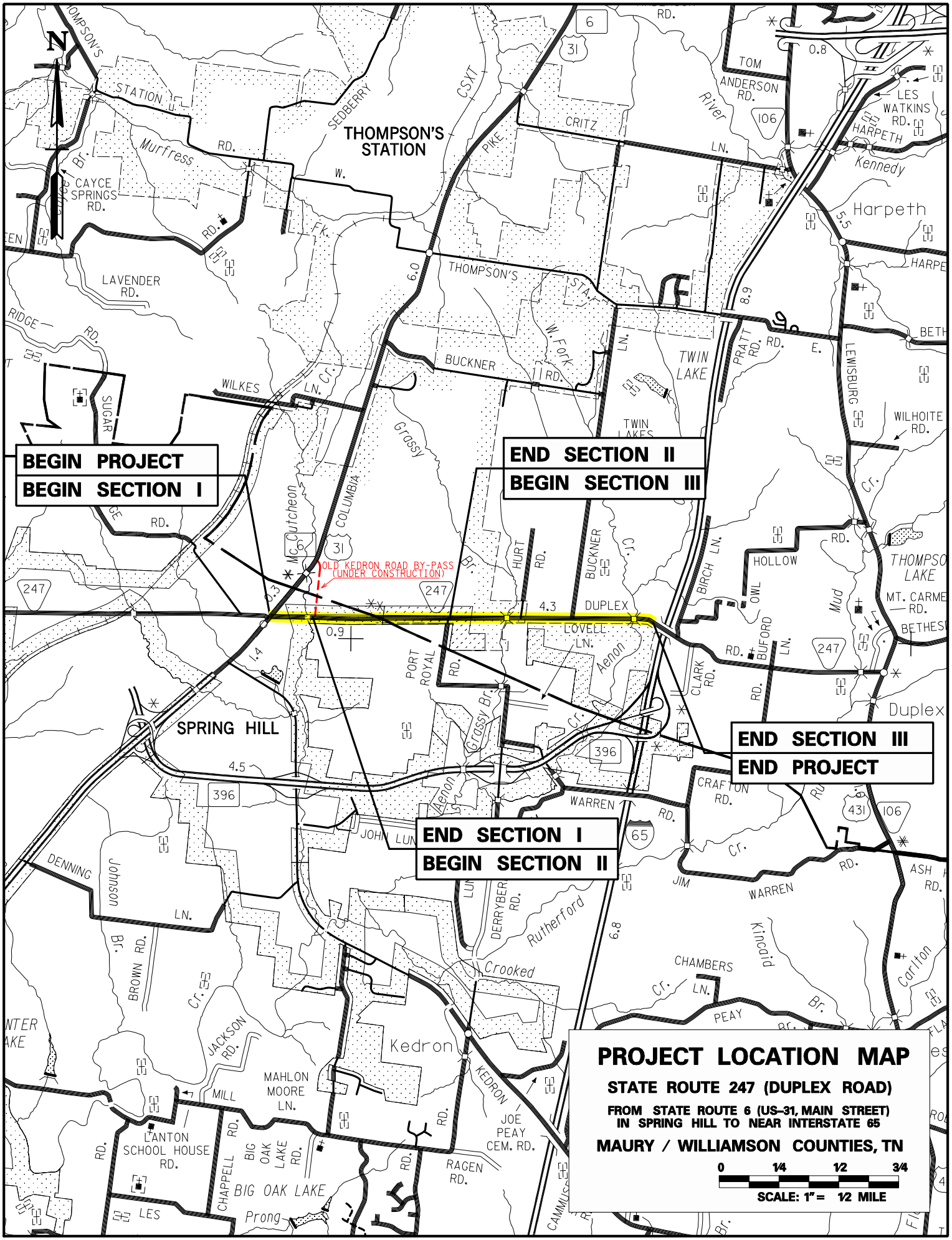
TRANSPORTATION PLANNING REPORT

STATE ROUTE 247 (DUPLEX ROAD)

FROM STATE ROUTE 6 (US 31, MAIN STREET) IN SPRING HILL
TO 0.11 MILES WEST OF I-65
MAURY AND WILLIAMSON COUNTIES

PREPARED BY CLINARD ENGINEERING ASSOCIATES, LLC
FOR
TENNESSEE DEPARTMENT OF TRANSPORTATION
PROJECT PLANNING DIVISION

Approved by:	Signature	DATE
CHIEF OF ENVIRONMENT AND PLANNING	Ed Cole	8/3/08
TRANSPORTATION DIRECTOR PROJECT PLANNING DIVISION	Steve Allen	8-28-08
TRANSPORTATION MANAGER 2 PROJECT PLANNING DIVISION	Bill Hart	8.25.08


BEGIN PROJECT
BEGIN SECTION I
END SECTION II
BEGIN SECTION III
END SECTION III
END PROJECT
END SECTION I
BEGIN SECTION II
OLD KEDRON ROAD BY-PASS (UNDER CONSTRUCTION)
THOMPSON'S STATION
SPRING HILL
Kedron
Duplex
Harpeth
Lewisburg
BIG OAK LAKE
TWIN LAKE
THOMPSON'S LAKE
N
0.3
0.9
4.3
4.5
6.0
6.8
8.9
0.8
5.5
4.7
PROJECT LOCATION MAP
STATE ROUTE 247 (DUPLEX ROAD)
FROM STATE ROUTE 6 (US-31, MAIN STREET) IN SPRING HILL TO NEAR INTERSTATE 65
MAURY / WILLIAMSON COUNTIES, TN
0 1/4 1/2 3/4
SCALE: 1" = 1/2 MILE

BEGIN PROJECT
BEGIN SECTION I

END SECTION I
BEGIN SECTION II

END SECTION II
BEGIN SECTION III

END SECTION III
END PROJECT

PROJECT QUAD MAP

STATE ROUTE 247 (DUPLEX ROAD)

FROM STATE ROUTE 6 (US-31, MAIN STREET)
IN SPRING HILL TO NEAR INTERSTATE 65

MAURY / WILLIAMSON COUNTIES, TN

0 1000′ 2000′ 3000′

SCALE: 1″ = 2000′

SUMMARY DATA TABLE

ITEM	EXISTING	PROPOSED (Section I)
Functional Class	Urban Collector	Urban Collector
System Class	STP	STP
Length (Miles)	0.4	0.4
Cross Section (Feet)	18' / 20' / 30'	36' / 48' / 68'
Present ADT (2010)	8,730	8,730
Future ADT (2030)	15,710	15,710
DHV (2030)	1,571	1,571
% Trucks	4 % (ADT) 3 % (DHV)	4 % (ADT) 3 % (DHV)
Estimated Right-of-Way Acquisition (Acres)		0.99
Estimated Right-of-Way Tracts Affected		15
Estimated Family Displacements		2
Estimated Business Displacements		0
Estimated Non-Profit Displacements		0
Estimated Right-of-Way Cost		$405,550
Estimated Utility Cost Reimbursable		$51,000
Estimated Utility Cost Non-Reimbursable		$151,000
Estimated Construction Cost		$1,021,000
Estimated Preliminary Engineering Cost		$93,000
Total Estimated Project Cost		$1,721,550

SUMMARY DATA TABLE

ITEM	EXISTING	PROPOSED (Section II)
Functional Class	Urban Collector	Urban Collector
System Class	STP	STP
Length (Miles)	1.22	1.22
Cross Section (Feet)	18'-33' / 20'-35' / 30'-60'	36' / 48' / 68'
Present ADT (2010)	7,960 - 9,500	7,960 - 9,500
Future ADT (2030)	14,320 - 17,100	14,320 - 17,100
DHV (2030)	1,432 - 1,710	1,432 - 1,710
% Trucks	4 % (ADT) 3 % (DHV)	4 % (ADT) 3 % (DHV)
Estimated Right-of-Way Acquisition (Acres)		3.33
Estimated Right-of-Way Tracts Affected		56
Estimated Family Displacements		3
Estimated Business Displacements		0
Estimated Non-Profit Displacements		0
Estimated Right-of-Way Cost		$944,050
Estimated Utility Cost Reimbursable		$213,000
Estimated Utility Cost Non-Reimbursable		$598,000
Estimated Construction Cost		$4,681,000
Estimated Preliminary Engineering Cost		$426,000
Total Estimated Project Cost		$6,862,050

SUMMARY DATA TABLE

ITEM	EXISTING	PROPOSED (Section III)
Functional Class	Urban Collector and Rural Major Collector	Urban Collector and Rural Major Collector
System Class	STP	STP
Length (Miles)	1.57	1.57
Cross Section (Feet)	20'-31' / 22'-33' / 50'-60'	36' / 48' / 68'
Present ADT (2010)	5,440- 6,370	5,440- 6,370
Future ADT (2030)	9,780 - 11,450	9,780 - 11,450
DHV (2030)	978 - 1,145	978 - 1,145
% Trucks	4 % (ADT) 3 % (DHV)	4 % (ADT) 3 % (DHV)
Estimated Right-of-Way Acquisition (Acres)		1.90
Estimated Right-of-Way Tracts Affected		40
Estimated Family Displacements		0
Estimated Business Displacements		0
Estimated Non-Profit Displacements		0
Estimated Right-of-Way Cost		$258,000
Estimated Utility Cost Reimbursable		$262,000
Estimated Utility Cost Non-Reimbursable		$737,000
Estimated Construction Cost		$5,261,000
Estimated Preliminary Engineering Cost		$478,000
Total Estimated Project Cost		$6,996,000

SUMMARY DATA TABLE

ITEM	EXISTING	PROPOSED (Sections I, II, & III)
Functional Class	Urban Collector and Rural Major Collector	Urban Collector and Rural Major Collector
System Class	STP	STP
Length (Miles)	3.19	3.19
Cross Section (Feet)	Varies	36' / 48' / 68'
Present ADT (2010)	7,080	7,080
Future ADT (2030)	12,734	12,734
DHV (2030)	1,273	1,273
% Trucks	4 % (ADT) 3 % (DHV)	4 % (ADT) 3 % (DHV)
Estimated Right-of-Way Acquisition (Acres)		6.22
Estimated Right-of-Way Tracts Affected		111
Estimated Family Displacements		5
Estimated Business Displacements		0
Estimated Non-Profit Displacements		0
Estimated Right-of-Way Cost		$1,607,600
Estimated Utility Cost Reimbursable		$526,000
Estimated Utility Cost Non-Reimbursable		$1,486,000
Estimated Construction Cost		$10,963,000
Estimated Preliminary Engineering Cost		$997,000
Total Estimated Project Cost		$15,579,600

PURPOSE OF STUDY

The purpose of this study is to determine the need and feasibility of improving State Route 247 (Duplex Road) from State Route 6 (US-31 / Main Street) in Maury County to 0.11 miles west of I-65 in Williamson County. The objectives of this study are to determine the need for improvement, develop a proposed plan for the project, calculate estimated costs, and identify locations of environmental concern. This study was initiated in response to the request of the City of Spring Hill and is included in the Nashville Area Metropolitan Planning Organization Long Range Transportation Plan.

DEFICIENCIES AND EXISTING CONDITIONS

Geometrics	X	Structures	X
Operational	X	R/R Crossing	
Crash Rate	1.53	Statewide Crash Rate	2.51 (Urban) 1.70 (Rural)

This study section of State Route 247 (Duplex Road) is a collector roadway consisting of two travel lanes that vary from ten (10) to eleven (11) feet in width. Portions of this roadway contain exclusive left turn lanes which have been built as part of the more recently constructed residential developments located along the corridor. Existing right-of-way along State Route 247 varies from forty (40) to sixty (60) feet.

As shown in the functional plans located in the Appendix of this report, the existing vertical geometry of State Route 247 (Duplex Road) contains several locations that are substandard based upon the required forty (40) mile per hour design speed. Presently, the entire study section of State Route 247 is posted for a speed limit of thirty-five (35) miles per hour.

Photo 1: View facing east along State Route 247 at intersection of Port Royal Road

Land use along the project consists of a combination of both businesses and residential development with the majority of commercial use presently located near the beginning of the project at the intersection of State Route 6 (US-31).

Photo 2: View facing south along State Route 6 (US-31) near intersection of State Route 247 (0n left)

Over the last several years, the City of Spring Hill has experienced tremendous growth with much of the growth located along State Route 247 comprised of new large scale residential subdivisions. Based upon the 2000 U.S. Census the population of Spring Hill was 7,715. In May of 2005, the City of Spring Hill performed a Special Census which recorded the present population of 19,831. With its close proximity to Nashville (30 miles) and other large employers such as Saturn assembly plant this growth is anticipated to continue with over 1,000 new building permits being issued each year.

To assist in alleviating some of the traffic congestion at the intersection of State Route 247 and State Route 6 (US-31), the City is presently constructing a new north-south roadway, Old Kedron Road By-Pass (Miles Johnson Parkway) which will connect to State Route 6, north of the existing intersection. Details of the roadway plans are contained in the Appendix of this study.

Based upon traffic volumes developed by the Tennessee Department of Transportation (TDOT), base year (2010) volumes along State Route 247 will range from 5,440 to 9,500 vehicles per day and in the design year (2030) range from 9,780 to 17,100 vehicles per day. Several subdivisions are being built along this section of State Route 247. Brandon Darks (TDOT Project Planning) has had three meetings with Ferrell White (City of Spring Hill) to discuss traffic and subdivision build-out. These meetings were held September 7, 2005, September 30, 2005, and April 5, 2006.

As mentioned previously, where new developments have been approved along State Route 247, the City has required various entrance improvements such as the addition of turn lanes as well as requiring some reservation for future additional right-of-way needs along the roadway frontage.

Photo 3: View looking west near end of project (Chapman's Crossing on right)

In order to quantify the traffic operation of the corridor, analysis was performed for the existing roadway as well as for the existing intersections located along State Route 247 within the project limits to determine the level-of-service (LOS). Level-of-service is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Letters designate each level, from A to F, with LOS A representing the best conditions and LOS F the worst. As shown below, this two-lane roadway is projected to operate at an acceptable level of service in the base year with one segment located between future Old Kedron Road By-Pass and Commonwealth to operate at a LOS E in the design year 2030.

ROADWAY SEGMENT	2010	2030
From S.R. 6 (U.S. 31, Main Street) to MJ Bypass	D	D
From MJ Bypass to Commonwealth Drive	D	E
From Commonwealth Drive to Port Royal Road	C	D
From Port Royal Road to Hurt Road	C	D
From Hurt Road to Buckner Lane	C	D
From Buckner Lane to End of Project	C	D

Based upon analysis of the major unsignalized and signalized intersections along the route, the majority will operate at an unacceptable level-of-service in the design year. Most of the operational break-down of these intersections are directly related to the lack of sufficient turn lanes from both the mainline of State Route 247 and many of the major side roads.

INTERSECTION	2030 AM	2030 PM
S.R. 6 (U.S. 31, Main Street)	F	F
Miles Johnson Parkway (Bypass)	F	F
Commonwealth Drive	F	F
Port Royal Road	F	F
Hurt Road	D	F
Buckner Lane	F	F

Photo 4: View facing east along State Route 247 at intersection of Port Royal Road

PROPOSED IMPROVEMENTS

State Route 247 (Duplex Road) will be designed based upon TDOT Standard Drawing RD01-TS-7A and will contain two twelve (12) foot travel lanes and a twelve (12) foot center turn lane. There will be four foot shoulders with curb and gutter, which will allow six feet for bicycle traffic. Five foot sidewalks will be located along both sides of the roadway within a total right-of-way width of sixty-eight (68) feet. Due to the constraints located throughout the project limits, a reduced shoulder width of four (4) feet is recommended instead of a six foot shoulder. Based upon this modification, a design exception would be required for this change.

The improvements to the following sections will alleviate many of the geometric and capacity problems identified by increasing capacity and improving intersection operation throughout the corridor.

Section I

Section I begins at State Route 6 (US-31) and ends at Hughes Street, a length of approximately 0.40 miles. This portion of State Route 247 (Duplex Road) has a base year average daily traffic (ADT) of 8,730 vehicles and a design year (2030) ADT of 15,710 vehicles.

Proposed intersection improvements at the intersection of State Route 6 (US-31) will include a short realignment of State Route 247 to provide exclusive right and left turn lanes while avoiding any additional right-of-way from the Spring Hill United Methodist Church located in the southeast quadrant of the intersection.

Photo 5: View looking West along State Route 247 near intersection of State Route 6 (US-31)

In order to accommodate the addition of an exclusive center turn lane and the associated shoulders and sidewalks within the required right-of-way width of sixty-eight (68) feet, two residential displacements will occur. As part of the proposed improvements for this section, retaining walls will also be required to minimize additional impacts as well as to avoid any encroachment onto the historic “White Hall” property.

Photo 6: White Hall Historical Property (Section I)

Total estimated cost for the additional laneage, proposed signal improvements, and right-of-way outlined for Section I is approximately $1,721,550. A detailed summary of all of the costs associated with this estimate is included in the Appendix of this report.

Section II

The second section begins at Hughes Street and ends 600 feet east of Port Royal Road, a length of approximately 1.22 miles. This portion of State Route 247 (Duplex Road) has a base year average daily traffic (ADT) of 7,960 vehicles and a design year (2030) ADT of 14,320 vehicles.

Construction of the proposed Old Kedron Road By-Pass is currently underway and is expected to be completed by the end of the year 2006. Based upon design year traffic volumes, this intersection will require signalization as well as re-striping for the required turning movements in the base year 2010.

Photo 7: View looking north along future Old Kedron Road By-pass (Miles Johnson Parkway)

To avoid any negative impact on the Spring Hill Village Apartments, a minor alignment shift of State Route 247 to the south will be necessary east of the by-pass with retaining walls located along both sides of the roadway at various locations to minimize impacts to development located in close proximity to the existing right-of-way, such as the Newton Church of Christ.

Near the Winter Park Subdivision, the vertical alignment of the roadway does not meet required forty (40) miles per hour design speed and will need to be lowered significantly. Due to the close proximity of the subdivision south of State Route 247, a retaining wall will be necessary to prevent impacts to multiple properties in the subdivision. To the north, two residences will be acquired due to slope and construction easements. An additional residence in the southwest corner of Port Royal Road will likely have to be acquired as well.

The intersection of State Route 247 and Commonwealth Drive (Wakefield Subdivision) will be improved by extending the left turn storage and providing for future signalization.

The alignment of State Route 247 would be shifted slightly to the south, east of the intersection with Commonwealth Drive, returning to the existing alignment at the intersection with Port Royal Road. The intersection improvements at this location will include additional laneage and accommodations for a future traffic signal. The east and west bound approaches will contain single left turn and through-right travel lanes. The raised grass median north of State Route 247 on Port Royal Road will be removed to include a left turn lane. South of State Route 247, Port Royal Road will be widened to the west to provide a left turn lane in the northbound direction. A retaining wall will be needed east of the intersection, along the south side of the roadway to prevent any impacts to homes as the vertical alignment is adjusted to meet the design speed.

Photo 8: View looking east along State Route 247 at intersection of Port Royal Road

Total estimated cost for the additional laneage, intersection improvements, and right-of-way outlined for Section II is approximately $6,862,050. A detailed summary of all of the costs associated with this estimate is included in the Appendix of this report.

Section III

Section III begins 600 feet east of Port Royal Road and ends 0.11 miles west of I-65, a length of approximately 1.57 miles. This portion of State Route 247 (Duplex Road) has a base year average daily traffic (ADT) of 6,370 vehicles and a design year (2030) ADT of 11,450 vehicles.

In order to meet the required design speed of forty (40) miles per hour, numerous segments of the State Route 247 vertical alignment will be either raised or lowered. In order to minimize right-of-way impacts retaining walls will be used at these locations.

Photo 9: View looking west near Benvento Subdivision

The improvements at the Hurt Road intersection will be minimal, including a dedicated left turn lane on State Route 247. State Route 247 at Buckner Lane will be widened to include left turn lanes in both east and westbound directions. Buckner Lane will be widened north and south of the intersection to accommodate left and through-right lanes.

A left turn lane will be provided for vehicles turning onto Secluded Lane. The roadway will then taper down to the existing width approximately 0.11 miles west of Interstate 65.

Total estimated cost for the additional laneage, intersection improvements, and right-of-way outlined for Section III is approximately $6,996,000. A detailed summary of all of the costs associated with this estimate is included in the Appendix of this report.

Total estimated cost for the recommended improvements for the entire 3.19 mile study segment of State Route 247 (Duplex Road) is approximately $15,579,600. A detailed summary of all of the costs associated with this estimate is included in the Appendix of this report.

PROPOSED IMPROVEMENTS - TRAFFIC ANALYSIS

Based upon both the base and design year traffic volumes provided, traffic analysis was performed for the recommended improvements as outlined previously. As shown in the table below, with the addition of an exclusive center turn lane along State Route 247, the entire corridor operates at an acceptable level-of-service for the years 2010 and 2030.

ROADWAY SEGMENT	2010	2030
From S.R. 6 (U.S. 31, Main Street) to MJ Bypass	C	D
From MJ Bypass to Commonwealth Drive	C	D
From Commonwealth Drive to Port Royal Road	C	D
From Port Royal Road to Hurt Road	C	C
From Hurt Road to Buckner Lane	C	C
From Buckner Lane to End of Project	C	C

By providing this center turn lane along this major roadway, additional capacity can be provided by removing these movements from the mainline travel lanes.

Photo 10: View looking west along State Route 247 at Hardin Landing Subdivision

Based upon analysis for the improved major unsignalized and signalized intersections along the route, five of the six will operate at an acceptable level-of-service in the design year of 2030. In order for the intersection of State Route 247 and State Route 6 (US-31) to operate at an acceptable level-of-service, a substantial roadway widening (beyond the scope of this study) would be required along State Route 6 due to the heavy north-south traffic volumes traveling along this section of Main Street.

INTERSECTION	2030 AM	2030 PM
S.R. 6 (U.S. 31, Main Street)	F	F
Miles Johnson Parkway (Bypass)	C	C
Commonwealth Drive	B	D
Port Royal Road	B	D
Hurt Road	C	C
Buckner Lane	C	C

ENVIRONMENTAL CONSIDERATIONS

Formal environmental studies have not been conducted for the recommended improvements presented in this study. Upon completion of this study and at the appropriate time, formal environmental studies will be undertaken. During this study a cursory review of sensitive areas have been noted such as the following blue-line stream locations crossing State Route 247:

1. McCutcheon Creek (80 feet east of Hughes Street)
2. Tributary to McCutcheon Creek (450 feet east of Hughes Street)
3. Tributary to Grassy Branch (700 feet west of Port Royal Road)
4. Grassy Branch (320 feet west of Cochran Trace)
5. Aenon Creek (1,400 feet west of I-65)

There are three bridges located on this project:

1. 60S62510007 Bridge over McCutcheon Creek log mile 19.85 in Maury County
2. 94S62510001 Bridge over Grassy Branch log mile 1.04 in Williamson County
3. 94S62510003 Bridge over Aenon Creek log mile 2.10 in Williamson County

In addition to blue-line stream locations, the proposed improvements have also been developed to avoid “White Hall” which is listed on the National Register of Historic Places as well as both the Newton Church of Christ and the Spring Hill United Methodist Church.

INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

There are no recommendations at this time to incorporate any ITS measures with this improvement project.

DISPOSITION OF EXISTING ROUTE

All Improvements for State Route 247 (Duplex Road) are recommended to occur along the existing alignment with no disposition of the existing route.

FIELD INVESTIGATION

A field investigation of the site was made by the following individuals on March 10, 2006.

Tom Clinard	Clinard Engineering Associates
Brian Gaffney	Clinard Engineering Associates
Gary Webber	TDOT Planning
Charlie Graves	TDOT Planning
Larry Parker	TDOT Design
Bob Allen	TDOT Environmental
David Thompson	TDOT Environmental
Danny M. Leverette	Mayor - City of Spring Hill
Jerome D. Dempsey	Spring Hill Consulting Engineer
Ferrell White	City of Spring Hill
John D. McCord	City of Spring Hill
John B. Pewitt	City of Spring Hill

TDOT DESIGN CRITERIA FOR LOCATION AND DESIGN PHASE

ROUTE: State Route 247 SECTION: I
REGION: III COUNTY: Maury PROJECT NO.:
LOCATION: State Route 6 (U.S. 31, Main Street) to MJ Bypass

PRESENT ADT (2010)	8,730
FUTURE ADT (2030)	15,710
PERCENT TRUCKS	4 % (ADT) 3 % (DHV)
DHV (2030)	1,571
FUNCTIONAL CLASSIFICATION	Urban Collector
MINIMUM DESIGN SPEED	40
ACCESS CONTROL	N/A
MINIMUM RADIUS	465' (0.08 Max S.E.)
MAXIMUM GRADE	8%
MINIMUM STOPPING SIGHT DISTANCE	305'
SURFACE WIDTH	36'
NUMBER OF LANES	3
USABLE SHOULDER WIDTH	6' (4' Shoulder w/ 2' C&G)
MEDIAN WIDTH	12' Center Turn Lane
MINIMUM RIGHT OF WAY *	68'
SIGNALIZATION	Modify Existing @ S.R. 6

REMARKS: * Construction and Slope easements may be required outside the Right-of-Way limits.

TDOT DESIGN CRITERIA FOR LOCATION AND DESIGN PHASE

ROUTE: State Route 247 SECTION: II
REGION: III COUNTY: Maury/Williamson PROJECT NO.:
LOCATION: MJ Bypass to 600' East of Port Royal Road

PRESENT ADT (2010)	7,960 - 9,500
FUTURE ADT (2030)	14,320 - 17,100
PERCENT TRUCKS	4 % (ADT) 3 % (DHV)
DHV (2030)	1,432 - 1,710
FUNCTIONAL CLASSIFICATION	Urban Collector
MINIMUM DESIGN SPEED	40
ACCESS CONTROL	N/A
MINIMUM RADIUS	465' (0.08 Max S.E.)
MAXIMUM GRADE	8%
MINIMUM STOPPING SIGHT DISTANCE	305'
SURFACE WIDTH	36'
NUMBER OF LANES	3
USABLE SHOULDER WIDTH	6' (4' Shoulder w/ 2' C&G)
MEDIAN WIDTH	12' Center Turn Lane
MINIMUM RIGHT OF WAY *	68'
SIGNALIZATION	MJ Bypass, Commonwealth Dr., & Port Royal

REMARKS: * Construction and Slope easements may be required outside the Right-of-Way limits.

