Delay		133.9			30.8							
Approach LOS		F			C							
90th %ile Green (s)	50.0	110.0			53.5		16.5		16.5			
90th %ile Term Code	Max	Coord			Coord		Max		Max			
70th %ile Green (s)	50.0	110.0			53.5		16.5		16.5			
70th %ile Term Code	Max	Coord			Coord		Max		Max			
50th %ile Green (s)	50.0	110.0			53.5		16.5		16.5			
50th %ile Term Code	Max	Coord			Coord		Max		Max			
30th %ile Green (s)	50.0	110.0			53.5		16.5		16.5			
30th %ile Term Code	Max	Coord			Coord		Max		Max			
10th %ile Green (s)	50.0	110.0			53.5		16.5		16.5			
10th %ile Term Code	Max	Coord			Coord		Max		Max			
Stops (vph)	1009	107			593	899	349		119			
Fuel Used(gal)	73	4			21	31	15		7			
CO Emissions (g/hr)	5135	311			1473	2149	1036		477			
NOx Emissions (g/hr)	999	60			287	418	202		93			
VOC Emissions (g/hr)	1190	72			341	498	240		111			
Dilemma Vehicles (#)	0	18			27	0	0		0			
Queue Length 50th (ft)	~957	67			305	468	~230		143			
Queue Length 95th (ft)	#1083	75			373	573	#340		#353			
Internal Link Dist (ft)		476			1765			605			861	
Turn Bay Length (ft)							270					
Base Capacity (vph)	1179	2598			1352	1607	389		413			
Starvation Cap Reductn	163	623			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	1.55	0.45			0.59	0.77	1.11		0.96			

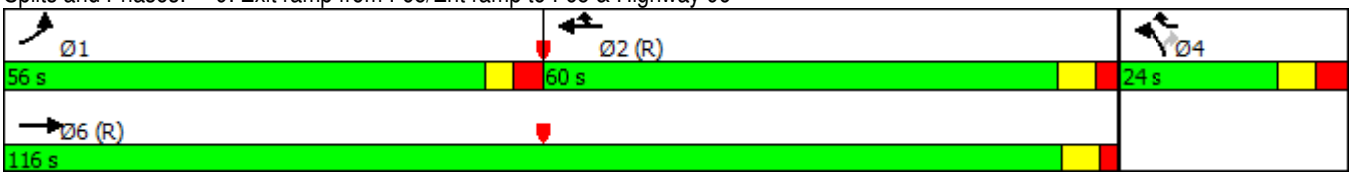
Intersection Summary

Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 122 (87%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.34			
Intersection Signal Delay: 88.7		Intersection LOS: F	
Intersection Capacity Utilization 108.8%		ICU Level of Service G	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: Exit ramp from I-65/Ent ramp to I-65 & Highway 96



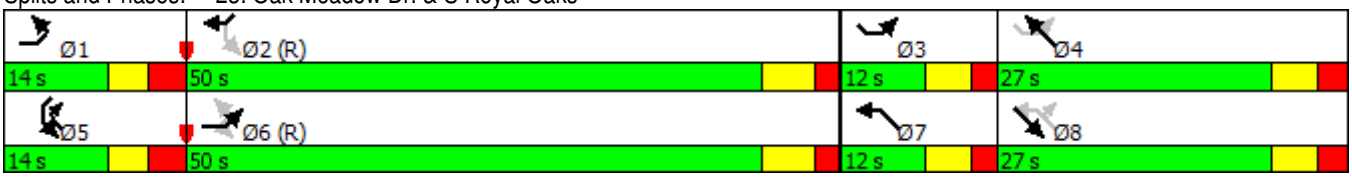
Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Lane Configurations												
Traffic Volume (vph)	87	1120	35	129	10	71	43	30	229	50	515	73
Future Volume (vph)	87	1120	35	129	10	71	43	30	229	50	515	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	8	11	11	11	11	12	12	13	12	12	12	12
Storage Length (ft)		70	150	75		0	100		195	180	0	
Storage Lanes		3	0	1		0	1		1	1	2	
Taper Length (ft)		50		50			50			50		
Lane Util. Factor	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00
Frt			0.850		0.872				0.850		0.850	
Flt Protected	0.950	0.950		0.950			0.950			0.950		
Satd. Flow (prot)	1534	3319	1531	1711	1570	0	1770	1925	1583	1770	2787	0
Flt Permitted	0.275	0.950		0.723			0.529			0.170		
Satd. Flow (perm)	444	3319	1531	1302	1570	0	985	1925	1583	317	2787	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			154		97				90		154	
Link Speed (mph)		30			25			40		30		
Link Distance (ft)		1875			721			918		1624		
Travel Time (s)		42.6			19.7			15.6		36.9		
Peak Hour Factor	0.67	0.94	0.63	0.79	0.58	0.73	0.75	0.58	0.92	0.75	0.75	0.69
Adj. Flow (vph)	130	1191	56	163	17	97	57	52	249	67	687	106
Shared Lane Traffic (%)												
Lane Group Flow (vph)	130	1191	56	163	114	0	57	52	249	67	793	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Right	Right
Median Width(ft)		30			12			12		12		
Link Offset(ft)		0			0			0		0		
Crosswalk Width(ft)		16			16			16		16		
Two way Left Turn Lane												
Headway Factor	1.20	1.04	1.04	1.04	1.04	1.00	1.00	0.96	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15	9	15		9	15		9	15	9	9
Number of Detectors	1	1	1	1	1		1	1	1	1	1	
Detector Template												
Leading Detector (ft)	42	42	42	42	42		42	42	42	42	42	
Trailing Detector (ft)	-3	-3	-3	-3	-3		-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	-3	-3	-3	-3		-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	45	45	45	45		45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	Prot	Perm	D.P+P	NA		D.P+P	NA	custom	pm+pt	Prot	
Protected Phases	1	6		3	8		7	4	5	5	2	
Permitted Phases	6		6	4			8		8	2		
Detector Phase	1	6		3	8		7	4	5	5	2	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	7.0		7.0	7.0	7.0	7.0	20.0	
Minimum Split (s)	13.0	26.0	26.0	12.5	20.0		12.5	20.0	13.0	13.0	26.0	

Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Total Split (s)	14.0	50.0	50.0	12.0	27.0		12.0	27.0	14.0	14.0	50.0	
Total Split (%)	13.6%	48.5%	48.5%	11.7%	26.2%		11.7%	26.2%	13.6%	13.6%	48.5%	
Maximum Green (s)	8.0	44.0	44.0	6.5	21.0		6.5	21.0	8.0	8.0	44.0	
Yellow Time (s)	3.0	4.0	4.0	3.5	3.5		3.5	3.5	3.0	3.0	4.0	
All-Red Time (s)	3.0	2.0	2.0	2.0	2.5		2.0	2.5	3.0	3.0	2.0	
Lost Time Adjust (s)	-2.5	-1.5	-1.5	-2.5	-2.5		-2.5	-2.5	-2.5	-2.5	-1.5	
Total Lost Time (s)	3.5	4.5	4.5	3.0	3.5		3.0	3.5	3.5	3.5	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	5.0	5.0	1.5	3.5		1.5	3.5	1.5	1.5	5.0	
Recall Mode	None	C-Min	C-Min	None	None		None	None	None	None	C-Min	
Act Effct Green (s)	71.4	60.5	60.5	19.4	11.7		19.4	11.7	24.9	71.1	60.4	
Actuated g/C Ratio	0.69	0.59	0.59	0.19	0.11		0.19	0.11	0.24	0.69	0.59	
v/c Ratio	0.32	0.61	0.06	0.58	0.43		0.22	0.24	0.55	0.19	0.47	
Control Delay	7.3	16.5	0.1	43.1	16.8		32.7	43.5	26.1	6.5	11.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	7.3	16.5	0.1	43.1	16.8		32.7	43.5	26.1	6.5	11.4	
LOS	A	B	A	D	B		C	D	C	A	B	
Approach Delay		14.9			32.3			29.7		11.1		
Approach LOS		B			C			C		B		
90th %ile Green (s)	8.0	52.4	52.4	6.5	12.7		6.5	12.7	7.9	7.9	52.3	
90th %ile Term Code	Max	Coord	Coord	Max	Gap		Max	Hold	Gap	Gap	Coord	
70th %ile Green (s)	7.7	56.1	56.1	6.5	9.9		6.5	9.9	7.0	7.0	55.4	
70th %ile Term Code	Gap	Coord	Coord	Max	Hold		Max	Gap	Min	Min	Coord	
50th %ile Green (s)	7.0	57.3	57.3	6.5	8.7		6.5	8.7	7.0	7.0	57.3	
50th %ile Term Code	Min	Coord	Coord	Max	Hold		Max	Gap	Min	Min	Coord	
30th %ile Green (s)	7.0	58.4	58.4	6.5	7.6		6.5	7.6	7.0	7.0	58.4	
30th %ile Term Code	Min	Coord	Coord	Max	Hold		Max	Gap	Min	Min	Coord	
10th %ile Green (s)	7.0	71.0	71.0	7.5	7.0		0.0	0.0	7.0	7.0	71.0	
10th %ile Term Code	Min	Coord	Coord	Hold	Min		Skip	Skip	Min	Min	Coord	
Stops (vph)	27	708	0	114	21		32	27	127	16	268	
Fuel Used(gal)	2	24	1	2	1		1	1	4	1	10	
CO Emissions (g/hr)	108	1680	36	165	60		61	50	272	55	720	
NOx Emissions (g/hr)	21	327	7	32	12		12	10	53	11	140	
VOC Emissions (g/hr)	25	389	8	38	14		14	12	63	13	167	
Dilemma Vehicles (#)	0	0	0	0	0		0	1	0	0	0	
Queue Length 50th (ft)	24	254	0	92	10		30	32	91	12	129	
Queue Length 95th (ft)	35	361	0	126	17		50	42	161	23	149	
Internal Link Dist (ft)		1795			641			838		1544		
Turn Bay Length (ft)	70	70	150	75			100		195	180		
Base Capacity (vph)	421	1950	963	281	433		254	439	462	369	1697	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.31	0.61	0.06	0.58	0.26		0.22	0.12	0.54	0.18	0.47	

Intersection Summary	
Area Type:	Other
Cycle Length: 103	

Actuated Cycle Length: 103	
Offset: 0 (0%), Referenced to phase 2:SWL and 6:EBL, Start of Green	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 17.3	Intersection LOS: B
Intersection Capacity Utilization 62.0%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 23: Oak Meadow Dr. & S Royal Oaks



Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	28	1280	103	6	46	41	33	12	123	277	764	25
Future Volume (vph)	28	1280	103	6	46	41	33	12	123	277	764	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	11	11	12	12	11	12	12	11	12
Grade (%)	1%					-1%	2%				-2%	
Storage Length (ft)		135			100		120	0			220	0
Storage Lanes		3			1		1	1			2	0
Taper Length (ft)					50		50				50	
Lane Util. Factor	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95
Frt		0.850	0.850					0.850			0.993	
Flt Protected				0.950	0.950		0.950			0.950	0.954	
Satd. Flow (prot)	1764	2707	1607	1754	1580	0	1787	1489	0	1787	3339	0
Flt Permitted	0.344			0.294	0.950		0.691			0.119	0.954	
Satd. Flow (perm)	607	2707	1607	543	1580	0	1300	1489	0	224	3339	0
Right Turn on Red			Yes						Yes			Yes
Satd. Flow (RTOR)			82					143			82	
Link Speed (mph)	30					30	30				30	
Link Distance (ft)	1624					433	515				792	
Travel Time (s)	36.9					9.8	11.7				18.0	
Peak Hour Factor	0.63	0.92	0.87	0.58	0.68	0.77	0.67	0.63	0.86	0.80	0.99	0.67
Heavy Vehicles (%)	0%	1%	0%	0%	11%	0%	0%	10%	3%	2%	2%	4%
Adj. Flow (vph)	44	1391	118	10	68	53	49	19	143	346	772	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	44	1391	118	10	68	53	49	162	0	346	809	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Left	Left	Right	Right	Left	Left	Right
Median Width(ft)	22					22	12				35	
Link Offset(ft)	0					0	0				0	
Crosswalk Width(ft)	16					16	16				16	
Two way Left Turn Lane												
Headway Factor	1.10	1.05	1.01	1.04	1.04	0.99	1.01	1.06	1.01	0.99	1.03	0.99
Turning Speed (mph)		9	9	15	15		15	9	9	15	15	9
Number of Detectors	1	1	0	1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	42	226	0	42	42	50	42	42		42	226	
Trailing Detector (ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Position(ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Size(ft)	45	6	50	45	45	50	45	45		45	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	NA	custom	custom	custom	Prot	NA	D.Pm	Prot		pm+pt	Prot	
Protected Phases	1	6			4			8		5	2	
Permitted Phases	6		6	8			4			2		
Detector Phase	1	6		8	4		4	8		5	2	
Switch Phase												

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Minimum Initial (s)	5.0	10.0	10.0	7.0	7.0		7.0	7.0		5.0	10.0	
Minimum Split (s)	17.0	73.0	73.0	50.0	50.0		50.0	50.0		17.0	73.0	
Total Split (s)	17.0	73.0	73.0	50.0	50.0		50.0	50.0		17.0	73.0	
Total Split (%)	12.1%	52.1%	52.1%	35.7%	35.7%		35.7%	35.7%		12.1%	52.1%	
Maximum Green (s)	10.5	67.0	67.0	43.0	43.0		43.0	43.0		10.5	67.0	
Yellow Time (s)	3.0	3.5	3.5	3.5	3.5		3.5	3.5		3.0	3.5	
All-Red Time (s)	3.5	2.5	2.5	3.5	3.5		3.5	3.5		3.5	2.5	
Lost Time Adjust (s)	-1.0	-3.0	-3.0	-2.5	-2.5		-2.5	-2.5		-1.0	-3.0	
Total Lost Time (s)	5.5	3.0	3.0	4.5	4.5		4.5	4.5		5.5	3.0	
Lead/Lag	Lead	Lag	Lag							Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
Recall Mode	None	C-Min	C-Min	None	None		None	None		None	C-Min	
Walk Time (s)		7.0	7.0	8.0	8.0		8.0	8.0			7.0	
Flash Dont Walk (s)		16.0	16.0	35.0	32.0		32.0	35.0			20.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0			0	
Act Effct Green (s)	106.2	101.1	101.1	14.4	14.4	0.0	14.4	14.4		114.1	107.4	
Actuated g/C Ratio	0.76	0.72	0.72	0.10	0.10	0.00	0.10	0.10		0.82	0.77	
v/c Ratio	0.08	0.71	0.10	0.18	0.42	no cap	0.37	0.58		1.12	0.31	
Control Delay	3.3	14.3	2.6	63.2	65.8		65.1	20.5		96.3	8.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	3.3	14.3	2.6	63.2	65.8	Error	65.1	20.5		96.3	8.7	
LOS	A	B	A	E	E	F	E	C		F	A	
Approach Delay	13.1					Err	30.9				34.9	
Approach LOS	B					F	C				C	
90th %ile Green (s)	7.5	93.3	93.3	16.7	16.7		16.7	16.7		10.5	96.3	
90th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
70th %ile Green (s)	6.9	96.2	96.2	13.8	13.8		13.8	13.8		10.5	99.8	
70th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
50th %ile Green (s)	6.6	98.1	98.1	11.9	11.9		11.9	11.9		10.5	102.0	
50th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
30th %ile Green (s)	6.3	100.0	100.0	10.0	10.0		10.0	10.0		10.5	104.2	
30th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
10th %ile Green (s)	0.0	102.8	102.8	7.2	7.2		7.2	7.2		10.5	119.8	
10th %ile Term Code	Skip	Coord	Coord	Hold	Hold		Hold	Hold		Max	Coord	
Stops (vph)	6	714	11	7	41	0	30	28		165	524	
Fuel Used(gal)	0	24	1	0	1	0	1	1		8	9	
CO Emissions (g/hr)	28	1668	99	10	70	10	51	88		563	641	
NOx Emissions (g/hr)	6	325	19	2	14	2	10	17		110	125	
VOC Emissions (g/hr)	7	387	23	2	16	2	12	20		130	148	
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0		0	0	
Queue Length 50th (ft)	6	372	8	8	59	0	42	16		~186	175	
Queue Length 95th (ft)	10	525	28	17	79	0	61	21		m#233	m339	
Internal Link Dist (ft)	1544					353	435				712	
Turn Bay Length (ft)		135	135	100	100		120			220	220	
Base Capacity (vph)	572	1954	1182	176	513	1	422	580		310	2580	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Reduced v/c Ratio	0.08	0.71	0.10	0.06	0.13	53.00	0.12	0.28		1.12	0.31	

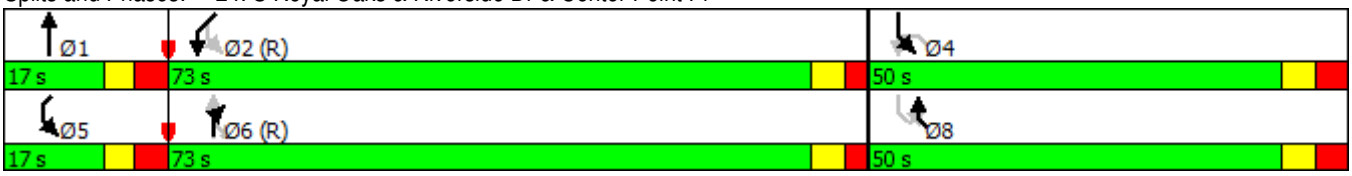
Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 139 (99%), Referenced to phase 2:SWL and 6:NBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: Err			
Intersection Signal Delay: Err		Intersection LOS: F	
Intersection Capacity Utilization Err%		ICU Level of Service H	
Analysis Period (min) 15			

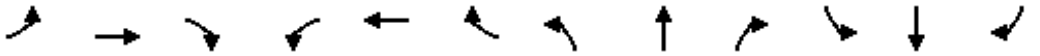
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

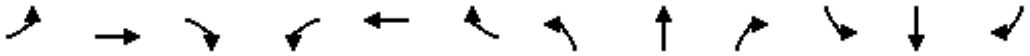
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: S Royal Oaks & Riverside Dr & Center Point Pl





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	206	1108	63	985	1174	269	141	371	1002	316	469	178
Future Volume (vph)	206	1108	63	985	1174	269	141	371	1002	316	469	178
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	12	11	12	13	12	13	13	11	11	11
Grade (%)		0%			0%			1%			0%	
Storage Length (ft)	200		300	285		0	195		450	220		650
Storage Lanes	2		1	2		1	2		2	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.91	0.91	0.97	0.95	1.00	0.97	0.95	0.88	0.97	0.95	0.95
Frt		0.991				0.850			0.850		0.953	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3467	4923	0	3351	3539	1652	3484	3712	2894	3385	3326	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3467	4923	0	3351	3539	1652	3484	3712	2894	3385	3326	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		7				87					43	
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		350			691			792			964	
Travel Time (s)		6.0			11.8			18.0			21.9	
Peak Hour Factor	0.92	0.93	0.81	0.87	0.91	0.89	0.74	0.83	0.89	0.83	0.95	0.80
Heavy Vehicles (%)	1%	1%	0%	1%	2%	1%	0%	0%	1%	0%	0%	0%
Adj. Flow (vph)	224	1191	78	1132	1290	302	191	447	1126	381	494	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	224	1269	0	1132	1290	302	191	447	1126	381	717	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		30			24			30			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.04	1.00	1.04	1.00	0.96	1.01	0.96	0.96	1.04	1.04	1.04
Turning Speed (mph)	18		10	18		10	18		10	18		10
Number of Detectors	1	1		1	1	0	1	2	1	1	2	
Detector Template												
Leading Detector (ft)	42	236		42	236	0	42	146	42	42	146	
Trailing Detector (ft)	-3	230		-3	230	0	-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	230		-3	230	230	-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	6		45	6	6	45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								140			140	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	

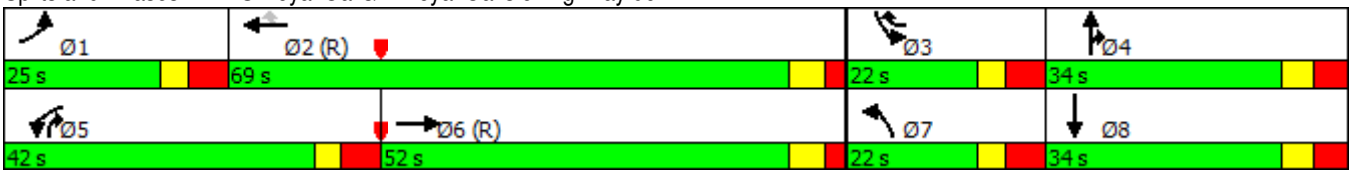


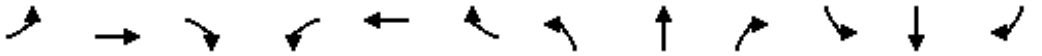
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	
Protected Phases	1	6		5	2	3	7	4	4 5	3	8	
Permitted Phases						2						
Detector Phase	1	6		5	2	3	7	4	4 5	3	8	
Switch Phase												
Minimum Initial (s)	6.0	13.0		6.0	13.0	6.0	6.0	10.0		6.0	10.0	
Minimum Split (s)	25.0	52.0		42.0	69.0	22.0	22.0	34.0		22.0	34.0	
Total Split (s)	25.0	52.0		42.0	69.0	22.0	22.0	34.0		22.0	34.0	
Total Split (%)	16.7%	34.7%		28.0%	46.0%	14.7%	14.7%	22.7%		14.7%	22.7%	
Maximum Green (s)	17.5	45.5		34.5	62.5	14.5	14.5	26.5		14.5	26.5	
Yellow Time (s)	3.0	4.0		3.0	4.0	3.0	3.0	3.5		3.0	3.5	
All-Red Time (s)	4.5	2.5		4.5	2.5	4.5	4.5	4.0		4.5	4.0	
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5	-2.0	-2.0	-3.0		-2.0	-3.0	
Total Lost Time (s)	5.0	4.0		5.0	4.0	5.5	5.5	4.5		5.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	6.0		3.0	6.0	3.0	3.0	4.5		3.0	4.5	
Recall Mode	None	C-Min		None	C-Min	None	None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		37.0			24.0			36.0			36.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	17.3	48.0		37.0	67.7	88.2	14.9	29.5	71.0	16.5	31.1	
Actuated g/C Ratio	0.12	0.32		0.25	0.45	0.59	0.10	0.20	0.47	0.11	0.21	
v/c Ratio	0.56	0.80		1.37	0.81	0.30	0.55	0.61	0.82	1.02	0.99	
Control Delay	68.2	51.1		205.9	49.2	16.7	56.0	47.5	54.4	117.0	86.1	
Queue Delay	0.0	0.3		0.3	0.0	0.0	0.0	0.0	0.2	0.0	0.6	
Total Delay	68.2	51.4		206.1	49.2	16.7	56.0	47.5	54.6	117.0	86.7	
LOS	E	D		F	D	B	E	D	D	F	F	
Approach Delay		53.9			110.8			53.0			97.2	
Approach LOS		D			F			D			F	
90th %ile Green (s)	17.5	45.5		34.5	62.5	14.5	14.5	26.5		14.5	26.5	
90th %ile Term Code	Max	Coord		Max	Coord	Max	Max	Max		Max	Max	
70th %ile Green (s)	16.7	45.5		34.5	63.3	14.5	14.5	26.5		14.5	26.5	
70th %ile Term Code	Gap	Coord		Max	Coord	Max	Max	Max		Max	Max	
50th %ile Green (s)	15.1	45.5		34.5	64.9	14.5	13.5	26.5		14.5	27.5	
50th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
30th %ile Green (s)	13.4	45.5		34.5	66.6	14.5	12.0	26.5		14.5	29.0	
30th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
10th %ile Green (s)	11.1	45.5		34.5	68.9	14.5	9.8	26.5		14.5	31.2	
10th %ile Term Code	Gap	Coord		Max	Coord	Max	Gap	Max		Max	Hold	
Stops (vph)	189	1046		761	1064	208	128	336	976	280	542	
Fuel Used(gal)	5	25		57	32	5	3	8	23	11	19	
CO Emissions (g/hr)	364	1765		3965	2216	359	223	541	1585	800	1343	
NOx Emissions (g/hr)	71	343		771	431	70	43	105	308	156	261	
VOC Emissions (g/hr)	84	409		919	514	83	52	125	367	185	311	
Dilemma Vehicles (#)	0	39		0	45	0	0	0	0	0	0	
Queue Length 50th (ft)	108	415		~771	582	140	86	215	651	~203	~360	
Queue Length 95th (ft)	151	475		m#573	m517	m125	m100	m252	m717	#272	#512	
Internal Link Dist (ft)		270			611			712			884	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	200			285			195		450	220		
Base Capacity (vph)	462	1580		826	1598	1007	383	730	1369	372	724	
Starvation Cap Reductn	0	0		0	0	0	0	0	24	0	0	
Spillback Cap Reductn	0	48		40	0	0	0	0	0	0	2	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.48	0.83		1.44	0.81	0.30	0.50	0.61	0.84	1.02	0.99	