TDOT DESIGN CRITERIA FOR LOCATION AND DESIGN PHASE

ROUTE: State Route 247 SECTION: III
REGION: III COUNTY: Williamson PROJECT NO.:
LOCATION: 600' East of Port Royal Road to 0.11 miles West of I-65

PRESENT ADT (2010)	5,440- 6,370
FUTURE ADT (2030)	9,780 - 11,450
PERCENT TRUCKS	4 % (ADT) 3 % (DHV)
DHV (2030)	978 - 1,145
FUNCTIONAL CLASSIFICATION	Urban Collector and Rural Major Collector
MINIMUM DESIGN SPEED	40
ACCESS CONTROL	N/A
MINIMUM RADIUS	465' (0.08 Max S.E.)
MAXIMUM GRADE	8%
MINIMUM STOPPING SIGHT DISTANCE	305'
SURFACE WIDTH	36'
NUMBER OF LANES	3
USABLE SHOULDER WIDTH	6' (4' Shoulder w/ 2' C&G)
MEDIAN WIDTH	12' Center Turn Lane
MINIMUM RIGHT OF WAY *	68'
SIGNALIZATION	Buckner Lane

REMARKS: * Construction and Slope easements may be required outside the Right-of-Way limits.

COST DATA SHEET

PROJECT: State Route 247 (Duplex Road) Section I
LOCATION: From SR 6 to Hughes Street
LENGTH: 0.30 miles
CROSS SECTION:

RIGHT-OF-WAY

Land, Improvements & Damages	(# Acres	0.99)	$262,000	
Incidentals	(# Tracts	15)	$65,250	
Relocation Payments	(Residences	2)	$78,300	
	(Businesses	0)	$0	
	(Non-Profits	0)		
Total Right-Of-Way Cost				**$405,550**

UTILITY RELOCATION

Reimbursable	$51,000	
Non-Reimbursable	$151,000	
Total Utility Adjustment Cost		**$202,000**

CONSTRUCTION

Clear and Grubbing	$4,000	
Earthwork	$50,000	
Pavement Removal	$19,000	
Drainage (Erosion Control = $120,000)	$210,000	
Structures (Preserv'n/Demol'n = $0)	$0	
Railroad Crossing	$0	
Paving	$200,000	
Retaining Walls	$134,000	
Maintenance of Traffic	$100,000	
Topsoil	$0	
Seeding	$0	
Sodding	$34,000	
Signing	$5,000	
Signalization	$50,000	
Fence	$0	
Rock Walls	$0	
Guardrail	$0	
Rip-rap or Slope Protection	$8,000	
Other Construction Items (8.5%)	$69,000	
Mobilization	$45,000	
10% Engineering and Contigencies	$93,000	
Total Construction Cost		**$1,021,000**
Preliminary Engineering (10% of Constr.)		**$93,000**

TOTAL ESTIMATED COST (SECTION I) **$1,721,550**

COST DATA SHEET

PROJECT: State Route 247 (Duplex Road) Section II
LOCATION: From Hughes Street to 600' East of Port Royal Road
LENGTH: 1.29 miles
CROSS SECTION:

RIGHT-OF-WAY				
Land, Improvements & Damages	(# Acres	3.33)	$583,000	
Incidentals	(# Tracts	56)	$243,600	
Relocation Payments	(Residences	3)	$117,450	
	(Businesses	0)	$0	
	(Non-Profits	0)		
Total Right-Of-Way Cost				**$944,050**
UTILITY RELOCATION				
Reimbursable			$213,000	
Non-Reimbursable			$598,000	
Total Utility Adjustment Cost				**$811,000**
CONSTRUCTION				
Clear and Grubbing			$12,000	
Earthwork			$310,000	
Pavement Removal			$82,000	
Drainage (Erosion Control =	$524,000)		$911,000	
Structures (Preserv'n/Demol'n =	$19,200)		$211,000	
Railroad Crossing			$0	
Paving			$994,000	
Retaining Walls			$612,000	
Maintenance of Traffic			$250,000	
Topsoil			$0	
Seeding			$0	
Sodding			$185,000	
Signing			$10,000	
Signalization			$150,000	
Fence			$0	
Rock Walls			$0	
Guardrail			$14,000	
Rip-rap or Slope Protection			$24,000	
Other Construction Items (8.5%)			$302,000	
Mobilization			$188,000	
10% Engineering and Contigencies			$426,000	
Total Construction Cost				**$4,681,000**
Preliminary Engineering (10% of Constr.)				**$426,000**

TOTAL ESTIMATED COST (SECTION II) **$6,862,050**

COST DATA SHEET

PROJECT: State Route 247 (Duplex Road) Section III
LOCATION: From 600' East of Port Royal Road to 0.11 miles West of I-65
LENGTH: 1.59 miles
CROSS SECTION:

RIGHT-OF-WAY

Land, Improvements & Damages	(# Acres	1.90)	$84,000	
Incidentals	(# Tracts	40)	$174,000	
Relocation Payments	(Residences	0)	$0	
	(Businesses	0)	$0	
	(Non-Profits	0)		
Total Right-Of-Way Cost				**$258,000**

UTILITY RELOCATION

Reimbursable		$262,000	
Non-Reimbursable		$737,000	
Total Utility Adjustment Cost			**$999,000**

CONSTRUCTION

Clear and Grubbing		$8,000	
Earthwork		$430,000	
Pavement Removal		$102,000	
Drainage (Erosion Control =	$524,000)	$1,004,000	
Structures (Preserv'n/Demol'n =	$18,000)	$210,000	
Railroad Crossing		$0	
Paving		$1,139,000	
Retaining Walls		$741,000	
Maintenance of Traffic		$300,000	
Topsoil		$0	
Seeding		$0	
Sodding		$184,000	
Signing		$15,000	
Signalization		$50,000	
Fence		$0	
Rock Walls		$0	
Guardrail		$14,000	
Rip-rap or Slope Protection		$33,000	
Other Construction Items (8.5%)		$342,000	
Mobilization		$211,000	
10% Engineering and Contigencies		$478,000	
Total Construction Cost			**$5,261,000**
Preliminary Engineering (10% of Constr.)			**$478,000**

TOTAL ESTIMATED COST (SECTION III) **$6,996,000**

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

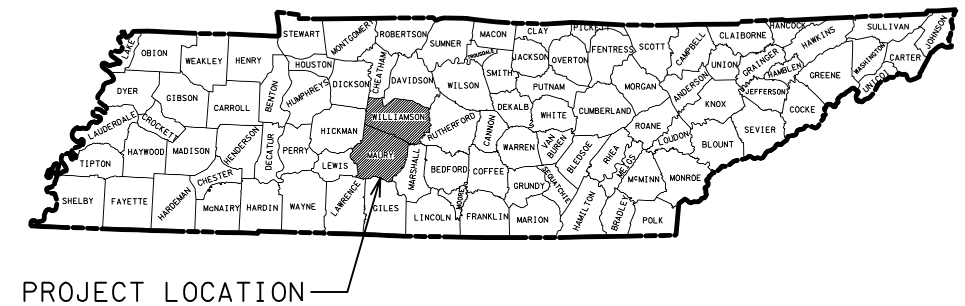
Index Of Sheets

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING

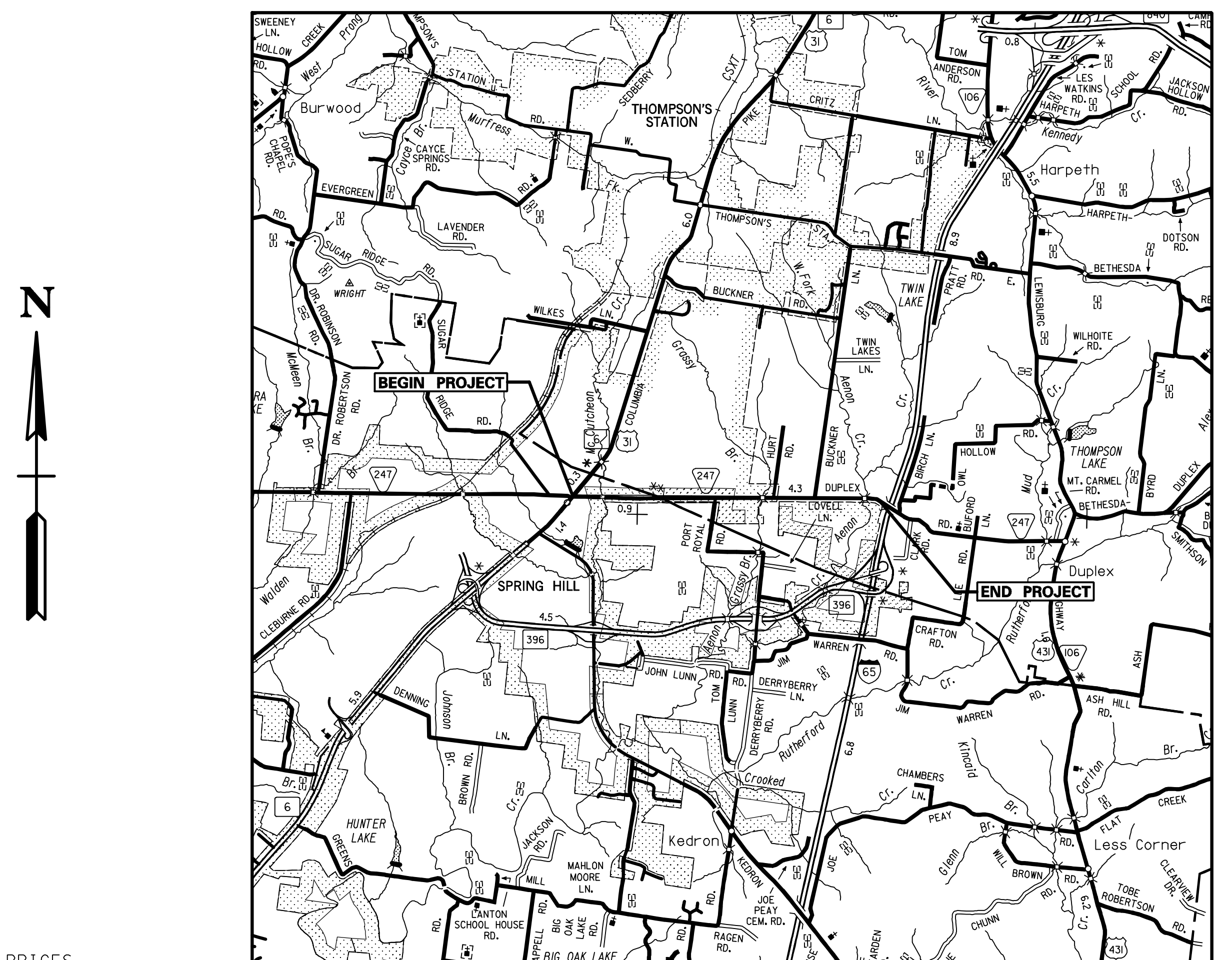
TENN.	YEAR	SHEET NO.
	2006	1
FED. AID PROJ. NO.		
STATE PROJ. NO.		

STATE ROUTE 247 (DUPLEX ROAD)
FROM S.R. 6 (US 31, MAIN STREET) IN
SPRING HILL TO 0.11 MILES WEST OF I-65
MAURY AND WILLIAMSON COUNTIES

STATE HIGHWAY NO. 247 F.A.H.S. NO. 247



PROJECT LOCATION



0 1 2 3
SCALE: 1″= 1 MILE

APPROVED: ______________________
CHIEF ENGINEER

DATE: ______________________

APPROVED: ______________________
COMMISSIONER

SPECIAL NOTES

PROPOSALS MAY BE REJECTED BY THE COMMISSIONER IF ANY OF THE UNIT PRICES CONTAINED THEREIN ARE OBVIOUSLY UNBALANCED, EITHER EXCESSIVE OR BELOW THE REASONABLE COST ANALYSIS VALUE.

THIS PROJECT TO BE CONSTRUCTED UNDER THE STANDARD SPECIFICATIONS OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION DATED MARCH 1, 1995 AND ADDITIONAL SPECIFICATIONS AND SPECIAL PROVISIONS CONTAINED IN THE PLANS AND IN THE PROPOSAL CONTRACT

TDOT ROAD SP. SV. 2 ______________________

DESIGNER CLINARD ENGINEERING ASSOCIATES, LLC. CHECKED BY ______________________

P.E. NO. ______________________

TRAFFIC DATA	
ADT (2010)	7,080
ADT (2030)	12,734
DHV (2030)	1,273
D	55 - 45
T (ADT)	4 %
T (DHV)	3 %
V	40 MPH

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED:

DIVISION ADMINISTRATOR DATE

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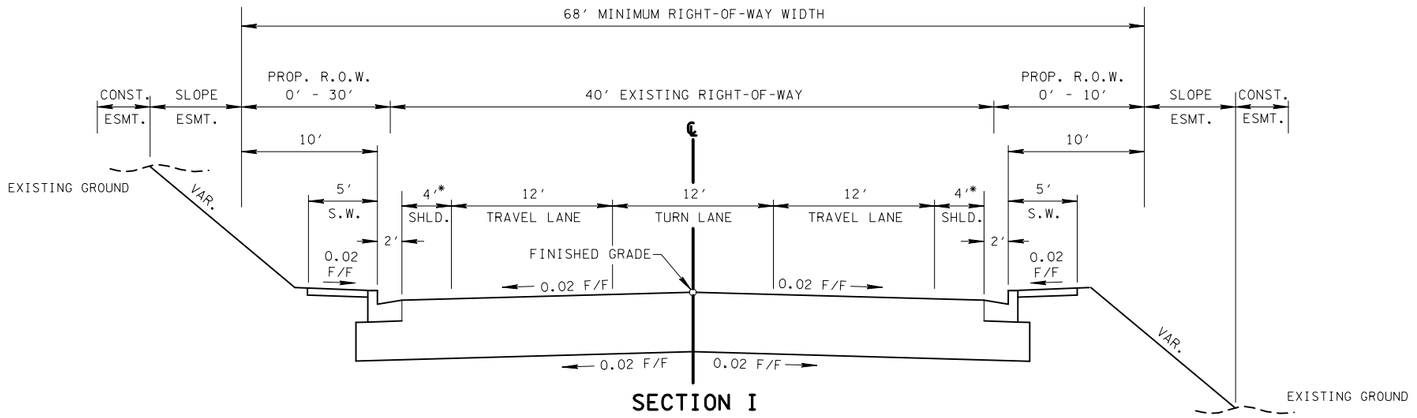
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

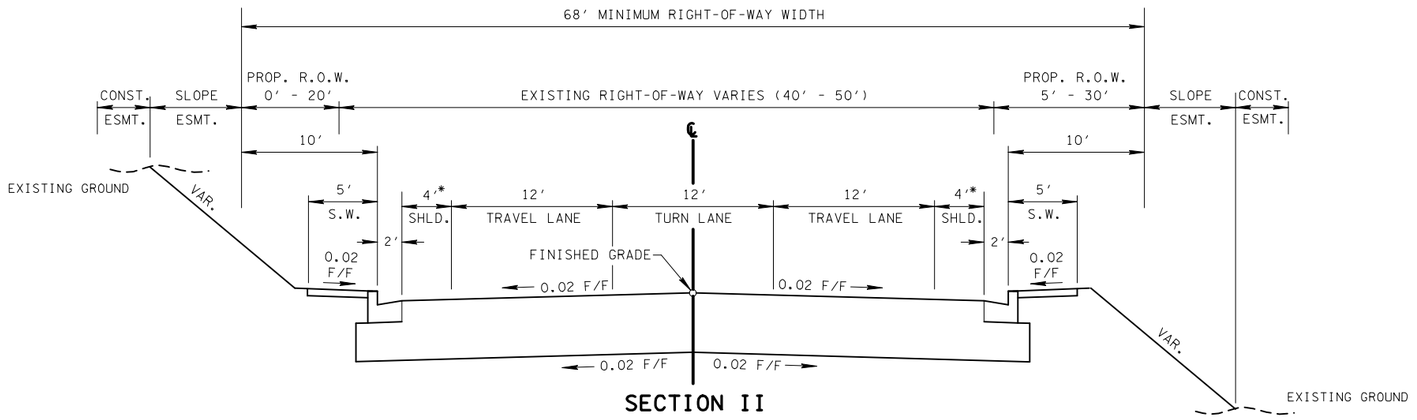
TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		2



SECTION I

FROM STATE ROUTE 6 (US-31, MAIN STREET)
TO HUGHES STREET

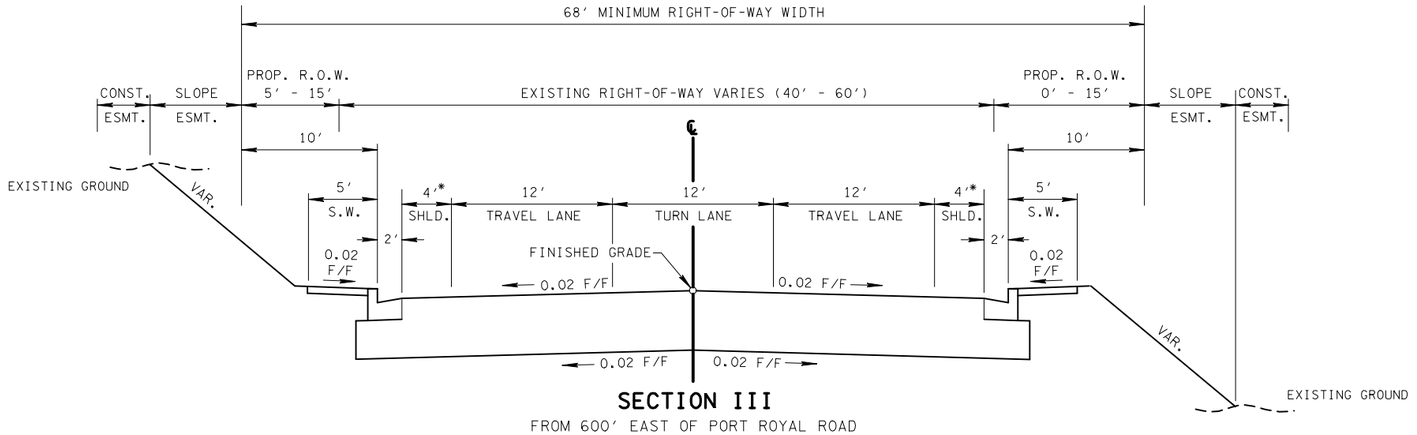
(BASED ON STD. DWG. RD01-TS-7A)



SECTION II

FROM HUGHES STREET
TO 600′ EAST OF PORT ROYAL ROAD

(BASED ON STD. DWG. RD01-TS-7A)



SECTION III

FROM 600′ EAST OF PORT ROYAL ROAD
TO 0.11 MILES WEST OF I-65

(BASED ON STD. DWG. RD01-TS-7A)

* DESIGN EXCEPTION REQUIRED
FOR REDUCED WIDTH SHOULDERS

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

TYPICAL SECTIONS

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		3

N

BEGIN PROJECT
BEGIN SECTION 1

MODIFY EXISTING SIGNAL

POPLAR HOUSE RESTAURANT

TO FRANKLIN

STATE ROUTE 6 (US-31, MAIN STREET)

HOLLANDS PHARMACY AND GIFTS

CROSSLIN SUPPLY COMPANY

BAGSBY TRACTOR TRUCK SERVICE

LOCKE AVENUE

SPRING HILL VET

AFFORDABLE WELDING FAB.

MT. HOPE CHURCH

EXIST. DRIVE

RES

MAURY FARMERS CO-OP

PROPOSED R.O.W.

69'

PRESENT R.O.W.

STATE ROUTE 247 (DUPLEX ROAD)

MATCHLINE

SEE SHEET 4

TO COLUMBIA

SPRING HILL UMC

KARATE

PROPOSED RETAINING WALL (TYP.)

SHOWTIME VIDEO/TAN

SPRING HILL FURNITURE

WHITE HALL
(HISTORIC - 1844)

OLD SPRING HILL HIGH SCHOOL (OFFICES AND SHOPS)

N. SCHOOL STREET

SPRING HILL MINI-STORAGE

COM

WALNUT STREET

SPRING HILL MINI-STORAGE

AERIAL PHOTO TAKEN: 02/18/05

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET)
IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

0 50 100
SCALE: 1" = 50'

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		3A

VC = 130.00'
K = 38
V = 30 MPH

VC = 170.00'
K = 98
V = 50 MPH

VPI 75+00.00
EL. 741.98
VPC 75+15.00
EL. 741.51
VPT 76+45.00
EL. 739.86
VPC 77+75.00
EL. 740.02
VPT 79+45.00
EL. 741.97
VPC 80+22.50
EL. 743.54
VPI 81+00.00
EL. 745.10
VPT 81+77.50
EL. 745.27
VPC 83+00.00
EL. 745.55
VPI 84+50.00
EL. 745.89
VPT 86+00.00
EL. 739.16
VPC 86+80.00
EL. 739.57

BEGIN PROJECT
BEGIN SECTION I

SCHOOL ST
WALNUT ST

-3.13%
0.28%
2.02%
0.22%
0.22%
-4.49%

VPI 75+80.00
EL. 739.47
VPI 78+60.00
EL. 740.26

VC = 155.00'
K = 86
V = 50 MPH

VC = 300.00'
K = 64
V = 45 MPH

770 765 760 755 750 745 740 735 730 725 720 715 710

75+00 76+00 77+00 78+00 79+00 80+00 81+00 82+00 83+00 84+00 85+00 86+00 87+00

LEGEND
- RETAINING WALL - NORTH OF ℄
- RETAINING WALL - SOUTH OF ℄
- AREA OF CUT
- AREA OF FILL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		4

N

McCUTCHEON CREEK

OLD KEDRON ROAD BY-PASS
(MILES JOHNSON PARKWAY)
UNDER CONSTRUCTION

SPRING HILL
VILLAGE APARTMENTS

SPRING HILL
VILLAGE APARTMENTS

RES

RES

RES

RES

RES

RES

RES

END SECTION I
BEGIN SECTION II

SEE SHEET 3

MATCHLINE

PROPOSED R.O.W.

PROPOSED R.O.W.

FUTURE
SIGNAL

PRESENT R.O.W.

PROPOSED R.O.W.

MATCHLINE

SEE SHEET 5

WHITE HALL
(HISTORIC – 1844)

HUGHES STREET

OLD KEDRON ROAD BY-PASS
(MILES JOHNSON PARKWAY)
UNDER CONSTRUCTION

AERIAL PHOTO TAKEN: 02/18/05

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET)
IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

0 50 100
SCALE: 1" = 50'

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		4A

750
745
740
735
730
725
720
715
710
705
700
695
690

VPI 87+60.00
EL. 731.98

VPT 88+40.00
EL. 723.51

VPC 88+77.00
EL. 722.51

VC = 476.00'
K = 64
V = 40 MPH

VC = 340.00'
K = 113
V = 50 MPH

-4.49%

-8.10%

LOCKE AVE

HUGHE ST

BOX BRIDGE

VPT 93+53.00
EL. 701.65

VPC 93+85.00
EL. 701.43

VPT 97+25.00
EL. 704.25

RAISE GRADE TO
MEET 40 MPH

-8.10%

0.67%

0.67%

2.33%

END SECTION I

BEGIN SECTION II

VPI 91+15.00
EL. 703.24

VC = 160.00'
K = 44
V = 40 MPH

VPI 95+55.00
EL. 700.30

87+00 88+00 89+00 90+00 91+00 92+00 93+00 94+00 95+00 96+00 97+00 98+00 99+00 100+00

LEGEND

- RETAINING WALL - NORTH OF ℄
- RETAINING WALL - SOUTH OF ℄
- AREA OF CUT
- AREA OF FILL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET)
IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		5

N

WILLIAMSON COUNTY
MAURY COUNTY

ALEX DRIVE

SPRING HILL VILLAGE APARTMENTS

RES

CHURCH OF CRIST AT NEWTON

PROPOSED RETAINING WALL (TYP.)

SEE SHEET 4

MATCHLINE

STATE ROUTE 247 (DUPLEX ROAD)

PROPOSED R.O.W.

MATCHLINE

SEE SHEET 6

PROPOSED RETAINING WALL (TYP.)

WINTER PARK SUBDIVISION

WESTON LANE

HARRISON WAY

AERIAL PHOTO TAKEN: 02/18/05

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247 (DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

0 50 100
SCALE: 1" = 50'

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		5A

760 755 750 745 740 735 730 725 720 715 710 705 700

VC = 200.00'
K = 362
V = 70 MPH

VPC 102+90.00
EL. 717.40

VPT 104+90.00
EL. 722.61

VPC 110+70.00
EL. 739.32

VPI 111+45.00
EL. 741.48

VPT 112+20.00
EL. 741.12

HARRISON WAY

ALEX DR

2.33%
2.88%
2.88%
-0.48%

VC = 150.00'
K = 45
V = 40 MPH

VPI 103+90.00
EL. 719.78

100+00 101+00 102+00 103+00 104+00 105+00 106+00 107+00 108+00 109+00 110+00 111+00 112+00 113+00

LEGEND

- RETAINING WALL - NORTH OF ℄
- RETAINING WALL - SOUTH OF ℄
- AREA OF CUT
- AREA OF FILL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET)
IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		6

N

RES

WILLIAMSON COUNTY
MAURY COUNTY

LEXINGTON FARMS

LEXINGTON FARMS

RES

RES

PROPOSED RETAINING WALL (TYP.)

PROPOSED RETAINING WALL (TYP.)

SEE SHEET 5

MATCHLINE

PROPOSED R.O.W.

68'

PROPOSED R.O.W.

PROPOSED R.O.W.

MATCHLINE

HARDINS LANDING SUBDIVISION

SEE SHEET 7

CARLYON COURT

AERIAL PHOTO TAKEN: 02/18/05

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET)
IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

0 50 100
SCALE: 1" = 50'

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		6A

VC = 560.00'
K = 64
V = 40 MPH

VPT 119+15.00
EL. 762.10

VPC 119+15.00
EL. 762.10

LEXINGTON FARMS

VPI 120+65.00
EL. 774.41

VPT 122+15.00
EL. 777.50

VPC 123+20.00
EL. 779.66

VC = 160.00'
K = 68
V = 40 MPH

VPT 124+80.00
EL. 784.84

VPC 125+98.50
EL. 790.07

VPC 113+55.00
EL. 740.47

ALEX DR

CARLYON CT

VPI 116+35.00
EL. 739.13

VPI 124+00.00
EL. 781.31

VC = 300.00'
K = 49
V = 40 MPH

8.20%

2.06%

-0.48%

8.20%

2.06%

4.41%

RAISE GRADE TO MEET 40 MPH

790 785 780 775 770 765 760 755 750 745 740 735 730

113+00 114+00 115+00 116+00 117+00 118+00 119+00 120+00 121+00 122+00 123+00 124+00 125+00 126+00

LEGEND

- RETAINING WALL - NORTH OF ℄
- RETAINING WALL - SOUTH OF ℄
- AREA OF CUT
- AREA OF FILL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		7

N

COMMONWEALTH DRIVE

WAKEFIELD SUBDIVISION

SEE SHEET 6

FUTURE SIGNAL

68'

STATE ROUTE 247 (DUPLEX ROAD)

PROPOSED R.O.W.