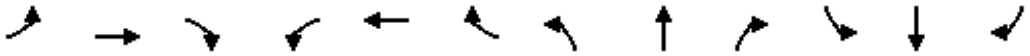
Intersection Summary	
Area Type:	Other
Cycle Length: 150	
Actuated Cycle Length: 150	
Offset: 133 (89%), Referenced to phase 2:WBT and 6:EBT, Start of Green	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.37	
Intersection Signal Delay: 82.3	Intersection LOS: F
Intersection Capacity Utilization 90.4%	ICU Level of Service E
Analysis Period (min) 15	
~ Volume exceeds capacity, queue is theoretically infinite.	
Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 7: S Royal Oaks/N Royal Oaks & Highway 96





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	2005	488	285	928	0	0	0	0	914	0	1455
Future Volume (vph)	0	2005	488	285	928	0	0	0	0	914	0	1455
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	12	12	12	12	12	12	11
Grade (%)		0%			0%			0%			1%	
Storage Length (ft)	0		0	420		0	0		0	350		0
Storage Lanes	0		1	0		0	0		0	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.86	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.88
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	6408	1583	1787	3455	0	0	0	0	3450	0	2707
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	6408	1583	1787	3455	0	0	0	0	3450	0	2707
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			399									134
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		501			556			756			888	
Travel Time (s)		8.5			9.5			20.6			24.2	
Peak Hour Factor	1.00	0.93	0.78	0.71	0.86	1.00	1.00	1.00	1.00	0.87	1.00	0.88
Heavy Vehicles (%)	2%	2%	2%	1%	1%	2%	2%	2%	2%	1%	2%	1%
Adj. Flow (vph)	0	2156	626	401	1079	0	0	0	0	1051	0	1653
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2156	626	401	1079	0	0	0	0	1051	0	1653
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.01	1.01	1.05
Turning Speed (mph)	15		12	15		9	15		9	18		12
Number of Detectors		1	0	1	1					1		1
Detector Template												
Leading Detector (ft)		300	0	42	300					42		42
Trailing Detector (ft)		294	0	-3	294					-3		-3
Detector 1 Position(ft)		294	-3	-3	294					-3		-3
Detector 1 Size(ft)		6	45	45	6					45		45
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0		0.0
Turn Type		NA	Perm	Prot	NA					Prot		Prot
Protected Phases		6		5	2					4		4
Permitted Phases			6									
Detector Phase		6	6	5	2					4		4
Switch Phase												



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)		25.0	25.0	5.0	25.0					15.0		15.0
Minimum Split (s)		55.0	55.0	30.0	85.0					65.0		65.0
Total Split (s)		55.0	55.0	30.0	85.0					65.0		65.0
Total Split (%)		36.7%	36.7%	20.0%	56.7%					43.3%		43.3%
Maximum Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
Yellow Time (s)		4.0	4.0	3.0	4.0					4.0		4.0
All-Red Time (s)		2.0	2.0	3.0	2.0					3.5		3.5
Lost Time Adjust (s)		-2.0	-2.0	-1.0	-2.0					-2.0		-2.0
Total Lost Time (s)		4.0	4.0	5.0	4.0					5.5		5.5
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		4.5	4.5	3.0	4.5					3.0		3.0
Recall Mode		C-Min	C-Min	None	C-Min					None		None
Act Effct Green (s)		51.0	51.0	25.0	81.0					59.5		59.5
Actuated g/C Ratio		0.34	0.34	0.17	0.54					0.40		0.40
v/c Ratio		0.99	0.78	1.35	0.58					0.77		1.43
Control Delay		72.5	30.8	226.2	26.7					43.9		231.7
Queue Delay		1.3	0.0	0.0	0.9					1.8		0.0
Total Delay		73.8	30.8	226.2	27.6					45.7		231.7
LOS		E	C	F	C					D		F
Approach Delay		64.1			81.4							
Approach LOS		E			F							
90th %ile Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
90th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
70th %ile Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
70th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
50th %ile Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
50th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
30th %ile Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
30th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
10th %ile Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
10th %ile Term Code		Coord	Coord	Max	Coord					Max		Max
Stops (vph)		1879	525	223	503					776		1000
Fuel Used(gal)		64	12	16	13					18		83
CO Emissions (g/hr)		4492	850	1146	943					1262		5836
NOx Emissions (g/hr)		874	165	223	184					246		1135
VOC Emissions (g/hr)		1041	197	266	219					292		1353
Dilemma Vehicles (#)		105	0	0	52					0		0
Queue Length 50th (ft)		639	325	~525	290					457		~1200
Queue Length 95th (ft)		m#695	m294	#521	433					515		#1305
Internal Link Dist (ft)		421			476			676			808	
Turn Bay Length (ft)				420						350		
Base Capacity (vph)		2178	801	297	1865					1368		1154
Starvation Cap Reductn		0	0	0	466					0		0
Spillback Cap Reductn		14	0	0	0					172		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		1.00	0.78	1.35	0.77					0.88		1.43

Intersection Summary

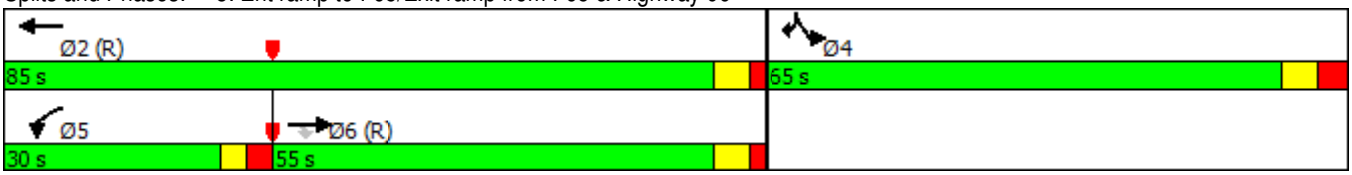
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 104 (69%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.43			
Intersection Signal Delay: 104.8		Intersection LOS: F	
Intersection Capacity Utilization 84.9%		ICU Level of Service E	
Analysis Period (min) 15			

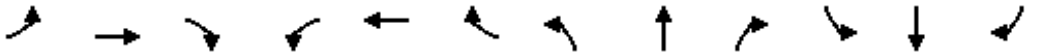
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

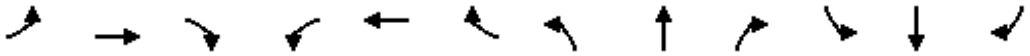
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 8: Ent ramp to I-65/Exit ramp from I-65 & Highway 96





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	622	2297	0	0	897	998	316	0	164	0	0	0
Future Volume (vph)	622	2297	0	0	897	998	316	0	164	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	12	12	11	12	13	12	12	12
Grade (%)		1%			0%			1%			0%	
Storage Length (ft)	0		0	0		0	270		0	0		0
Storage Lanes	2		0	0		2	2		1	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3270	3371	0	0	3539	2787	3302	0	1597	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3270	3371	0	0	3539	2787	3302	0	1597	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						223			69			
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		556			1845			685			941	
Travel Time (s)		9.5			31.4			18.7			25.7	
Peak Hour Factor	0.97	0.98	1.00	0.25	0.91	0.93	0.92	1.00	0.87	1.00	1.00	1.00
Heavy Vehicles (%)	3%	3%	2%	0%	2%	2%	2%	2%	4%	2%	2%	2%
Adj. Flow (vph)	641	2344	0	0	986	1073	343	0	189	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	641	2344	0	0	986	1073	343	0	189	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		22			26			22			22	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.05	1.05	1.01	1.00	1.00	1.00	1.05	1.01	0.96	1.00	1.00	1.00
Turning Speed (mph)	18		9	15		10	15		15	15		9
Number of Detectors	1	1			1	0	1		1			
Detector Template												
Leading Detector (ft)	42	300			300	0	42		50			
Trailing Detector (ft)	-3	294			294	0	-3		0			
Detector 1 Position(ft)	-3	294			294	0	-3		0			
Detector 1 Size(ft)	45	6			6	50	45		50			
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Queue (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Delay (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Turn Type	Prot	NA			NA	custom	Prot		Perm			
Protected Phases	1	6			2	2 4	4					
Permitted Phases									4			
Detector Phase	1	6			2	2 4	4		4			
Switch Phase												

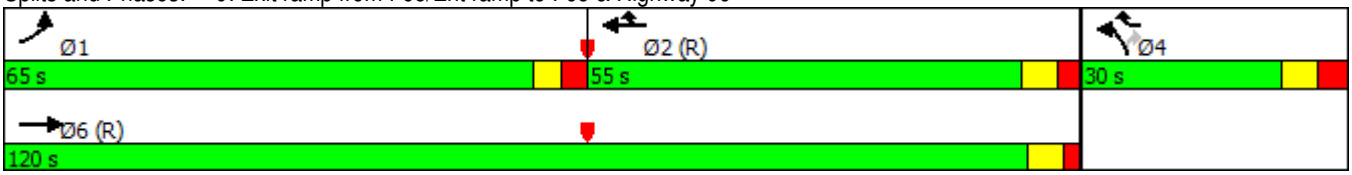


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	12.0	18.0			18.0		7.0		7.0			
Minimum Split (s)	65.0	120.0			55.0		30.0		30.0			
Total Split (s)	65.0	120.0			55.0		30.0		30.0			
Total Split (%)	43.3%	80.0%			36.7%		20.0%		20.0%			
Maximum Green (s)	59.0	114.0			48.5		22.5		22.5			
Yellow Time (s)	3.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	3.0	2.0			2.5		3.5		3.5			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.5		7.5		7.5			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.5			4.5		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Act Effct Green (s)	37.4	114.6			70.7	102.1	21.9		21.9			
Actuated g/C Ratio	0.25	0.76			0.47	0.68	0.15		0.15			
v/c Ratio	0.79	0.91			0.59	0.55	0.71		0.65			
Control Delay	79.6	23.9			32.0	11.0	70.0		48.9			
Queue Delay	0.0	5.5			0.0	0.0	0.0		0.0			
Total Delay	79.6	29.4			32.0	11.0	70.0		48.9			
LOS	E	C			C	B	E		D			
Approach Delay		40.2			21.0							
Approach LOS		D			C							
90th %ile Green (s)	45.4	114.0			62.1		22.5		22.5			
90th %ile Term Code	Gap	Coord			Coord		Max		Max			
70th %ile Green (s)	41.1	114.0			66.4		22.5		22.5			
70th %ile Term Code	Gap	Coord			Coord		Max		Max			
50th %ile Green (s)	37.3	114.0			70.2		22.5		22.5			
50th %ile Term Code	Gap	Coord			Coord		Max		Max			
30th %ile Green (s)	34.3	114.0			73.2		22.5		22.5			
30th %ile Term Code	Gap	Coord			Coord		Max		Max			
10th %ile Green (s)	29.0	117.2			81.7		19.3		19.3			
10th %ile Term Code	Gap	Coord			Coord		Gap		Gap			
Stops (vph)	611	1844			649	398	298		100			
Fuel Used(gal)	18	38			23	19	7		3			
CO Emissions (g/hr)	1288	2653			1639	1303	524		208			
NOx Emissions (g/hr)	251	516			319	253	102		40			
VOC Emissions (g/hr)	299	615			380	302	121		48			
Dilemma Vehicles (#)	0	83			30	0	0		0			
Queue Length 50th (ft)	344	588			368	219	166		112			
Queue Length 95th (ft)	m343	m495			487	330	222		190			
Internal Link Dist (ft)		476			1765			605			861	
Turn Bay Length (ft)							270					
Base Capacity (vph)	1286	2575			1668	1978	495		298			
Starvation Cap Reductn	0	200			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.50	0.99			0.59	0.54	0.69		0.63			

Intersection Summary

Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 138 (92%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 35.2		Intersection LOS: D	
Intersection Capacity Utilization 84.9%		ICU Level of Service E	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 9: Exit ramp from I-65/Ent ramp to I-65 & Highway 96



Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Lane Configurations												
Traffic Volume (vph)	92	827	41	147	55	118	104	36	123	196	765	145
Future Volume (vph)	92	827	41	147	55	118	104	36	123	196	765	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	8	11	11	11	11	12	12	13	12	12	12	12
Storage Length (ft)		70	150	75		0	100		195	180	0	
Storage Lanes		3	0	1		0	1		1	1	2	
Taper Length (ft)		50		50			50			50		
Lane Util. Factor	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00
Frt			0.850		0.905				0.850		0.850	
Flt Protected	0.950	0.950		0.950			0.950			0.950		
Satd. Flow (prot)	1534	3319	1531	1711	1630	0	1770	1925	1583	1770	2787	0
Flt Permitted	0.084	0.950		0.715			0.286			0.253		
Satd. Flow (perm)	136	3319	1531	1287	1630	0	533	1925	1583	471	2787	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			132		69				134		132	
Link Speed (mph)		30			25			40		30		
Link Distance (ft)		552			721			918		1624		
Travel Time (s)		12.5			19.7			15.6		36.9		
Peak Hour Factor	0.67	0.94	0.63	0.79	0.58	0.73	0.75	0.58	0.92	0.75	0.75	0.69
Adj. Flow (vph)	137	880	65	186	95	162	139	62	134	261	1020	210
Shared Lane Traffic (%)												
Lane Group Flow (vph)	137	880	65	186	257	0	139	62	134	261	1230	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Right	Right
Median Width(ft)		30			12			12		12		
Link Offset(ft)		0			0			0		0		
Crosswalk Width(ft)		16			16			16		16		
Two way Left Turn Lane												
Headway Factor	1.20	1.04	1.04	1.04	1.04	1.00	1.00	0.96	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15	9	15		9	15		9	15	9	9
Number of Detectors	1	1	1	1	1		1	1	1	1	1	
Detector Template												
Leading Detector (ft)	42	42	42	42	42		42	42	42	42	42	
Trailing Detector (ft)	-3	-3	-3	-3	-3		-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	-3	-3	-3	-3		-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	45	45	45	45		45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	Prot	Perm	D.P+P	NA		D.P+P	NA	custom	pm+pt	Prot	
Protected Phases	1	6		3	8		7	4	5	5	2	
Permitted Phases	6		6	4			8		8	2		
Detector Phase	1	6		3	8		7	4	5	5	2	
Switch Phase												
Minimum Initial (s)	7.0	20.0	20.0	7.0	7.0		7.0	7.0	7.0	7.0	20.0	
Minimum Split (s)	18.0	57.0	57.0	14.0	35.0		14.0	35.0	14.0	14.0	53.0	

Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Total Split (s)	18.0	57.0	57.0	14.0	35.0		14.0	35.0	14.0	14.0	53.0	
Total Split (%)	15.0%	47.5%	47.5%	11.7%	29.2%		11.7%	29.2%	11.7%	11.7%	44.2%	
Maximum Green (s)	12.0	51.0	51.0	8.5	29.0		8.5	29.0	8.0	8.0	47.0	
Yellow Time (s)	3.0	4.0	4.0	3.5	3.5		3.5	3.5	3.0	3.0	4.0	
All-Red Time (s)	3.0	2.0	2.0	2.0	2.5		2.0	2.5	3.0	3.0	2.0	
Lost Time Adjust (s)	-2.5	-1.5	-1.5	-2.5	-2.5		-2.5	-2.5	-2.5	-2.5	-1.5	
Total Lost Time (s)	3.5	4.5	4.5	3.0	3.5		3.0	3.5	3.5	3.5	4.5	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	5.0	5.0	1.5	3.5		1.5	3.5	1.5	1.5	5.0	
Recall Mode	None	C-Min	C-Min	None	None		None	None	None	None	C-Min	
Act Effct Green (s)	74.7	61.6	61.6	34.5	22.7		33.9	21.7	36.6	71.3	59.8	
Actuated g/C Ratio	0.62	0.51	0.51	0.29	0.19		0.28	0.18	0.30	0.59	0.50	
v/c Ratio	0.60	0.52	0.08	0.44	0.71		0.53	0.18	0.23	0.67	0.85	
Control Delay	28.5	21.8	0.2	34.8	43.0		37.5	39.6	5.3	21.2	31.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	28.5	21.8	0.2	34.8	43.0		37.5	39.6	5.3	21.2	31.4	
LOS	C	C	A	C	D		D	D	A	C	C	
Approach Delay		21.3			39.5			25.0		29.6		
Approach LOS		C			D			C		C		
90th %ile Green (s)	12.0	51.5	51.5	8.5	28.5		8.5	28.5	8.0	8.0	47.5	
90th %ile Term Code	Max	Coord	Coord	Max	Gap		Max	Hold	Max	Max	Coord	
70th %ile Green (s)	12.0	56.3	56.3	8.5	23.7		8.5	23.7	8.0	8.0	52.3	
70th %ile Term Code	Max	Coord	Coord	Max	Gap		Max	Hold	Max	Max	Coord	
50th %ile Green (s)	10.3	59.8	59.8	8.5	20.2		8.5	20.2	8.0	8.0	57.5	
50th %ile Term Code	Gap	Coord	Coord	Max	Gap		Max	Hold	Max	Max	Coord	
30th %ile Green (s)	7.7	63.2	63.2	8.5	16.8		8.5	16.8	8.0	8.0	63.5	
30th %ile Term Code	Gap	Coord	Coord	Max	Gap		Max	Hold	Max	Max	Coord	
10th %ile Green (s)	7.0	69.9	69.9	24.8	11.7		7.1	0.0	7.8	7.8	70.7	
10th %ile Term Code	Min	Coord	Coord	Hold	Gap		Gap	Skip	Gap	Gap	Coord	
Stops (vph)	47	538	0	113	117		76	28	14	91	657	
Fuel Used(gal)	1	10	0	2	3		2	1	1	4	21	
CO Emissions (g/hr)	83	713	12	166	211		153	55	72	268	1466	
NOx Emissions (g/hr)	16	139	2	32	41		30	11	14	52	285	
VOC Emissions (g/hr)	19	165	3	39	49		35	13	17	62	340	
Dilemma Vehicles (#)	0	0	0	0	0		0	2	0	0	0	
Queue Length 50th (ft)	41	226	0	111	138		80	41	0	80	421	
Queue Length 95th (ft)	69	327	0	135	107		98	46	40	118	446	
Internal Link Dist (ft)		472			641			838		1544		
Turn Bay Length (ft)	70	70	150	75			100		195	180		
Base Capacity (vph)	255	1704	850	420	478		265	505	577	393	1455	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	0.54	0.52	0.08	0.44	0.54		0.52	0.12	0.23	0.66	0.85	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	

Actuated Cycle Length: 120	
Offset: 117 (98%), Referenced to phase 2:SWL and 6:EBL, Start of Green	
Natural Cycle: 120	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.85	
Intersection Signal Delay: 27.8	Intersection LOS: C
Intersection Capacity Utilization 64.2%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 23: Oak Meadow Dr. & S Royal Oaks

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	90	1107	27	83	64	123	46	58	302	269	1133	93
Future Volume (vph)	90	1107	27	83	64	123	46	58	302	269	1133	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	11	11	12	12	11	12	12	11	12
Grade (%)	1%					-1%	2%				-2%	
Storage Length (ft)		135			100		120	0			220	0
Storage Lanes		3			1		1	1			2	0
Taper Length (ft)					50		50				50	
Lane Util. Factor	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95
Frt		0.850	0.850					0.850			0.987	
Flt Protected				0.950	0.950		0.950			0.950	0.956	
Satd. Flow (prot)	1764	2707	1575	1736	1754	0	1752	1546	0	1805	3365	0
Flt Permitted	0.144			0.167	0.950		0.673			0.093	0.956	
Satd. Flow (perm)	254	2707	1575	305	1754	0	1241	1546	0	177	3365	0
Right Turn on Red			Yes						Yes			Yes
Satd. Flow (RTOR)			124					166			76	
Link Speed (mph)	30					30	30				30	
Link Distance (ft)	1624					433	515				792	
Travel Time (s)	36.9					9.8	11.7				18.0	
Peak Hour Factor	0.79	0.95	0.64	0.86	0.71	0.82	0.75	0.88	0.94	0.75	0.90	0.76
Heavy Vehicles (%)	0%	1%	2%	1%	0%	0%	2%	0%	0%	1%	1%	0%
Adj. Flow (vph)	114	1165	42	97	90	150	61	66	321	359	1259	122
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	1165	42	97	90	150	61	387	0	359	1381	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Left	Left	Right	Right	Left	Left	Right
Median Width(ft)	22					22	12				35	
Link Offset(ft)	0					0	0				0	
Crosswalk Width(ft)	16					16	16				16	
Two way Left Turn Lane												
Headway Factor	1.10	1.05	1.01	1.04	1.04	0.99	1.01	1.06	1.01	0.99	1.03	0.99
Turning Speed (mph)		9	9	15	15		15	9	9	15	15	9
Number of Detectors	1	1	0	1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	42	226	0	42	42	50	42	42		42	226	
Trailing Detector (ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Position(ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Size(ft)	45	6	50	45	45	50	45	45		45	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	NA	custom	custom	custom	Prot	NA	D.Pm	Prot		pm+pt	Prot	
Protected Phases	1	6			4	2!		8		5	2!	
Permitted Phases	6		6	8			4			2		
Detector Phase	1	6		8	4	2	4	8		5	2	
Switch Phase												