MATCHLINE

MATCHLINE

SEE SHEET 8

COMMONWEALTH DRIVE

RES

AERIAL PHOTO TAKEN: 02/18/05

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247 (DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

0 50 100
SCALE: 1" = 50'

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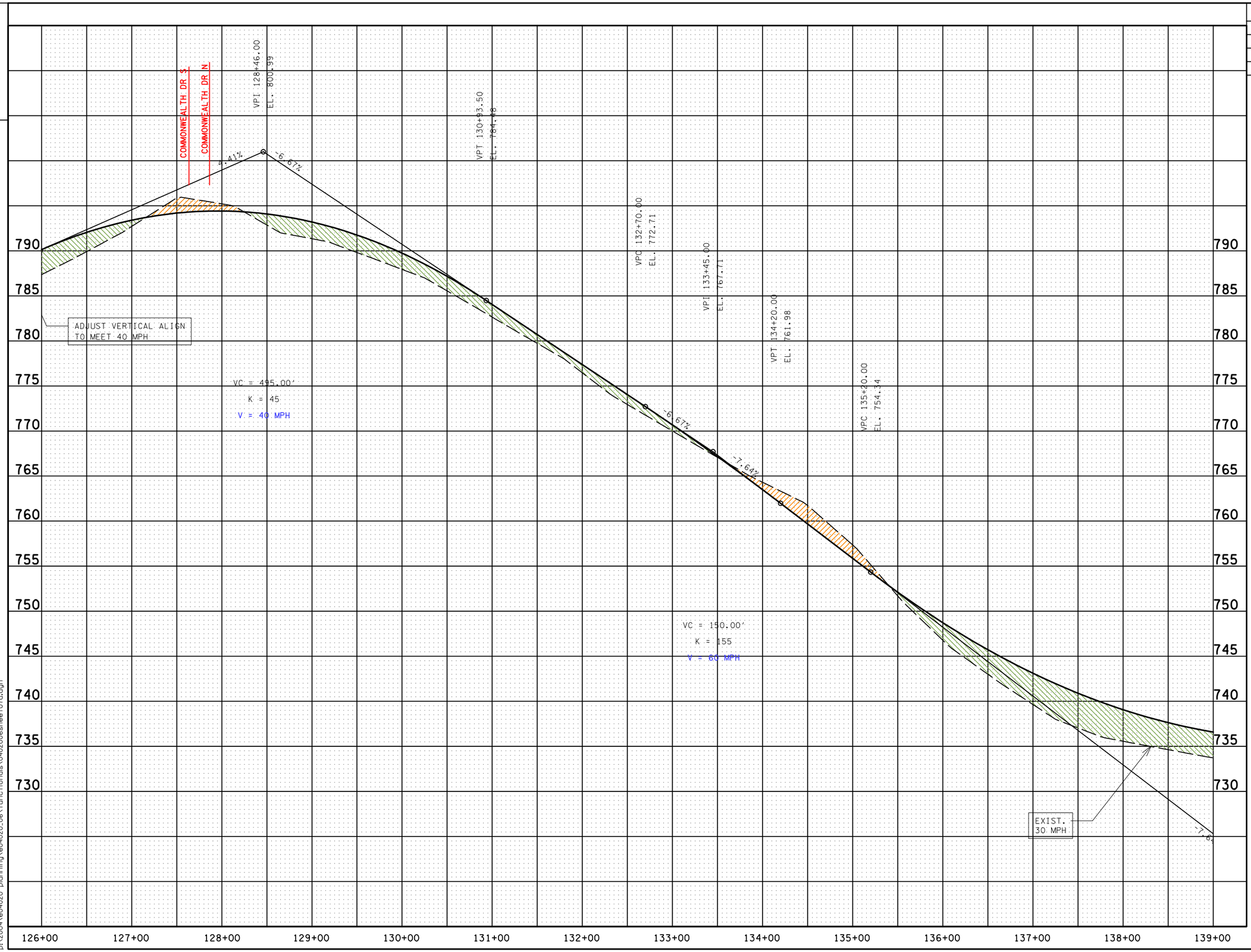
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		7A



LEGEND

- RETAINING WALL - NORTH OF ℄
- RETAINING WALL - SOUTH OF ℄
- AREA OF CUT
- AREA OF FILL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247 (DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		8

N

RIDGEPORT SUBDIVISION

PROPOSED RETAINING WALL (TYP.)

ELECTRICAL UTILITY SUBSTATION

SEE SHEET 7

MATCHLINE

PRESENT R.O.W.

PROPOSED R.O.W.

PROPOSED R.O.W.

MATCHLINE

SEE SHEET 9

AERIAL PHOTO TAKEN: 02/18/05

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET)
IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

0 50 100
SCALE: 1" = 50'

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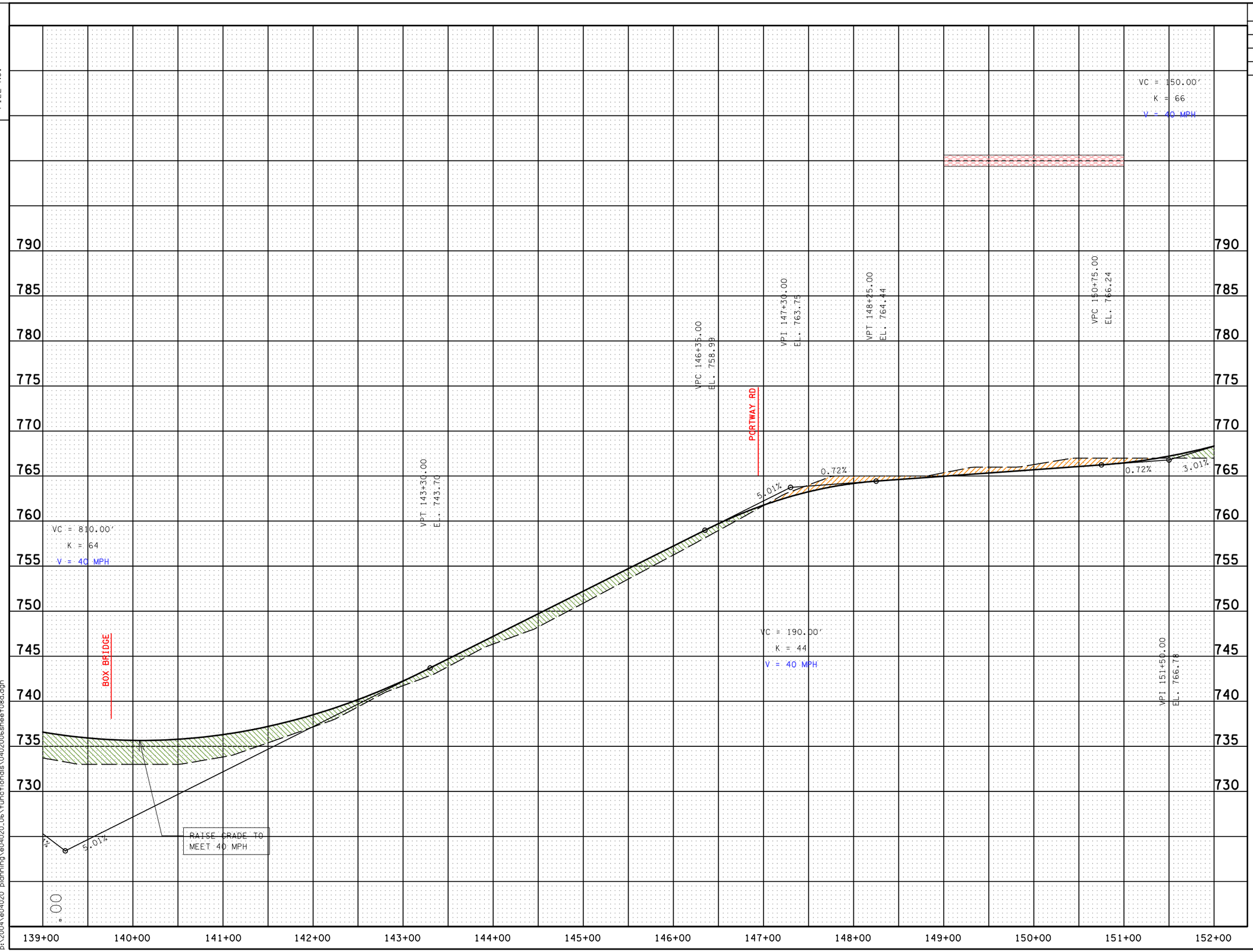
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		8A



LEGEND

- RETAINING WALL - NORTH OF ℄
- RETAINING WALL - SOUTH OF ℄
- AREA OF CUT
- AREA OF FILL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		9

N

PORT ROYAL ROAD

WYNGATE ESTATES

END SECTION II
BEGIN SECTION III

SEE SHEET 8

FUTURE SIGNAL

PROPOSED R.O.W.

STATE ROUTE 247 (DUPLEX ROAD)

68'

MATCHLINE

PROPOSED R.O.W.

SEE SHEET 10

MATCHLINE

RES

PROPOSED RETAINING WALL (TYP.)

HEARTHSIDE DRIVE

PORT ROYAL ROAD

CANDLEWICKE ROAD

AERIAL PHOTO TAKEN: 02/18/05

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET)
IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

0 50 100
SCALE: 1" = 50'

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		9A

VPT 152+25.00
EL. 769.04

VPC 154+02.50
EL. 774.38

PORT ROYAL RD S

PORT ROYAL RD N

EXIST.
20 MPH

+7.01%

-7.14%

LOWER GRADE TO
MEET 40 MPH

VPI 156+30.00
EL. 781.22

VC = 330.00'
K = 65
V = 40 MPH

VPT 158+57.50
EL. 764.98

VPC 158+90.00
EL. 762.66

END SECTION II
BEGIN SECTION III

VPT 162+20.00
EL. 747.51

VPC 163+87.50
EL. 744.07

VC = 455.00'
K = 45
V = 40 MPH

-7.14%

-2.05%

VPT 160+55.00
EL. 750.89

790 785 780 775 770 765 760 755 750 745 740 735 730

152+00 153+00 154+00 155+00 156+00 157+00 158+00 159+00 160+00 161+00 162+00 163+00 164+00

LEGEND

- RETAINING WALL - NORTH OF ℄
- RETAINING WALL - SOUTH OF ℄
- AREA OF CUT
- AREA OF FILL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET)
IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		10

N

AUGUSTA TRACE DRIVE

AUGUSTA TRACE DRIVE

SPRING MEADOW SUBDIVISION

PROPOSED R.O.W.

SEE SHEET 9

MATCHLINE

MATCHLINE

PROPOSED RETAINING WALL (TYP.)

PROPOSED R.O.W.

SEE SHEET 11

BAKERS SPRINGS SUBDIVISION

CANDLEWICKE ROAD

BAKER SPRINGS LANE

DAVE

BAKER

CREEK

GRASSY BRANCH CREEK

AERIAL PHOTO TAKEN: 02/18/05

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET)
IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

0 50 100
SCALE: 1" = 50'

9/1/2006 9:38:19 AM
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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		10A

VPI 164+40.00
EL. 743.00
VPT 164+92.50
EL. 740.72
CANDLEWICKE DR
VC = 105.00'
K = 46
V = 40 MPH
-2.05%
-4.34%
VPC 167+85.00
EL. 728.04
SPRING MEADOW CIRCLE
VC = 230.00'
K = 79
V = 45 MPH
-4.34%
-1.44%
VPI 169+00.00
EL. 723.05
VPT 170+15.00
EL. 721.39
BAKER SPRINGS LN S
AUGUSTA TRACE DR N
VPC 172+40.00
EL. 718.15
VPI 173+00.00
EL. 717.29
VPI 173+60.00
EL. 714.82
VPC 174+62.50
EL. 710.59
BAKER CREEK DR
-1.44%
-4.12%
VC = 120.00'
K = 45
V = 40 MPH
-4.12%

760 755 750 745 740 735 730 725 720 715 710 705 700

164+00 165+00 166+00 167+00 168+00 169+00 170+00 171+00 172+00 173+00 174+00 175+00 176+00

LEGEND
- RETAINING WALL - NORTH OF ℄
- RETAINING WALL - SOUTH OF ℄
- AREA OF CUT
- AREA OF FILL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET)
IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		11

N

AUGUSTA TRACE DRIVE

HURT ROAD

SEE SHEET 10

PROPOSED RETAINING WALL (TYP.)

RES

RES

PROPOSED R.O.W.

88'

MATCHLINE

STATE ROUTE 247 (DUPLEX ROAD)

R.O.W.

MATCHLINE

SEE SHEET 12

GRASSY BRANCH CREEK

COCHRAN TRACE DRIVE

TORRENCE TRAIL

AERIAL PHOTO TAKEN: 02/18/05

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247 (DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

0 50 100
SCALE: 1" = 50'

9/1/2006 9:38:27 AM
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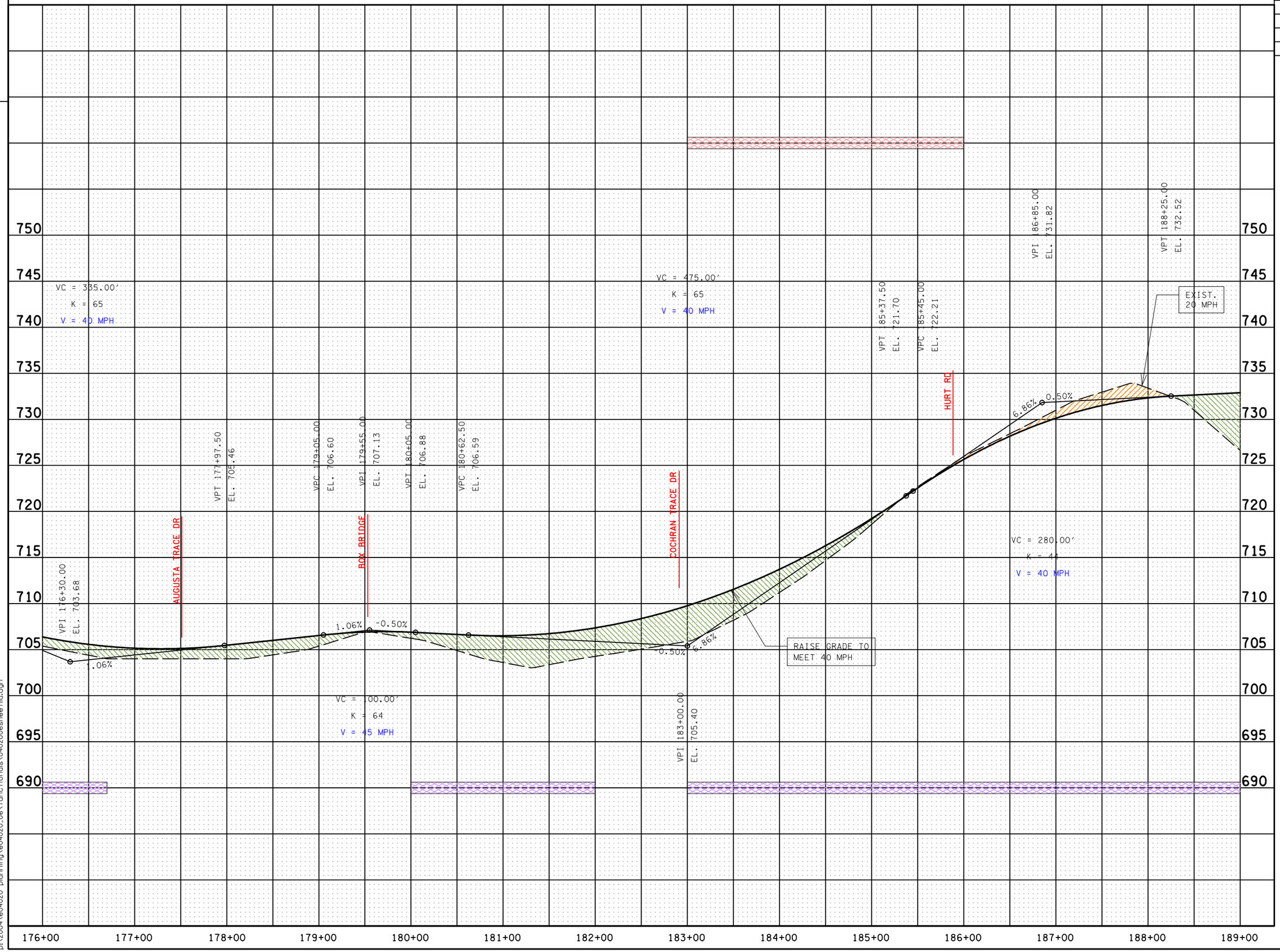
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		11A



LEGEND

- RETAINING WALL - NORTH OF ℄
- RETAINING WALL - SOUTH OF ℄
- AREA OF CUT
- AREA OF FILL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247 (DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

9/1/2006 9:38:29 AM
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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		12

N

SEE SHEET 11

MATCHLINE

BENVENTO SUBDIVISION

PROPOSED R.O.W.

PROPOSED R.O.W.

MATCHLINE

PRESENT R.O.W.

PROPOSED RETAINING WALL (TYP.)

PRESENT R.O.W.

SEE SHEET 13

RES

PIPKIN HILLS

AERIAL PHOTO TAKEN: 02/18/05

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET)
IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

0 50 100
SCALE: 1" = 50'

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		12A

VC = 235.00'
K = 65
V = 40 MPH

VC = 360.00'
K = 64
V = 40 MPH

VC = 325.00'
K = 44
V = 40 MPH

VPC 189+82.50
EL. 733.31

VPT 192+17.50
EL. 738.70

VPC 193+22.50
EL. 743.00

VPI 194+85.00
EL. 749.64

VPT 196+47.50
EL. 744.31

VPC 196+50.00
EL. 744.23

VPI 200+10.00
EL. 742.50

VPI 191+00.00
EL. 733.90

VPI 198+30.00
EL. 738.33

BENVENTO SUBDIVISION

PIPKINS HILLS

4.09%
-3.28%
-3.28%
2.32%
0.50%
4.09%

RAISE GRADE TO MEET 40 MPH

EXIST. 20 MPH

760 755 750 745 740 735 730 725 720 715 710 705 700

189+00 190+00 191+00 192+00 193+00 194+00 195+00 196+00 197+00 198+00 199+00 200+00 201+00 202+00

LEGEND

- RETAINING WALL - NORTH OF ℄
- RETAINING WALL - SOUTH OF ℄
- AREA OF CUT
- AREA OF FILL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET)
IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

9/1/2006 9:38:37 AM
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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		13

N

BUCKNER LANE

FUTURE SIGNAL

SEE SHEET 12

MATCHLINE

STATE ROUTE 247 (DUPLEX ROAD)

71'

MATCHLINE

PROPOSED RETAINING WALL (TYP.)

PROPOSED RETAINING WALL (TYP.)

SEE SHEET 14

BURTONWOOD SUBDIVISION

BUCKNER LANE

AERIAL PHOTO TAKEN: 02/18/05

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247 (DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

0 50 100
SCALE: 1" = 50'

9/1/2006 9:38:43 AM
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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		13A

VC = 120.00'
K = 66
V = 40 MPH

VPC 202+40.00
EL. 747.84

VPT 203+60.00
EL. 751.71

VPC 204+37.50
EL. 754.92

VPI 205+50.00
EL. 759.57

VPT 206+62.50
EL. 758.47

VPC 208+50.00
EL. 756.65

VPI 209+00.00
EL. 756.17

VPT 209+50.00
EL. 754.93

VC = 340.00'
K = 65
V = 40 MPH

VPC 211+30.00
EL. 750.48

VPT 214+70.00
EL. 750.99

BUCKNER LN N
BUCKNER LN S

2.32%
4.13%
-0.97%
-0.97%
-2.47%
-2.47%
2.77%

VC = 225.00'
K = 44
V = 40 MPH

VPI 203+00.00
EL. 749.23

VC = 100.00'
K = 67
V = 45 MPH

VPI 213+00.00
EL. 746.28

770 765 760 755 750 745 740 735 730 725 720 715 710

202+00 203+00 204+00 205+00 206+00 207+00 208+00 209+00 210+00 211+00 212+00 213+00 214+00 215+00

LEGEND

- RETAINING WALL - NORTH OF ℄
- RETAINING WALL - SOUTH OF ℄
- AREA OF CUT
- AREA OF FILL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		14

N

SEE SHEET 13

MATCHLINE

PROPOSED R.O.W.

PROPOSED R.O.W.

71'

PRESENT R.O.W.

PRESENT R.O.W.

PROPOSED RETAINING WALL (TYP.)

DAKOTA POINTE SUBDIVISION

MATCHLINE

SEE SHEET 15

CHAPMAN'S RETREAT SUBDIVISION

AERIAL PHOTO TAKEN: 02/18/05

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET)
IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

0 50 100
SCALE: 1" = 50'

9/1/2006 9:38:51 AM
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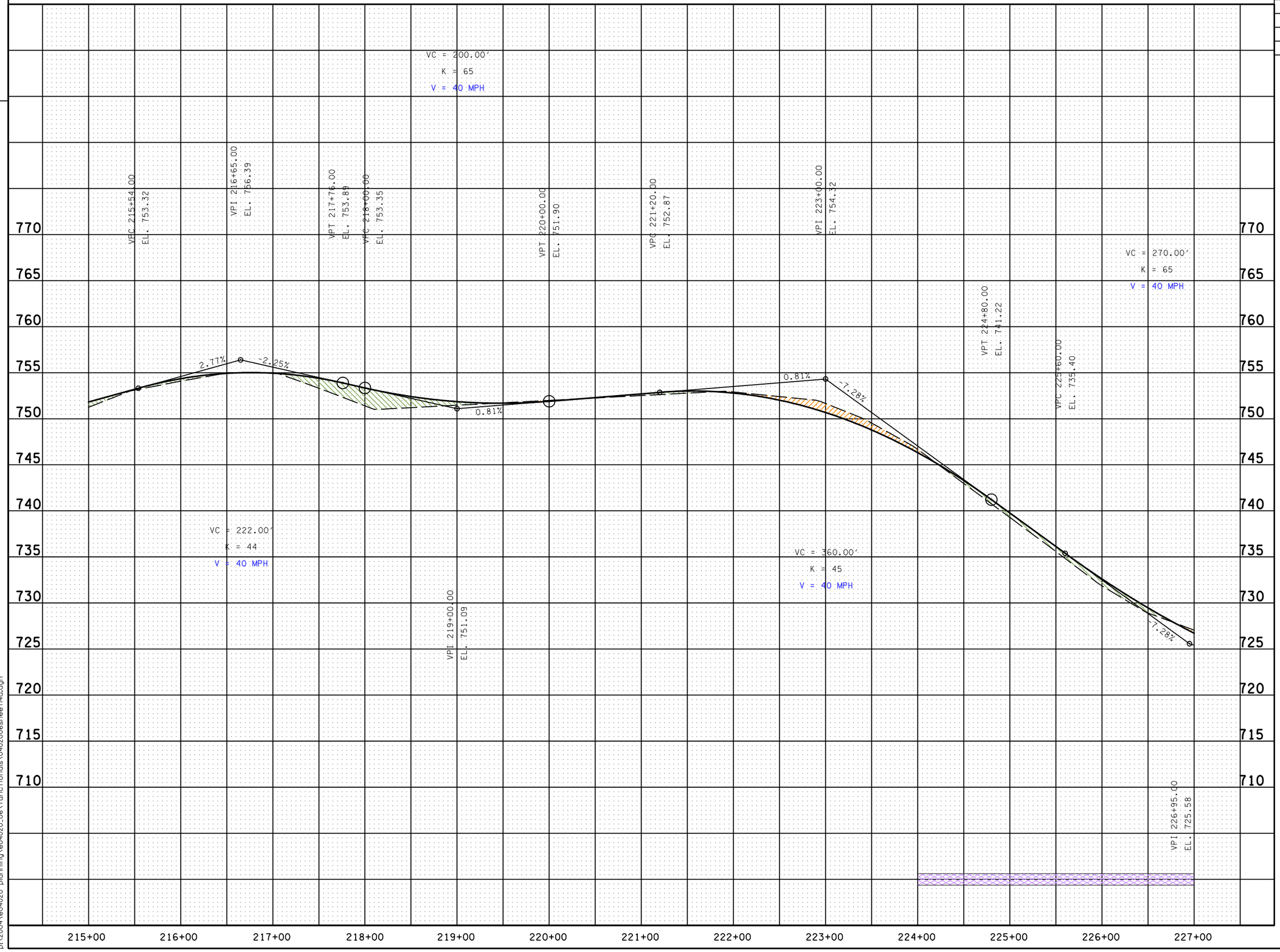
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		14A



LEGEND

- RETAINING WALL - NORTH OF ℄
- RETAINING WALL - SOUTH OF ℄
- AREA OF CUT
- AREA OF FILL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247 (DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

9/1/2006 9:38:53 AM
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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		15

N

DAKOTA POINTE SUBDIVISION

SAKARI CIRCLE

SEE SHEET 14

MATCHLINE

STATE ROUTE 247 (DUPLEX ROAD)

PROPOSED R.O.W.

68'

PROPOSED R.O.W.