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Minimum Initial (s)	5.0	10.0	10.0	7.0	7.0	10.0	7.0	7.0		5.0	10.0	
Minimum Split (s)	15.0	70.0	70.0	50.0	50.0	85.0	50.0	50.0		30.0	85.0	
Total Split (s)	14.0	72.0	72.0	49.0	49.0	87.0	49.0	49.0		29.0	87.0	
Total Split (%)	9.3%	48.0%	48.0%	32.7%	32.7%	58.0%	32.7%	32.7%		19.3%	58.0%	
Maximum Green (s)	7.5	66.0	66.0	42.0	42.0	81.0	42.0	42.0		22.5	81.0	
Yellow Time (s)	3.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.0	3.5	
All-Red Time (s)	3.5	2.5	2.5	3.5	3.5	2.5	3.5	3.5		3.5	2.5	
Lost Time Adjust (s)	-1.0	-3.0	-3.0	-2.5	-2.5		-2.5	-2.5		-1.0	-3.0	
Total Lost Time (s)	5.5	3.0	3.0	4.5	4.5		4.5	4.5		5.5	3.0	
Lead/Lag	Lead	Lag	Lag			Lag				Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
Recall Mode	None	C-Min	C-Min	None	None	C-Min	None	None		None	C-Min	
Walk Time (s)		7.0	7.0	8.0	8.0	7.0	8.0	8.0			7.0	
Flash Dont Walk (s)		16.0	16.0	35.0	32.0	20.0	32.0	35.0			20.0	
Pedestrian Calls (#/hr)		0	0	0	0	0	0	0			0	
Act Effct Green (s)	81.3	75.4	75.4	38.1	38.1	0.0	38.1	38.1		101.9	90.6	
Actuated g/C Ratio	0.54	0.50	0.50	0.25	0.25	0.00	0.25	0.25		0.68	0.60	
v/c Ratio	0.52	0.86	0.05	1.26	0.20	no cap	0.19	0.75		0.96	0.67	
Control Delay	21.2	41.5	0.1	231.8	42.9		42.8	37.4		56.3	15.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	2.2	
Total Delay	21.2	41.5	0.1	231.8	42.9	Error	42.8	37.4		56.3	18.0	
LOS	C	D	A	F	D	F	D	D		E	B	
Approach Delay	38.4					Err	38.2				25.9	
Approach LOS	D					F	D				C	
90th %ile Green (s)	7.5	66.0	66.0	42.0	42.0	81.0	42.0	42.0		22.5	81.0	
90th %ile Term Code	Max	Coord	Coord	Max	Hold	Coord	Hold	Max		Max	Coord	
70th %ile Green (s)	7.5	66.0	66.0	42.0	42.0	81.0	42.0	42.0		22.5	81.0	
70th %ile Term Code	Max	Coord	Coord	Max	Hold	Coord	Hold	Max		Max	Coord	
50th %ile Green (s)	7.5	67.2	67.2	40.8	40.8	82.2	40.8	40.8		22.5	82.2	
50th %ile Term Code	Max	Coord	Coord	Gap	Hold	Coord	Hold	Gap		Max	Coord	
30th %ile Green (s)	7.5	75.2	75.2	32.8	32.8	90.2	32.8	32.8		22.5	90.2	
30th %ile Term Code	Max	Coord	Coord	Gap	Hold	Coord	Hold	Gap		Max	Coord	
10th %ile Green (s)	6.8	87.8	87.8	20.2	20.2	103.5	20.2	20.2		22.5	103.5	
10th %ile Term Code	Gap	Coord	Coord	Gap	Hold	Coord	Hold	Gap		Max	Coord	
Stops (vph)	43	918	0	68	48	0	35	198		270	996	
Fuel Used(gal)	2	28	0	5	1	0	1	5		6	17	
CO Emissions (g/hr)	123	1988	24	320	73	29	54	369		436	1189	
NOx Emissions (g/hr)	24	387	5	62	14	6	11	72		85	231	
VOC Emissions (g/hr)	29	461	6	74	17	7	13	86		101	276	
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0		0	0	
Queue Length 50th (ft)	40	595	0	~108	66	0	45	197		234	692	
Queue Length 95th (ft)	58	#776	0	#215	88	0	70	305		m165	m562	
Internal Link Dist (ft)	1544					353	435				712	
Turn Bay Length (ft)		135	135	100	100		120			220	220	
Base Capacity (vph)	223	1361	853	90	520	1	368	575		375	2062	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	514	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Reduced v/c Ratio	0.51	0.86	0.05	1.08	0.17	150.00	0.17	0.67		0.96	0.89	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 123 (82%), Referenced to phase 2:SBSW and 6:NBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: Err			
Intersection Signal Delay: Err		Intersection LOS: F	
Intersection Capacity Utilization Err%		ICU Level of Service H	
Analysis Period (min) 15			

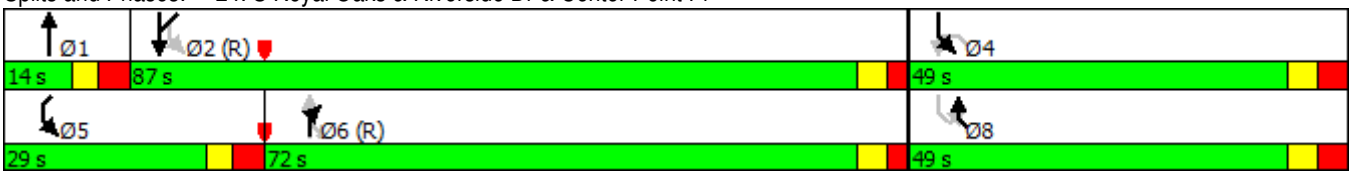
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

! Phase conflict between lane groups.

Splits and Phases: 24: S Royal Oaks & Riverside Dr & Center Point Pl



HCS 2010 Two-Way Stop Control Summary Report

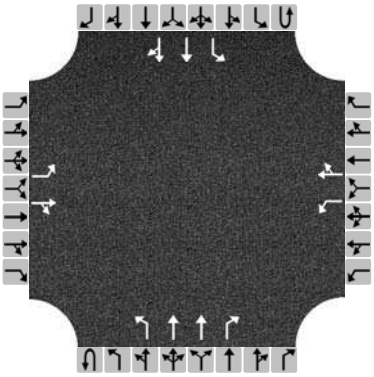
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Intersection Orientation	North-South
Project Description	10728 (Total)

Site Information

Intersection	S. Royal Oaks and Rand
Jurisdiction	Franklin, TN
East/West Street	Rand Pl / Home Depot
North/South Street	S. Royal Oaks Blvd
Peak Hour Factor	0.97
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		1	1	0		1	1	0	0	1	2	1	0	1	2	0
Configuration		L		TR		L		TR		L	T	R		L	T	TR
Volume (veh/h)		26	1	9		14	0	40		10	1447	25		64	659	51
Percent Heavy Vehicles		0	0	0		0	0	0		0				0		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left + Thru															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		27		10		14		41		10				66		
Capacity		148		394		100		361		882				446		
v/c Ratio		0.18		0.03		0.14		0.11		0.01				0.15		
95% Queue Length		0.6		0.1		0.5		0.4		0.0				0.5		
Control Delay (s/veh)		34.8		14.4		47.0		16.3		9.1				14.5		
Level of Service (LOS)		D		B		E		C		A				B		
Approach Delay (s/veh)	29.3				24.1				0.1				1.2			
Approach LOS	D				C				A				A			

HCS 2010 Two-Way Stop Control Summary Report

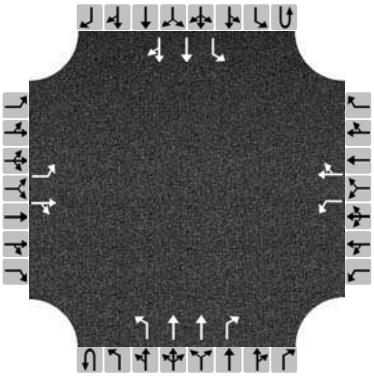
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	PM Peak Hour
Intersection Orientation	North-South
Project Description	10728 (Total)

Site Information

Intersection	S. Royal Oaks and Rand
Jurisdiction	Franklin, TN
East/West Street	Rand Pl / Home Depot
North/South Street	S. Royal Oaks Blvd
Peak Hour Factor	0.96
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		1	1	0		1	1	0	0	1	2	1	0	1	2	0
Configuration		L		TR		L		TR		L	T	R		L	T	TR
Volume (veh/h)		26	3	16		21	4	52		6	1016	17		45	1023	105
Percent Heavy Vehicles		0	0	0		0	0	0		0				0		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left + Thru															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		27		20		22		58		6				47		
Capacity		130		330		157		418		602				656		
v/c Ratio		0.21		0.06		0.14		0.14		0.01				0.07		
95% Queue Length		0.7		0.2		0.5		0.5		0.0				0.2		
Control Delay (s/veh)		39.7		16.6		31.6		15.0		11.0				10.9		
Level of Service (LOS)		E		C		D		C		B				B		
Approach Delay (s/veh)	29.9				19.6				0.1				0.4			
Approach LOS	D				C				A				A			

HCS 2010 Two-Way Stop Control Summary Report

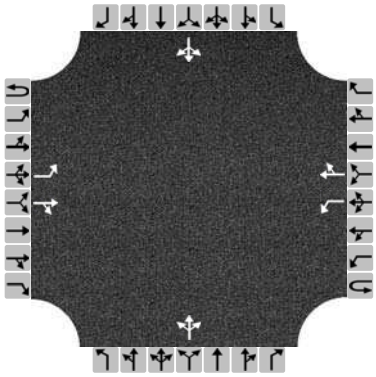
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	10728 (Total)

Site Information

Intersection	Oak Meadow Dr and dwy
Jurisdiction	Franklin, TN
East/West Street	Oak Meadow Drive
North/South Street	Western Home Depot dwy
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume (veh/h)		24	64	7		0	266	0		27	6	0		1	2	9
Percent Heavy Vehicles		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		30									42				14	
Capacity		1239				1519					665				814	
v/c Ratio		0.02									0.06				0.02	
95% Queue Length		0.1									0.2				0.1	
Control Delay (s/veh)		8.0				7.4					10.8				9.5	
Level of Service (LOS)		A				A					B				A	
Approach Delay (s/veh)	2.0								10.8				9.5			
Approach LOS	A								B				A			

HCS 2010 Two-Way Stop Control Summary Report

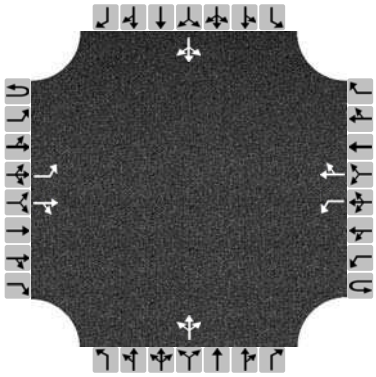
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	PM Peak Hour
Intersection Orientation	East-West
Project Description	10728 (Total)

Site Information

Intersection	Oak Meadow Dr and dwy
Jurisdiction	Franklin, TN
East/West Street	Oak Meadow Drive
North/South Street	Western Home Depot dwy
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume (veh/h)		24	241	27		0	215	2		15	3	0		16	5	33
Percent Heavy Vehicles		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		30									23				67	
Capacity		1304				1236					543				707	
v/c Ratio		0.02									0.04				0.09	
95% Queue Length		0.1									0.1				0.3	
Control Delay (s/veh)		7.8				7.9					11.9				10.6	
Level of Service (LOS)		A				A					B				B	
Approach Delay (s/veh)	0.6								11.9				10.6			
Approach LOS	A								B				B			

HCS 2010 Two-Way Stop Control Summary Report

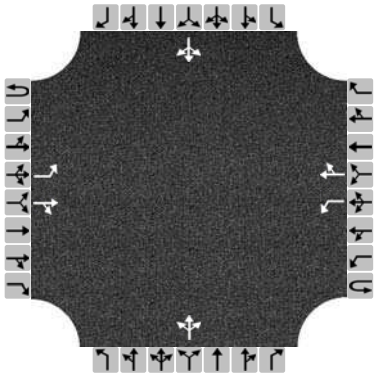
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Intersection Orientation	East-West
Project Description	10728 (Total)

Site Information

Intersection	Oak Meadow Dr and dwy
Jurisdiction	Franklin, TN
East/West Street	Oak Meadow Drive
North/South Street	Eastern Home Depot dwy
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume (veh/h)		13	49	3		0	198	0		14	0	0		0	0	54
Percent Heavy Vehicles		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		16									18				68	
Capacity		1330				1550					567				796	
v/c Ratio		0.01									0.03				0.09	
95% Queue Length		0.0									0.1				0.3	
Control Delay (s/veh)		7.7				7.3					11.6				9.9	
Level of Service (LOS)		A				A					B				A	
Approach Delay (s/veh)	1.5								11.6				9.9			
Approach LOS	A								B				A			

HCS 2010 Two-Way Stop Control Summary Report

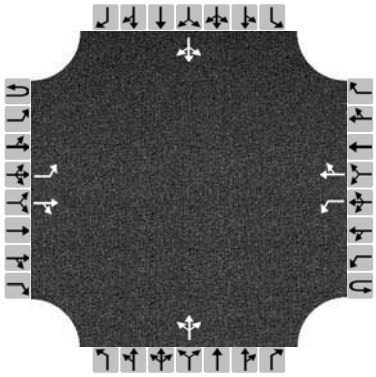
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	PM Peak Hour
Intersection Orientation	East-West
Project Description	10728 (Total)

Site Information

Intersection	Oak Meadow Dr and dwy
Jurisdiction	Franklin, TN
East/West Street	Oak Meadow Drive
North/South Street	Eastern Home Depot dwy
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes



Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	1	1	0	0	1	1	0		0	1	0		0	1	0
Configuration		L		TR		L		TR			LTR				LTR	
Volume (veh/h)		53	190	14		0	181	0		7	0	0		0	0	29
Percent Heavy Vehicles		0				0				0	0	0		0	0	0
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left Only															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		66									9				36	
Capacity		1355				1321					460				819	
v/c Ratio		0.05									0.02				0.04	
95% Queue Length		0.2									0.1				0.1	
Control Delay (s/veh)		7.8				7.7					13.0				9.6	
Level of Service (LOS)		A				A					B				A	
Approach Delay (s/veh)	1.6								13.0				9.6			
Approach LOS	A								B				A			

HCS 2010 Two-Way Stop Control Summary Report

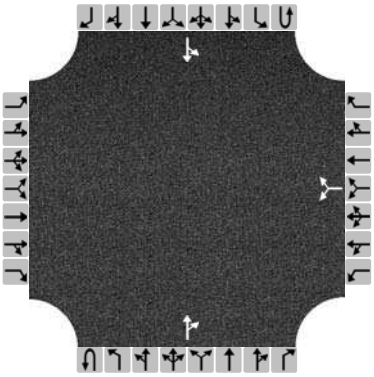
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Intersection Orientation	North-South
Project Description	10728 (Total)

Site Information

Intersection	Home Depot dwy and projec
Jurisdiction	Franklin, TN
East/West Street	Project Access
North/South Street	Eastern Home Depot dwy
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						54		44			0	13		11	0	
Percent Heavy Vehicles						0		0						0		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)							123							14		
Capacity							1018							1615		
v/c Ratio							0.12							0.01		
95% Queue Length							0.4							0.0		
Control Delay (s/veh)							9.0							7.2		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)					9.0								7.2			
Approach LOS					A								A			

HCS 2010 Two-Way Stop Control Summary Report

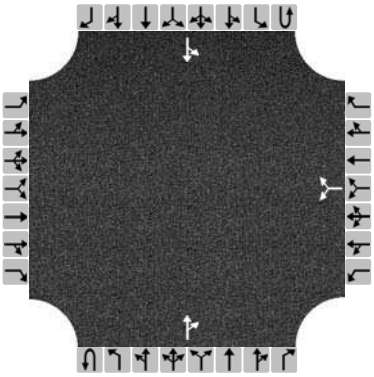
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	PM Peak Hour
Intersection Orientation	North-South
Project Description	10728 (Total)

Site Information

Intersection	Home Depot dwy and projec
Jurisdiction	Franklin, TN
East/West Street	Project Access
North/South Street	Eastern Home Depot dwy
Peak Hour Factor	0.80
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

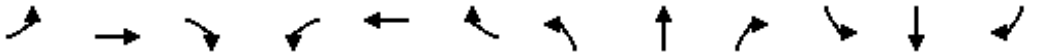
Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		0	0	0		0	0	0	0	0	1	0	0	0	1	0
Configuration							LR					TR		LT		
Volume (veh/h)						29		23			0	53		44	0	
Percent Heavy Vehicles						0		0						0		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Undivided															
Median Storage																

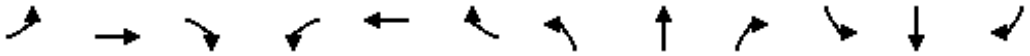
Delay, Queue Length, and Level of Service

Flow Rate (veh/h)							65							55		
Capacity							910							1549		
v/c Ratio							0.07							0.04		
95% Queue Length							0.2							0.1		
Control Delay (s/veh)							9.3							7.4		
Level of Service (LOS)							A							A		
Approach Delay (s/veh)					9.3								7.4			
Approach LOS					A								A			

TOTAL PROJECTED CONDITIONS
With a third northbound through lane



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	112	772	60	849	993	281	99	276	1060	225	211	82
Future Volume (vph)	112	772	60	849	993	281	99	276	1060	225	211	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	12	11	12	13	12	13	13	11	11	11
Grade (%)		0%			0%			1%			0%	
Storage Length (ft)	200		300	285		0	195		450	220		650
Storage Lanes	2		1	2		1	2		2	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.91	0.91	0.97	0.95	1.00	0.97	0.95	0.88	0.97	0.95	0.95
Frt		0.988				0.850			0.850		0.961	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3400	4688	0	3286	3406	1620	3350	3639	2865	3319	3241	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3400	4688	0	3286	3406	1620	3350	3639	2865	3319	3241	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		9				127					29	
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		350			691			792			964	
Travel Time (s)		6.0			11.8			18.0			21.9	
Peak Hour Factor	0.80	0.90	0.80	0.93	0.91	0.88	0.82	0.80	0.93	0.92	0.74	0.81
Heavy Vehicles (%)	3%	6%	2%	3%	6%	3%	4%	2%	2%	2%	4%	2%
Adj. Flow (vph)	140	858	75	913	1091	319	121	345	1140	245	285	101
Shared Lane Traffic (%)												
Lane Group Flow (vph)	140	933	0	913	1091	319	121	345	1140	245	386	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		30			24			30			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.04	1.00	1.04	1.00	0.96	1.01	0.96	0.96	1.04	1.04	1.04
Turning Speed (mph)	18		10	18		10	18		10	18		10
Number of Detectors	1	1		1	1	0	1	2	1	1	2	
Detector Template												
Leading Detector (ft)	42	236		42	236	0	42	146	42	42	146	
Trailing Detector (ft)	-3	230		-3	230	0	-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	230		-3	230	230	-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	6		45	6	6	45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								140			140	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	

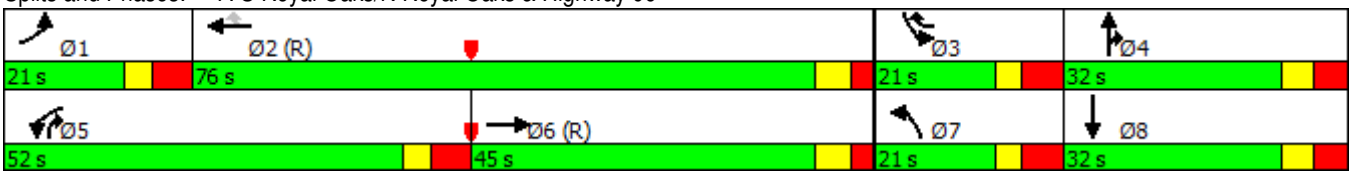


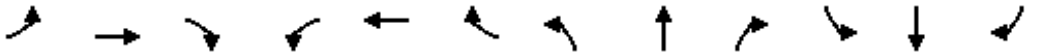
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	
Protected Phases	1	6		5	2	3	7	4	4 5	3	8	
Permitted Phases						2						
Detector Phase	1	6		5	2	3	7	4	4 5	3	8	
Switch Phase												
Minimum Initial (s)	6.0	13.0		6.0	13.0	6.0	6.0	10.0		6.0	10.0	
Minimum Split (s)	21.0	42.0		45.0	66.0	21.0	21.0	32.0		21.0	32.0	
Total Split (s)	21.0	45.0		52.0	76.0	21.0	21.0	32.0		21.0	32.0	
Total Split (%)	14.0%	30.0%		34.7%	50.7%	14.0%	14.0%	21.3%		14.0%	21.3%	
Maximum Green (s)	13.5	38.5		44.5	69.5	13.5	13.5	24.5		13.5	24.5	
Yellow Time (s)	3.0	4.0		3.0	4.0	3.0	3.0	3.5		3.0	3.5	
All-Red Time (s)	4.5	2.5		4.5	2.5	4.5	4.5	4.0		4.5	4.0	
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5	-2.0	-2.0	-3.0		-2.0	-3.0	
Total Lost Time (s)	5.0	4.0		5.0	4.0	5.5	5.5	4.5		5.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	6.0		3.0	6.0	3.0	3.0	4.5		3.0	4.5	
Recall Mode	None	C-Min		None	C-Min	None	None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		37.0			24.0			36.0			36.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	13.8	41.4		46.9	74.5	93.7	12.7	27.5	78.9	15.2	30.0	
Actuated g/C Ratio	0.09	0.28		0.31	0.50	0.62	0.08	0.18	0.53	0.10	0.20	
v/c Ratio	0.45	0.72		0.89	0.65	0.30	0.43	0.52	0.76	0.73	0.58	
Control Delay	68.7	52.3		56.2	30.7	9.4	69.5	58.4	32.0	78.8	54.2	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	
Total Delay	68.7	52.3		56.2	30.7	9.4	69.5	58.4	32.5	78.8	54.2	
LOS	E	D		E	C	A	E	E	C	E	D	
Approach Delay		54.5			37.8			40.9			63.8	
Approach LOS		D			D			D			E	
Queue Length 50th (ft)	68	302		444	445	89	58	162	485	121	167	
Queue Length 95th (ft)	91	356		m483	m488	m123	83	189	586	170	181	
Internal Link Dist (ft)		270			611			712			884	
Turn Bay Length (ft)	200			285			195		450	220		
Base Capacity (vph)	362	1299		1029	1690	1062	346	667	1508	342	671	
Starvation Cap Reductn	0	0		0	0	0	0	0	95	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.39	0.72		0.89	0.65	0.30	0.35	0.52	0.81	0.72	0.58	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 44 (29%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.89			
Intersection Signal Delay: 44.8		Intersection LOS: D	