MATCHLINE

SEE SHEET 16

CHAPMAN'S RETREAT SUBDIVISION

CHAPMAN'S

RETREAT

DRIVE

THE CHILDRENS CENTER

EAGLE LEE DR

BRIGG

AERIAL PHOTO TAKEN: 02/18/05

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247 (DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

0 50 100
SCALE: 1" = 50'

9/1/2006 9:38:59 AM
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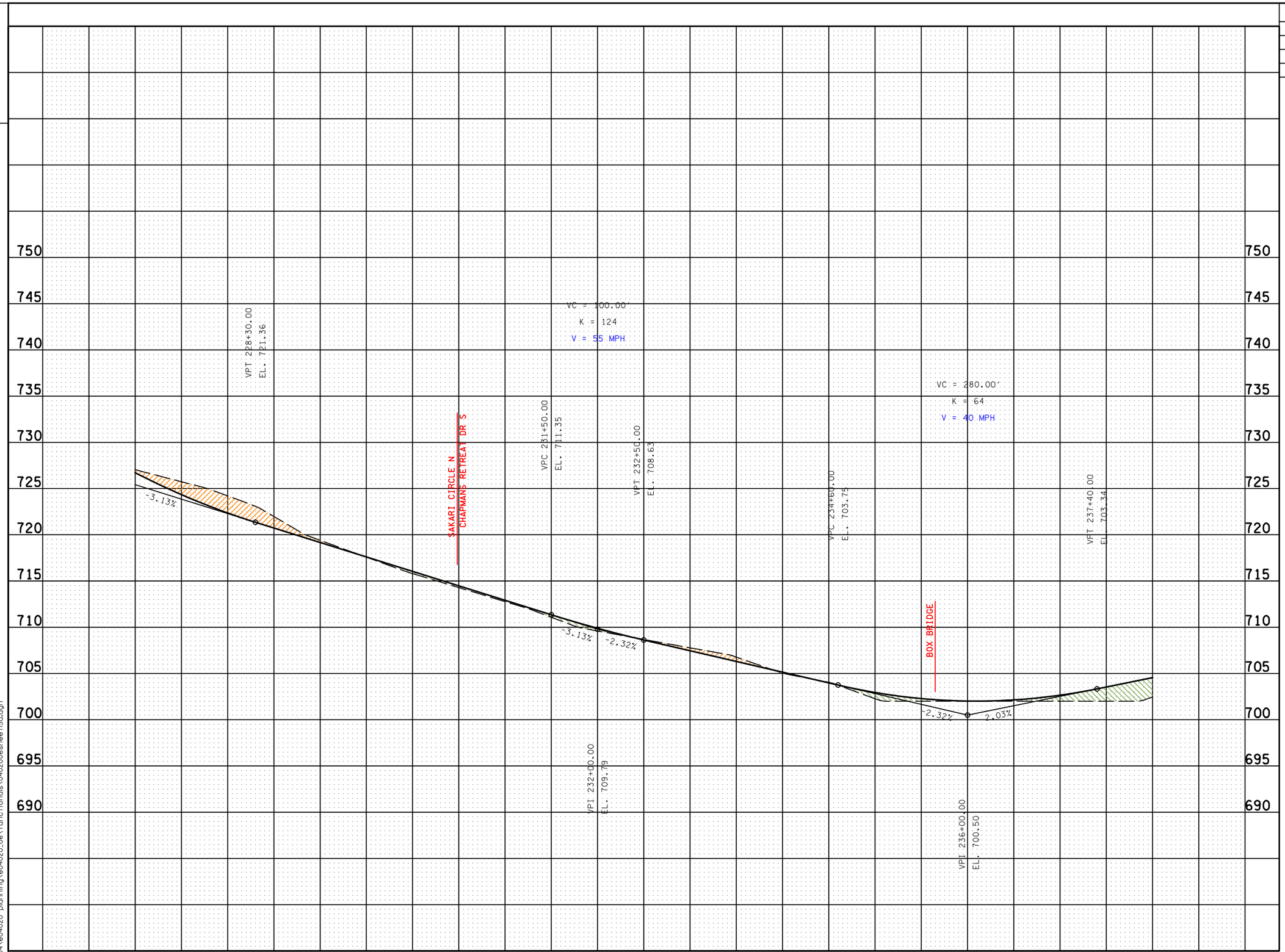
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		15A



LEGEND

- RETAINING WALL - NORTH OF ℄
- RETAINING WALL - SOUTH OF ℄
- AREA OF CUT
- AREA OF FILL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		16

N

SEE SHEET 15

MATCHLINE

CHAPMANS CROSSING SUBDIVISION

CHAPMANS CROSSING

END PROJECT
END SECTION III

TO NASHVILLE

THE CHILDRENS CENTER

BRIGGS LANE

PRESENT R.O.W.

PRESENT R.O.W.

RES

INTERSTATE 65

SECLUDED LANE

STORAGE STATION

FERGUSON ROAD

TO HUNTSVILLE

AERIAL PHOTO TAKEN: 02/18/05

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET)
IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

0 50 100
SCALE: 1" = 50'

9/1/2006 9:39:08 AM
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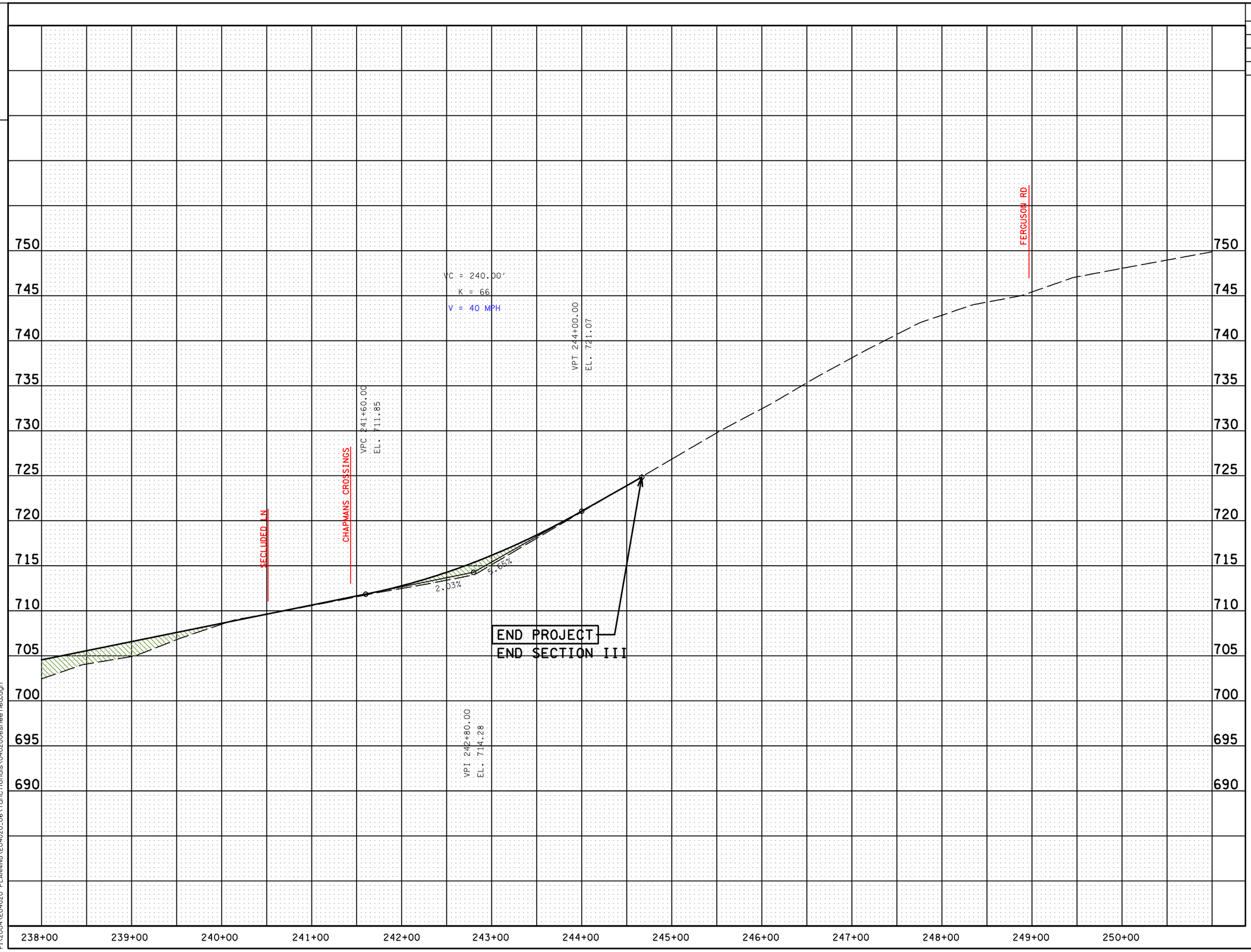
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
TPR	2006		16A



LEGEND

- RETAINING WALL - NORTH OF ℄
- RETAINING WALL - SOUTH OF ℄
- AREA OF CUT
- AREA OF FILL

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL
TO 0.11 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

SCALE: 1"= 50' HORIZ.
1"= 5' VERT.

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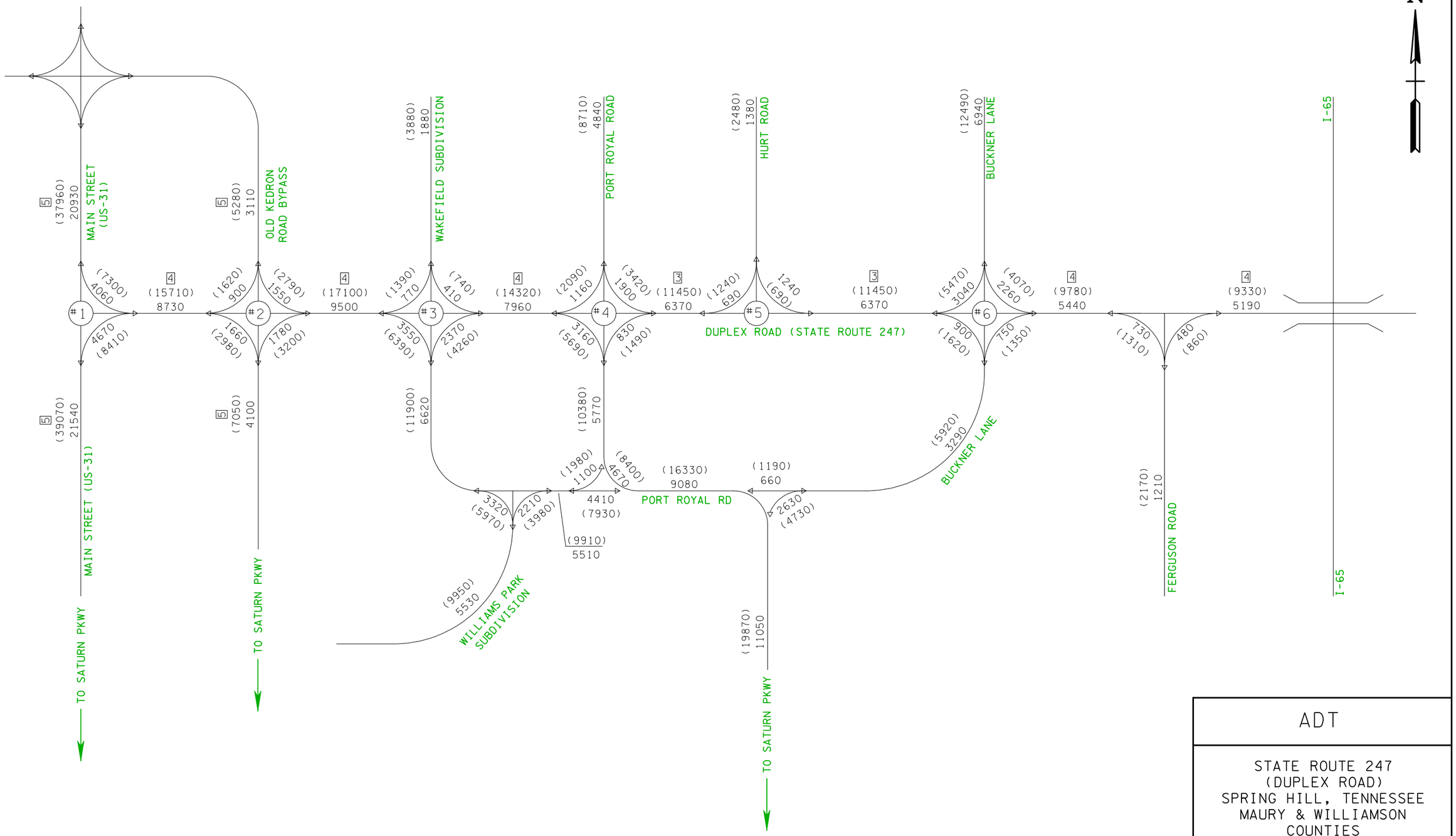
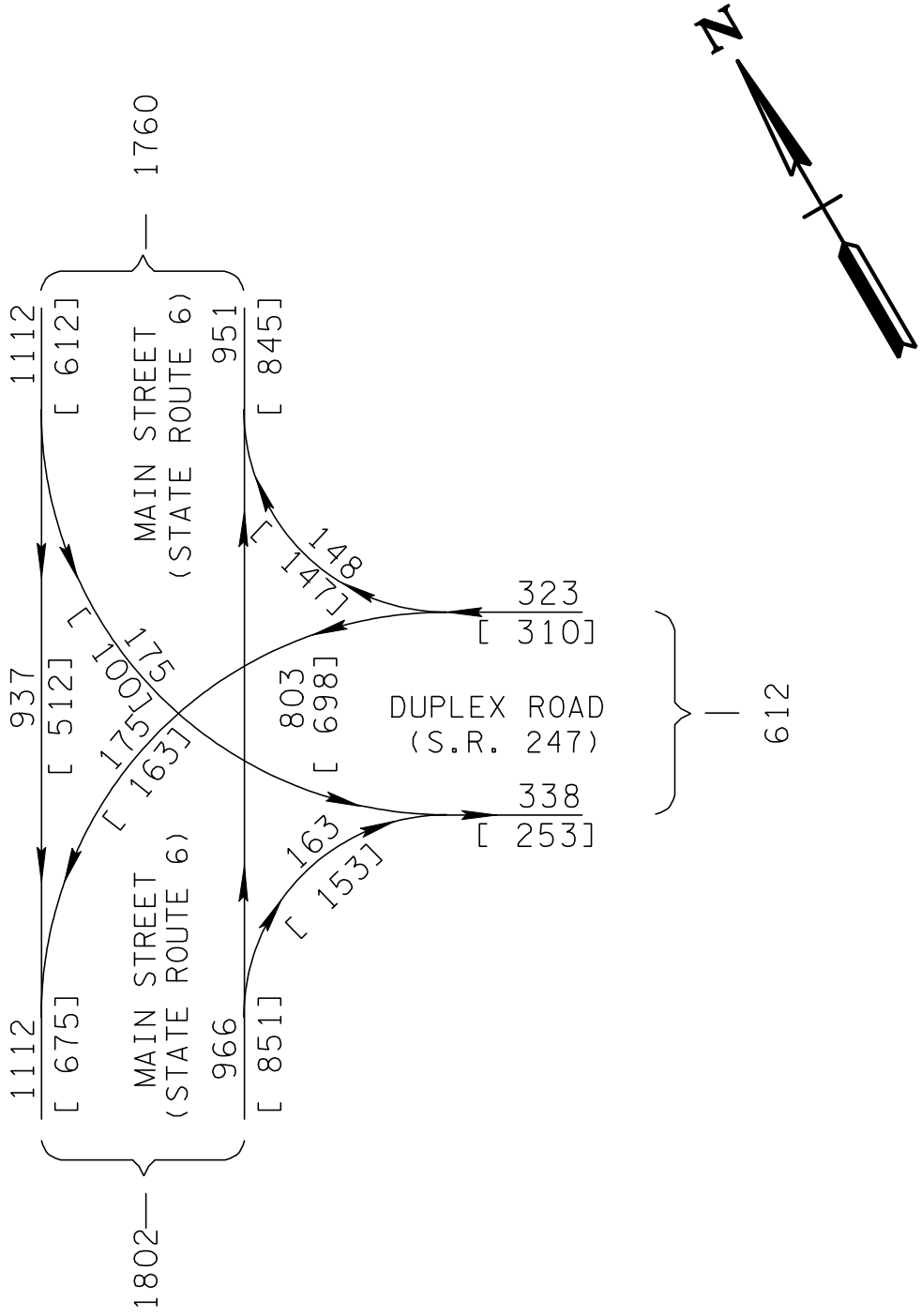


ADT

STATE ROUTE 247
(DUPLEX ROAD)
SPRING HILL, TENNESSEE
MAURY & WILLIAMSON
COUNTIES

2010 ADT 000
2030 ADT (000)

N.T.S.

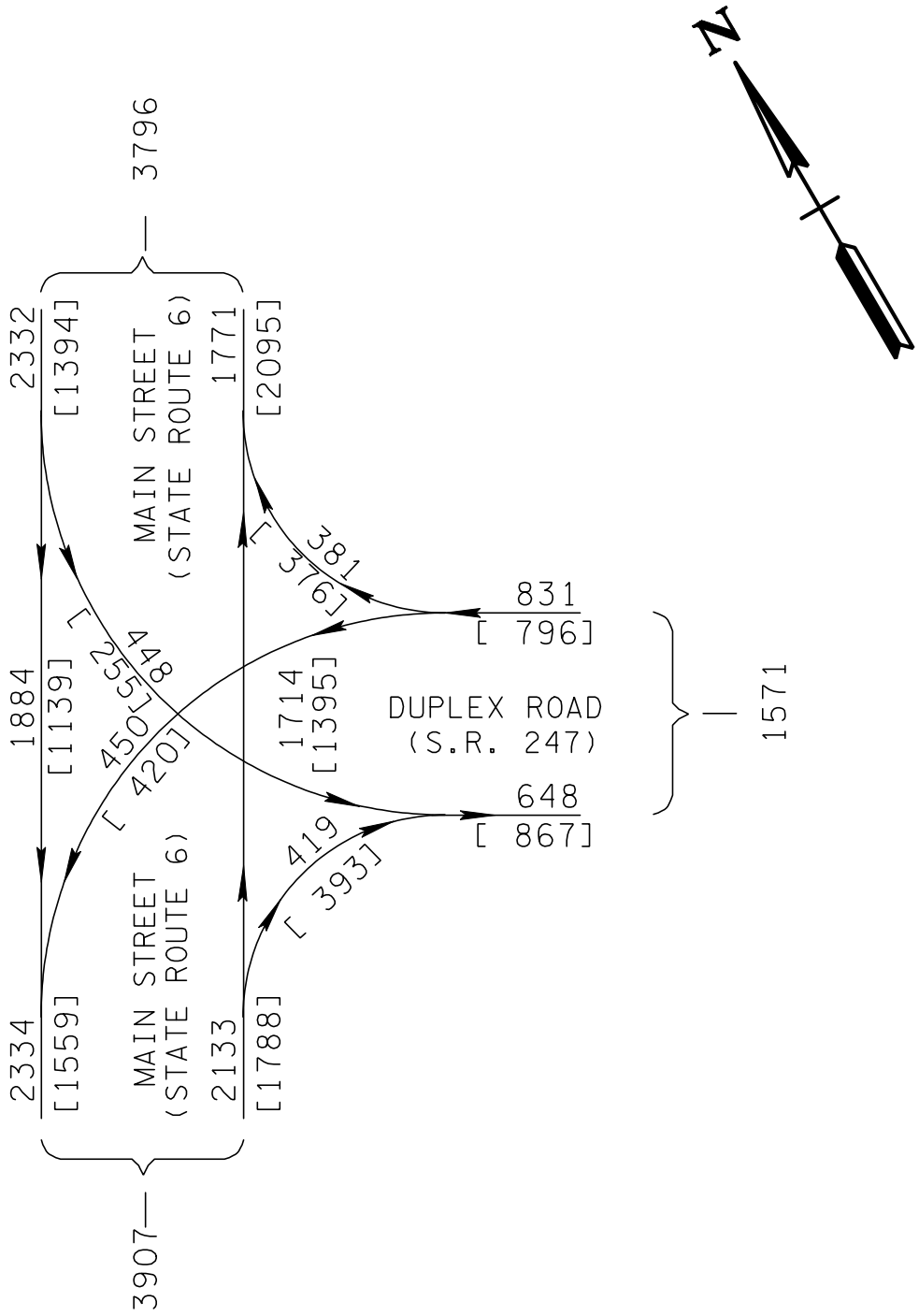


2005 DHV (INT. #1)

STATE ROUTE 247
(DUPLEX ROAD)
SPRING HILL, TENNESSEE
MAURY & WILLIAMSON
COUNTIES

P.M.
[A.M.]

N.T.S.

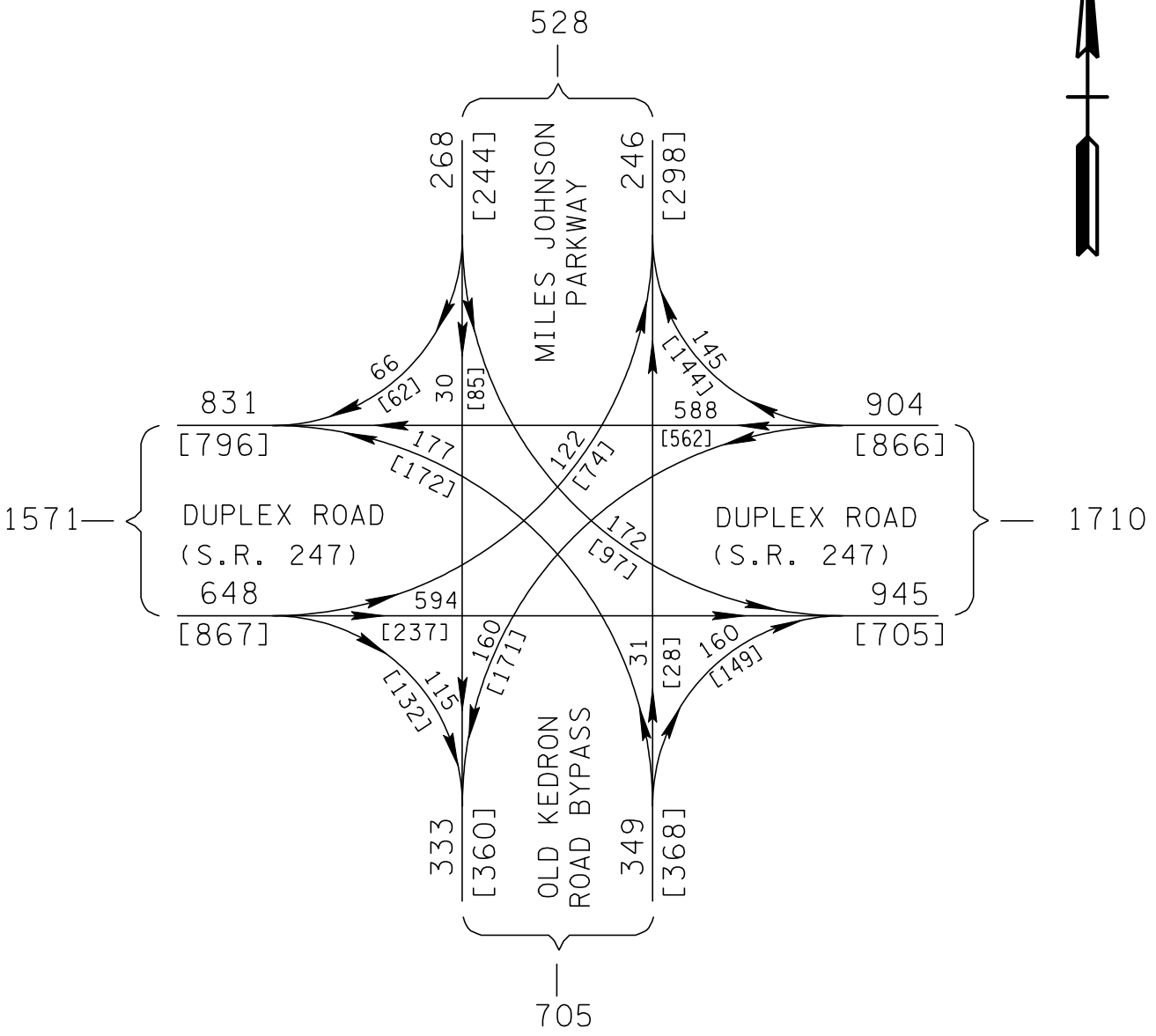


2030 DHV (INT. #1)

STATE ROUTE 247
(DUPLEX ROAD)
SPRING HILL, TENNESSEE
MAURY & WILLIAMSON
COUNTIES

P.M.
[A.M.]

N.T.S.

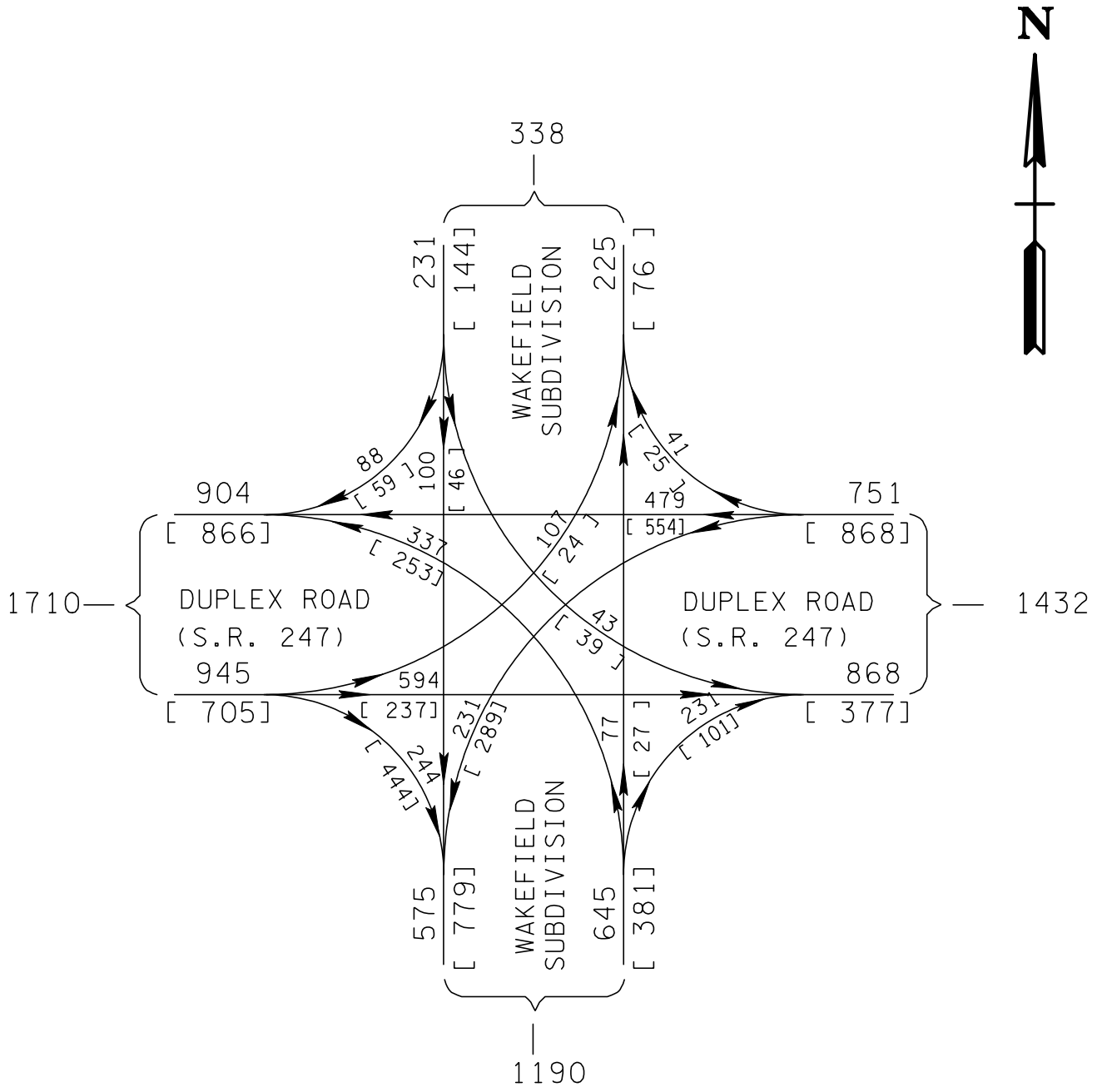


2030 DHV (INT. #2)

STATE ROUTE 247
(DUPLEX ROAD)
SPRING HILL, TENNESSEE
MAURY & WILLIAMSON
COUNTIES

P.M.
[A.M.]