Intersection Capacity Utilization 71.8% ICU Level of Service C
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: S Royal Oaks/N Royal Oaks & Highway 96





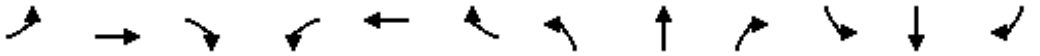
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1793	194	111	1060	0	0	0	0	355	0	1039
Future Volume (vph)	0	1793	194	111	1060	0	0	0	0	355	0	1039
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	12	12	12	12	12	12	11
Grade (%)		0%			0%			0%			1%	
Storage Length (ft)	0		0	420		0	0		0	350		0
Storage Lanes	0		1	0		0	0		0	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.86	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.88
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	6346	1509	1787	3388	0	0	0	0	3287	0	2654
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	6346	1509	1787	3388	0	0	0	0	3287	0	2654
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			162									93
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		501			556			756			888	
Travel Time (s)		8.5			9.5			20.6			24.2	
Peak Hour Factor	1.00	0.91	0.90	0.86	0.87	1.00	1.00	1.00	1.00	0.85	1.00	0.94
Heavy Vehicles (%)	2%	3%	7%	1%	3%	2%	2%	2%	2%	6%	2%	3%
Adj. Flow (vph)	0	1970	216	129	1218	0	0	0	0	418	0	1105
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1970	216	129	1218	0	0	0	0	418	0	1105
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.01	1.01	1.05
Turning Speed (mph)	15		12	15		9	15		9	18		12
Number of Detectors		1	0	1	1					1		1
Detector Template												
Leading Detector (ft)		300	0	42	300					42		42
Trailing Detector (ft)		294	0	-3	294					-3		-3
Detector 1 Position(ft)		294	-3	-3	294					-3		-3
Detector 1 Size(ft)		6	45	45	6					45		45
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0		0.0
Turn Type		NA	Perm	Prot	NA					Prot		Prot
Protected Phases		6		5	2					4		4
Permitted Phases			6									
Detector Phase		6	6	5	2					4		4
Switch Phase												

Lanes, Volumes, Timings
8: Ent ramp to I-65/Exit ramp from I-65 & Highway 96 3/31/2016

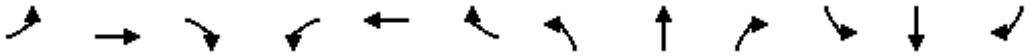
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)		25.0	25.0	5.0	25.0					15.0		15.0
Minimum Split (s)		62.0	62.0	23.0	85.0					55.0		55.0
Total Split (s)		62.0	62.0	23.0	85.0					65.0		65.0
Total Split (%)		41.3%	41.3%	15.3%	56.7%					43.3%		43.3%
Maximum Green (s)		56.0	56.0	17.0	79.0					57.5		57.5
Yellow Time (s)		4.0	4.0	3.0	4.0					4.0		4.0
All-Red Time (s)		2.0	2.0	3.0	2.0					3.5		3.5
Lost Time Adjust (s)		-2.0	-2.0	-1.0	-2.0					-2.0		-2.0
Total Lost Time (s)		4.0	4.0	5.0	4.0					5.5		5.5
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		4.5	4.5	3.0	4.5					3.0		3.0
Recall Mode		C-Min	C-Min	None	C-Min					None		None
Act Effct Green (s)		60.1	60.1	15.9	81.0					59.5		59.5
Actuated g/C Ratio		0.40	0.40	0.11	0.54					0.40		0.40
v/c Ratio		0.77	0.31	0.69	0.67					0.32		1.00
Control Delay		34.8	8.3	87.9	4.6					32.1		67.4
Queue Delay		7.6	0.0	0.0	0.6					0.1		0.0
Total Delay		42.4	8.3	87.9	5.2					32.3		67.4
LOS		D	A	F	A					C		E
Approach Delay		39.0			13.1							
Approach LOS		D			B							
Queue Length 50th (ft)		386	37	97	24					144		575
Queue Length 95th (ft)		461	m80	m138	m24					176		#754
Internal Link Dist (ft)		421			476			676			808	
Turn Bay Length (ft)				420						350		
Base Capacity (vph)		2544	702	214	1829					1303		1108
Starvation Cap Reductn		0	0	0	262					0		0
Spillback Cap Reductn		547	0	0	0					250		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.99	0.31	0.60	0.78					0.40		1.00

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 32 (21%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.00			
Intersection Signal Delay: 37.8		Intersection LOS: D	
Intersection Capacity Utilization 108.8%		ICU Level of Service G	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 8: Ent ramp to I-65/Exit ramp from I-65 & Highway 96



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1386	762	0	0	762	1217	409	0	364	0	0	0
Future Volume (vph)	1386	762	0	0	762	1217	409	0	364	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	12	12	11	12	13	12	12	12
Grade (%)		1%			0%			1%			0%	
Storage Length (ft)	0		0	0		0	270		0	0		0
Storage Lanes	2		0	0		2	2		1	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3302	3307	0	0	3539	2814	3302	0	1628	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3302	3307	0	0	3539	2814	3302	0	1628	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						22			258			
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		556			1845			685			941	
Travel Time (s)		9.5			31.4			18.7			25.7	
Peak Hour Factor	0.88	0.86	0.95	1.00	0.95	0.98	0.95	0.25	0.92	1.00	1.00	0.95
Heavy Vehicles (%)	2%	5%	2%	2%	2%	1%	2%	0%	2%	2%	2%	2%
Adj. Flow (vph)	1575	886	0	0	802	1242	431	0	396	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	1575	886	0	0	802	1242	431	0	396	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		22			26			22			22	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.05	1.05	1.01	1.00	1.00	1.00	1.05	1.01	0.96	1.00	1.00	1.00
Turning Speed (mph)	18		9	15		10	15		15	15		9
Number of Detectors	1	1			1	0	1		1			
Detector Template												
Leading Detector (ft)	42	300			300	0	42		50			
Trailing Detector (ft)	-3	294			294	0	-3		0			
Detector 1 Position(ft)	-3	294			294	0	-3		0			
Detector 1 Size(ft)	45	6			6	50	45		50			
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Queue (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Delay (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Turn Type	Prot	NA			NA	custom	Prot		Perm			
Protected Phases	1	6			2	2 4	4					
Permitted Phases									4			
Detector Phase	1	6			2	2 4	4		4			
Switch Phase												



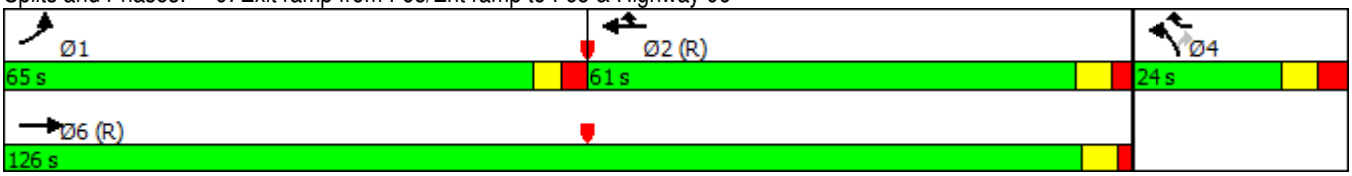
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	12.0	18.0			18.0		7.0		7.0			
Minimum Split (s)	56.0	116.0			60.0		24.0		24.0			
Total Split (s)	65.0	126.0			61.0		24.0		24.0			
Total Split (%)	43.3%	84.0%			40.7%		16.0%		16.0%			
Maximum Green (s)	59.0	120.0			54.5		16.5		16.5			
Yellow Time (s)	3.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	3.0	2.0			2.5		3.5		3.5			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.5		7.5		7.5			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.5			4.5		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Act Effct Green (s)	59.0	120.0			54.5	80.5	16.5		16.5			
Actuated g/C Ratio	0.39	0.80			0.36	0.54	0.11		0.11			
v/c Ratio	1.21	0.33			0.62	0.82	1.19		0.97			
Control Delay	140.5	12.3			41.9	33.7	163.6		60.3			
Queue Delay	0.8	0.7			0.0	0.0	0.0		0.0			
Total Delay	141.3	13.0			41.9	33.7	163.6		60.3			
LOS	F	B			D	C	F		E			
Approach Delay		95.1			36.9							
Approach LOS		F			D							
Queue Length 50th (ft)	~990	273			339	546	~260		147			
Queue Length 95th (ft)	#1090	333			411	660	#372		#363			
Internal Link Dist (ft)		476			1765			605			861	
Turn Bay Length (ft)							270					
Base Capacity (vph)	1298	2645			1285	1520	363		408			
Starvation Cap Reductn	229	1319			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	0		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	1.47	0.67			0.62	0.82	1.19		0.97			

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 0 (0%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.21			
Intersection Signal Delay: 75.7		Intersection LOS: E	
Intersection Capacity Utilization 108.8%		ICU Level of Service G	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 9: Exit ramp from I-65/Ent ramp to I-65 & Highway 96

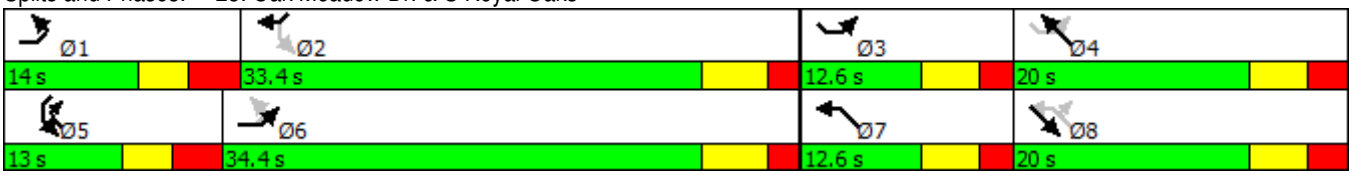


Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Lane Configurations												
Traffic Volume (vph)	87	1120	35	129	10	71	43	30	229	50	515	73
Future Volume (vph)	87	1120	35	129	10	71	43	30	229	50	515	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	8	11	11	11	11	12	12	13	12	12	12	12
Storage Length (ft)		70	150	75		0	100		195	180	0	
Storage Lanes		3	0	1		0	1		1	1	2	
Taper Length (ft)		50		50			50			50		
Lane Util. Factor	1.00	0.94	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00
Frt		0.993			0.872				0.850		0.850	
Flt Protected	0.950	0.954		0.950			0.950			0.950		
Satd. Flow (prot)	1534	4810	0	1711	1570	0	1770	1925	1583	1770	2787	0
Flt Permitted	0.249	0.954		0.723			0.652			0.147		
Satd. Flow (perm)	402	4810	0	1302	1570	0	1215	1925	1583	274	2787	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		198			97				118		198	
Link Speed (mph)		30			25			40		30		
Link Distance (ft)		1875			721			918		1624		
Travel Time (s)		42.6			19.7			15.6		36.9		
Peak Hour Factor	0.67	0.94	0.63	0.79	0.58	0.73	0.75	0.58	0.92	0.75	0.75	0.69
Adj. Flow (vph)	130	1191	56	163	17	97	57	52	249	67	687	106
Shared Lane Traffic (%)												
Lane Group Flow (vph)	130	1247	0	163	114	0	57	52	249	67	793	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Right	Right
Median Width(ft)		41			12			12		12		
Link Offset(ft)		0			0			0		0		
Crosswalk Width(ft)		16			16			16		16		
Two way Left Turn Lane												
Headway Factor	1.20	1.04	1.04	1.04	1.04	1.00	1.00	0.96	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15	9	15		9	15		9	15	9	9
Number of Detectors	1	1		1	1		1	1	1	1	1	
Detector Template												
Leading Detector (ft)	42	42		42	42		42	42	42	42	42	
Trailing Detector (ft)	-3	-3		-3	-3		-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	-3		-3	-3		-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	45		45	45		45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	Prot		D.P+P	NA		D.P+P	NA	custom	pm+pt	Prot	
Protected Phases	1	6		3	8		7	4	5	5	2	
Permitted Phases	6			4			8		8	2		
Detector Phase	1	6		3	8		7	4	5	5	2	
Switch Phase												
Minimum Initial (s)	7.0	20.0		7.0	7.0		7.0	7.0	7.0	7.0	20.0	
Minimum Split (s)	13.0	26.0		12.5	20.0		12.5	20.0	13.0	13.0	26.0	

Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Total Split (s)	14.0	34.4		12.6	20.0		12.6	20.0	13.0	13.0	33.4	
Total Split (%)	17.5%	43.0%		15.8%	25.0%		15.8%	25.0%	16.3%	16.3%	41.8%	
Maximum Green (s)	8.0	28.4		7.1	14.0		7.1	14.0	7.0	7.0	27.4	
Yellow Time (s)	3.0	4.0		3.5	3.5		3.5	3.5	3.0	3.0	4.0	
All-Red Time (s)	3.0	2.0		2.0	2.5		2.0	2.5	3.0	3.0	2.0	
Lost Time Adjust (s)	-2.5	-1.5		-2.5	-2.5		-2.5	-2.5	-2.5	-2.5	-1.5	
Total Lost Time (s)	3.5	4.5		3.0	3.5		3.0	3.5	3.5	3.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	5.0		1.5	3.5		1.5	3.5	1.5	1.5	5.0	
Recall Mode	None	Min		None	None		None	None	None	None	Min	
Act Effct Green (s)	38.7	27.6		16.6	11.1		16.6	11.1	21.1	39.0	30.6	
Actuated g/C Ratio	0.58	0.41		0.25	0.17		0.25	0.17	0.32	0.58	0.46	
v/c Ratio	0.32	0.59		0.43	0.33		0.15	0.16	0.43	0.18	0.57	
Control Delay	9.1	14.8		22.9	12.0		18.7	28.3	12.4	7.9	14.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	9.1	14.8		22.9	12.0		18.7	28.3	12.4	7.9	14.1	
LOS	A	B		C	B		B	C	B	A	B	
Approach Delay		14.3			18.4			15.7		13.6		
Approach LOS		B			B			B		B		
Queue Length 50th (ft)	24	128		56	7		18	21	44	12	118	
Queue Length 95th (ft)	37	185		87	16		35	32	102	25	145	
Internal Link Dist (ft)		1795			641			838		1544		
Turn Bay Length (ft)	70	70		75			100		195	180		
Base Capacity (vph)	420	2322		384	471		384	489	581	378	1415	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.31	0.54		0.42	0.24		0.15	0.11	0.43	0.18	0.56	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 66.8			
Natural Cycle: 75			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.59			
Intersection Signal Delay: 14.7		Intersection LOS: B	
Intersection Capacity Utilization 52.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 23: Oak Meadow Dr. & S Royal Oaks



Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	28	1280	103	6	46	41	33	12	123	277	764	25
Future Volume (vph)	28	1280	103	6	46	41	33	12	123	277	764	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	11	11	12	12	11	12	12	11	12
Grade (%)	1%					-1%	2%				-2%	
Storage Length (ft)		135			100		120	0			220	0
Storage Lanes		3			1		1	1			2	0
Taper Length (ft)					50		50				50	
Lane Util. Factor	1.00	0.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95
Frt		0.850						0.850			0.993	
Flt Protected				0.950	0.950		0.950			0.950	0.954	
Satd. Flow (prot)	1764	3509	0	1754	1580	0	1787	1489	0	1787	3339	0
Flt Permitted	0.344			0.294	0.950		0.691			0.089	0.954	
Satd. Flow (perm)	607	3509	0	543	1580	0	1300	1489	0	167	3339	0
Right Turn on Red			Yes						Yes			Yes
Satd. Flow (RTOR)		82						143			82	
Link Speed (mph)	30					30	30				30	
Link Distance (ft)	1624					433	515				792	
Travel Time (s)	36.9					9.8	11.7				18.0	
Peak Hour Factor	0.63	0.92	0.87	0.58	0.68	0.77	0.67	0.63	0.86	0.80	0.99	0.67
Heavy Vehicles (%)	0%	1%	0%	0%	11%	0%	0%	10%	3%	2%	2%	4%
Adj. Flow (vph)	44	1391	118	10	68	53	49	19	143	346	772	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	44	1509	0	10	68	53	49	162	0	346	809	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Left	Left	Right	Right	Left	Left	Right
Median Width(ft)	22					22	12				35	
Link Offset(ft)	0					0	0				0	
Crosswalk Width(ft)	16					16	16				16	
Two way Left Turn Lane												
Headway Factor	1.10	1.05	1.01	1.04	1.04	0.99	1.01	1.06	1.01	0.99	1.03	0.99
Turning Speed (mph)		9	9	15	15		15	9	9	15	15	9
Number of Detectors	1	1		1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	42	226		42	42	50	42	42		42	226	
Trailing Detector (ft)	-3	220		-3	-3	0	-3	-3		-3	220	
Detector 1 Position(ft)	-3	220		-3	-3	0	-3	-3		-3	220	
Detector 1 Size(ft)	45	6		45	45	50	45	45		45	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	NA	custom		custom	Prot	NA	D.Pm	Prot		pm+pt	Prot	
Protected Phases	1	6			4			8		5	2	
Permitted Phases	6			8			4			2		
Detector Phase	1	6		8	4		4	8		5	2	
Switch Phase												

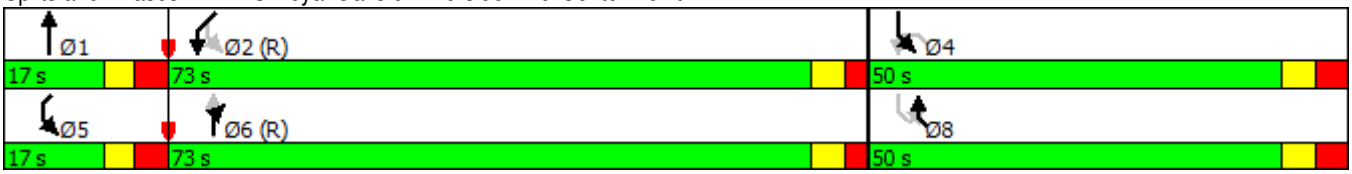
Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Minimum Initial (s)	5.0	10.0		7.0	7.0		7.0	7.0		5.0	10.0	
Minimum Split (s)	17.0	73.0		50.0	50.0		50.0	50.0		17.0	73.0	
Total Split (s)	17.0	73.0		50.0	50.0		50.0	50.0		17.0	73.0	
Total Split (%)	12.1%	52.1%		35.7%	35.7%		35.7%	35.7%		12.1%	52.1%	
Maximum Green (s)	10.5	67.0		43.0	43.0		43.0	43.0		10.5	67.0	
Yellow Time (s)	3.0	3.5		3.5	3.5		3.5	3.5		3.0	3.5	
All-Red Time (s)	3.5	2.5		3.5	3.5		3.5	3.5		3.5	2.5	
Lost Time Adjust (s)	-1.0	-3.0		-2.5	-2.5		-2.5	-2.5		-1.0	-3.0	
Total Lost Time (s)	5.5	3.0		4.5	4.5		4.5	4.5		5.5	3.0	
Lead/Lag	Lead	Lag								Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.5	3.5		3.5	3.5		3.5	3.5		3.5	3.5	
Recall Mode	None	C-Min		None	None		None	None		None	C-Min	
Walk Time (s)		7.0		8.0	8.0		8.0	8.0			7.0	
Flash Dont Walk (s)		16.0		35.0	32.0		32.0	35.0			20.0	
Pedestrian Calls (#/hr)		0		0	0		0	0			0	
Act Effct Green (s)	106.2	101.1		14.4	14.4	0.0	14.4	14.4		114.1	107.4	
Actuated g/C Ratio	0.76	0.72		0.10	0.10	0.00	0.10	0.10		0.82	0.77	
v/c Ratio	0.08	0.59		0.18	0.42	no cap	0.37	0.58		1.29	0.31	
Control Delay	3.3	10.3		63.2	65.8		65.1	20.5		181.0	5.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	3.3	10.3		63.2	65.8	Error	65.1	20.5		181.0	5.4	
LOS	A	B		E	E	F	E	C		F	A	
Approach Delay	10.1					Err	30.9				58.0	
Approach LOS	B					F	C				E	
Queue Length 50th (ft)	6	248		8	59	0	42	16		~283	97	
Queue Length 95th (ft)	10	337		17	79	0	61	21		#402	146	
Internal Link Dist (ft)	1544					353	435				712	
Turn Bay Length (ft)		135		100	100		120			220	220	
Base Capacity (vph)	572	2556		176	513	1	422	580		269	2580	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.08	0.59		0.06	0.13	53.00	0.12	0.28		1.29	0.31	

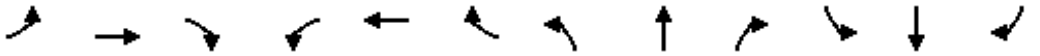
Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 139 (99%), Referenced to phase 2:SWL and 6:NBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: Err			
Intersection Signal Delay: Err		Intersection LOS: F	
Intersection Capacity Utilization Err%		ICU Level of Service H	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.

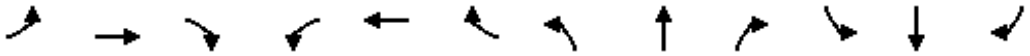
Queue shown is maximum after two cycles.

Splits and Phases: 24: S Royal Oaks & Riverside Dr & Center Point Pl





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	206	1108	63	985	1174	269	141	371	1002	316	469	178
Future Volume (vph)	206	1108	63	985	1174	269	141	371	1002	316	469	178
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	12	11	12	13	12	13	13	11	11	11
Grade (%)		0%			0%			1%			0%	
Storage Length (ft)	200		300	285		0	195		450	220		650
Storage Lanes	2		1	2		1	2		2	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.91	0.91	0.97	0.95	1.00	0.97	0.95	0.88	0.97	0.95	0.95
Frt		0.991				0.850			0.850		0.953	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	3467	4923	0	3351	3539	1652	3484	3712	2894	3385	3326	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	3467	4923	0	3351	3539	1652	3484	3712	2894	3385	3326	0
Right Turn on Red			Yes			Yes			No			Yes
Satd. Flow (RTOR)		7				87					43	
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		350			691			792			964	
Travel Time (s)		6.0			11.8			18.0			21.9	
Peak Hour Factor	0.92	0.93	0.81	0.87	0.91	0.89	0.74	0.83	0.89	0.83	0.95	0.80
Heavy Vehicles (%)	1%	1%	0%	1%	2%	1%	0%	0%	1%	0%	0%	0%
Adj. Flow (vph)	224	1191	78	1132	1290	302	191	447	1126	381	494	223
Shared Lane Traffic (%)												
Lane Group Flow (vph)	224	1269	0	1132	1290	302	191	447	1126	381	717	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		30			24			30			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.04	1.00	1.04	1.00	0.96	1.01	0.96	0.96	1.04	1.04	1.04
Turning Speed (mph)	18		10	18		10	18		10	18		10
Number of Detectors	1	1		1	1	0	1	2	1	1	2	
Detector Template												
Leading Detector (ft)	42	236		42	236	0	42	146	42	42	146	
Trailing Detector (ft)	-3	230		-3	230	0	-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	230		-3	230	230	-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	6		45	6	6	45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)								140			140	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	

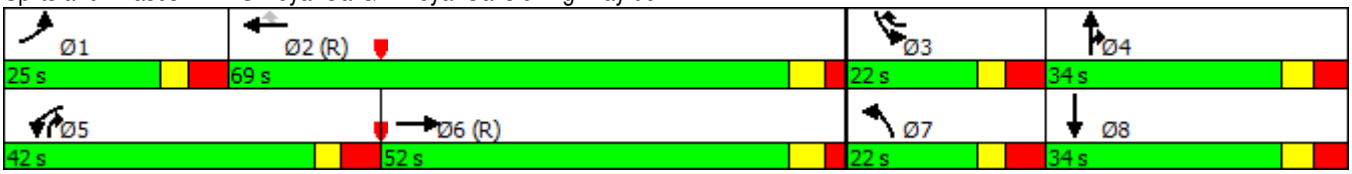


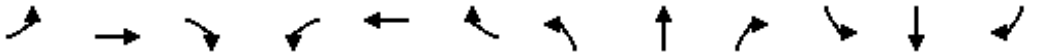
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	pt+ov	Prot	NA	
Protected Phases	1	6		5	2	3	7	4	4 5	3	8	
Permitted Phases						2						
Detector Phase	1	6		5	2	3	7	4	4 5	3	8	
Switch Phase												
Minimum Initial (s)	6.0	13.0		6.0	13.0	6.0	6.0	10.0		6.0	10.0	
Minimum Split (s)	25.0	52.0		42.0	69.0	22.0	22.0	34.0		22.0	34.0	
Total Split (s)	25.0	52.0		42.0	69.0	22.0	22.0	34.0		22.0	34.0	
Total Split (%)	16.7%	34.7%		28.0%	46.0%	14.7%	14.7%	22.7%		14.7%	22.7%	
Maximum Green (s)	17.5	45.5		34.5	62.5	14.5	14.5	26.5		14.5	26.5	
Yellow Time (s)	3.0	4.0		3.0	4.0	3.0	3.0	3.5		3.0	3.5	
All-Red Time (s)	4.5	2.5		4.5	2.5	4.5	4.5	4.0		4.5	4.0	
Lost Time Adjust (s)	-2.5	-2.5		-2.5	-2.5	-2.0	-2.0	-3.0		-2.0	-3.0	
Total Lost Time (s)	5.0	4.0		5.0	4.0	5.5	5.5	4.5		5.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	6.0		3.0	6.0	3.0	3.0	4.5		3.0	4.5	
Recall Mode	None	C-Min		None	C-Min	None	None	None		None	None	
Walk Time (s)		7.0			7.0			7.0			7.0	
Flash Dont Walk (s)		37.0			24.0			36.0			36.0	
Pedestrian Calls (#/hr)		0			0			0			0	
Act Effct Green (s)	17.3	48.0		37.0	67.7	88.2	14.9	29.5	71.0	16.5	31.1	
Actuated g/C Ratio	0.12	0.32		0.25	0.45	0.59	0.10	0.20	0.47	0.11	0.21	
v/c Ratio	0.56	0.80		1.37	0.81	0.30	0.55	0.61	0.82	1.02	0.99	
Control Delay	68.2	51.1		205.3	32.2	12.8	59.8	67.4	45.2	117.0	86.1	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	68.2	51.1		205.3	32.2	12.8	59.8	67.4	45.3	117.0	86.1	
LOS	E	D		F	C	B	E	E	D	F	F	
Approach Delay		53.7			102.0			52.4			96.8	
Approach LOS		D			F			D			F	
Queue Length 50th (ft)	108	415		~750	651	140	92	235	454	~203	~360	
Queue Length 95th (ft)	151	475		m#569	m436	m122	m109	m268	m570	#272	#512	
Internal Link Dist (ft)		270			611			712			884	
Turn Bay Length (ft)	200			285			195		450	220		
Base Capacity (vph)	462	1580		826	1598	1007	383	730	1369	372	724	
Starvation Cap Reductn	0	0		0	0	0	0	0	5	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.48	0.80		1.37	0.81	0.30	0.50	0.61	0.83	1.02	0.99	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 26 (17%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.37			
Intersection Signal Delay: 78.6		Intersection LOS: E	

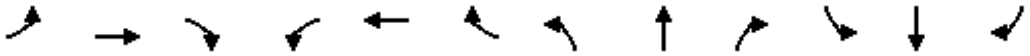
Intersection Capacity Utilization 90.4% ICU Level of Service E
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 7: S Royal Oaks/N Royal Oaks & Highway 96





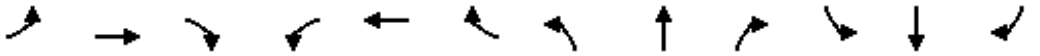
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	2005	488	285	928	0	0	0	0	914	0	1455
Future Volume (vph)	0	2005	488	285	928	0	0	0	0	914	0	1455
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	12	12	11	12	12	12	12	12	12	11
Grade (%)		0%			0%			0%			1%	
Storage Length (ft)	0		0	420		0	0		0	350		0
Storage Lanes	0		1	0		0	0		0	2		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	1.00	0.86	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	0.88
Frt			0.850									0.850
Flt Protected				0.950						0.950		
Satd. Flow (prot)	0	6408	1583	1787	3455	0	0	0	0	3450	0	2707
Flt Permitted				0.950						0.950		
Satd. Flow (perm)	0	6408	1583	1787	3455	0	0	0	0	3450	0	2707
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			399									134
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		501			556			756			888	
Travel Time (s)		8.5			9.5			20.6			24.2	
Peak Hour Factor	1.00	0.93	0.78	0.71	0.86	1.00	1.00	1.00	1.00	0.87	1.00	0.88
Heavy Vehicles (%)	2%	2%	2%	1%	1%	2%	2%	2%	2%	1%	2%	1%
Adj. Flow (vph)	0	2156	626	401	1079	0	0	0	0	1051	0	1653
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	2156	626	401	1079	0	0	0	0	1051	0	1653
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.04	1.00	1.00	1.00	1.00	1.01	1.01	1.05
Turning Speed (mph)	15		12	15		9	15		9	18		12
Number of Detectors		1	0	1	1					1		1
Detector Template												
Leading Detector (ft)		300	0	42	300					42		42
Trailing Detector (ft)		294	0	-3	294					-3		-3
Detector 1 Position(ft)		294	-3	-3	294					-3		-3
Detector 1 Size(ft)		6	45	45	6					45		45
Detector 1 Type		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex					Cl+Ex		Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Queue (s)		0.0	0.0	0.0	0.0					0.0		0.0
Detector 1 Delay (s)		0.0	0.0	0.0	0.0					0.0		0.0
Turn Type		NA	Perm	Prot	NA					Prot		Prot
Protected Phases		6		5	2					4		4
Permitted Phases			6									
Detector Phase		6	6	5	2					4		4
Switch Phase												



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)		25.0	25.0	5.0	25.0					15.0		15.0
Minimum Split (s)		55.0	55.0	30.0	85.0					65.0		65.0
Total Split (s)		55.0	55.0	30.0	85.0					65.0		65.0
Total Split (%)		36.7%	36.7%	20.0%	56.7%					43.3%		43.3%
Maximum Green (s)		49.0	49.0	24.0	79.0					57.5		57.5
Yellow Time (s)		4.0	4.0	3.0	4.0					4.0		4.0
All-Red Time (s)		2.0	2.0	3.0	2.0					3.5		3.5
Lost Time Adjust (s)		-2.0	-2.0	-1.0	-2.0					-2.0		-2.0
Total Lost Time (s)		4.0	4.0	5.0	4.0					5.5		5.5
Lead/Lag		Lag	Lag	Lead								
Lead-Lag Optimize?												
Vehicle Extension (s)		4.5	4.5	3.0	4.5					3.0		3.0
Recall Mode		C-Min	C-Min	None	C-Min					None		None
Act Effct Green (s)		51.0	51.0	25.0	81.0					59.5		59.5
Actuated g/C Ratio		0.34	0.34	0.17	0.54					0.40		0.40
v/c Ratio		0.99	0.78	1.35	0.58					0.77		1.43
Control Delay		57.0	16.7	224.3	29.1					43.9		231.7
Queue Delay		0.0	0.0	0.0	1.3					1.2		0.0
Total Delay		57.0	16.7	224.3	30.5					45.0		231.7
LOS		E	B	F	C					D		F
Approach Delay		47.9			83.0							
Approach LOS		D			F							
Queue Length 50th (ft)		637	110	~525	329					457		~1200
Queue Length 95th (ft)		m#692	m118	#521	468					515		#1305
Internal Link Dist (ft)		421			476			676			808	
Turn Bay Length (ft)				420						350		
Base Capacity (vph)		2178	801	297	1865					1368		1154
Starvation Cap Reductn		0	0	0	535					0		0
Spillback Cap Reductn		0	0	0	0					136		0
Storage Cap Reductn		0	0	0	0					0		0
Reduced v/c Ratio		0.99	0.78	1.35	0.81					0.85		1.43

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 42 (28%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.43			
Intersection Signal Delay: 98.6		Intersection LOS: F	
Intersection Capacity Utilization 84.9%		ICU Level of Service E	
Analysis Period (min) 15			
~ Volume exceeds capacity, queue is theoretically infinite.			
Queue shown is maximum after two cycles.			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 8: Ent ramp to I-65/Exit ramp from I-65 & Highway 96

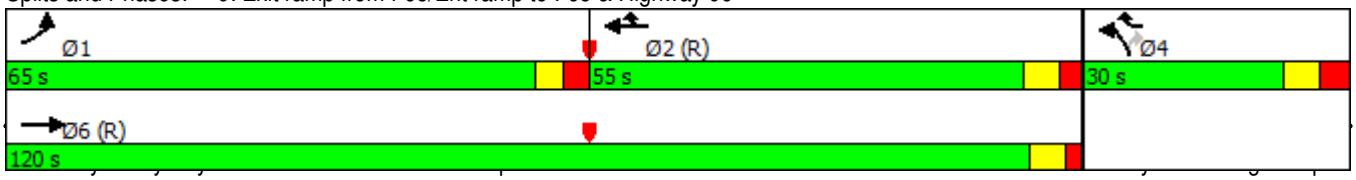


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	622	2297	0	0	897	998	316	0	164	0	0	0
Future Volume (vph)	622	2297	0	0	897	998	316	0	164	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	11	11	12	12	12	12	11	12	13	12	12	12
Grade (%)		1%			0%			1%			0%	
Storage Length (ft)	0		0	0		0	270		0	0		0
Storage Lanes	2		0	0		2	2		1	0		0
Taper Length (ft)	50			50			50			50		
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	0.88	0.97	1.00	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected	0.950						0.950					
Satd. Flow (prot)	3270	3371	0	0	3539	2787	3302	0	1597	0	0	0
Flt Permitted	0.950						0.950					
Satd. Flow (perm)	3270	3371	0	0	3539	2787	3302	0	1597	0	0	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						223			69			
Link Speed (mph)		40			40			25			25	
Link Distance (ft)		556			1845			685			941	
Travel Time (s)		9.5			31.4			18.7			25.7	
Peak Hour Factor	0.97	0.98	1.00	0.25	0.91	0.93	0.92	1.00	0.87	1.00	1.00	1.00
Heavy Vehicles (%)	3%	3%	2%	0%	2%	2%	2%	2%	4%	2%	2%	2%
Adj. Flow (vph)	641	2344	0	0	986	1073	343	0	189	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	641	2344	0	0	986	1073	343	0	189	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		22			26			22			22	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.05	1.05	1.01	1.00	1.00	1.00	1.05	1.01	0.96	1.00	1.00	1.00
Turning Speed (mph)	18		9	15		10	15		15	15		9
Number of Detectors	1	1			1	0	1		1			
Detector Template												
Leading Detector (ft)	42	300			300	0	42		50			
Trailing Detector (ft)	-3	294			294	0	-3		0			
Detector 1 Position(ft)	-3	294			294	0	-3		0			
Detector 1 Size(ft)	45	6			6	50	45		50			
Detector 1 Type	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex			
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Queue (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Detector 1 Delay (s)	0.0	0.0			0.0	0.0	0.0		0.0			
Turn Type	Prot	NA			NA	custom	Prot		Perm			
Protected Phases	1	6			2	2 4	4					
Permitted Phases									4			
Detector Phase	1	6			2	2 4	4		4			
Switch Phase												

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Initial (s)	12.0	18.0			18.0		7.0		7.0			
Minimum Split (s)	65.0	120.0			55.0		30.0		30.0			
Total Split (s)	65.0	120.0			55.0		30.0		30.0			
Total Split (%)	43.3%	80.0%			36.7%		20.0%		20.0%			
Maximum Green (s)	59.0	114.0			48.5		22.5		22.5			
Yellow Time (s)	3.0	4.0			4.0		4.0		4.0			
All-Red Time (s)	3.0	2.0			2.5		3.5		3.5			
Lost Time Adjust (s)	0.0	0.0			0.0		0.0		0.0			
Total Lost Time (s)	6.0	6.0			6.5		7.5		7.5			
Lead/Lag	Lead				Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	4.0	4.5			4.5		3.0		3.0			
Recall Mode	None	C-Min			C-Min		None		None			
Act Effct Green (s)	37.4	114.6			70.7	102.1	21.9		21.9			
Actuated g/C Ratio	0.25	0.76			0.47	0.68	0.15		0.15			
v/c Ratio	0.79	0.91			0.59	0.55	0.71		0.65			
Control Delay	79.8	22.6			32.0	11.0	70.0		48.9			
Queue Delay	0.0	7.5			0.0	0.0	0.3		0.0			
Total Delay	79.8	30.1			32.0	11.0	70.2		48.9			
LOS	E	C			C	B	E		D			
Approach Delay		40.7			21.0							
Approach LOS		D			C							
Queue Length 50th (ft)	340	582			368	219	166		112			
Queue Length 95th (ft)	m324	m495			487	330	222		190			
Internal Link Dist (ft)		476			1765			605			861	
Turn Bay Length (ft)							270					
Base Capacity (vph)	1286	2575			1668	1978	495		298			
Starvation Cap Reductn	0	224			0	0	0		0			
Spillback Cap Reductn	0	0			0	0	12		0			
Storage Cap Reductn	0	0			0	0	0		0			
Reduced v/c Ratio	0.50	1.00			0.59	0.54	0.71		0.63			

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 80 (53%), Referenced to phase 2:WBT and 6:EBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.91			
Intersection Signal Delay: 35.6		Intersection LOS: D	
Intersection Capacity Utilization 84.9%		ICU Level of Service E	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 9: Exit ramp from I-65/Ent ramp to I-65 & Highway 96



Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Lane Configurations												
Traffic Volume (vph)	92	827	41	147	55	118	104	36	123	196	765	145
Future Volume (vph)	92	827	41	147	55	118	104	36	123	196	765	145
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	8	11	11	11	11	12	12	13	12	12	12	12
Storage Length (ft)		70	150	75		0	100		195	180	0	
Storage Lanes		3	0	1		0	1		1	1	2	
Taper Length (ft)		50		50			50			50		
Lane Util. Factor	1.00	0.94	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.88	1.00
Frt		0.990			0.905				0.850		0.850	
Flt Protected	0.950	0.956		0.950			0.950			0.950		
Satd. Flow (prot)	1534	4806	0	1711	1630	0	1770	1925	1583	1770	2787	0
Flt Permitted	0.119	0.956		0.685			0.236			0.253		
Satd. Flow (perm)	192	4806	0	1233	1630	0	440	1925	1583	471	2787	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		105			52				127		105	
Link Speed (mph)		30			25			40		30		
Link Distance (ft)		552			721			918		1624		
Travel Time (s)		12.5			19.7			15.6		36.9		
Peak Hour Factor	0.67	0.94	0.63	0.79	0.58	0.73	0.75	0.58	0.92	0.75	0.75	0.69
Adj. Flow (vph)	137	880	65	186	95	162	139	62	134	261	1020	210
Shared Lane Traffic (%)												
Lane Group Flow (vph)	137	945	0	186	257	0	139	62	134	261	1230	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Right	Right
Median Width(ft)		41			12			12		12		
Link Offset(ft)		0			0			0		0		
Crosswalk Width(ft)		16			16			16		16		
Two way Left Turn Lane												
Headway Factor	1.20	1.04	1.04	1.04	1.04	1.00	1.00	0.96	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	15	9	15		9	15		9	15	9	9
Number of Detectors	1	1		1	1		1	1	1	1	1	
Detector Template												
Leading Detector (ft)	42	42		42	42		42	42	42	42	42	
Trailing Detector (ft)	-3	-3		-3	-3		-3	-3	-3	-3	-3	
Detector 1 Position(ft)	-3	-3		-3	-3		-3	-3	-3	-3	-3	
Detector 1 Size(ft)	45	45		45	45		45	45	45	45	45	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	pm+pt	Prot		D.P+P	NA		D.P+P	NA	custom	pm+pt	Prot	
Protected Phases	1	6		3	8		7	4	5	5	2	
Permitted Phases	6			4			8		8	2		
Detector Phase	1	6		3	8		7	4	5	5	2	
Switch Phase												
Minimum Initial (s)	7.0	20.0		7.0	7.0		7.0	7.0	7.0	7.0	20.0	
Minimum Split (s)	18.0	57.0		14.0	35.0		14.0	35.0	14.0	14.0	53.0	

Lane Group	EBL2	EBL	EBR	SEL	SET	SER	NWL	NWT	NWR	SWL	SWR	SWR2
Total Split (s)	19.0	77.0		14.0	35.0		14.0	35.0	24.0	24.0	82.0	
Total Split (%)	12.7%	51.3%		9.3%	23.3%		9.3%	23.3%	16.0%	16.0%	54.7%	
Maximum Green (s)	13.0	71.0		8.5	29.0		8.5	29.0	18.0	18.0	76.0	
Yellow Time (s)	3.0	4.0		3.5	3.5		3.5	3.5	3.0	3.0	4.0	
All-Red Time (s)	3.0	2.0		2.0	2.5		2.0	2.5	3.0	3.0	2.0	
Lost Time Adjust (s)	-2.5	-1.5		-2.5	-2.5		-2.5	-2.5	-2.5	-2.5	-1.5	
Total Lost Time (s)	3.5	4.5		3.0	3.5		3.0	3.5	3.5	3.5	4.5	
Lead/Lag	Lead	Lag		Lead	Lag		Lead	Lag	Lead	Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	1.5	5.0		1.5	3.5		1.5	3.5	1.5	1.5	5.0	
Recall Mode	None	C-Min		None	None		None	None	None	None	C-Min	
Act Effct Green (s)	96.7	83.0		38.6	26.6		38.0	24.8	45.1	101.1	85.2	
Actuated g/C Ratio	0.64	0.55		0.26	0.18		0.25	0.17	0.30	0.67	0.57	
v/c Ratio	0.58	0.35		0.51	0.78		0.67	0.19	0.24	0.58	0.76	
Control Delay	22.9	17.7		49.6	62.4		58.6	52.5	7.0	17.2	11.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	22.9	17.7		49.6	62.4		58.6	52.5	7.0	17.2	11.1	
LOS	C	B		D	E		E	D	A	B	B	
Approach Delay		18.3			57.0			36.8		12.1		
Approach LOS		B			E			D		B		
Queue Length 50th (ft)	45	157		148	194		107	52	5	53	65	
Queue Length 95th (ft)	56	215		185	153		133	59	50	26	56	
Internal Link Dist (ft)		472			641			838		1544		
Turn Bay Length (ft)	70	70		75			100		195	180		
Base Capacity (vph)	265	2704		366	383		209	404	617	499	1629	
Starvation Cap Reductn	0	0		0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0		0	0	0	0	0	
Storage Cap Reductn	0	0		0	0		0	0	0	0	0	
Reduced v/c Ratio	0.52	0.35		0.51	0.67		0.67	0.15	0.22	0.52	0.76	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 16 (11%), Referenced to phase 2:SWL and 6:EBL, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 22.5		Intersection LOS: C	
Intersection Capacity Utilization 58.2%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 23: Oak Meadow Dr. & S Royal Oaks