N.T.S.

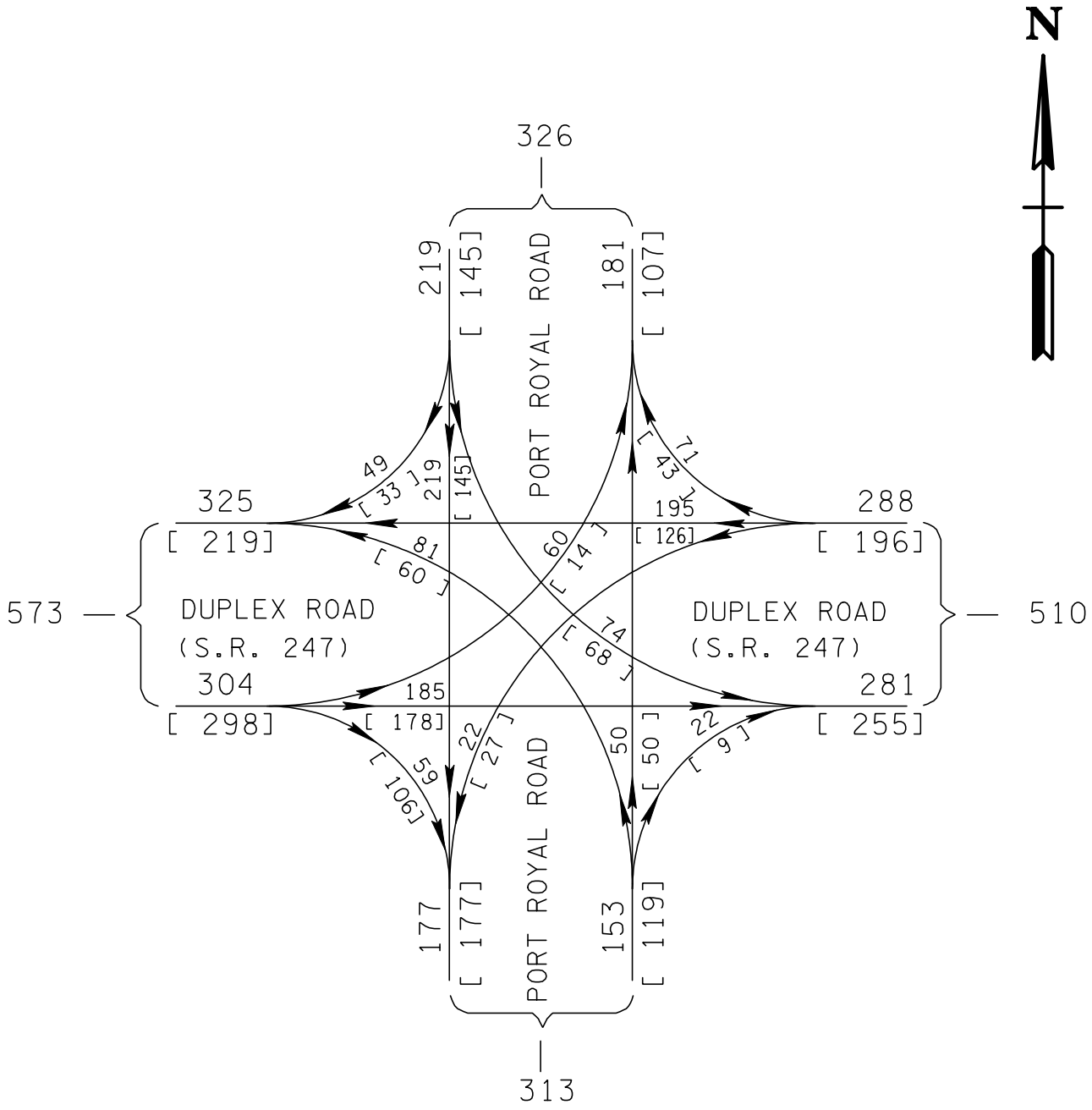


2030 DHV (INT. #3)

STATE ROUTE 247
(DUPLEX ROAD)
SPRING HILL, TENNESSEE
MAURY & WILLIAMSON
COUNTIES

P.M.
[A.M.]

N.T.S.

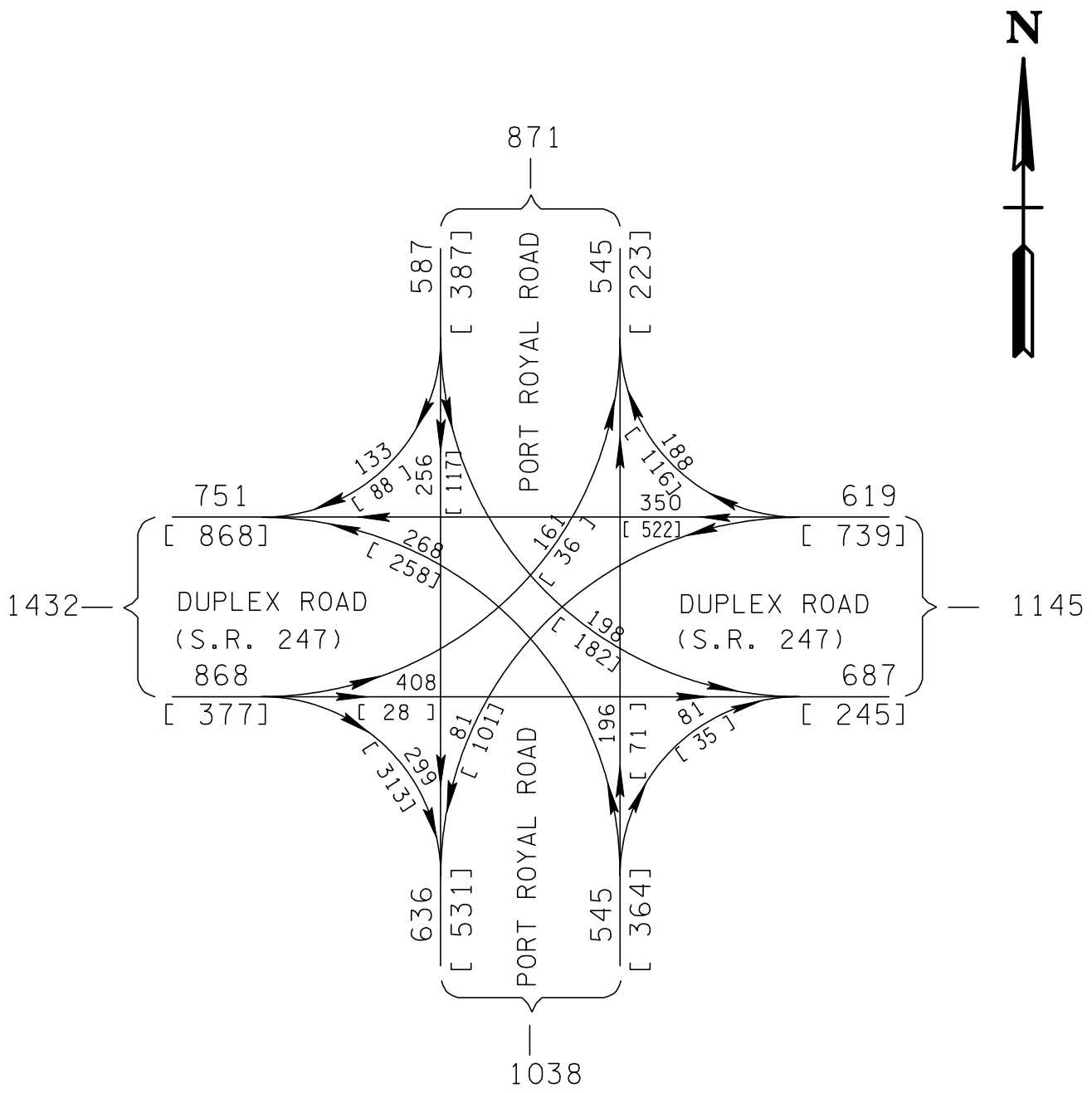


2005 DHV (INT. #4)

STATE ROUTE 247
(DUPLEX ROAD)
SPRING HILL, TENNESSEE
MAURY & WILLIAMSON
COUNTIES

P.M.
[A.M.]

N.T.S.

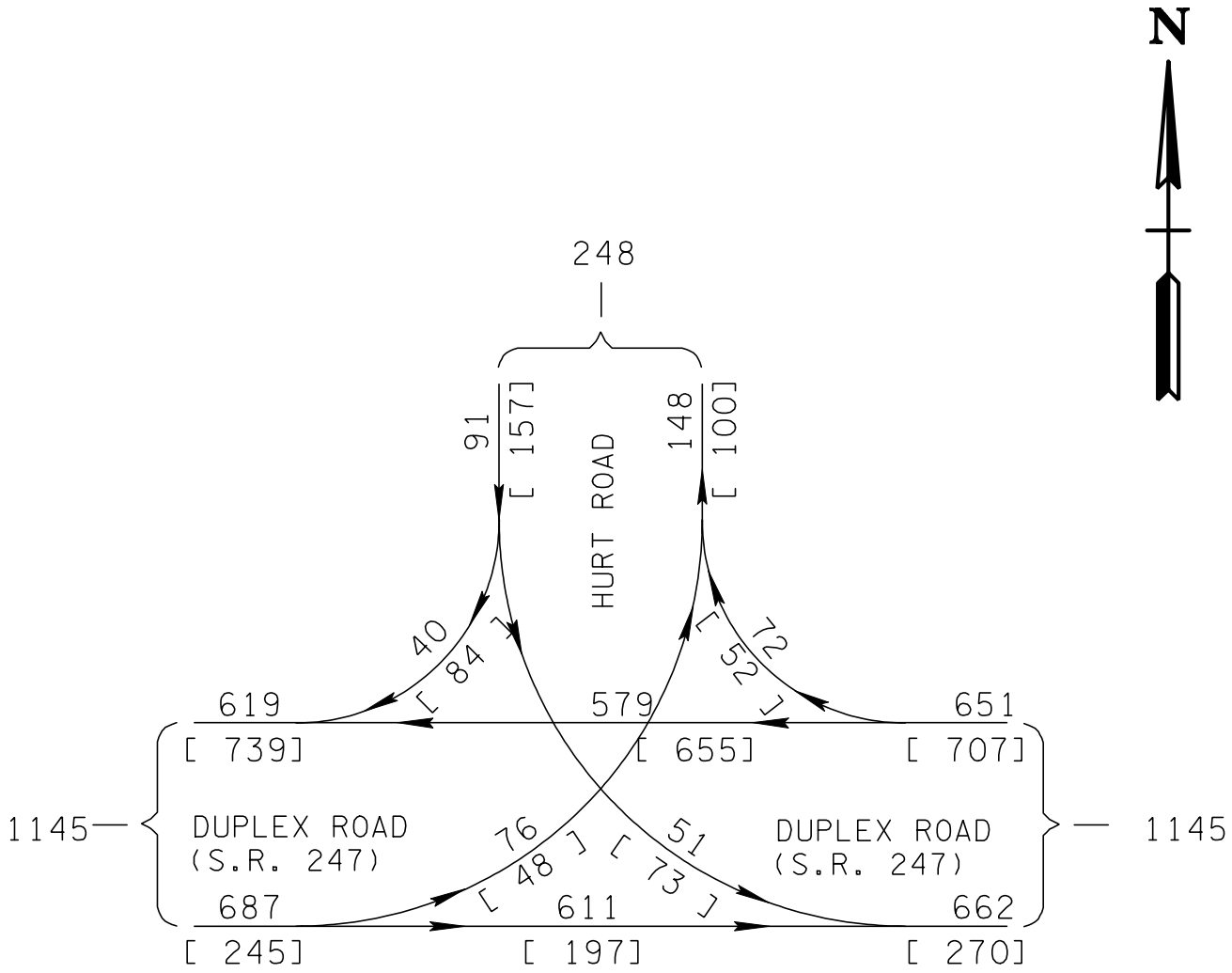


2030 DHV (INT. #4)

STATE ROUTE 247
(DUPLEX ROAD)
SPRING HILL, TENNESSEE
MAURY & WILLIAMSON
COUNTIES

P.M.
[A.M.]

N.T.S.

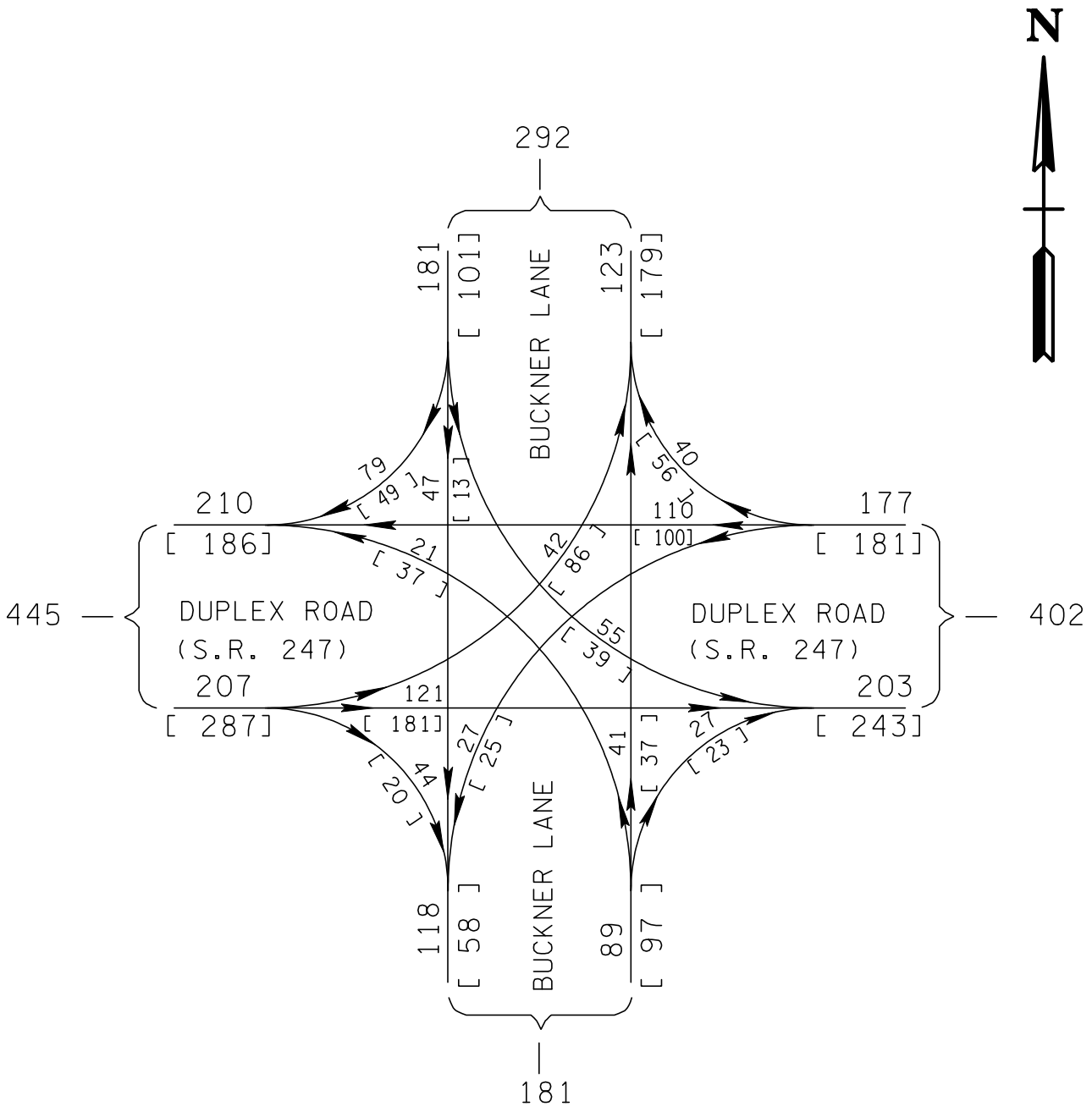


2030 DHV (INT. #5)

STATE ROUTE 247
(DUPLEX ROAD)
SPRING HILL, TENNESSEE
MAURY & WILLIAMSON
COUNTIES

P.M.
[A.M.]

N.T.S.

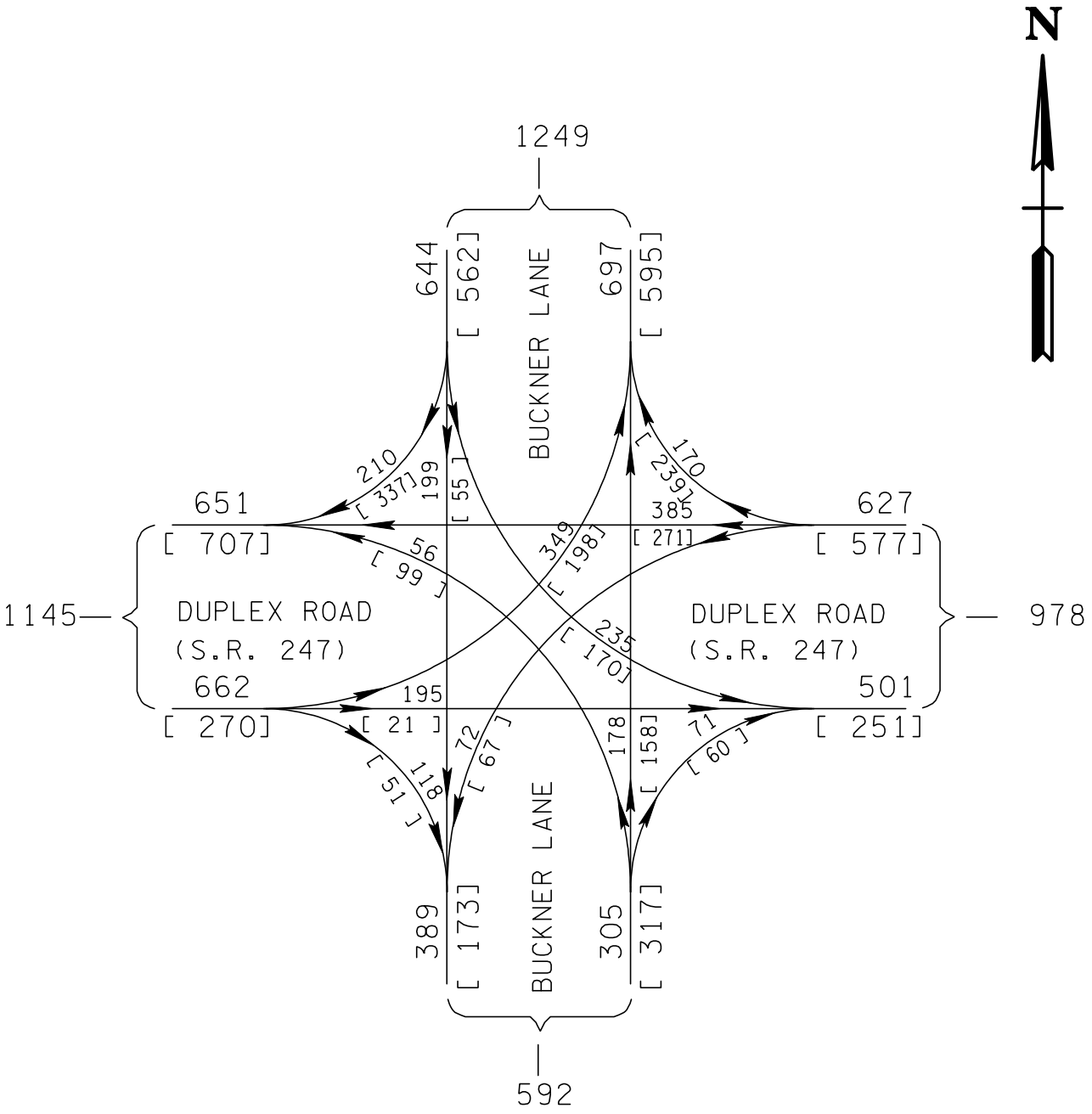


2005 DHV (INT. #6)

STATE ROUTE 247
(DUPLEX ROAD)
SPRING HILL, TENNESSEE
MAURY & WILLIAMSON
COUNTIES

P.M.
[A.M.]

N.T.S.

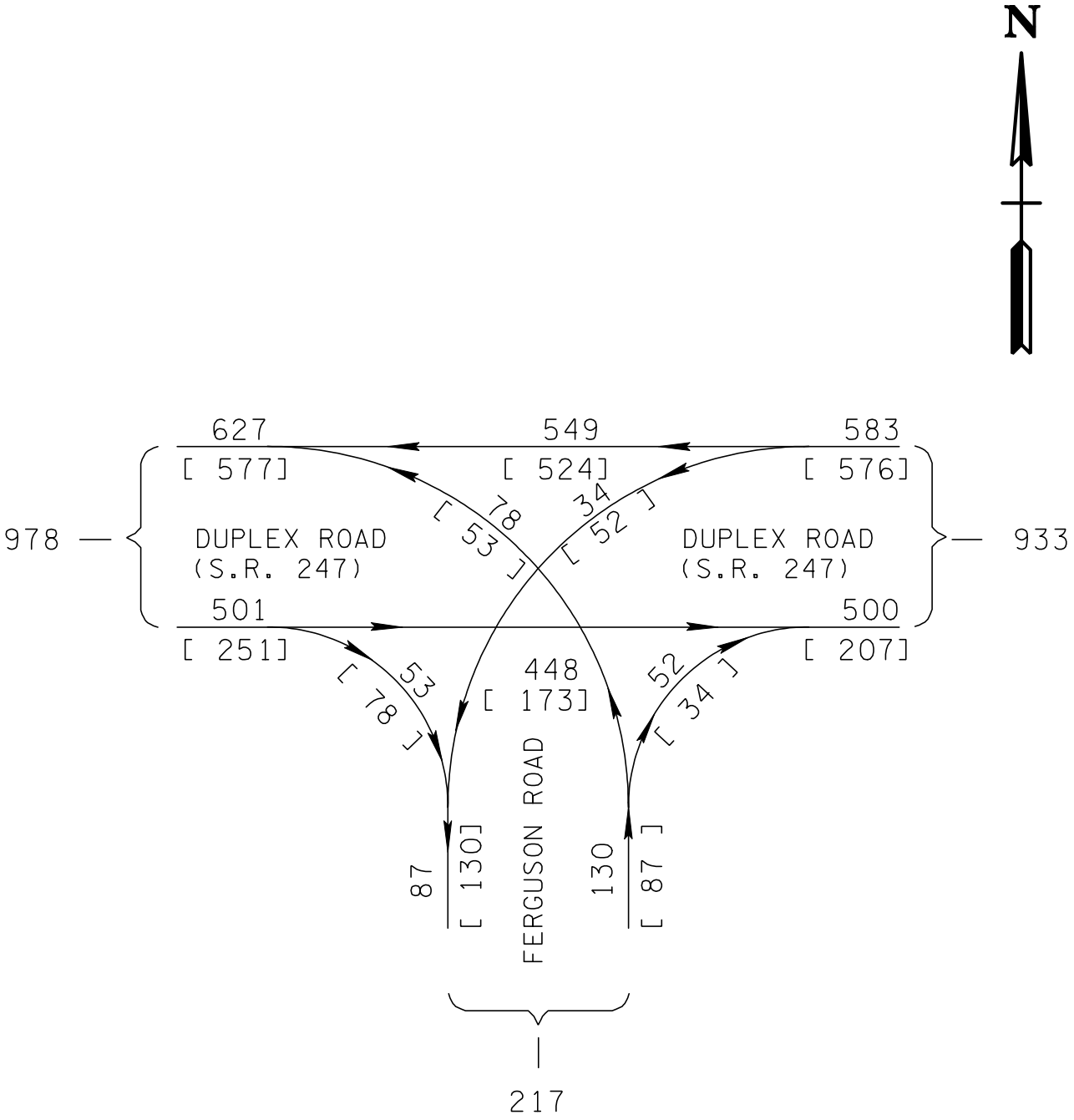


2030 DHV (INT. #6)

STATE ROUTE 247
(DUPLEX ROAD)
SPRING HILL, TENNESSEE
MAURY & WILLIAMSON
COUNTIES

P.M.
[A.M.]

N.T.S.



2030 DHV (INT. #7)

STATE ROUTE 247
(DUPLEX ROAD)
SPRING HILL, TENNESSEE
MAURY & WILLIAMSON
COUNTIES

P.M.
[A.M.]

N.T.S.

BACKGROUND INFORMATION

The Daily Herald.

Spring Hill asks for help from TDOT

By NANCY GLASSCOCK/Staff Writer

SPRING HILL -- The city's population was 1,456 when Saturn Corporation opened a facility in Maury County.

But now that a new census confirms an increase to 17,325, roads haven't changed and cannot withstand the swelling numbers, City Administrator Ken York told a Tennessee Department of Transportation representative Friday.

"If we had a printing press in the basement where we could make $100 bills, that would take care of it," York said. "But we need your help, and we need it very badly."

TDOT and city officials met in City Hall to discuss improvements of state roads and tour parts of the city, along U.S. 31, Duplex and Beechcroft Roads -- areas that are in desperate need of modification, city officials said.

"TDOT has not done a single, solitary road project in all these years, despite the growth we've had," York told the audience, which included TDOT Chief of Environment and Planning Ed Cole.

York said Duplex Road, the city's major thoroughfare, draws heavy congestion from nearby subdivisions and was not built to withstand the current volume of traffic, not including projected growth estimates.

He said the city has issued 85 building permits in June alone.

"It's accelerating to the point that we're starting to have to do things now we didn't anticipate for five to ten years," he said.

York asked TDOT for assistance in road improvements, after which Cole said he, and TDOT officials would take a closer look at traffic predictions for the area before determining the best action.

"We're going to have to be careful with how we fund what we do," he said. "We'll go back and take a look at how we project those traffic models."

Cole said citizens do not seem divided over the issue of road improvements, which is a positive aspect for the city.

State Representatives Tom DuBois, R-Columbia, Glen Casada, R-College Grove, and State Senators Bill Ketron, R-Murfreesboro, Jim Bryson, R-Franklin, the Board of Mayor and Aldermen and Maury County Mayor Jim Bailey attended the meeting.

Nancy Glasscock may be contacted at nglasscock@c-dh.net or (931) 388-6464 ext. 3021.

Growth Royale: Single road faces major population boom

Expect 10,000 new neighbors

By SUE McCLURE
Staff Writer

SPRING HILL — If you're part of the daily commuter parade that wends its way down windy Port Royal Road to Saturn Parkway and Interstate 65, then you've undoubtedly noticed grading work under way for several new subdivisions.

And you, ever the seeker of knowledge and truth, have undoubtedly asked yourself, "Self, I wonder what's going on over there?"

Well it's a good thing you're sitting down.

And it's a good thing you have your seat belt on, or you might fall over.

Because the news is — 11 new subdivisions and retail developments are being built along Port Royal that will add 2,434 new houses, 1,062 town houses, 682 apartments and at least 247 acres of commercial, business and retail development.

That, gentle commuter, means 10,319 new neighbors will be added to your Port Royal environs, based on U.S. Census figures of 2.47 people per household.

Add to that a new prekindergarten through fourth-grade elementary school and you've got lots o' folks.

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Thursday, 09/29/05

Spring Hill looks to widen road in busy area

Duplex flanked with ever-sprouting residential growth

By SUE McCLURE
Staff Writer

SPRING HILL — City officials are once again trying to pave the way for the widening of narrow, shoulderless Duplex Road, an oft-traveled route serving loads of new residential development in both Williamson and Maury counties.

"We have a meeting set with (Department of Transportation) officials for 2 o'clock next Tuesday," Mayor Danny Leverette said. "We'll be talking about the roadways, specifically Duplex, to see what the status is of what's being worked on."

City officials will also ask the state about installing a traffic light at the corner of Saturn Parkway and Main Street, where a Target-anchored shopping center is proposed.

Ed Cole, chief of environment and planning for the Tennessee Department of Transportation, said he would miss the meeting due to a scheduling conflict, but his colleague, Dennis Cook, would be present.

In the meantime, TDOT was in Spring Hill on Tuesday, Cole said.

"I'm very pleased that we had people out there (yesterday) doing ramp counts off Saturn Parkway," Cole said. "That will provide us with an update on the traffic forecast, which is one of the ways of benchmarking the project priority.

"We normally do an annual traffic count, but when we know something has happened, we'll come back and do additional research."

What has happened along Duplex is the construction of dozens of subdivisions, which are, in turn, funneling hundreds of cars along this narrow road with steep drop-offs on either side.

In June, city officials took TDOT officials on a bus tour of Duplex and other roads they deemed in need of repair or widening.

At that time, Cole quipped that he hoped the bus didn't have a flat tire, for there was nowhere for them to pull over.

Also during the tour, the possibility of the city "partnering" with the state on the costs of the roadway was discussed.

"I won't say it's a go without the approval of the aldermen, but I would say that if we stepped up to the plate with the engineering fees, I don't know what would stop the project from moving ahead," Leverette said. "I would like to see something moving on it in the next six months."

Leverette said he received a letter from TDOT Commissioner Gerald Nicely explaining that there was no money in the budget for an engineering study of Duplex Road, prompting the city to look into its own resources.

"The engineering study would cost approximately $600,000," Leverette said. "And we have identified $500,000 to $600,000 that we had planned to spend on building a bridge and entrance to the park we plan to build on Highway 31 (next to Spring Hill Baptist Church), that could be shifted to engineering funds for Duplex Road."

Cole said he was unfamiliar with the letter Leverette received from Nicely, but added that it was "very normal with the budget as it is."

"The budget for this year was set before our meeting with the city officials (in June)," he said.

Cole added that the state is "two or three weeks away from having the outcome" from this week's ramp count on Saturn Parkway.

Tuesday's meeting will be held at Spring Hill City Hall. •

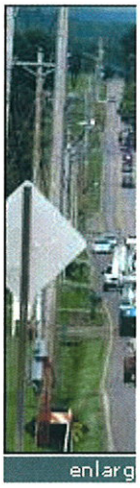
City officials want wider Duplex

Process to be slow, but mayor hopeful

By SUE McCLURE
Staff Writer

SPRING HILL — City officials want to see Duplex Road widened — ASAP.

"I sent TDOT a letter saying the city was interested in partnering with them to get the engineering study done for the road," Mayor Danny Leverette said. "I know it's a slow process, but we want to get things moving."



City officials
Duplex Road.

In June, city officials took Tennessee Department of Transportation officials on a bus tour of Duplex and other roads they deemed in need of repair or widening.

At that time, the possibility of the city "partnering" with the state on the costs of the roadway was discussed. An engineering study would cost approximately $600,000, Leverette said.

While the matter has not come before the Board of Mayor and Aldermen for a formal vote, the mayor said he believes aldermen will be amenable to the idea.

In addition to the letter, Leverette, City Administrator Ken York and Aldermen Brandon McCulloch and Miles Johnson drove to Nashville for a meeting with TDOT officials.

"We wanted to express our willingness to partner with TDOT on Duplex Road," Leverette said. "We're trying to get our ducks in a row and make sure that if we get the money, it

won't lie there on a shelf for years."

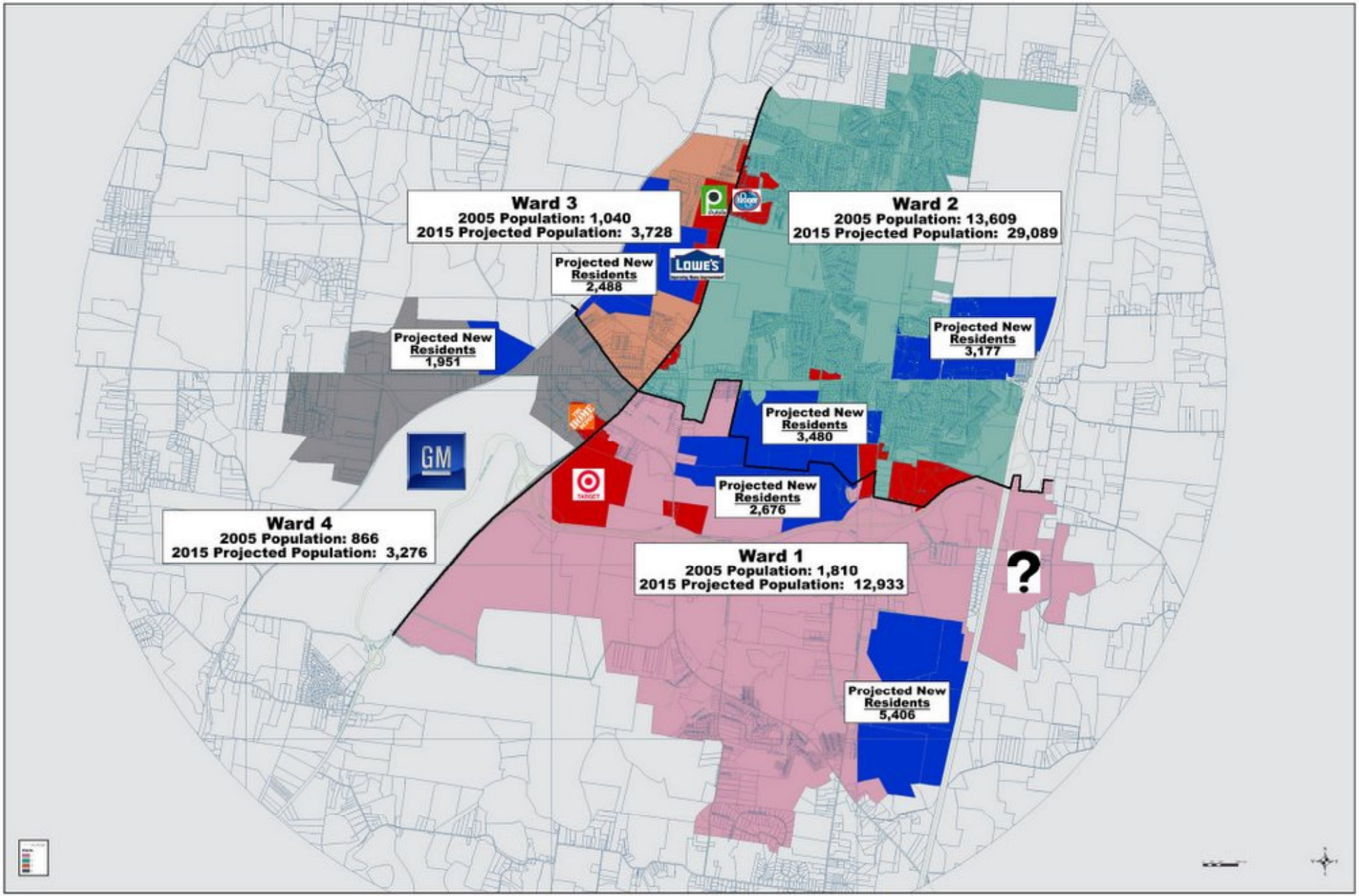
In fact, TDOT workers have been in town lately, conducting traffic studies and other preliminary work, according to Ed Cole, TDOT's chief of environment and planning.

"That will provide us with an update on the traffic forecast, which is one of the ways of benchmarking the project priority," Cole said.

Leverette said the city has already acquired the rights of way from homeowners along Duplex, paving the way for the widening of the road.

"I don't want to get high expectations as to when this project could start, because I know it's a slow process even if they approved it today," Leverette said. "But we're ready." •

CITY OF SPRING HILL WARD MAP



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL DIVISION
SUITE 900, JAMES K. POLK BUILDING
505 DEADERICK STREET
NASHVILLE, TENNESSEE 37243-0334
(615) 741-3653
FAX: (615) 741-1098
E-mail: Martha.Carver@state.tn.us
www.tdot.state.tn.us

MEMORANDUM

TO: Gary Webber, Planning Division

FROM: Martha Carver, Historic Preservation Manager

DATE: April 19, 2006

SUBJECT: Historic Preservation Scoping, State Route 247 (Duplex Road) from State Route 6 (U.S. 31) to I-65, Maury and Williamson Counties

TDOT historians have conducted a records search at the Tennessee State Historic Preservation Office (TN-SHPO) and a reconnaissance level field survey of this project within Maury and Williamson Counties. Currently there is one property listed on the National Register of Historic Places within the existing State Route 247 corridor: White Hall, a historic house on the south side of State Route 247 just east of Spring Hill. See National Register boundary map on the following page.

The reconnaissance survey identified several properties that will require additional survey and research.

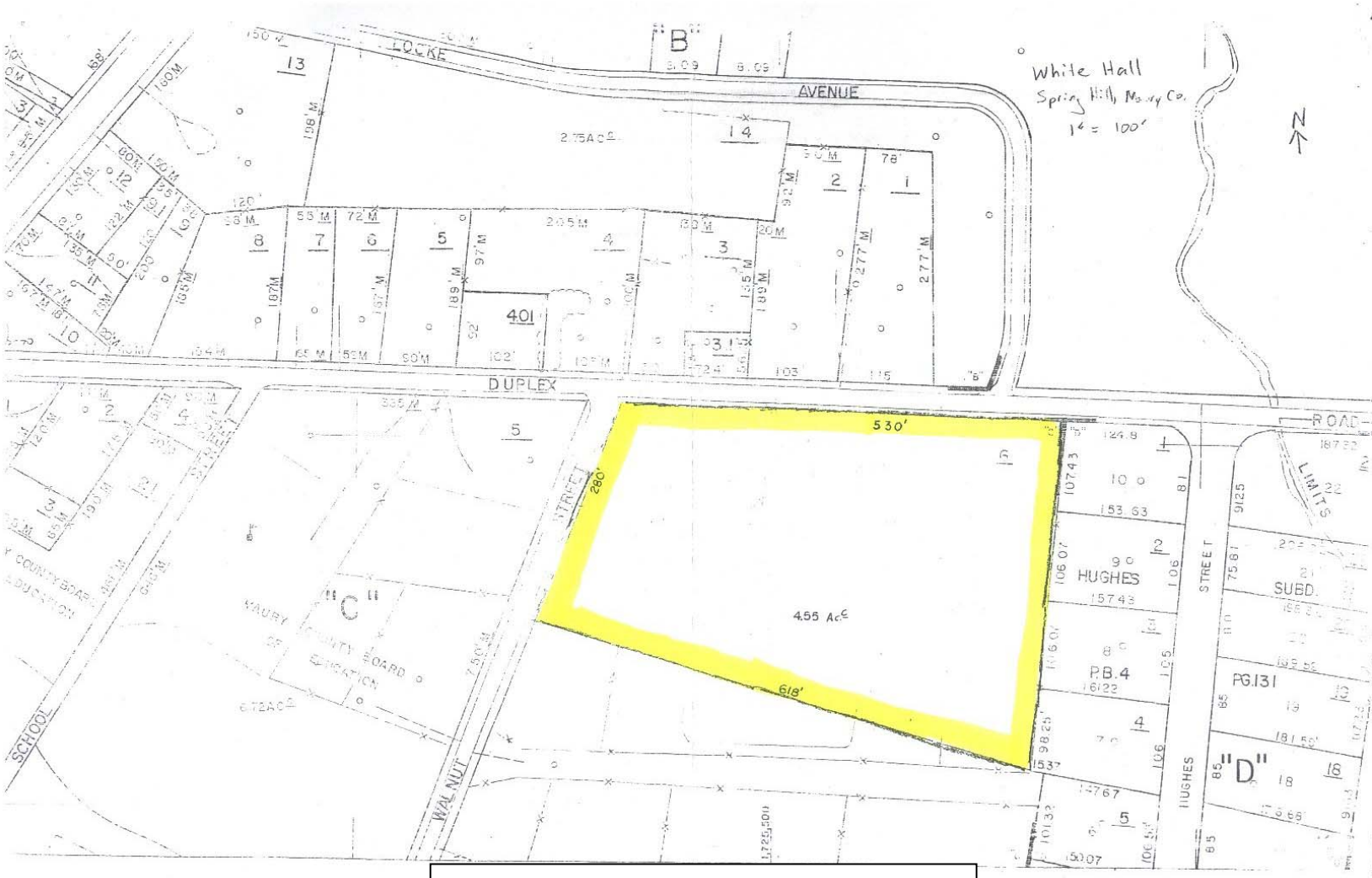
1. Mt. Hope Missionary Baptist Church-The congregation of this church previously attempted to have this church listed on the National Register. At that time the SHPO thought the church was eligible, but it has been altered since that time. Its eligibility will need to be reassessed.
2. MU-1292-Spring Hill United Methodist Church-This 1890s church will need to be assessed for National Register eligibility.
3. Spring Hill High School-Not surveyed by the SHPO, this circa 1930s property will also need to be assessed for NR eligibility.
4. Residences-These houses, not previously surveyed by the TN-SHPO, will require documenting but are unlikely to be National Register eligible.
5. MU-562-Small side-gable house to document, unlikely to be eligible.

Further research may indicate that any (or none) of the above properties are National Register eligible. The attached map identifies these properties by number.

Measures should be taken in the planning process to avoid the National Register property and minimize the project in order to prevent adverse effects or potential 4(f) takes. If properties are identified later as being eligible for the National Register, they will also need to be avoided to prevent adverse effects or potential 4(f) takes.

Please let us know if we can be of further assistance.

Enclosure
cc: David Thompson



White Hall National Register Boundaries,
Spring Hill, Maury County

Historic Preservation Preliminary Scoping Map

State Route 257 (Duplex Road) from State Route 6 to I-65
Maury and WilliamsonCounties

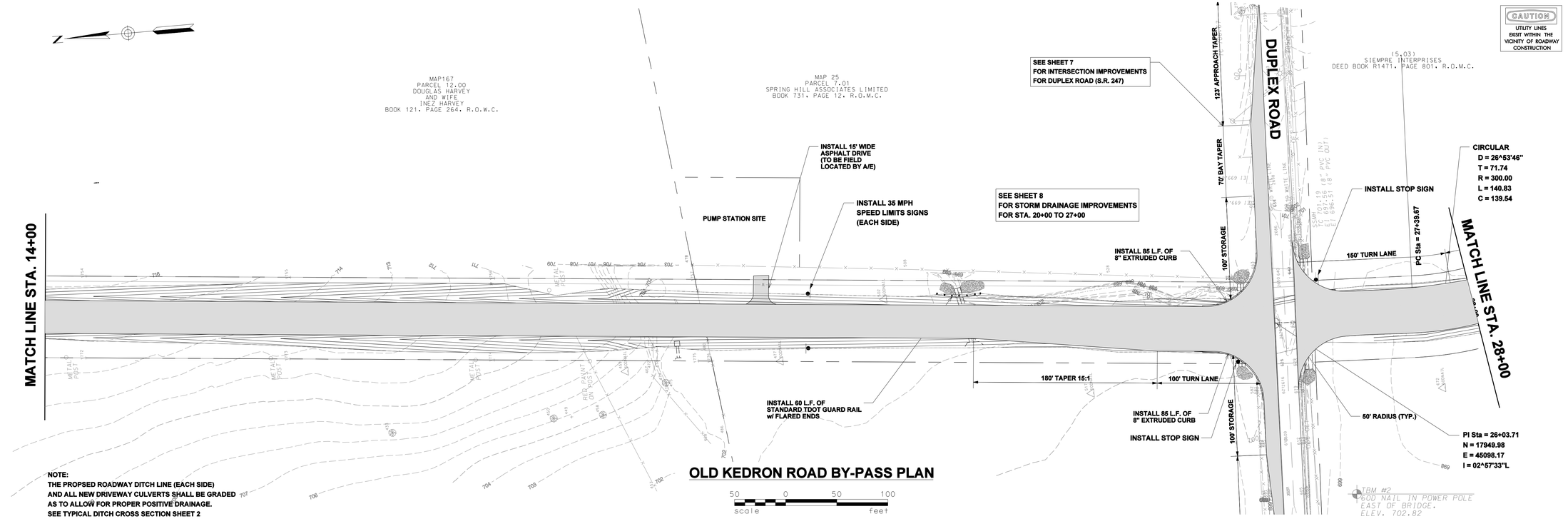
Quads: Spring Hill 63SW, Carters Creek 64NW, Rally Hill 64NE, Bethesda 63SE

1
2
3
4
5

White Hall NR Listed

Scale 1:15,000
0 1,125 2,250 4,500 Feet

86°56'0"W 86°55'0"W 86°54'0"W 86°53'0"W
35°46'0"N 35°45'0"N

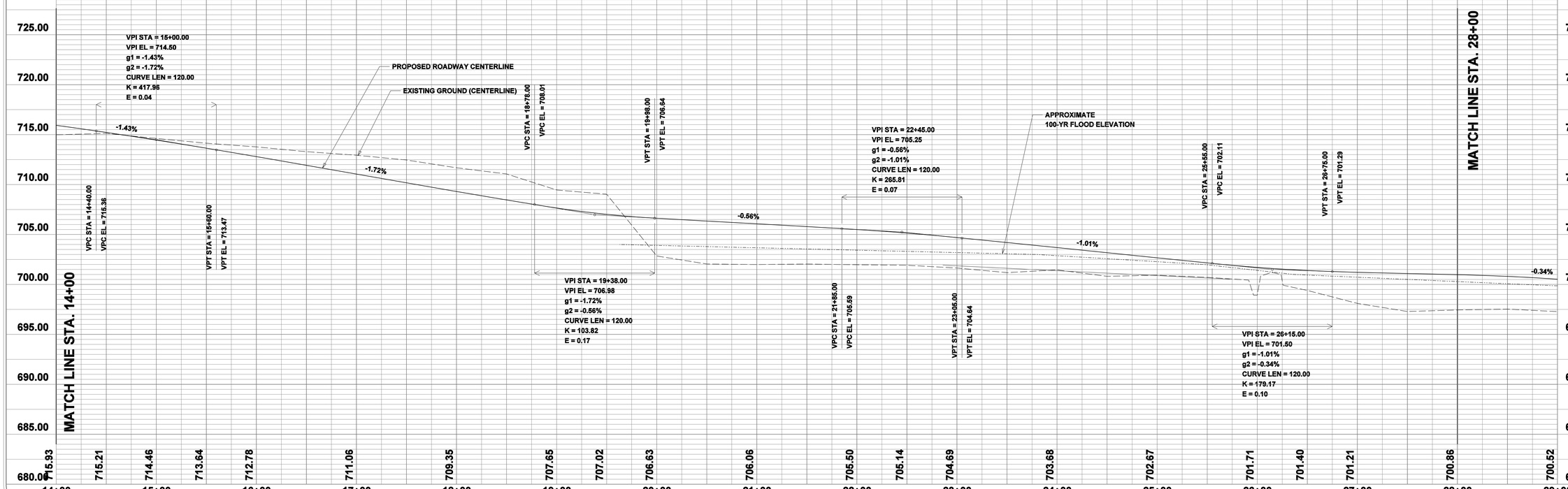


OLD KEDRON ROAD BY-PASS PLAN

50 0 50 100
scale feet

NOTE:
THE PROPSED ROADWAY DITCH LINE (EACH SIDE) AND ALL NEW DRIVEWAY CULVERTS SHALL BE GRADED AS TO ALLOW FOR PROPER POSITIVE DRAINAGE. SEE TYPICAL DITCH CROSS SECTION SHEET 2

SCALES:
1" = 50' HOR
1" = 5' VER



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DEMPSEY, DILLING & ASSOCIATES, PC.
Engineering Consultants
429 Nissan Drive, Suite 100
Smyrna, Tennessee 37167 (615) 220-5800

REVISIONS	DATE

JEROME D. DEMPSEY
REGISTERED ENGINEER
AGRICULTURE
ONMMBUS
No. 102927
STATE OF TENNESSEE

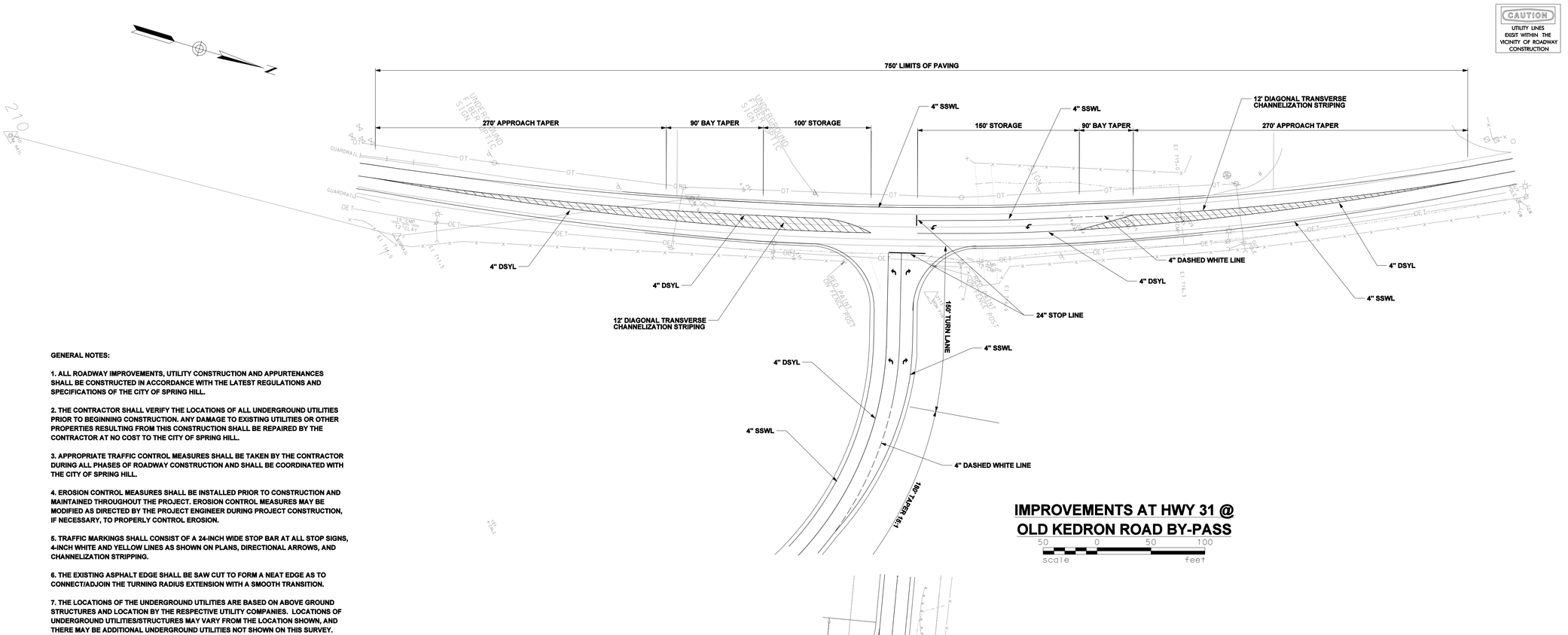
DATE:	JUNE 2005
DRAWN BY:	MH
CHECKED BY:	BD
APPROVED BY:	JDD

PLAN AND PROFILE STA. 14+00 TO 28+00

OLD KEDRON ROAD BY-PASS
CITY OF SPRING HILL, TENNESSEE
WILLIAMSON & MAURY COUNTY

SHEET NO.
4
OF 21

JOB NO. : 0100-28



GENERAL NOTES:

1. ALL ROADWAY IMPROVEMENTS, UTILITY CONSTRUCTION AND APPURTENANCES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST REGULATIONS AND SPECIFICATIONS OF THE CITY OF SPRING HILL.

2. THE CONTRACTOR SHALL VERIFY THE LOCATIONS OF ALL UNDERGROUND UTILITIES PRIOR TO BEGINNING CONSTRUCTION. ANY DAMAGE TO EXISTING UTILITIES OR OTHER PROPERTIES RESULTING FROM THIS CONSTRUCTION SHALL BE REPAIRED BY THE CONTRACTOR AT NO COST TO THE CITY OF SPRING HILL.

3. APPROPRIATE TRAFFIC CONTROL MEASURES SHALL BE TAKEN BY THE CONTRACTOR DURING ALL PHASES OF ROADWAY CONSTRUCTION AND SHALL BE COORDINATED WITH THE CITY OF SPRING HILL.

4. EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO CONSTRUCTION AND MAINTAINED THROUGHOUT THE PROJECT. EROSION CONTROL MEASURES MAY BE MODIFIED AS DIRECTED BY THE PROJECT ENGINEER DURING PROJECT CONSTRUCTION, IF NECESSARY, TO PROPERLY CONTROL EROSION.