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	90	1107	27	83	64	123	46	58	302	269	1133	93
Future Volume (vph)	90	1107	27	83	64	123	46	58	302	269	1133	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	11	11	12	12	11	12	12	11	12
Grade (%)	1%					-1%	2%				-2%	
Storage Length (ft)		135			100		120	0			220	0
Storage Lanes		3			1		1	1			2	0
Taper Length (ft)					50		50				50	
Lane Util. Factor	1.00	0.76	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95
Frt		0.850						0.850			0.987	
Flt Protected				0.950	0.950		0.950			0.950	0.956	
Satd. Flow (prot)	1764	3505	0	1736	1754	0	1752	1546	0	1805	3365	0
Flt Permitted	0.144			0.160	0.950		0.672			0.098	0.956	
Satd. Flow (perm)	254	3505	0	292	1754	0	1239	1546	0	186	3365	0
Right Turn on Red			Yes						Yes			Yes
Satd. Flow (RTOR)		124						168			76	
Link Speed (mph)	30					30	30				30	
Link Distance (ft)	1624					433	515				792	
Travel Time (s)	36.9					9.8	11.7				18.0	
Peak Hour Factor	0.79	0.95	0.64	0.86	0.71	0.82	0.75	0.88	0.94	0.75	0.90	0.76
Heavy Vehicles (%)	0%	1%	2%	1%	0%	0%	2%	0%	0%	1%	1%	0%
Adj. Flow (vph)	114	1165	42	97	90	150	61	66	321	359	1259	122
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	1207	0	97	90	150	61	387	0	359	1381	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Left	Left	Right	Right	Left	Left	Right
Median Width(ft)	22					22	12				35	
Link Offset(ft)	0					0	0				0	
Crosswalk Width(ft)	16					16	16				16	
Two way Left Turn Lane												
Headway Factor	1.10	1.05	1.01	1.04	1.04	0.99	1.01	1.06	1.01	0.99	1.03	0.99
Turning Speed (mph)		9	9	15	15		15	9	9	15	15	9
Number of Detectors	1	1		1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	42	226		42	42	50	42	42		42	226	
Trailing Detector (ft)	-3	220		-3	-3	0	-3	-3		-3	220	
Detector 1 Position(ft)	-3	220		-3	-3	0	-3	-3		-3	220	
Detector 1 Size(ft)	45	6		45	45	50	45	45		45	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	NA	custom		custom	Prot	NA	D.Pm	Prot		pm+pt	Prot	
Protected Phases	1	6			4	2!		8		5	2!	
Permitted Phases	6			8			4			2		
Detector Phase	1	6		8	4	2	4	8		5	2	
Switch Phase												

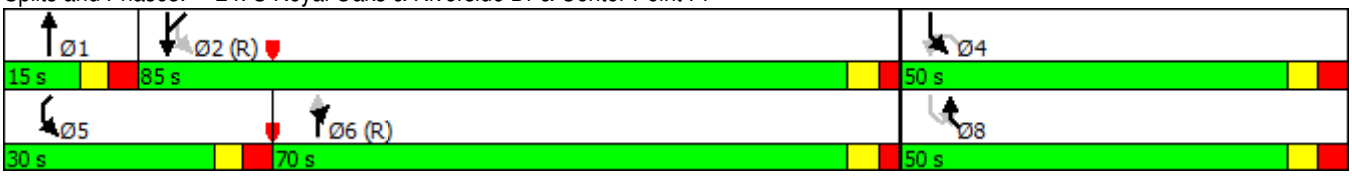
Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Minimum Initial (s)	5.0	10.0		7.0	7.0	10.0	7.0	7.0		5.0	10.0	
Minimum Split (s)	15.0	70.0		50.0	50.0	85.0	50.0	50.0		30.0	85.0	
Total Split (s)	15.0	70.0		50.0	50.0	85.0	50.0	50.0		30.0	85.0	
Total Split (%)	10.0%	46.7%		33.3%	33.3%	56.7%	33.3%	33.3%		20.0%	56.7%	
Maximum Green (s)	8.5	64.0		43.0	43.0	79.0	43.0	43.0		23.5	79.0	
Yellow Time (s)	3.0	3.5		3.5	3.5	3.5	3.5	3.5		3.0	3.5	
All-Red Time (s)	3.5	2.5		3.5	3.5	2.5	3.5	3.5		3.5	2.5	
Lost Time Adjust (s)	-1.0	-3.0		-2.5	-2.5		-2.5	-2.5		-1.0	-3.0	
Total Lost Time (s)	5.5	3.0		4.5	4.5		4.5	4.5		5.5	3.0	
Lead/Lag	Lead	Lag				Lag				Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.5	3.5		3.5	3.5	3.5	3.5	3.5		3.5	3.5	
Recall Mode	None	C-Min		None	None	C-Min	None	None		None	C-Min	
Walk Time (s)		7.0		8.0	8.0	7.0	8.0	8.0			7.0	
Flash Dont Walk (s)		16.0		35.0	32.0	20.0	32.0	35.0			20.0	
Pedestrian Calls (#/hr)		0		0	0	0	0	0			0	
Act Effct Green (s)	81.5	74.9		37.6	37.6	0.0	37.6	37.6		102.4	90.3	
Actuated g/C Ratio	0.54	0.50		0.25	0.25	0.00	0.25	0.25		0.68	0.60	
v/c Ratio	0.50	0.67		1.33	0.21	no cap	0.20	0.75		0.92	0.67	
Control Delay	28.8	37.6		261.2	43.0		42.8	37.5		63.2	3.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.8	
Total Delay	28.8	37.6		261.2	43.0	Error	42.8	37.5		63.2	4.0	
LOS	C	D		F	D	F	D	D		E	A	
Approach Delay	36.8					Err	38.2				16.2	
Approach LOS	D					F	D				B	
Queue Length 50th (ft)	45	282		~115	67	0	46	198		245	41	
Queue Length 95th (ft)	101	552		#216	87	0	69	299		m184	m17	
Internal Link Dist (ft)	1544					353	435				712	
Turn Bay Length (ft)		135		100	100		120			220	220	
Base Capacity (vph)	234	1812		88	532	1	375	585		391	2056	
Starvation Cap Reductn	0	0		0	0	0	0	0		0	345	
Spillback Cap Reductn	0	0		0	0	0	0	0		0	0	
Storage Cap Reductn	0	0		0	0	0	0	0		0	0	
Reduced v/c Ratio	0.49	0.67		1.10	0.17	150.00	0.16	0.66		0.92	0.81	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 136 (91%), Referenced to phase 2:SBSW and 6:NBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: Err			
Intersection Signal Delay: Err		Intersection LOS: F	
Intersection Capacity Utilization Err%		ICU Level of Service H	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.
! Phase conflict between lane groups.

Splits and Phases: 24: S Royal Oaks & Riverside Dr & Center Point Pl



HCS 2010 Two-Way Stop Control Summary Report

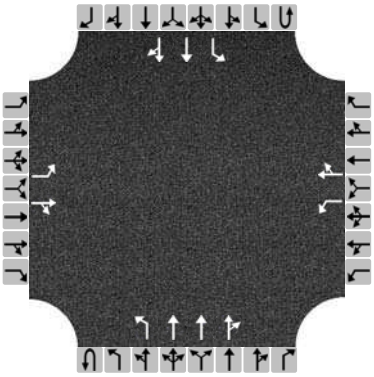
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	AM Peak Hour
Intersection Orientation	North-South
Project Description	10728 (Total)

Site Information

Intersection	S. Royal Oaks and Rand
Jurisdiction	Franklin, TN
East/West Street	Rand Pl / Home Depot
North/South Street	S. Royal Oaks Blvd
Peak Hour Factor	0.97
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		1	1	0		1	1	0	0	1	3	0	0	1	2	0
Configuration		L		TR		L		TR		L	T	TR		L	T	TR
Volume (veh/h)		26	1	9		14	0	40		10	1447	25		64	659	51
Percent Heavy Vehicles		0	0	0		0	0	0		0				0		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left + Thru															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		27		10		14		41		10				66		
Capacity		171		387		98		354		882				446		
v/c Ratio		0.16		0.03		0.14		0.12		0.01				0.15		
95% Queue Length		0.5		0.1		0.5		0.4		0.0				0.5		
Control Delay (s/veh)		30.0		14.5		47.8		16.5		9.1				14.5		
Level of Service (LOS)		D		B		E		C		A				B		
Approach Delay (s/veh)	25.8				24.5				0.1				1.2			
Approach LOS	D				C				A				A			

HCS 2010 Two-Way Stop Control Summary Report

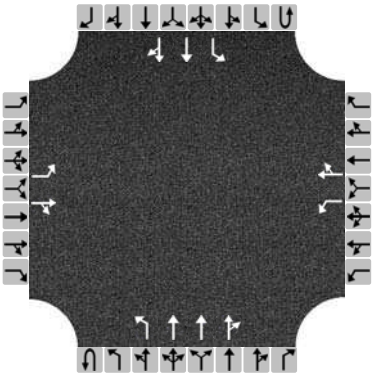
General Information

Analyst	FTG
Agency/Co.	FTG
Date Performed	Mar 2016
Analysis Year	2016
Time Analyzed	PM Peak Hour
Intersection Orientation	North-South
Project Description	10728 (Total)

Site Information

Intersection	S. Royal Oaks and Rand
Jurisdiction	Franklin, TN
East/West Street	Rand Pl / Home Depot
North/South Street	S. Royal Oaks Blvd
Peak Hour Factor	0.96
Analysis Time Period (hrs)	0.25

Lanes



Major Street: North-South

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority		10	11	12		7	8	9	1U	1	2	3	4U	4	5	6
Number of Lanes		1	1	0		1	1	0	0	1	3	0	0	1	2	0
Configuration		L		TR		L		TR		L	T	TR		L	T	TR
Volume (veh/h)		26	3	16		21	4	52		6	1016	17		45	1023	105
Percent Heavy Vehicles		0	0	0		0	0	0		0				0		
Proportion Time Blocked																
Right Turn Channelized	No				No				No				No			
Median Type	Left + Thru															
Median Storage	1															

Delay, Queue Length, and Level of Service

Flow Rate (veh/h)		27		20		22		58		6				47		
Capacity		138		328		156		413		602				656		
v/c Ratio		0.20		0.06		0.14		0.14		0.01				0.07		
95% Queue Length		0.7		0.2		0.5		0.5		0.0				0.2		
Control Delay (s/veh)		37.4		16.7		31.9		15.1		11.0				10.9		
Level of Service (LOS)		E		C		D		C		B				B		
Approach Delay (s/veh)	28.6				19.8				0.1				0.4			
Approach LOS	D				C				A				A			

APPENDIX D
TRIP GENERATION

TRIP GENERATION CALCULATIONS – Assisted Living

The following calculations are based on the data compiled for ITE Land Use Code 254.

Average Daily Traffic

T = 2.74 (X)
T = 2.74 (**208**)
T = 570 vehicles

Enter = 0.50 (570) = 285 vehicles
Exit = 0.50 (570) = 285 vehicles

AM traffic during peak hour of adjacent street

T = 0.23 (X)
T = 0.23 (**208**)
T = 47 vehicles

Enter = 0.72 (47) = 34 vehicles
Exit = 0.28 (47) = 13 vehicles

PM traffic during peak hour of adjacent street

T = 0.37 (X)
T = 0.37 (**208**)
T = 77 vehicles

Enter = 0.39 (77) = 30 vehicles
Exit = 0.61 (77) = 47 vehicles

TRIP GENERATION CALCULATIONS – Multi-Family (North)

The following calculations are based on the data compiled for ITE Land Use Code 220.

Average Daily Traffic

T = 6.65 (X)
T = 6.65 (**240**)
T = 1,596 vehicle-trips

Enter = 0.50 (1,596) = 798 vehicles
Exit = 0.50 (1,596) = 798 vehicles

A.M. traffic during peak hour of adjacent street

T = 0.51 (X)
T = 0.51 (**240**)
T = 122 vehicle-trips

Enter = 0.20 (122) = 24 vehicles
Exit = 0.80 (122) = 98 vehicles

P.M. traffic during peak hour of adjacent street

T = 0.62 (X)
T = 0.62 (**240**)
T = 149 vehicle-trips

Enter = 0.65 (149) = 97 vehicles
Exit = 0.35 (149) = 52 vehicles

TRIP GENERATION CALCULATIONS – Multi-Family (South)

The following calculations are based on the data compiled for ITE Land Use Code 220.

Average Daily Traffic

T = 6.65 (X)
T = 6.65 (**115**)
T = 764 vehicle-trips

Enter = 0.50 (764) = 382 vehicles
Exit = 0.50 (764) = 382 vehicles

A.M. traffic during peak hour of adjacent street

T = 0.51 (X)
T = 0.51 (**115**)
T = 59 vehicle-trips

Enter = 0.20 (59) = 12 vehicles
Exit = 0.80 (59) = 47 vehicles

P.M. traffic during peak hour of adjacent street

T = 0.62 (X)
T = 0.62 (**115**)
T = 71 vehicle-trips

Enter = 0.65 (71) = 46 vehicles
Exit = 0.35 (71) = 25 vehicles

NEEL-SCHAFFER
Solutions you can build upon

engineers
planners
surveyors
environmental scientists
landscape architects

April 14, 2016
N-S Project No. 13194.001

Mr. Carl Baughman, P.E.
Traffic/Transportation Engineer
City of Franklin
109 3rd Avenue South
P. O. Box 305
Franklin, TN 37065-0305

Subject: Review of Updated Traffic Impact Study
Epoch Apartments – Oak Meadow Drive

Dear Carl:

Per your request, we have completed a review of the updated traffic study for the referenced proposed project. In response to staff and Neel-Schaffer comments, the applicant submitted a revised traffic study. This correspondence documents our follow-up remarks on the updated report.

- For the intersection of S. Royal Oaks Blvd and Riverside Dr., the study provided additional comments as requested (in new section 5.4 and updated section 6.0) about modifying the phasing of the traffic signal. The report addressed comments regarding the possibility of changing the signal phasing from its existing concurrent permissive-only side street phasing to protected-permitted left turn phasing. The study reported that the existing concurrent phasing results in more efficient (lower delay) operation, but that protected-permissive phasing might reduce driver indecision thereby allowing side street drivers to make more definitive turning movements. Our review did not find details documenting the protected-permissive phasing alternative in the appendix.

  We request, in conjunction with staff, that the study provide analysis print-outs in the appendix documenting the protected-permissive scenario. We desire to compare the AM and PM peak results of the two phasing options.

- The study, as requested, provided additional remarks (in new section 5.4) regarding level-of-service operation of Murfreesboro Rd at I-65 NB and SB ramps. The study attributed the continued unsatisfactory peak period levels-of-service to the significant traffic volumes traveling through the intersections/corridor. As mentioned in our original review memo, but not further addressed in the updated study, continued monitoring and updated traffic signal timings can help provide some mitigation.

- For the Eastern Home Depot Access Road and Project Access for the Northern Apartments intersection, we have two suggestions as potential improvement measures. First, we would recommend a more direct (less angled) connection between the apartment complex area and the Home Depot Access road. Also, we suggest that there be separate westbound left and right exit lanes (i.e. three-lane cross section) at the driveway intersection. The updated traffic study did not comment or address these remarks from the original review.

- For the Oak Meadow Drive and Eastern Project Access / Home Depot Access intersection, the updated traffic study did not address our original comments:
  - Emphasis that the design process consider and provide appropriate intersection sight distance for drivers exiting the south (NB) driveway access (recognizing the horizontal curve just to the east of the intersection)
  - Emphasis on addressing possible sight distance limitations for drivers traveling northbound/westbound on Oak Meadow Drive approaching the eastern driveway intersection. Proposed measures could include new signs, proper design/placement of proposed landscaping and removal of existing vegetation/overgrowth.
  - We recommend that the eastbound and westbound approaches of Oak Meadow Drive be modified to provide dedicated left-turn lanes as described in our original review

- For the Oak Meadow Drive and Western Project Access / Home Depot Access intersection, the updated traffic study did not address our original comments:
  - Recommendation of re-application of pavement markings on the Home Depot access road, including double-yellow centerline
  - Recommendation to modify the eastbound and westbound approaches of Oak Meadow Drive to provide dedicated left-turn lanes as described in our original review

- For the S. Royal Oaks Boulevard and Rand Place / Home Depot Access Road intersection, the updated traffic study did not address our original comments:
  - Recommendation for re-application of the westbound approach pavement markings as noted in our original review
  - We also suggest consideration be given to modifying the lane assignments for the westbound approach. Because of the predominant westbound right-turn movement, we suggest that the outside (curb) lane be converted to a right-turn only lane with the inside lane operating as a shared through-left lane. If pursued, this change would require new lane line pavement markings, turn arrow pavement markings and signing as mentioned in the original review

- Regarding Oak Meadow Drive, we suggest consideration be given to lowering the posted speed limit. We believe it may be appropriate to lower the speed limit along Oak Meadow Drive between S. Royal Oaks Blvd and the Home Depot eastern access driveway (currently 40mph) due to the proposed increase in active driveway connections and traffic volumes.

- The revised traffic study updated and/or adequately addressed all other comments provided in Neel-Schaffer's original review.

We appreciate the opportunity to provide our review comments and participate in the planning process. Please let us know if you need any additional information or have any questions.

Sincerely,
NEEL-SCHAFFER, INC.

Gregory Judy, P.E., PTOE
Engineer Manager

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	28	1198	103	6	46	41	33	12	96	267	747	25
Future Volume (vph)	28	1198	103	6	46	41	33	12	96	267	747	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	11	11	12	12	11	12	12	11	12
Grade (%)	1%					-1%	2%				-2%	
Storage Length (ft)		135			100		120	0			220	0
Storage Lanes		3			1		1	1			2	0
Taper Length (ft)					50		50				50	
Lane Util. Factor	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95
Frt		0.850	0.850					0.850			0.993	
Flt Protected				0.950	0.950		0.950			0.950	0.955	
Satd. Flow (prot)	1764	2707	1607	1754	1580	0	1787	1486	0	1787	3343	0
Flt Permitted	0.351			0.423	0.950		0.691			0.137	0.955	
Satd. Flow (perm)	619	2707	1607	781	1580	0	1300	1486	0	258	3343	0
Right Turn on Red			Yes						Yes			Yes
Satd. Flow (RTOR)			82					112			82	
Link Speed (mph)	30					30	30				30	
Link Distance (ft)	1624					433	515				792	
Travel Time (s)	36.9					9.8	11.7				18.0	
Peak Hour Factor	0.63	0.92	0.87	0.58	0.68	0.77	0.67	0.63	0.86	0.80	0.99	0.67
Heavy Vehicles (%)	0%	1%	0%	0%	11%	0%	0%	10%	3%	2%	2%	4%
Adj. Flow (vph)	44	1302	118	10	68	53	49	19	112	334	755	37
Shared Lane Traffic (%)												
Lane Group Flow (vph)	44	1302	118	10	68	53	49	131	0	334	792	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Left	Left	Right	Right	Left	Left	Right
Median Width(ft)	22					22	12				35	
Link Offset(ft)	0					0	0				0	
Crosswalk Width(ft)	16					16	16				16	
Two way Left Turn Lane												
Headway Factor	1.10	1.05	1.01	1.04	1.04	0.99	1.01	1.06	1.01	0.99	1.03	0.99
Turning Speed (mph)		9	9	15	15		15	9	9	15	15	9
Number of Detectors	1	1	0	1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	42	226	0	42	42	50	42	42		42	226	
Trailing Detector (ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Position(ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Size(ft)	45	6	50	45	45	50	45	45		45	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	NA	custom	custom	custom	Prot	NA	D.Pm	Prot		pm+pt	Prot	
Protected Phases	1	6			4			8		5	2	
Permitted Phases	6		6	8			4			2		
Detector Phase	1	6		8	4		4	8		5	2	
Switch Phase												

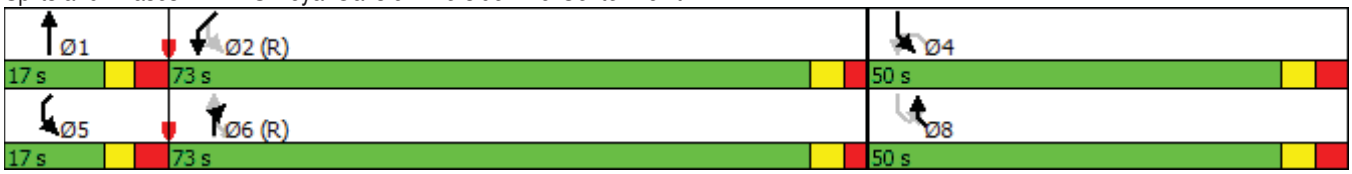
Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Minimum Initial (s)	5.0	10.0	10.0	7.0	7.0		7.0	7.0		5.0	10.0	
Minimum Split (s)	17.0	73.0	73.0	50.0	50.0		50.0	50.0		17.0	73.0	
Total Split (s)	17.0	73.0	73.0	50.0	50.0		50.0	50.0		17.0	73.0	
Total Split (%)	12.1%	52.1%	52.1%	35.7%	35.7%		35.7%	35.7%		12.1%	52.1%	
Maximum Green (s)	10.5	67.0	67.0	43.0	43.0		43.0	43.0		10.5	67.0	
Yellow Time (s)	3.0	3.5	3.5	3.5	3.5		3.5	3.5		3.0	3.5	
All-Red Time (s)	3.5	2.5	2.5	3.5	3.5		3.5	3.5		3.5	2.5	
Lost Time Adjust (s)	-1.0	-3.0	-3.0	-2.5	-2.5		-2.5	-2.5		-1.0	-3.0	
Total Lost Time (s)	5.5	3.0	3.0	4.5	4.5		4.5	4.5		5.5	3.0	
Lead/Lag	Lead	Lag	Lag							Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
Recall Mode	None	C-Min	C-Min	None	None		None	None		None	C-Min	
Walk Time (s)		7.0	7.0	8.0	8.0		8.0	8.0			7.0	
Flash Dont Walk (s)		16.0	16.0	35.0	32.0		32.0	35.0			20.0	
Pedestrian Calls (#/hr)		0	0	0	0		0	0			0	
Act Effct Green (s)	106.2	101.1	101.1	14.4	14.4	0.0	14.4	14.4		114.1	107.4	
Actuated g/C Ratio	0.76	0.72	0.72	0.10	0.10	0.00	0.10	0.10		0.82	0.77	
v/c Ratio	0.08	0.67	0.10	0.12	0.42	no cap	0.37	0.52		1.00	0.31	
Control Delay	3.3	13.0	2.6	58.5	65.8		65.1	21.2		70.3	8.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	3.3	13.0	2.6	58.5	65.8	Error	65.1	21.2		70.3	8.3	
LOS	A	B	A	E	E	F	E	C		E	A	
Approach Delay	11.9					Err	33.2				26.7	
Approach LOS	B					F	C				C	
90th %ile Green (s)	7.5	93.3	93.3	16.7	16.7		16.7	16.7		10.5	96.3	
90th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
70th %ile Green (s)	6.9	96.2	96.2	13.8	13.8		13.8	13.8		10.5	99.8	
70th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
50th %ile Green (s)	6.6	98.1	98.1	11.9	11.9		11.9	11.9		10.5	102.0	
50th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
30th %ile Green (s)	6.3	100.0	100.0	10.0	10.0		10.0	10.0		10.5	104.2	
30th %ile Term Code	Gap	Coord	Coord	Hold	Gap		Gap	Hold		Max	Coord	
10th %ile Green (s)	0.0	102.8	102.8	7.2	7.2		7.2	7.2		10.5	119.8	
10th %ile Term Code	Skip	Coord	Coord	Hold	Hold		Hold	Hold		Max	Coord	
Stops (vph)	6	624	11	6	41	0	30	25		205	368	
Fuel Used(gal)	0	22	1	0	1	0	1	1		7	8	
CO Emissions (g/hr)	28	1523	99	9	70	10	51	73		462	567	
NOx Emissions (g/hr)	6	296	19	2	14	2	10	14		90	110	
VOC Emissions (g/hr)	7	353	23	2	16	2	12	17		107	131	
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0		0	0	
Queue Length 50th (ft)	6	326	8	8	59	0	42	16		168	68	
Queue Length 95th (ft)	10	459	28	17	79	0	61	24		m#163	m336	
Internal Link Dist (ft)	1544					353	435				712	
Turn Bay Length (ft)		135	135	100	100		120			220	220	
Base Capacity (vph)	580	1954	1182	253	513	1	422	558		335	2583	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Reduced v/c Ratio	0.08	0.67	0.10	0.04	0.13	53.00	0.12	0.23		1.00	0.31	