5. TRAFFIC MARKINGS SHALL CONSIST OF A 24-INCH WIDE STOP BAR AT ALL STOP SIGNS, 4-INCH WHITE AND YELLOW LINES AS SHOWN ON PLANS, DIRECTIONAL ARROWS, AND CHANNELIZATION STRIPPING.

6. THE EXISTING ASPHALT EDGE SHALL BE SAW CUT TO FORM A NEAT EDGE AS TO CONNECT/ADJOIN THE TURNING RADIUS EXTENSION WITH A SMOOTH TRANSITION.

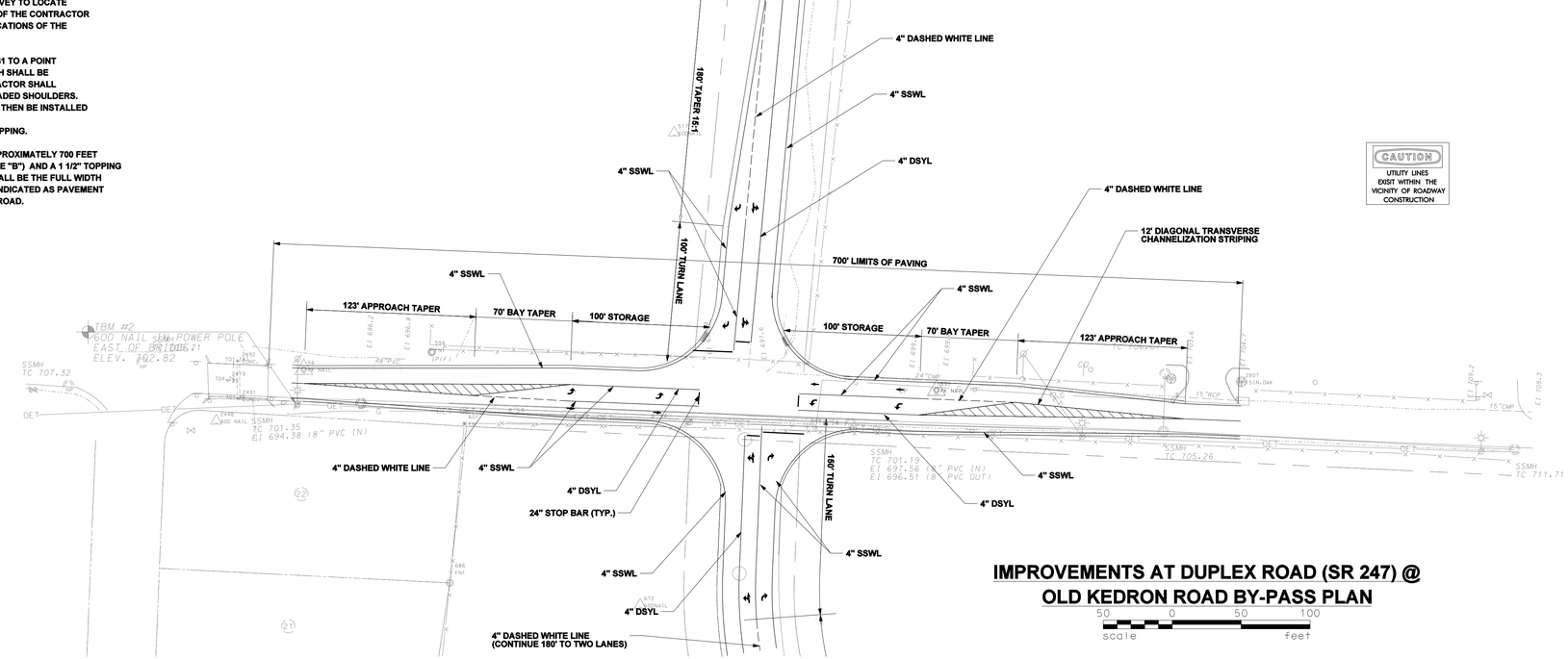
7. THE LOCATIONS OF THE UNDERGROUND UTILITIES ARE BASED ON ABOVE GROUND STRUCTURES AND LOCATION BY THE RESPECTIVE UTILITY COMPANIES. LOCATIONS OF UNDERGROUND UTILITIES/STRUCTURES MAY VARY FROM THE LOCATION SHOWN, AND THERE MAY BE ADDITIONAL UNDERGROUND UTILITIES NOT SHOWN ON THIS SURVEY. NO EXCAVATIONS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE UNDERGROUND UTILITIES/STRUCTURES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR AND OR INDIVIDUAL DIGGING IN THIS AREA TO FIELD VERIFY THE LOCATIONS OF THE UTILITIES SHOWN HEREON WITH THE RESPECTIVE UTILITY OWNERS.

8. THE CONTRACTOR SHALL CLIP/ GRADE THE SHOULDERS OF HWY 31 TO A POINT IN PREPERATION OF WIDENING WORK AT HWY 31. ADDITIONAL WIDTH SHALL BE CONSTRUCTED AS PER THE TYPICAL SECTION DETAILS. THE CONTRACTOR SHALL INSTALL A MINIMUM OF 4" OF TYPE "B" ASPHALT BINDER AT THE GRADED SHOULDERS. AN ASPHALT LEVELING COURSE (TYPE "B" ASPHALT BINDER) SHALL THEN BE INSTALLED ON HWY 31 AND DUPLEX ROAD AS TO ALLOW FOR PREPARATION (SMOOTHING OUT) FOR THE 1 1/2" COURSE OF TYPE "E" ASPHALT TOPPING.

9. APPROXIMATELY 750 FEET AT THE HWY 31 INTERSECTION AND APPROXIMATELY 700 FEET AT THE DUPLEX INTERSECTION WILL RECEIVE A LEVEL COURSE (TYPE "B") AND A 1 1/2" TOPPING COURSE (TYPE "E") AS NOTED ON THE PLANS. THE APPLICATION SHALL BE THE FULL WIDTH OF THE ROAD (AFTER WIDENING WORK IS COMPLETED) TO A POINT INDICATED AS PAVEMENT LIMITS (AND AS DIRECTED BY THE A/E) ALONG HWY 31 AND DUPLEX ROAD.

IMPROVEMENTS AT HWY 31 @ OLD KEDRON ROAD BY-PASS

50 0 50 100
scale feet



IMPROVEMENTS AT DUPLEX ROAD (SR 247) @ OLD KEDRON ROAD BY-PASS PLAN

50 0 50 100
scale feet

DEMPSEY, DILLING & ASSOCIATES, PC.
Engineering Consultants
429 Nissan Drive, Suite 100
Smyrna, Tennessee 37167 (615) 220-5800

REVISIONS	DATE
TDOT REVISIONS	OCT 2004

JEROME D. DEMPSEY
REGISTERED ENGINEER
AGRICULTURE
ONMENT
No. 102922
STATE OF TENNESSEE

DATE:	JUNE 2005
DRAWN BY:	MH
CHECKED BY:	BD
APPROVED BY:	JDD

INTERSECTION IMPROVEMENTS

OLD KEDRON ROAD BY-PASS
CITY OF SPRING HILL, TENNESSEE
WILLIAMSON & MAURY COUNTY

SHEET NO.
7
OF 21

JOB NO. : 0100-28

$DATE$ $TIME$
$FILE$

TRIMS DATA & CRASH ANALYSIS

Crash Rate Calculation for SR 247 (Duplex Road) - Section 1

County:	Maury	**City:**	Spring Hill	**Date:**	4/4/2006
Route:	SR-247 (Duplex Road)			**Log Mile Beginning:**	19.54
Location on Route:	SR-6 to Hughes Street			**Log Mile Ending:**	19.84
Crash History Start Date:	1/1/2001	**TO**	12/31/2003		

number of crashes=	4
number of years=	3.0
ADT=	6,120
length (miles)=	0.4
Statewide Average Rate=	1.68
Number of Fatal Crashes=	0
Number of Injury Crashes=	0
Exposure Rate=	2.68
Average Crash Rate=	1.49
Critical Crash Rate=	3.71
Statewide Average Rate=	1.70
Severity Index=	0.00
Ratio=	0.40

Crash Rate Calculation for SR 247 (Duplex Road) - Section 2

County:	Maury / Williamson	**City:**	Spring Hill	**Date:**	4/4/2006
Route:	SR-247 (Duplex Road)			**Log Mile Beginning:**	19.84 (Maury)
Location on Route:	Hughes St. to East of Port Royal			**Log Mile Ending:**	0.66 (Williamson)
Crash History Start Date:	1/1/2001	**TO**	12/31/2003		

number of crashes=	13
number of years=	3.0
ADT=	5,730
length (miles)=	1.22
Statewide Average Rate=	1.68
Number of Fatal Crashes=	0
Number of Injury Crashes=	1
Exposure Rate=	7.65
Average Crash Rate=	1.70
Critical Crash Rate=	2.84
Statewide Average Rate=	1.70
Severity Index=	0.08
Ratio=	0.60

Crash Rate Calculation for SR 247 (Duplex Road) - Section 3

County:	Williamson	**City:**	Spring Hill	**Date:**	4/4/2006
Route:	SR-247 (Duplex Road)			**Log Mile Beginning:**	0.66
Location on Route:	E of Port Royal to W of I-65			**Log Mile Ending:**	2.26
Crash History Start Date:	1/1/2001	**TO**	12/31/2003		

number of crashes=	10
number of years=	3.0
ADT=	4,523
length (miles)=	1.57
Statewide Average Rate=	1.68
Number of Fatal Crashes=	0
Number of Injury Crashes=	3
Exposure Rate=	7.77
Average Crash Rate=	1.29
Critical Crash Rate=	2.83
Statewide Average Rate=	1.68
Severity Index=	0.30
Ratio=	0.46

Crash Rate Calculation for SR 247 (Duplex Road)

County:	Maury/Williamson	**City:**	Spring Hill	**Date:**	4/4/2006
Route:	SR-247 (Duplex Road)			**Log Mile Beginning:**	19.54 (Maury)
Location on Route:	SR-6 to I-65			**Log Mile Ending:**	2.37 (Williamson)
Crash History Start Date:	1/1/2001	**TO**	12/31/2003		

number of crashes=	27
number of years=	3.0
ADT=	4,890
length (miles)=	3.3
Statewide Average Rate=	1.68
Number of Fatal Crashes=	0
Number of Injury Crashes=	4
Exposure Rate=	17.65
Average Crash Rate=	1.53
Critical Crash Rate=	2.43
Statewide Average Rate=	1.70
Severity Index=	0.15
Ratio=	0.63

ROUTE FEATURE DESCRIPTION LISTING

MAURY County - SR247

COUNTY: MAURY **COUNTY NO.** 60

ROUTE: SR247 **SPECIAL CASE:** None **CTY SEQ:** 1

LOG MILE	ITEM CODE	ROUTE FEATURE	DESC CODE
19.540	9	1-WAY STOP	901
19.540	3	SR-6 (MAIN ST.) RT. & LT. / ALONG SR-6 FOR 0.02 MILE	310
19.540	9	TRAFFIC SIGNAL	905
19.540	3	LEAVE SR-6 (MAIN ST.) LT. / BEGIN DUPLEX RD.	332
19.540	9	BEGIN 35 MPH	932
19.620	5	A519 (N. SCHOOL ST.) RT.	520
19.700	5	A520 (WALNUT ST.) RT.	520
19.800	5	A518 (LOCKE AV.) LT.	530
19.840	5	A522 (HUGHES ST.) RT.	520
19.850	2	BRIDGE [60S62510007]: MCCUTCHEON CREEK	231
19.860	1	SPRING HILL CITY LIMITS LT.	199
19.860	1	BEGIN CENTERLINE OF ROAD AS SPRING HILL CITY LIMITS	164
20.030	5	A954 (ALEX DR.) LT.	530
20.100	9	CHURCH OF CHRIST AT NEWTOWN LT.	912
20.240	5	Z999 HARRISON WAY RT.	520
20.310	5	A954 (ALEX DR.) LT.	530
20.320	1	LEAVE SPRING HILL CITY LIMITS	135
20.320	1	END CENTERLINE OF ROAD AS SPRING HILL CITY LIMITS	165
20.320	5	Z999 CARLYON COURT RT.	520
20.390	5	Z999 LEXINGTON FARMS DR LT.	530
20.470	1	MAURY-WILLIAMSON COUNTY LINE	125

County	Route	Log Mile	First Harmful Event	Manner of First Collision	Total Inj	Total Killed	Total Veh	Date of Crash	Time of Crash
MAURY	SR247	19.700	Utility Pole	No Collision w/ Vehicle	0	0	1	08/18/2003	1132
MAURY	SR247	19.760	Ditch	Sideswipe, Same Dir	0	0	1	08/26/2003	612
MAURY	SR247	19.800	Other Animal	Unknown	0	0	1	05/11/2001	1855
MAURY	SR247	19.840	Other Animal	Unknown	0	0	1	11/13/2002	645
MAURY	SR247	19.860	Ditch	Head-On	0	0	1	08/05/2003	940
MAURY	SR247	20.030	Other Animal	Unknown	0	0	1	04/04/2001	1300
MAURY	SR247	20.030	Tree	Unknown	0	0	1	11/04/2001	1
MAURY	SR247	20.310	Motor Vehicle in Transport	Sideswipe, Opposite Dir	0	0	2	07/30/2003	1720
MAURY	SR247	20.470	Motor Vehicle in Transport	Sideswipe, Same Dir	0	0	2	01/24/2001	1537

MAURY County - SR247

County: MAURY (60) ***Route No.*** SR247 ***Special Case*** 0-NONE ***County Sequence*** 1

Beg Log Mile	End Log Mile	ROW	Access Control	Operation	Illum-ination	School Spd Lmt	Spd Lmt	Truck Spd Lmt	Terrain	Land Use	Thru Lanes	Nbr Lanes	Feature Information			
													Seq. #	Type	Width	Composition
19.540	19.620	30	0-NONE	2-TWO WAY	YES		35		2-ROLLING	4-FRINGE (MIX RES. COMM.)	2	2	1	DRAINAGE		DITCH
		30									2	2	2	SHOULDER (OUTSIDE)	1	SOIL (DIRT)
		30									2	2	3	PAVEMENT	18	ASPHALT CONCRETE
		30									2	2	4	SHOULDER (OUTSIDE)	1	ASPHALT CONCRETE
		30									2	2	5	DRAINAGE		CURB, GUTTER & SIDEWALK
19.620	19.860	30	0-NONE	2-TWO WAY	YES		35		2-ROLLING	4-FRINGE (MIX RES. COMM.)	2	2	1	DRAINAGE		DITCH
		30									2	2	2	SHOULDER (OUTSIDE)	1	SOIL (DIRT)
		30									2	2	3	PAVEMENT	18	ASPHALT CONCRETE
		30									2	2	4	SHOULDER (OUTSIDE)	1	SOIL (DIRT)
		30									2	2	5	DRAINAGE		DITCH
19.860	20.320	40	0-NONE	2-TWO WAY	NO		35		2-ROLLING	7-RESIDENTIAL	2	2	1	DRAINAGE		DITCH
		40									2	2	2	SHOULDER (OUTSIDE)	1	SOIL (DIRT)
		40									2	2	3	PAVEMENT	20	ASPHALT CONCRETE
		40									2	2	4	SHOULDER (OUTSIDE)	1	SOIL (DIRT)
		40									2	2	5	DRAINAGE		DITCH
20.320	20.470	60	0-NONE	2-TWO WAY	YES		35		2-ROLLING	7-RESIDENTIAL	2	2	1	DRAINAGE		DITCH
		60									2	2	2	SHOULDER (OUTSIDE)	1	ASPHALT CONCRETE
		60									2	2	3	PAVEMENT	11	ASPHALT CONCRETE
		60									2	2	4	MEDIAN	11	PAINTED
		60									2	2	5	PAVEMENT	11	ASPHALT CONCRETE

MAURY County - SR247

County: MAURY (60) ***Route No.*** SR247 ***Special Case*** 0-NONE ***County Sequence*** 1

Beg Log Mile	End Log Mile	ROW	Access Control	Operation	Illum-ination	School Spd Lmt	Spd Lmt	Truck Spd Lmt	Terrain	Land Use	Thru Lanes	Nbr Lanes	Feature Information			
													Seq. #	Type	Width	Composition
20.320	20.470	60	0-NONE	2-TWO WAY	YES		35		2-ROLLING	7-RESIDENTIAL	2	2	6	SHOULDER (OUTSIDE)	1	ASPHALT CONCRETE
		60									2	2	7	DRAINAGE		DITCH

ROUTE FEATURE DESCRIPTION LISTING

WILLIAMSON County - SR247

COUNTY: WILLIAMSON **COUNTY NO.** 94

ROUTE: SR247 **SPECIAL CASE:** None **CTY SEQ:** 1

LOG MILE	ITEM CODE	ROUTE FEATURE	DESC CODE
0.000	1	MAURY-WILLIAMSON COUNTY LINE / BEGIN DUPLEX ROAD	120
0.000	9	BEGIN 35 MPH / ILLUMINATION	930
0.050	5	Z999 CITY ST RT. & LT	520
0.280	9	CULVERT ; BRANCH	980
0.420	5	Z999 PORTWAY RD LT.	530
0.450	1	LEAVE SPRING HILL CITY LIMITS	135
0.550	5	A125 PORT ROYAL RD. RT. & B701 PORT ROYAL RD. LT.	510
0.750	5	Z999 CANDLEWICKE DR RT.	520
0.820	5	B708 SPRING MEADOW CIR. LT.	530
0.880	5	Z999 BAKER SPRINGS LN RT. & Z999 AUGUSTA TRACE DR LT.	510
0.950	5	Z999 BAKER CREEK DR RT.	520
1.000	5	Z999 AUGUSTA TRACE DR. LT.	530
1.040	2	(94S62510001) BRIDGE: GRASSY BRANCH	205
1.100	5	Z999 COCHRAN TRAE DR RT.	520
1.160	5	A564 HURT RD. LT.	530
1.400	5	Z999 PIPKIN HILLS DR RT	599
1.590	5	A560 BUCKNER LN. RT. & LT.	510
1.640	1	LEAVE SPRING HILL URBAN BOUNDARY	145
2.000	5	Z999 CHAPMAN'S RETREAT DR RT.	520
2.100	2	(94S62510003) BRIDGE: AENON CR.	205
2.190	5	Z999 SECLUDED LN RT.	520
2.210	5	Z999 CHAPMAN'S CROSSING LT.	530
2.210	9	END ILLUMINATION	931
2.350	5	A567 FERGUSON RD. RT.	520
2.370	2	(94I00650001) OVERHEAD: I-65	205
2.490	5	A291 OWL HOLLOW RD. LT.	530

ROUTE FEATURE DESCRIPTION LISTING

WILLIAMSON County - SR247

COUNTY: WILLIAMSON **COUNTY NO.** 94

ROUTE: SR247 **SPECIAL CASE:** None **CTY SEQ:** 1

LOG MILE	ITEM CODE	ROUTE FEATURE	DESC CODE
2.640	5	A488 CLARK RD. RT.	520
2.700	9	CULVERT ; BRANCH	980
3.170	9	DUPLEX ORIGINAL CHURCH OF GOD LT.	912
3.360	5	A127 LEE RD. RT. & BUFORD LN. LT.	510
3.780	9	CULVERT ; BRANCH	980
3.980	9	CEMETERY RT.	913
4.120	2	(94S62510005) BRIDGE: MUD CR.	205
4.300	9	1-WAY STOP	901
4.300	3	SR-106 LEWISBURG PK. RT. & LT.	310

County	Route	Log Mile	First Harmful Event	Manner of First Collision	Total Inj	Total Killed	Total Veh	Date of Crash	Time of Crash
WILLIAMSON	SR247	0.200	Ditch	No Collision w/ Vehicle	0	0	1	09/16/2003	1800
WILLIAMSON	SR247	0.280	Other Object (not fixed)	Unknown	0	0	1	02/02/2001	2030
WILLIAMSON	SR247	0.300	Ditch	No Collision w/ Vehicle	0	0	1	09/23/2003	800
WILLIAMSON	SR247	0.550	Motor Vehicle in Transport	Angle	0	0	2	07/15/2002	1620
WILLIAMSON	SR247	0.550	Motor Vehicle in Transport	Angle	0	0	2	11/05/2002	1534
WILLIAMSON	SR247	0.550	Motor Vehicle in Transport	Angle	2	0	2	05/27/2001	1121
WILLIAMSON	SR247	0.550	Fence	Angle	0	0	2	12/02/2002	1643
WILLIAMSON	SR247	0.560	Motor Vehicle in Transport	Angle	0	0	2	12/22/2003	2129
WILLIAMSON	SR247	0.850	Other Fixed Object	Angle	0	0	1	01/02/2002	1413
WILLIAMSON	SR247	0.870	Motor Vehicle in Transport	Angle	0	0	2	09/15/2002	1345
WILLIAMSON	SR247	0.870	Ditch	No Collision w/ Vehicle	0	0	1	10/03/2003	321
WILLIAMSON	SR247	1.060	Ditch	Angle	0	0	1	12/20/2003	22
WILLIAMSON	SR247	1.560	Motor Vehicle in Transport	Angle	0	0	2	07/30/2003	15
WILLIAMSON	SR247	1.590	Motor Vehicle in Transport	Angle	0	0	2	07/27/2001	527
WILLIAMSON	SR247	1.590	Motor Vehicle in Transport	Angle	3	0	2	08/09/2003	926
WILLIAMSON	SR247	1.590	Motor Vehicle in Transport	Head-On	1	0	2	09/22/2002	1517
WILLIAMSON	SR247	1.590	Motor Vehicle in Transport	Rear-End	0	0	2	11/08/2001	1652
WILLIAMSON	SR247	1.590	Ditch	Unknown	1	0	2	03/31/2002	1456
WILLIAMSON	SR247	2.800	Tree	No Collision w/ Vehicle	2	0	1	10/31/2003	2300
WILLIAMSON	SR247	3.200	Motor Vehicle in Transport	Angle	0	0	2	03/29/2003	1853
WILLIAMSON	SR247	3.360	Motor Vehicle in Transport	Angle	1	0	2	02/13/2002	515
WILLIAMSON	SR247	3.360	Motor Vehicle in Transport	Head-On	1	0	2	07/17/2003	1445
WILLIAMSON	SR247	3.370	Motor Vehicle in Transport	Angle	0	0	2	12/10/2003	1530
WILLIAMSON	SR247	3.620	Overturn	Unknown	0	0	1	01/12/2002	1355
WILLIAMSON	SR247	4.200	Embankment	No Collision w/ Vehicle	0	0	1	09/14/2002	1030
WILLIAMSON	SR247	4.210		Head-On	0	0	2	06/09/2003	1520

GEOMETRIC REPORT

WILLIAMSON County - SR247

County: WILLIAMSON (94) ***Route No.*** SR247 ***Special Case*** 0-NONE ***County Sequence*** 1

Beg Log Mile	End Log Mile	ROW	Access Control	Operation	Illum-ination	School Spd Lmt	Spd Lmt	Truck Spd Lmt	Terrain	Land Use	Thru Lanes	Nbr Lanes	Feature Information			
													Seq. #	Type	Width	Composition
0.000	0.120	60	0-NONE	2-TWO WAY	YES		35		2-ROLLING	7-RESIDENTIAL	2	2	8	DRAINAGE		DITCH
		60									2	2	9	SHOULDER (OUTSIDE)	1	ASPHALT CONCRETE
		60									2	2	10	PAVEMENT	11	ASPHALT CONCRETE
		60									2	2	11	MEDIAN	11	PAINTED
		60									2	2	12	PAVEMENT	11	ASPHALT CONCRETE
		60									2	2	13	SHOULDER (OUTSIDE)	1	ASPHALT CONCRETE
		60									2	2	14	DRAINAGE		DITCH
0.120	0.300	60	0-NONE	2-TWO WAY	YES		35		2-ROLLING	7-RESIDENTIAL	2	2	8	DRAINAGE		DITCH
		60									2	2	9	SHOULDER (OUTSIDE)	1	GRAVEL
		60									2	2	10	PAVEMENT	20	ASPHALT CONCRETE
		60									2	2	12	SHOULDER (OUTSIDE)	1	GRAVEL
		60									2	2	13	DRAINAGE		DITCH
0.300	0.910	50	0-NONE	2-TWO WAY	YES		35		2-ROLLING	7-RESIDENTIAL	2	2	8	DRAINAGE		DITCH
		50									2	2	9	SHOULDER (OUTSIDE)	1	GRAVEL
		50									2	2	10	PAVEMENT	20	ASPHALT CONCRETE
		50									2	2	12	SHOULDER (OUTSIDE)	1	GRAVEL
		50									2	2	13	DRAINAGE		DITCH
0.910	1.030	50	0-NONE	2-TWO WAY	YES		35		2-ROLLING	7-RESIDENTIAL	2	2	1	DRAINAGE		DITCH
		50									2	2	2	SHOULDER (OUTSIDE)	1	ASPHALT CONCRETE
		50									2	2	3	PAVEMENT	10	ASPHALT CONCRETE

WILLIAMSON County - SR247

County: WILLIAMSON (94) ***Route No.*** SR247 ***Special Case*** 0-NONE ***County Sequence*** 1

Beg Log Mile	End Log Mile	ROW	Access Control	Operation	Illumination	School Spd Lmt	Spd Lmt	Truck Spd Lmt	Terrain	Land Use	Thru Lanes	Nbr Lanes	Feature Information			
													Seq. #	Type	Width	Composition
0.910	1.030	50	0-NONE	2-TWO WAY	YES		35		2-ROLLING	7-RESIDENTIAL	2	2	4	MEDIAN	11	PAINTED
		50									2	2	5	PAVEMENT	10	ASPHALT CONCRETE
		50									2	2	6	SHOULDER (OUTSIDE)	1	ASPHALT CONCRETE
		50									2	2	7	DRAINAGE		DITCH
1.030	2.210	50	0-NONE	2-TWO WAY	YES		35		2-ROLLING	7-RESIDENTIAL	2	2	1	DRAINAGE		DITCH
		50									2	2	2	SHOULDER (OUTSIDE)	1	SOIL (DIRT)
		50									2	2	3	PAVEMENT	20	ASPHALT CONCRETE
		50									2	2	4	SHOULDER (OUTSIDE)	1	SOIL (DIRT)
		50									2	2	5	DRAINAGE		DITCH
2.210	2.530	60	0-NONE	2-TWO WAY	NO		35		2-ROLLING	0-RURAL	2	2	1	DRAINAGE		DITCH
		60									2	2	2	SHOULDER (OUTSIDE)	1	ASPHALT CONCRETE
		60									2	2	3	PAVEMENT	20	ASPHALT CONCRETE
		60									2	2	4	SHOULDER (OUTSIDE)	1	ASPHALT CONCRETE
		60									2	2	5	DRAINAGE		DITCH
2.530	2.590	60	0-NONE	2-TWO WAY	NO		35		2-ROLLING	0-RURAL	2	2	1	DRAINAGE		DITCH
		60									2	2	2	SHOULDER (OUTSIDE)	1	SOIL (DIRT)
		60									2	2	3	PAVEMENT	20	ASPHALT CONCRETE
		60									2	2	4	SHOULDER (OUTSIDE)	1	SOIL (DIRT)
		60									2	2	5	DRAINAGE		DITCH
2.590	4.300	32	0-NONE	2-TWO WAY	NO		35		2-ROLLING	0-RURAL	2	2	1	DRAINAGE		DITCH

WILLIAMSON County - SR247

County: WILLIAMSON (94) ***Route No.*** SR247 ***Special Case*** 0-NONE ***County Sequence*** 1

Beg Log Mile	End Log Mile	ROW	Access Control	Operation	Illum-ination	School Spd Lmt	Spd Lmt	Truck Spd Lmt	Terrain	Land Use	Thru Lanes	Nbr Lanes	Feature Information			
													Seq. #	Type	Width	Composition
2.590	4.300	32	0-NONE	2-TWO WAY	NO		35		2-ROLLING	0-RURAL	2	2	2	SHOULDER (OUTSIDE)	1	SOIL (DIRT)
		32									2	2	3	PAVEMENT	20	ASPHALT CONCRETE
		32									2	2	4	SHOULDER (OUTSIDE)	1	SOIL (DIRT)
		32									2	2	5	DRAINAGE		DITCH

FIELD REVIEW INFORMATION

CLINARD ENGINEERING ASSOCIATES, LLC
INFRASTRUCTURE PLANNING AND DESIGN

MEMO

DATE: February 27, 2006

FROM: Tom Clinard, P.E.