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 140			
Offset: 139 (99%), Referenced to phase 2:SWL and 6:NBT, Start of Green			
Natural Cycle: 140			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: Err			
Intersection Signal Delay: Err		Intersection LOS: F	
Intersection Capacity Utilization Err%		ICU Level of Service H	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 24: S Royal Oaks & Riverside Dr & Center Point Pl



Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Lane Configurations												
Traffic Volume (vph)	90	1063	27	83	64	123	46	58	288	232	1063	93
Future Volume (vph)	90	1063	27	83	64	123	46	58	288	232	1063	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	10	11	12	11	11	12	12	11	12	12	11	12
Grade (%)	1%					-1%	2%				-2%	
Storage Length (ft)		135			100		120	0			220	0
Storage Lanes		3			1		1	1			2	0
Taper Length (ft)					50		50				50	
Lane Util. Factor	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.95
Frt		0.850	0.850					0.850			0.986	
Flt Protected				0.950	0.950		0.950			0.950	0.957	
Satd. Flow (prot)	1764	2707	1575	1736	1754	0	1752	1546	0	1805	3365	0
Flt Permitted	0.166			0.168	0.950		0.670			0.116	0.957	
Satd. Flow (perm)	293	2707	1575	307	1754	0	1236	1546	0	220	3365	0
Right Turn on Red			Yes						Yes			Yes
Satd. Flow (RTOR)			124					158			76	
Link Speed (mph)	30					30	30				30	
Link Distance (ft)	1624					433	515				792	
Travel Time (s)	36.9					9.8	11.7				18.0	
Peak Hour Factor	0.79	0.95	0.64	0.86	0.71	0.82	0.75	0.88	0.94	0.75	0.90	0.76
Heavy Vehicles (%)	0%	1%	2%	1%	0%	0%	2%	0%	0%	1%	1%	0%
Adj. Flow (vph)	114	1119	42	97	90	150	61	66	306	309	1181	122
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	1119	42	97	90	150	61	372	0	309	1303	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Right	Left	Left	Left	Left	Right	Right	Left	Left	Right
Median Width(ft)	22					22	12				35	
Link Offset(ft)	0					0	0				0	
Crosswalk Width(ft)	16					16	16				16	
Two way Left Turn Lane												
Headway Factor	1.10	1.05	1.01	1.04	1.04	0.99	1.01	1.06	1.01	0.99	1.03	0.99
Turning Speed (mph)		9	9	15	15		15	9	9	15	15	9
Number of Detectors	1	1	0	1	1	1	1	1		1	1	
Detector Template												
Leading Detector (ft)	42	226	0	42	42	50	42	42		42	226	
Trailing Detector (ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Position(ft)	-3	220	0	-3	-3	0	-3	-3		-3	220	
Detector 1 Size(ft)	45	6	50	45	45	50	45	45		45	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Turn Type	NA	custom	custom	custom	Prot	NA	D.Pm	Prot		pm+pt	Prot	
Protected Phases	1	6			4	2!		8		5	2!	
Permitted Phases	6		6	8			4			2		
Detector Phase	1	6		8	4	2	4	8		5	2	
Switch Phase												

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Minimum Initial (s)	5.0	10.0	10.0	7.0	7.0	10.0	7.0	7.0		5.0	10.0	
Minimum Split (s)	15.0	70.0	70.0	50.0	50.0	85.0	50.0	50.0		30.0	85.0	
Total Split (s)	14.0	72.0	72.0	49.0	49.0	87.0	49.0	49.0		29.0	87.0	
Total Split (%)	9.3%	48.0%	48.0%	32.7%	32.7%	58.0%	32.7%	32.7%		19.3%	58.0%	
Maximum Green (s)	7.5	66.0	66.0	42.0	42.0	81.0	42.0	42.0		22.5	81.0	
Yellow Time (s)	3.0	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.0	3.5	
All-Red Time (s)	3.5	2.5	2.5	3.5	3.5	2.5	3.5	3.5		3.5	2.5	
Lost Time Adjust (s)	-1.0	-3.0	-3.0	-2.5	-2.5		-2.5	-2.5		-1.0	-3.0	
Total Lost Time (s)	5.5	3.0	3.0	4.5	4.5		4.5	4.5		5.5	3.0	
Lead/Lag	Lead	Lag	Lag			Lag				Lead	Lag	
Lead-Lag Optimize?												
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	
Recall Mode	None	C-Min	C-Min	None	None	C-Min	None	None		None	C-Min	
Walk Time (s)		7.0	7.0	8.0	8.0	7.0	8.0	8.0			7.0	
Flash Dont Walk (s)		16.0	16.0	35.0	32.0	20.0	32.0	35.0			20.0	
Pedestrian Calls (#/hr)		0	0	0	0	0	0	0			0	
Act Effct Green (s)	84.9	79.0	79.0	36.4	36.4	0.0	36.4	36.4		103.6	92.2	
Actuated g/C Ratio	0.57	0.53	0.53	0.24	0.24	0.00	0.24	0.24		0.69	0.61	
v/c Ratio	0.46	0.79	0.05	1.31	0.21	no cap	0.20	0.75		0.82	0.62	
Control Delay	17.9	35.9	0.1	250.3	44.0		43.8	38.5		41.1	13.1	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	1.5	
Total Delay	17.9	35.9	0.1	250.3	44.0	Error	43.8	38.5		41.1	14.6	
LOS	B	D	A	F	D	F	D	D		D	B	
Approach Delay	33.1					Err	39.3				19.7	
Approach LOS	C					F	D				B	
90th %ile Green (s)	7.5	66.0	66.0	42.0	42.0	81.0	42.0	42.0		22.5	81.0	
90th %ile Term Code	Max	Coord	Coord	Max	Hold	Coord	Hold	Max		Max	Coord	
70th %ile Green (s)	7.5	66.0	66.0	42.0	42.0	81.0	42.0	42.0		22.5	81.0	
70th %ile Term Code	Max	Coord	Coord	Max	Hold	Coord	Hold	Max		Max	Coord	
50th %ile Green (s)	7.5	70.5	70.5	37.5	37.5	85.5	37.5	37.5		22.5	85.5	
50th %ile Term Code	Max	Coord	Coord	Gap	Hold	Coord	Hold	Gap		Max	Coord	
30th %ile Green (s)	7.5	79.5	79.5	29.9	29.9	93.1	29.9	29.9		21.1	93.1	
30th %ile Term Code	Max	Coord	Coord	Gap	Hold	Coord	Hold	Gap		Gap	Coord	
10th %ile Green (s)	6.8	98.0	98.0	18.3	18.3	105.4	18.3	18.3		14.2	105.4	
10th %ile Term Code	Gap	Coord	Coord	Gap	Hold	Coord	Hold	Gap		Gap	Coord	
Stops (vph)	42	838	0	67	48	0	35	190		209	817	
Fuel Used(gal)	2	26	0	5	1	0	1	5		5	15	
CO Emissions (g/hr)	119	1808	24	341	74	29	55	360		317	1030	
NOx Emissions (g/hr)	23	352	5	66	14	6	11	70		62	200	
VOC Emissions (g/hr)	28	419	6	79	17	7	13	83		73	239	
Dilemma Vehicles (#)	0	0	0	0	0	0	0	0		0	0	
Queue Length 50th (ft)	37	530	0	~114	69	0	46	195		162	645	
Queue Length 95th (ft)	58	#692	0	#214	88	0	70	293		m114	m571	
Internal Link Dist (ft)	1544					353	435				712	
Turn Bay Length (ft)		135	135	100	100		120			220	220	
Base Capacity (vph)	249	1425	888	91	520	1	366	569		400	2097	
Starvation Cap Reductn	0	0	0	0	0	0	0	0		0	558	
Spillback Cap Reductn	0	0	0	0	0	0	0	0		0	0	
Storage Cap Reductn	0	0	0	0	0	0	0	0		0	0	

Lane Group	NBT	NBR	NBR2	SBL2	SBL	SBT	NWL	NWR	NWR2	SWL2	SWL	SWR
Reduced v/c Ratio	0.46	0.79	0.05	1.07	0.17	150.00	0.17	0.65		0.77	0.85	

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 123 (82%), Referenced to phase 2:SBSW and 6:NBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: Err			
Intersection Signal Delay: Err		Intersection LOS: F	
Intersection Capacity Utilization Err%		ICU Level of Service H	
Analysis Period (min) 15			

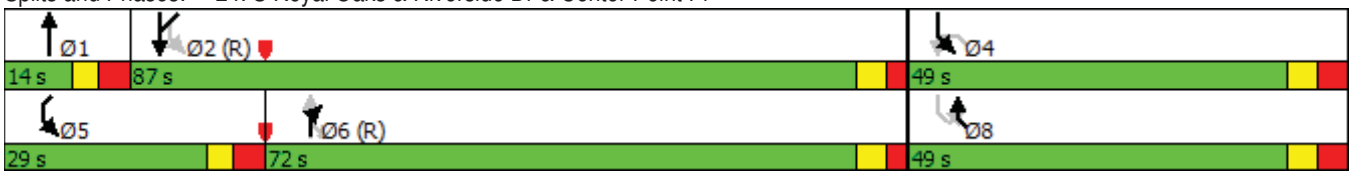
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

! Phase conflict between lane groups.

Splits and Phases: 24: S Royal Oaks & Riverside Dr & Center Point Pl



SITE DATA

PROJECT NAME	OAK MEADOWS EPOCH DEVELOPMENT REZONING & PUD APPLICATION
PROJECT NUMBER:	TBD
LOTS:	2 EXISTING, 3 PROPOSED
ADDRESS:	840 & 880 OAK MEADOWS DR.
CITY:	FRANKLIN
COUNTY:	WILLIAMSON
STATE:	TENNESSEE
CIVIL DISTRICT:	9TH
MAP, GROUP AND PARCEL NUMBERS:	MAP 79, PARCELS 88.00 (PORTION OF) & 101.19
EXISTING ZONING:	GC (GENERAL COMMERCIAL)
PROPOSED ZONING:	SD-R (12) (SPECIFIC DEVELOPMENT RESIDENTIAL 12 UNITS/AC)
CHARACTER AREA OVERLAY:	MECO-5
OTHER APPLICABLE OVERLAYS:	FFO & FWO
APPLICABLE DEVELOPMENT STANDARD:	CONVENTIONAL
ACREAGE OF SITE:	13.06 + 17.33 = 30.39 ACRES
SQUARE FOOTAGE OF SITE:	569,021 + 754,942 = 1,323,963 SQUARE FEET
MINIMUM REQUIRED SETBACK LINES:	ATTACHED RESIDENTIAL USE
YARD FRONTING COLLECTOR (OAK MEADOWS)	40'
SIDE YARD	15'
REAR YARD	30'
OWNER (BOTH PARCELS):	E. WARNER BASS, TRUSTEE
ADDRESS:	150 3RD AVE. SOUTH, SUITE 2800, NASHVILLE, TN 37201
PHONE NO.:	615.742.6400
E-MAIL ADDRESS:	wbass@bassberry.com
CONTACT NAME:	MR. WARNER BASS
MINERAL RIGHTS:	CONTROLLED BY CURRENT PROPERTY OWNER
APPLICANT:	CRUNK ENGINEERING LLC
ADDRESS:	1894 GEN. GEORGE PATTON DR., SUITE 600 FRANKLIN, TN 37067
PHONE NO.:	615.873.1795
E-MAIL ADDRESS:	adam@crunkeng.com
CONTACT NAME:	MR. ADAM CRUNK, P.E.

DENSITY

ATTACHED DWELLING UNITS	355 UNITS
LAND AREA	30.39 ACRES
LAND AREA WITHIN FLOODPLAIN OVERLAY	8.32 ACRES
OVERALL DENSITY	11.7 UNITS/ACRE
NET DENSITY (MINUS OVERLAY CONSTRAINT)	16.1 UNITS/ACRE

BUILDING HEIGHT

ALLOWABLE	6 STORIES MAXIMUM
PROPOSED	NORTH PARCEL - 4 STORIES SOUTH PARCEL 2/3 STORIES (2 STORY FACING STREET)

PROPOSED LANDSCAPE SURFACE RATIO: NORTH SITE - 0.42; SOUTH SITE - 0.56; COMBINED - 0.50
MINIMUM LANDSCAPE SURFACE RATIO: 0.20

PARKING

EXISTING 0

REQUIRED (1.5/1BR + 2.5/2BR + 3/3BR)

NORTH SITE		SOUTH SITE	
1BR - 104 UNITS * 1.5 =	156 SPACES	1BR - 45 UNITS * 1.5 =	68 SPACES
2BR - 112 UNITS * 2.5 =	280 SPACES	2BR - 50 UNITS * 2.5 =	125 SPACES
3BR - 24 UNITS * 3.0 =	72 SPACES	3BR - 20 UNITS * 3.0 =	60 SPACES
TOTAL REQUIRED	= 508 SPACES	TOTAL REQUIRED	= 253 SPACES
INCLUDING 9 ADA SPACES		INCLUDING 7 ADA SPACES	

MAXIMUM PARKING NORTH SITE - 610 SPACES; SOUTH SITE - 304 SPACES

*MODIFICATION OF STANDARD REQUEST TO REDUCE PARKING REQUIREMENT TO 1.75 PER UNIT
NORTH SITE = 240 X 1.75 = 420 SPACES
SOUTH SITE = 115 X 1.75 = 202 SPACES

PROPOSED

NORTH SITE		SOUTH SITE (APTS. ONLY)	
REGULAR SPACES	329	REGULAR SPACES	198
COMPACT SPACES (22 % OF TOTAL)	84	COMPACT SPACES (8 % OF TOTAL)	19
ADA SPACES	16	ADA SPACES	8
TOTAL PROVIDED	429	TOTAL PROVIDED	225
		SOUTH SITE (AMENITY CTR.)	
		REGULAR SPACES	24
		COMPACT SPACES (0% OF TOTAL)	0
		ADA SPACES	2
		TOTAL PROVIDED	26

TREE CANOPY:

EXISTING CANOPY COVERAGE	NORTH SITE - 9%	SOUTH SITE - 65%
REQUIRED PERCENTAGE TO REMAIN	NORTH SITE - 54%	SOUTH SITE - 36%
PROPOSED PERCENTAGE TO REMAIN	NORTH SITE - 54%	SOUTH SITE - 42%

PARKLAND DEDICATION: FEE IN LIEU OF FOR 5.37 ACRES, 355 TOTAL UNITS PROPOSED

OPEN SPACE:

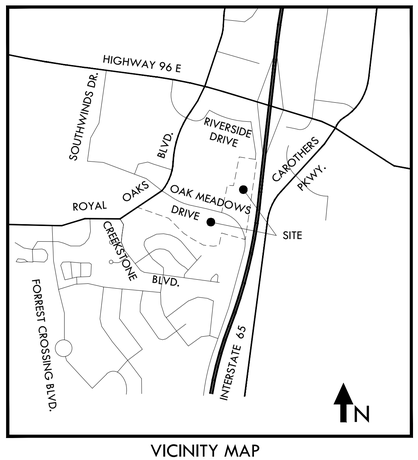
TOTAL OPEN SPACE REQ'D (15% OF 30.39 AC.)	4.56 AC.
FORMAL OPEN SPACE REQUIRED (33% OF OPEN SPACE REQUIRED)	1.52 AC.
	1.65 AC. PROVIDED
INFORMAL OPEN SPACE REQUIRED (67% OF OPEN SPACE REQUIRED)	3.04 AC.
	8.9 AC. PROVIDED

USE BUFFER: 50-FT CLASS C INCOMPATIBLE LAND USE BUFFER (SOUTH PORTION OF SOUTH SITE)
40-FT INTERSTATE BUFFER (EAST PORTION OF NORTH SITE)

NOTES:

PROPERTY IS LOCATED ON MAP 79 AS A PORTION OF LOT 88.00 AND PARCEL 101.19 CONTAINING 30.39 ACRES.

PARCEL 88.00 DOES LIE WITHIN THE 100-YEAR FLOOD PLAIN AS INDICATED BY FIRM MAP NO. 47187C0212F DATED SEPTEMBER 29, 2006.



VICINITY MAP
NO SCALE

REZONING

The Epoch Development

REZONING SUBMITTAL

Franklin, Williamson County, Tennessee

CITY OF FRANKLIN PROJECT NO. 6085

APRIL 7 2016

PREPARED FOR:

EPOCH RESIDENTIAL

359 Carolina Avenue
Winter Park, Florida
(407) 644-9055

STATEMENT OF IMPACT - POLICE, FIRE, SOLID WASTE, PARKS:
The proposed project will add 355 multi-family units. The property is currently undeveloped within the existing City Limits of the City of Franklin. Therefore, no new land is being developed outside the existing jurisdiction of City of Franklin Police, Fire, or Solid Waste services.

The project is approximately a 4 mile driving distance from the Police Station; 1.5 mile driving distance from the nearest fire station on Murfreesboro Rd.
The project will have two dumpster locations for solid waste. One serving 240 units and the other serving 115 units.
No new parkland is being dedicated as part of this project. However, this project will contribute to parkland funds.

STATEMENT OF IMPACT - STORMWATER:

The proposed development contains two site features that will be protected during construction. The south site contains a wetland area as well as a stream, Watson Branch. the site has been designed not to impact these site features. The required buffers for each feature have been shown on these plans.

STATEMENT OF IMPACT - TRANSPORTATION:
The proposed project will add 355 multi-family units with access along Oak Meadow Drive and Riverside Drive. The primary road corridor serving the project is the major arterial South Royal Oaks Boulevard. Based on the traffic study performed for this project, the majority of traffic will be directed in the northernly direction toward Cool Springs.

STATEMENT OF IMPACTS - WATER AND SEWER:
The proposed project is the construction of 355 new attached dwelling units with a mixture of one, two, and three bedroom units. The project will result in a projected flow of 101,250 GPD. The Northern site will be served by water off of the existing 10" main in the old Riverside Drive ROW, and sewer at the existing manhole behind the Home Depot. The Southern site will be served by water with a new 8" main along Oak Meadow Dr. that will connect from Royal Oaks Blvd. and tie into the 10" main along the old Riverside Drive ROW, and sewer will be served by the existing 24" main that runs along Watson Branch on the subject property. Reclaimed water is not located in the project vicinity.

SHEET NO.	SHEET TITLE
C0.0	COVER SHEET
C1.0	OVERALL EXISTING CONDITIONS
C1.1	NORTH SITE EXISTING CONDITIONS
C1.2	SOUTH SITE EXISTING CONDITIONS

CRUNK ENGINEERING LLC
1894 GENERAL GEORGE PATTON DR.
SUITE 600
FRANKLIN, TN 37067
(615) 873-1795
WWW.CRUNKENG.COM

ENGINEERING CRUNK

WILSON CAIN REGISTERED LANDSCAPE ARCHITECT AGRICULTURE No. 114180 STATE OF TENNESSEE 4/7

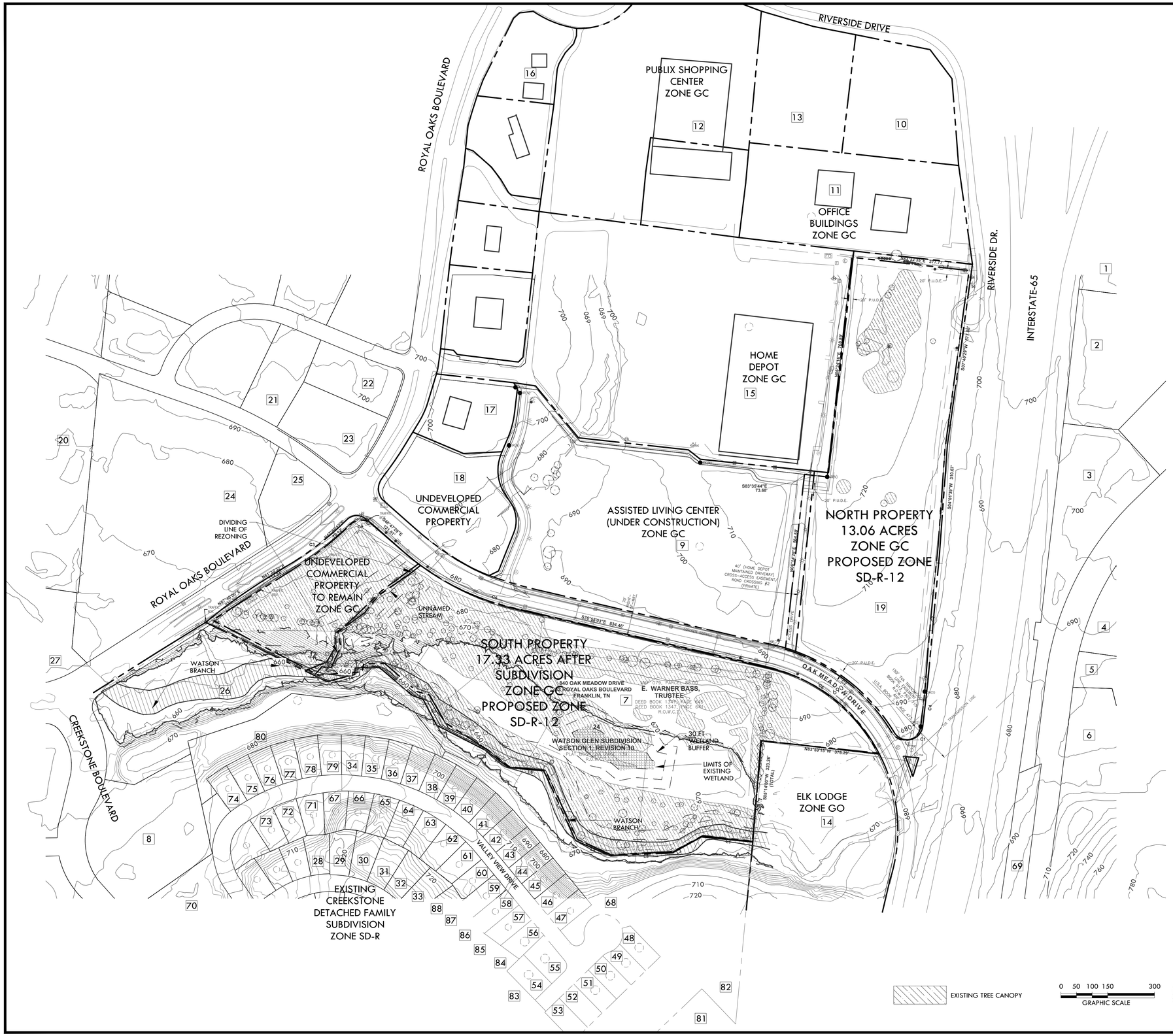
THE EPOCH DEVELOPMENT
REZONING SUBMITTAL
COF #6085 FRANKLIN, TN

REVISIONS	
No.	DATE

04/07/16 15001

C0.0

COVER SHEET



ID	PRCUID	DEED / PLAT	LAND USE	OWNER	ZONING
1	079---06905	DB 3844 DP 619 PB116 PP114	HOTEL	BRE/LQ PROP LLC	GC
2	079---06906	DB 2966 DP 435 PB22 PP11	AUTO DLR	ADKINS RODNEY G	GC
3	079---07600	DB 4341 DP763 PB22 PP11	CHURCH	CHURCH GATE THE	GC
4	079---08000	DB6337 DP70 PB61 PP69	REC	SOAR ADVENTURE TOWER LLC	GC
5	079---08200	DB5165 DP555	UNDEV.	NICHOLS J DONALD	SD-R
6	079---08300	DB1350 DP525	ATTACHED RESID.	UNITED DOMINION REALTY LP	GC
7	079---08800	DB1347 DP645 PB29 PP139	UNDEV.	BASS E WARNER TR	GC
8	079---10001	DB2192 DP320 PB31 PP125	DAYCARE	WOOD & WOOD LLC	GO
9	079---10100	DB6533 DP243 PB62 PP45	ASST. LVG	DOMINION SENIOR LIVING OF FRANKLIN L	GC
10	079---10101	DB5434 DP690	OFFICE	5107 LLC	GC
11	079---10102	DB2200 DP199 PB19 PP59	OFFICE	LIN DON REALTY LLC	GC
12	079---10103	DB5459 DP859 PB59 PP3	RETAIL	PUBLIX TENNESSEE LLC	GC
13	079---10104	DB6168 DP806 PB22 PP120	ASST. LVG	FRANKLIN TN SENIOR CARE PROPERTY LLC	GC
14	079---10105		REC	NASHVILLE LODGE #72 BPO ELKS	GO
15	079---10110	DB4406 DP792 PB29 PP138	RETAIL	HD DEVELOPMENT OF MARYLAND INC	GC
16	079---10114	DB5459 DP859 PB29 PP139	RETAIL	PUBLIX TENNESSEE LLC	GC
17	079---10116	DB1792 DP29 PB29 PP139	RETAIL	FIRST-CITIZENS BANK AND TR CO	GC
18	079---10117	PB 43 PP40	UNDEV.	BASS E WARNER TR	GC
19	079---10119	PB 43 PP40	UNDEV.	BASS E WARNER TR	GC
20	079I-A01401	DB4197 DP993 PB41 PP33	UNDEV.	SWJ2 TENNESSEE LLC	RM-20
21	079O-A00300	DB4200 DP849 PB27 PP4	INSTIT.	CHURCH CORNERSTONE-MINISTRIES INC	GC
22	079O-A00301	DB5790 DP107 PB29 PP10	RETAIL	MAGLI CHERYL S FAMILY TRUST	GC
23	079O-A00302	DB5871 DP528 PB26 PP10	RETAIL	LCJ LLC	GC
24	079O-A00400	DB794 DP881 PB12 PP76		UNITED STATES POSTAL SERV	CI
25	079O-A00401	DB1946 DP286 PB12 PP76	RETAIL	COMMUNITY BANK	GC
26	079O-G02500	DB5136 DP628	UNDEV.	CADENCE BANK NA	GO
27	079O-O20000	PB47 PP142	UNDEV.	ROYAL OAKS PARK SOUTH	GO
28	079O-O00100	DB5814 DP815 PB55 PP146	RESIDENTIAL	THURM DAVID M	SD-R
29	079O-O00200	DB5807 DP985 PB55 PP146	RESIDENTIAL	HAMILTON MALLORY	SD-R
30	079O-O00300	DB6624 DP480 PB55 PP146	RESIDENTIAL	LYLE JORDAN WILLIAM	SD-R
31	079O-O00400	DB5780 DP386 PB55 PP146	RESIDENTIAL	EVANGELISTA BERNARDINO JR	SD-R
32	079O-O00500	DB5841 DP984 PB55 PP146	RESIDENTIAL	CASTANEDA ORESTES	SD-R
33	079O-O00600	DB5809 DP135 PB55 PP146	RESIDENTIAL	VOSS STEPHEN M	SD-R
34	079O-E00100	DB6336 DP118 PB58 PP10	RESIDENTIAL	KHOT SOHAM	SD-R
35	079O-E00200	DB6190 DP252 PB58 PP10	RESIDENTIAL	GOOCH RYAN M	SD-R
36	079O-E00300	DB6218 DP405 PB58 PP10	RESIDENTIAL	SULLIVAN JOHN	SD-R
37	079O-E00400	DB6232 DP972 PB58 PP10	RESIDENTIAL	CULLEN ROBERT BARRY	SD-R
38	079O-E00500	DB6231 DP1 PB58 PP10	RESIDENTIAL	MILLER ROBERT FRANK	SD-R
39	079O-E00600	DB6288 DP734 PB58 PP10	RESIDENTIAL	DHARANI KHAIRUNISSA	SD-R
40	079O-E00700	DB6218 DP407 PB58 PP10	RESIDENTIAL	KNOX CONSUELIA S	SD-R
41	079O-E00800	DB6229 DP797 PB58 PP10	RESIDENTIAL	DAWKINS BRETTON GUY	SD-R
42	079O-E00900	DB6296 DP854 PB58 PP10	RESIDENTIAL	COMEAUX MARGARET A	SD-R
43	079O-E01000	DB6273 DP312 PB58 PP10	RESIDENTIAL	SMITH CHRISTOPHER S	SD-R
44	079O-E01100	DB6281 DP281 PB58 PP10	RESIDENTIAL	DANIELS THOMAS	SD-R
45	079O-E01200	DB6341 DP640 PB58 PP10	RESIDENTIAL	SUNDARAM BARATH SHANMUGA	SD-R
46	079O-E01300	DB6331 DP190 PB58 PP10	RESIDENTIAL	HOSSAIN MOHAMMAD	SD-R
47	079O-E01400	DB6264 DP154 PB58 PP10	RESIDENTIAL	MAPLESDEN LAWRENCE	SD-R
48	079O-E01500	DB6346 DP779 PB58 PP10	RESIDENTIAL	BECHARD BRIAN	SD-R
49	079O-E01600	DB6329 DP817 PB58 PP10	RESIDENTIAL	VIDYAM SATHEESH	SD-R
50	079O-E01700	DB6145 DP158 PB58 PP10	RESIDENTIAL	RUSSO JOHN M	SD-R
51	079O-E01800	DB6177 DP164 PB58 PP10	RESIDENTIAL	OLIGLEY J PATRICK	SD-R
52	079O-E01900	DB6151 DP238 PB58 PP10	RESIDENTIAL	BONHAM SYDNEY	SD-R
53	079O-E02000	DB6156 DP254 PB58 PP10	RESIDENTIAL	BURGER JORDAN	SD-R
54	079O-E02100	DB6172 DP871 PB58 PP10	RESIDENTIAL	NOLAN MICHAEL S TRUST	SD-R
55	079O-E02200	DB6195 DP626 PB58 PP10	RESIDENTIAL	PARSI SREEKANTH	SD-R
56	079O-E02300	DB6329 DP771 PB58 PP10	RESIDENTIAL	KOLLI MURALL KRISHNA	SD-R
57	079O-E02400	DB6252 DP619 PB58 PP10	RESIDENTIAL	KAMAN VENKATESH	SD-R
58	079O-E02500	DB6231 DP816 PB58 PP10	RESIDENTIAL	RAJENDRAN THAMIL S	SD-R
59	079O-E02600	DB6195 DP601 PB58 PP10	RESIDENTIAL	DOPPALAPUDI SRIKANTH	SD-R
60	079O-E02700	DB6182 DP362 PB58 PP10	RESIDENTIAL	CHINTAKINDI VARUN K	SD-R
61	079O-E02800	DB6177 DP138 PB58 PP10	RESIDENTIAL	KRISHNAN JAGADEESWARAN	SD-R
62	079O-E02900	DB6152 DP63 PB58 PP10	RESIDENTIAL	MOHAMED ABDUL R J	SD-R
63	079O-E03000	DB6153 DP125 PB58 PP10	RESIDENTIAL	PICHAIMUTHU NARAYANAN	SD-R
64	079O-E03100	DB6100 DP536 PB58 PP10	RESIDENTIAL	ZELLER JAMES S JR	SD-R
65	079O-E03200	DB6583 DP472 PB58 PP10	RESIDENTIAL	MURRAY KIMBERLY	SD-R
66	079O-E03300	DB6172 DP802 PB58 PP10	RESIDENTIAL	ZIPPER NATHAN M	SD-R
67	079O-E03400	DB6154 DP157 PB58 PP10	RESIDENTIAL	VIGIL MARIO G	SD-R
68	079O-E03500	DB6104 DP222 PB58 PP10	RESIDENTIAL	CREEKSTONES HOMEOWNERS ASSOCIATION I	SD-R
69	089---02609	DB3915 DP 891 PB14 PP17	RESIDENTIAL	A T & T CORP BY & THROUGH	R-2
70	089B-004200	DB5309 DP243 PB54 PP20	RESIDENTIAL	CREEKSTONE HOMEOWNERS ASSOCIATION IN	SD-R
71	089B-004600	DB5727 DP67 PB54 PP20	RESIDENTIAL	BLACKSHER NICOLE E	SD-R
72	089B-004700	DB6656 DP836 PB54 PP20	RESIDENTIAL	DRUSE JONATHAN	SD-R
73	089B-004800	DB5674 DP620 PB54 PP20	RESIDENTIAL	KUMAR RATNA	SD-R
74	089B-005000	DB6412 DP384 PB54 PP20	RESIDENTIAL	BLANKENSHIP JON I	SD-R
75	089B-005100	DB5710 DP738 PB54 PP20	RESIDENTIAL	BURRELL GERALD MARK	SD-R
76	089B-005200	DB5716 DP104 PB54 PP20	RESIDENTIAL	BUCKNER RICHARD D	SD-R
77	089B-005300	DB5604 DP513 PB54 PP20	RESIDENTIAL	LERCHE MICHAEL	SD-R
78	089B-005400	DB6046 DP929 PB54 PP20	RESIDENTIAL	RUSSELL KAREN KINGSBURY	SD-R
79	089B-005500	DB5747 DP463 PB54 PP20	RESIDENTIAL	THEURER DAVID S	SD-R
80	089B-005600	DB5309 DP243 PB54 PP20	RESIDENTIAL	CREEKSTONE HOMEOWNERS ASSOCIATION IN	SD-R
81	089B-P01500	DB6057 DP780 PB56 PP76	RESIDENTIAL	BARLOW JOHN	SD-R
82	089B-P01600	DB6119 DP165 PB56 PP76	RESIDENTIAL	ERWIN DEVAN A	SD-R
83	089B-P02000	DB6031 DP735 PB56 PP76	RESIDENTIAL	PATEL NIKUNJ M	SD-R
84	089B-P02100	DB5983 DP439 PB56 PP76	RESIDENTIAL	JANI BHAVESHKUMAR	SD-R
85	089B-P02200	DB5989 DP962 PB56 PP76	RESIDENTIAL	HARRIS JOHN	SD-R
86	089B-P02300	DB6003 DP115 PB56 PP76	RESIDENTIAL	LEDGISTER KEVIN ARTHUR	SD-R
87	089B-P02400	DB6377 DP104 PB56 PP76	RESIDENTIAL	JOHANSEN MICHAEL	SD-R
88	089B-P02500	DB5899 DP690 PB56 PP76	RESIDENTIAL	COLLIER EDWARD W III	SD-R

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THE EPOCH DEVELOPMENT

REZONING SUBMITTAL

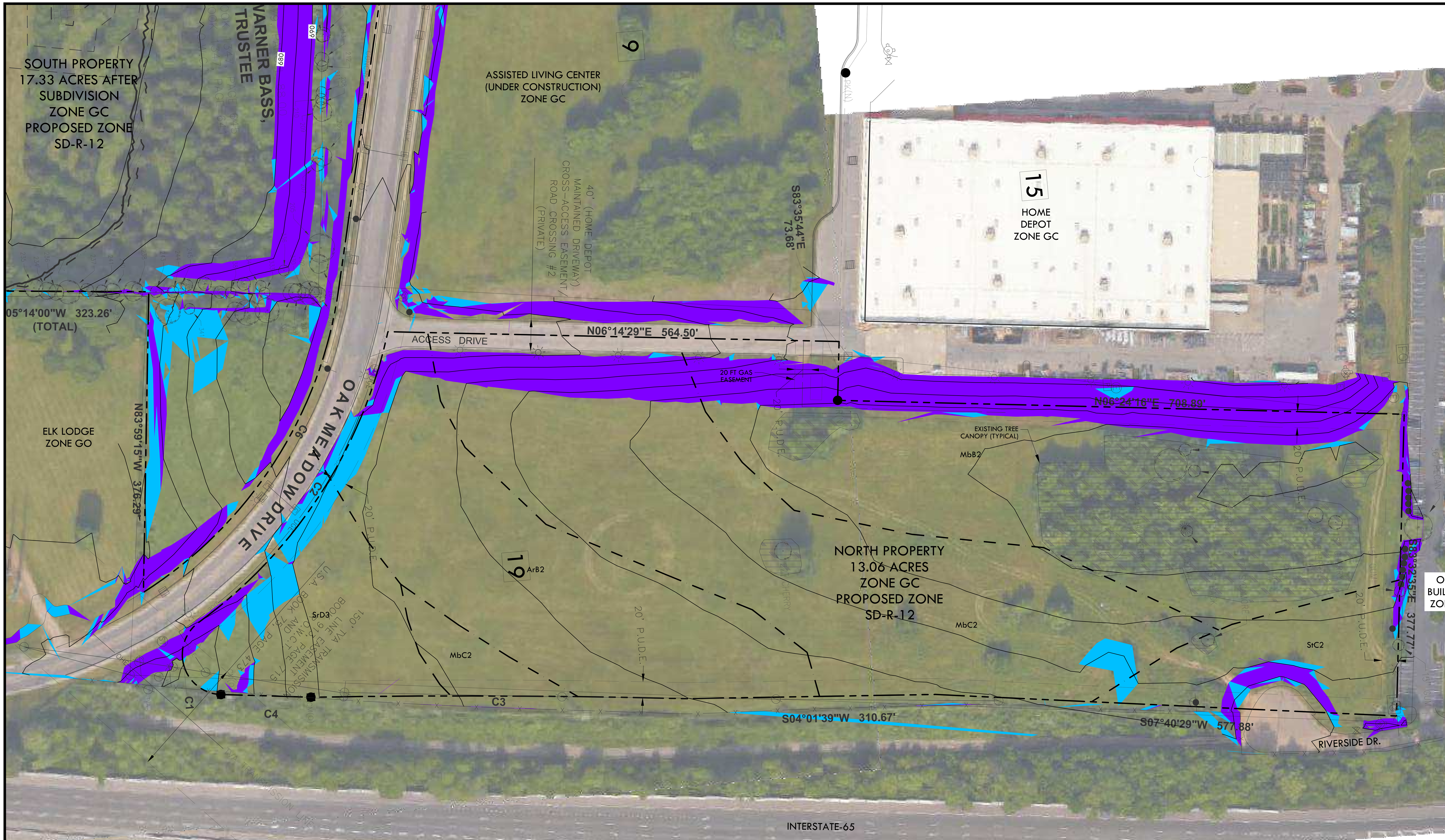
COF #6085 FRANKLIN, TN

REVISIONS	
No.	DATE

04/07/16 15001

C1.0

OVERALL EXISTING CONDITIONS PLAN



SLOPE LEGEND

(cyan)	GREATER THAN 14% AND LESS THAN 20% SLOPE
(purple)	GREATER THAN 20% SLOPE

SOIL TYPES

ArB2	Armour silt loam, 2% to 5 % slopes, eroded
CaC2	Captina silt loam, phosphatic, 5% to 12% slopes, eroded
Eg	Egam silt loam, phosphatic
Hu	Huntington silt loam, phosphatic
InE3	Inman silty clay loam, 20% to 30% slopes, severely eroded
MbB2	Maury silt loam, 2% to 5% slopes, eroded
MbC2	Maury silt loam, 5% to 12% slopes, eroded
SrC3	Stiversville clay loam, 5% to 12% slopes, eroded
SrD3	Stiversville clay loam, 12% to 20% slopes, severely eroded
StC2	Stiversville silt loam, 5% to 12% slopes, eroded

CURVE TABLE

CURVE	RADIUS	LENGTH	DELTA	TANGENT	CHORD	CHD BRG
C1	50.00'	123.89'	141°58'19"	145.10	94.54'	S77°58'06"W
C2	607.96'	443.66'	41°48'42"	232.23	433.88'	N51°57'06"W
C3	11300.00'	470.04'	2°23'00"	235.06	470.01'	S05°13'09"W
C4	11300.00'	112.73'	0°34'18"	56.37	112.73'	S06°41'48"W

0 30 60 120
GRAPHIC SCALE

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CRUNK ENGINEERING

WILSON CRUNK
REGISTERED ENGINEER
AGRICULTURE
COMMERCE
No. 114180
STATE OF TENNESSEE
4/7/16

THE EPOCH DEVELOPMENT
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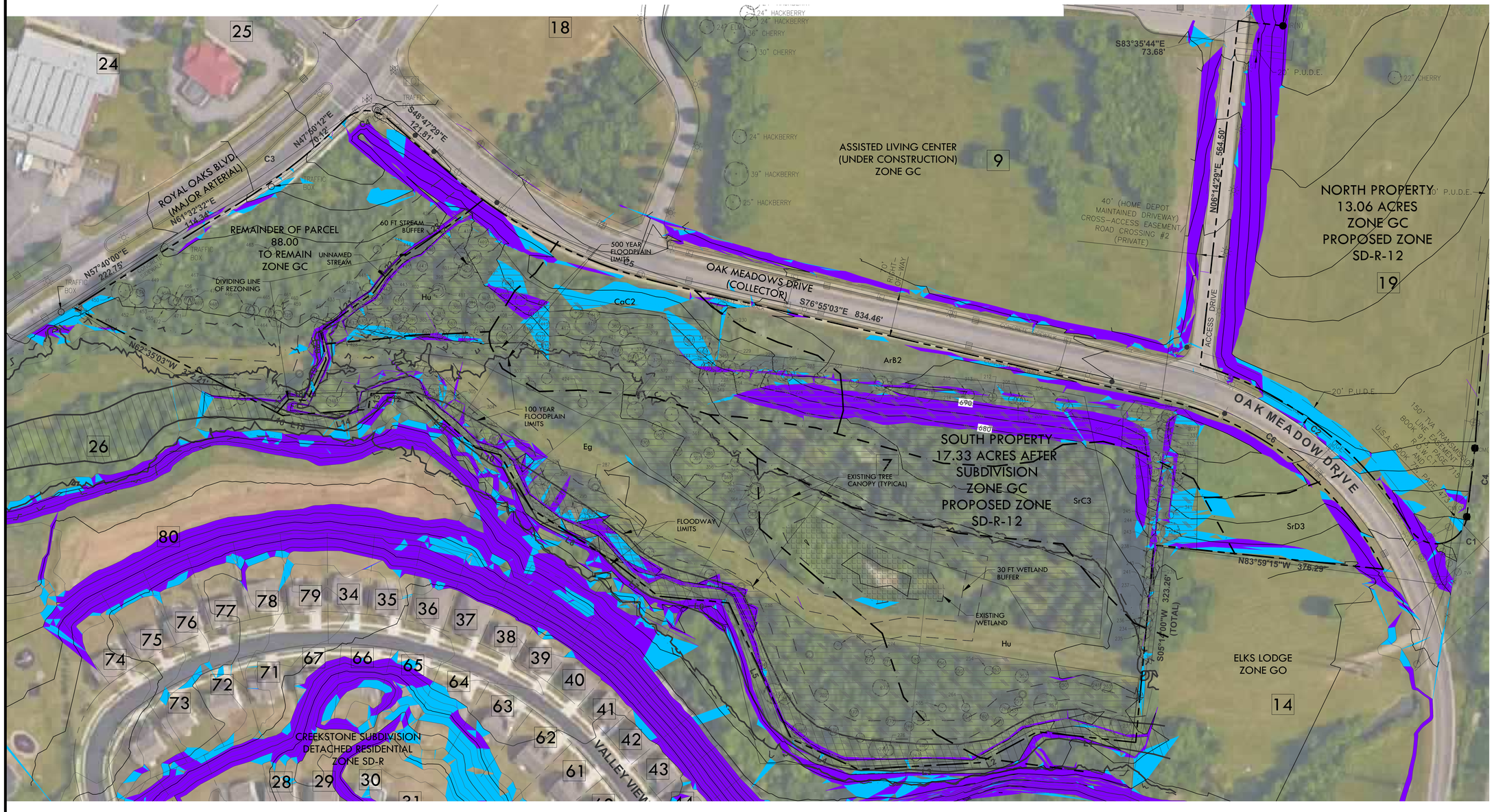
C1.1
NORTH SITE
EXISTING
CONDITIONS PLAN



SLOPE LEGEND

- GREATER THAN 14% AND LESS THAN 20% SLOPE
- GREATER THAN 20% SLOPE

SOIL TYPES

ArB2	Armour silt loam, 2% to 5 % slopes, eroded
CaC2	Captina silt loam, phosphatic, 5% to 12% slopes, eroded
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MbC2	Maury silt loam, 5% to 12% slopes, eroded
SrC3	Stiversville clay loam, 5% to 12% slopes, eroded
SrD3	Stiversville clay loam, 12% to 20% slopes, severely eroded
StC2	Stiversville silt loam, 5% to 12% slopes, eroded

0 40 80 160
GRAPHIC SCALE

N

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SOUTH SITE EXISTING CONDITIONS PLAN