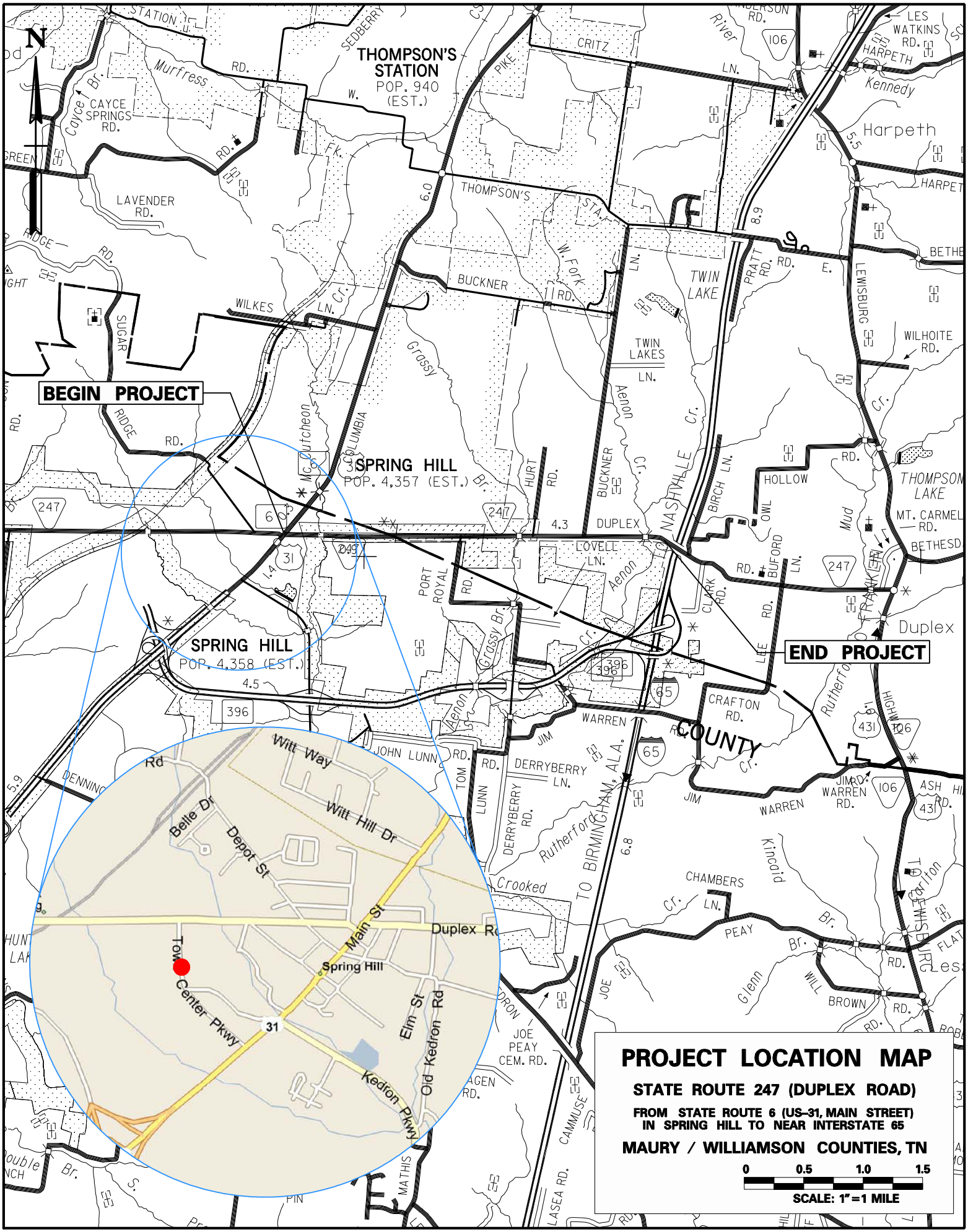
RE: Field Review for State Route 247 (Duplex Road)
From State Route 6 (US-31, Main Street)
To near Interstate 65
Maury and Williamson Counties

A field review will be held for the project on Friday, March 10th. We will meet at the Spring Hill City Hall, located at 199 Town Center Parkway (see attached map) at 10:00 AM (CST). If you have any questions, please feel free to call me.

ATTENDEE LIST

TDOT Project Planning	
Terry Gladden	Fax: 615-532-8451
Charlie Graves	Fax: 615-532-5995
Gary Webber	Fax: 615-532-8451
TDOT Environmental Planning	
Doug Delaney	Fax: 615-741-1098
Public Involvement	
Cammie Woodle – Title VI Office	Fax: 615-741-3169
Judy Steele – Community Relations	Fax: 615-253-1480
Missy Heaton – House Liaison	Fax: 615-253-1480
Jason Spain – Senate Liaison	Fax: 615-253-1480
TDOT Structures	
Ed Wasserman - Headquarters	Fax: 615-532-7745
Houston Walker	Fax: 615-532-7745
John Zirkle - Hydraulics	Fax: 615-532-5990
TDOT Design	
Jeff Jones - Headquarters	Fax: 615-532-2799
Carolyn Stonecipher – Region III	Fax: 615-253-5218
TDOT Survey	
Jim Waters - Headquarters	Fax: 615-532-2799
David Marshall – Region III	Fax: 615-350-4280
Traffic Engineer	
Mike Tugwell - Headquarters	Fax: 615-532-5995
Ali Farhangi – Region III	Fax: 615-350-4288
City of Spring HIll	
Danny M. Leverette - Mayor	Fax: 931-486-0516
Ken York – City Administrator	Fax: 931-486-0516
John McCord – Public Works Director	Fax: 931-486-0516
John Pewitt – Public Works Deputy Director	Fax: 931-486-0516

109 WESTPARK DRIVE SUITE 440 BRENTWOOD, TN 37027 PHONE: 615.370.6079 FAX: 615.627.4066


BEGIN PROJECT
END PROJECT
THOMPSON'S STATION
POP. 940 (EST.)
SPRING HILL
POP. 4,357 (EST.)
SPRING HILL
POP. 4,358 (EST.)
COUNTY
TO BIRMINGHAM, ALA.
Witt Way
Witt Hill Dr
Belle Dr
Depot St
Main St
Duplex Rd
Spring Hill
Center Pkwy
Elm St
Old Kedron Rd
Kedron Pkwy
31
PROJECT LOCATION MAP
STATE ROUTE 247 (DUPLEX ROAD)
FROM STATE ROUTE 6 (US-31, MAIN STREET) IN SPRING HILL TO NEAR INTERSTATE 65
MAURY / WILLIAMSON COUNTIES, TN
0 0.5 1.0 1.5
SCALE: 1" = 1 MILE

Clinard Engineering Associates, LLC
INFRASTRUCTURE • PLANNING • DESIGN

JN: E04020.06

STATE ROUTE 247 (DUPLEX ROAD))
FROM STATE ROUTE 6 (US-31) TO NEAR I-65
MAURY & WILLIAMSON COUNTY
SPRING HILL, TENNESSEE

Meeting Minutes

ISSUE VERSION: Final

MEETING NO.: 1
DATE: March 10, 2006
TIME: 10:00 am to 11:30 pm
LOCATION: Spring Hill City Hall

SUBJECT: TDOT Field Review

Prepared by: B. Gaffney

Approved by: Tom Clinard, P.E.

Date Prepared: 3/29/06

Attendee Names / Company

Tom Clinard / Clinard Engineering Associates
Brian Gaffney / Clinard Engineering Associates
Gary Webber / TDOT Planning
Charlie Graves / TDOT Planning
Larry Parker / TDOT Design
Bob Allen / TDOT Environmental
David Thompson / TDOT Environmental
Danny M. Leverette / Mayor - City of Spring Hill
Jerome D. Dempsey / Spring Hill Consulting Engineer
Ferrell White / City of Spring Hill
John D. McCord / City of Spring Hill
John B. Pewitt / City of Spring Hill

Copies To: File

The following items presented summarize the substantive items discussed or issues resolved at the above meeting to the best of the writer's memory.

ITEM	DESCRIPTION	STATUS	OPENED	CLOSED	ACTION
01	**Agenda Item 1 (Introductions):** The meeting began with introductions and the scope of work was discussed.	FYI			
02	**Agenda Item 2 (Project Overview):** Area Development and Growth • There are many subdivisions in different stages of planning, design, and construction along SR 247. • Some of these developments have houses and/or yards that encroach upon the existing roadway right-of-way. Previous APR • The previous study was determined to be out of date and was in need of revision. A set of handouts was given to each person present at the meeting that included a quad map, traffic volumes, traffic analysis, and proposed typical sections. (see attached handout)	FYI			
03	**Agenda Item 3 (Traffic Data and Analysis):** Existing Conditions • SR-247 is currently a narrow two lane road that has a lot of traffic. With all of the development along the route, the traffic is expected to grow exponentially. • There is minimal right-of-way along the route, which will make widening complicated. Design Year (2030) Operations • Most of the intersections along SR-247 operate at a level of service F in the design year. • Roadway sections operate at a LOS D or worse.	FYI			
04	**Agenda Item 4 (Proposed Improvements):** Typical Sections • The proposed section is a three lane curb and gutter section with two 14' travel lanes (to accommodate bike travelers) and a 12' center turn lane. • Retaining walls will be needed in various locations throughout the project (video shown to illustrate three such locations) Functional Plans • A proposed roadway was shown on top of an aerial layout.	FYI			

Clinard Engineering Associates, LLC
109 Westpark Drive • Suite 440 • Brentwood, TN 37027 • 615-370-6079 • FAX 615-627-4066

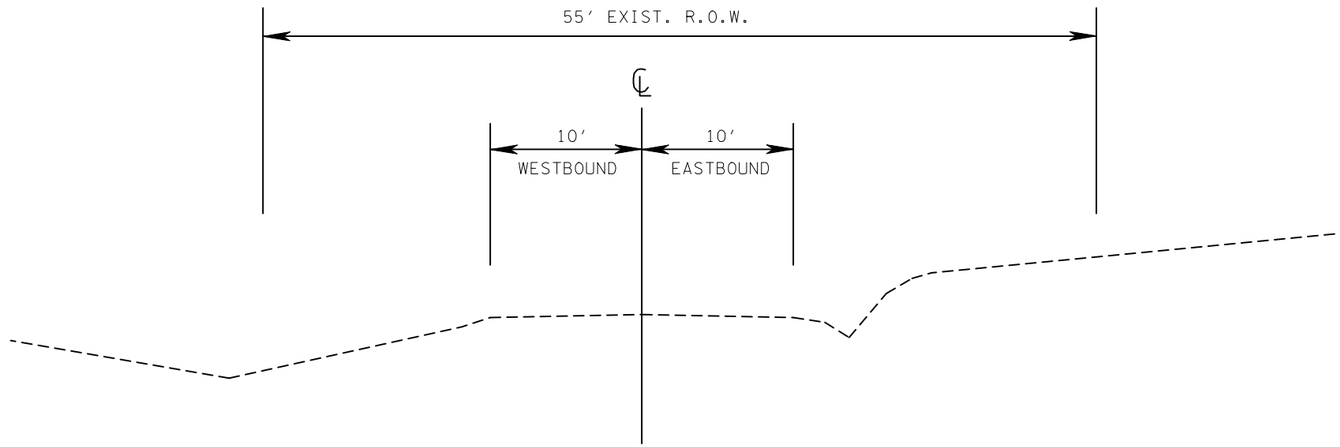
ITEM	DESCRIPTION	STATUS	OPENED	CLOSED	ACTION
	• Intersection improvements at 6 locations, 4 of which are signalized. • Historical properties and environmental concerns were labeled and discussed. Proposed Profile Adjustments • A survey of the existing centerline was conducted and an existing grade displayed. A proposed profile was created and the locations of necessary fills/cuts and retaining walls were discussed. Such things as line of sight and design speed were fixed with the proposed profile. Traffic Analysis • Adding a center turn lane throughout the project reduces the delay for through traffic and improves the roadway level of service to a C in many locations. • Intersection improvements will allow 5 of the 6 intersections to operate at an acceptable level of service. The intersection at US-31 (Main Street) would need more improvements that are not within the scope of this project.				
05	**Agenda Item 5 (Comments and Concerns):** The following comments and concerns were indicated at the meeting. • Larry Parker discussed having the roadway design adhere to standard drawing RD01-TS-7A, which includes a 6 foot shoulder. • TDOT Environmental mentioned some concerns with potential impacts to the Spring Hill Village Apartments.	FYI			
06	**Agenda Item 6 (Action Items):** The following were agreed upon actions to be taken after the field review. • Gary Webber will provide Clinard Engineering with further instruction as to what typical section is required (bike lanes, utility strip, etc…). • Clinard Engineering will prepare a request for a reassignment of traffic to the future Old Kedron Road Bypass. • State Route 247 will be divided into three sections for this TPR. Section I will begin at Main Street and end at the new Bypass. Section II will begin at the bypass and end just east of Port Royal Road. Section III will continue to the end of the project near I-65.	 NEW NEW NEW	 3/10/06 3/10/06 3/10/06	 3/15/06 3/15/06 3/13/06	 Typ. Section received Request sent Sections created

State Route 247 (Duplex Road)
From State Route 6 (US 31) to Near I-65
Maury & Williamson County / Spring Hill, Tennessee

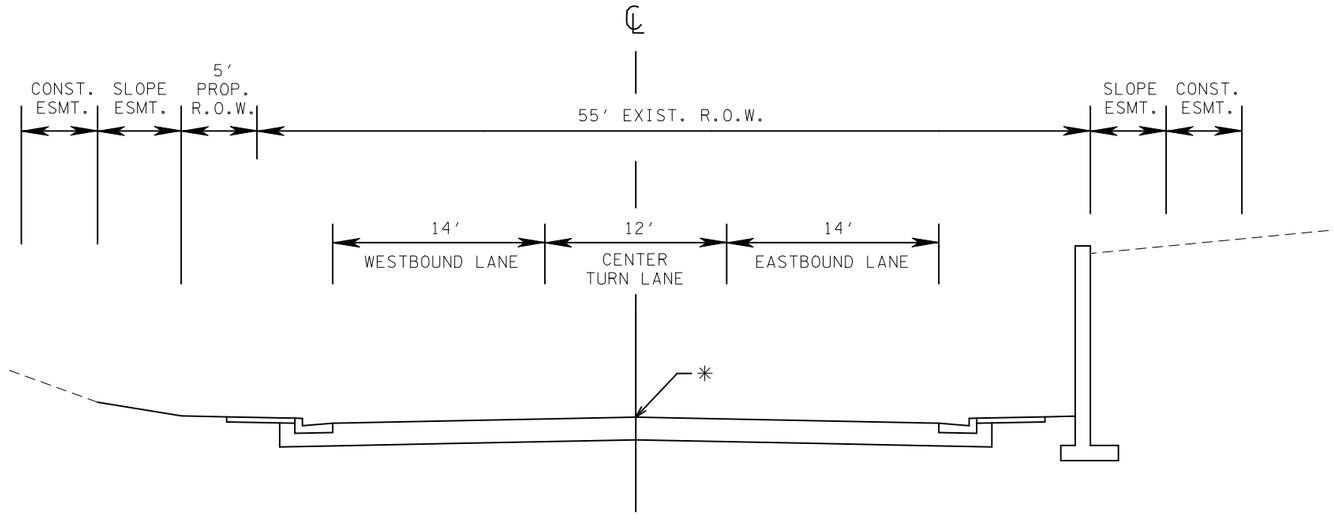
Friday, March 10, 2006
10:00 am

1. **Project Overview**
    a. **Area Development & Growth**
    b. **Previous Advance Planning Report**
2. **Traffic Data and Analysis**
    a. **Existing Conditions**
    b. **Design Year Operations**
3. **Proposed Improvements**
    a. **Typical Section**
    b. **Functional Plans**
    c. **Proposed Profile Adjustments**
4. **Schedule and Action Items Summary**
5. **Adjourn**

EXISTING



PROPOSED



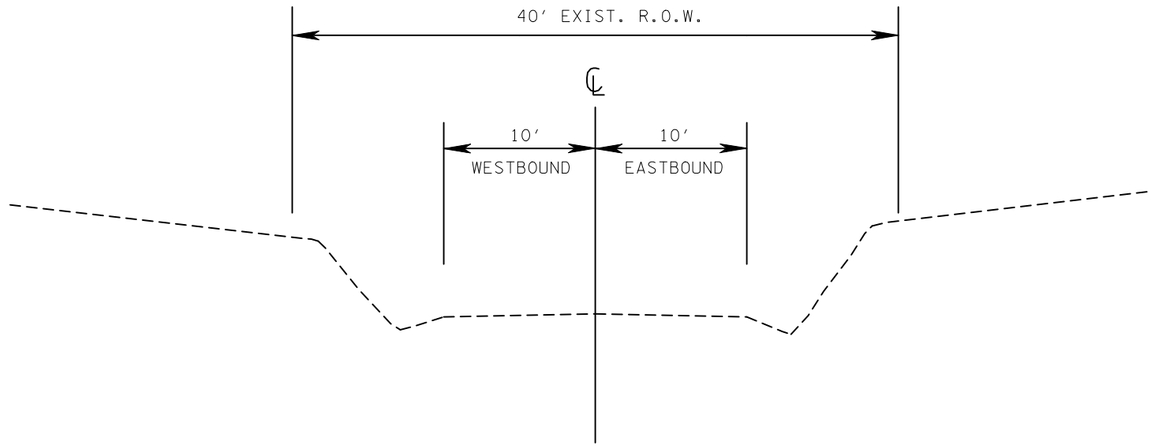
✳ PROPOSED FINISHED GRADE
TO BE LOWERED ± 7 FT

STATE ROUTE 247
(DUPLEX ROAD)

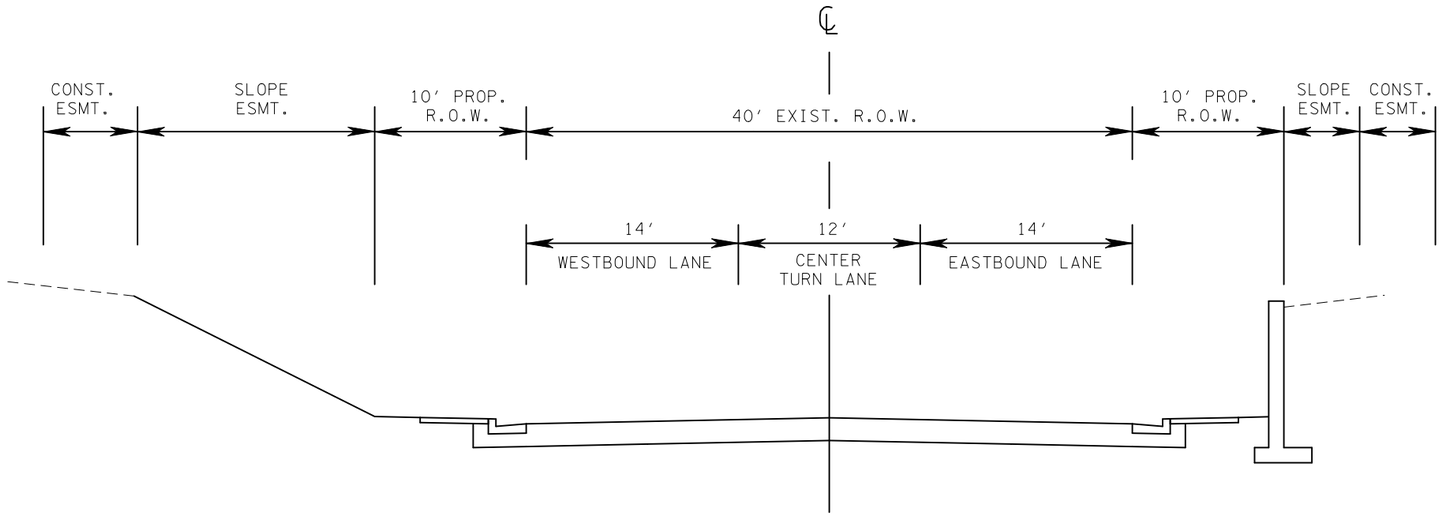
FROM S.R. 6 (US 31, MAIN STREET)
IN SPRING HILL
TO 0.02 MILES WEST OF I-65
MAURY AND WILLIAMSON COUNTIES

SECTION Ⓒ–Ⓒ

EXISTING



PROPOSED



STATE ROUTE 247

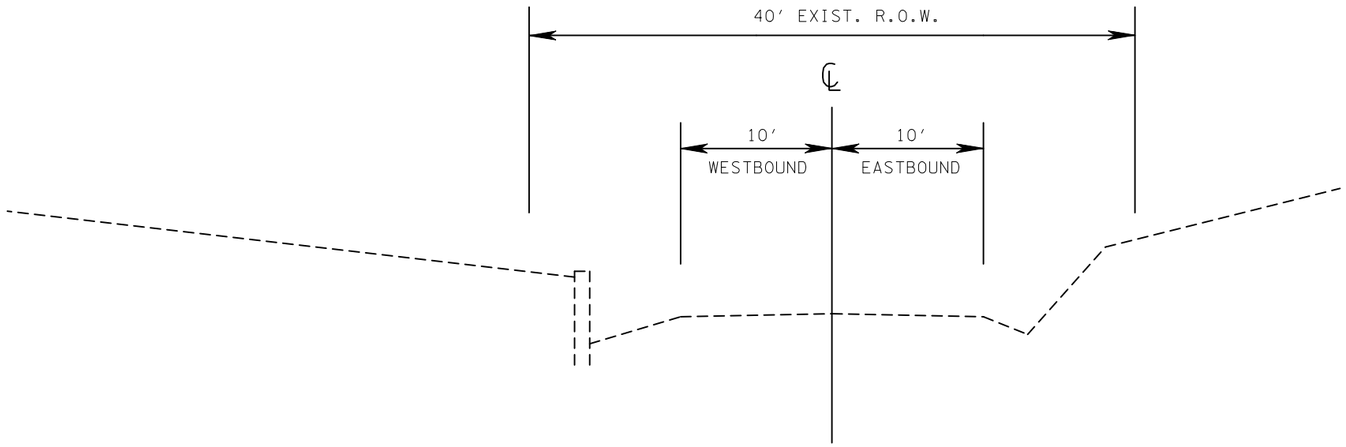
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL TO 0.02 MILES WEST OF I-65

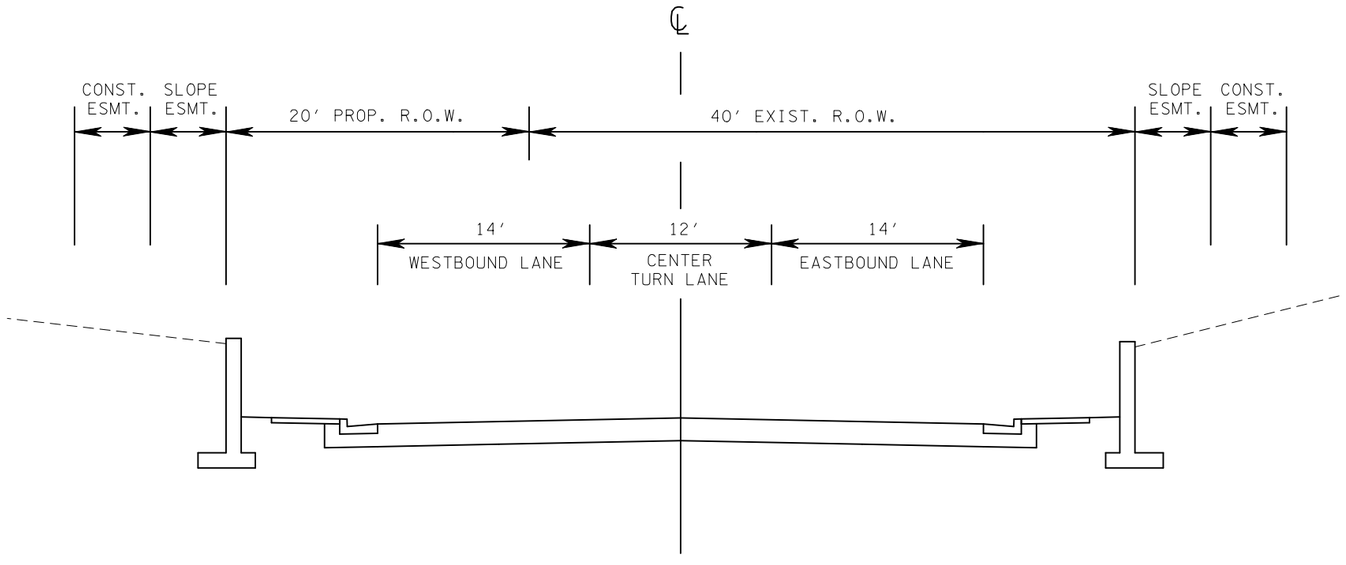
MAURY AND WILLIAMSON COUNTIES

SECTION Ⓑ–Ⓑ

EXISTING



PROPOSED



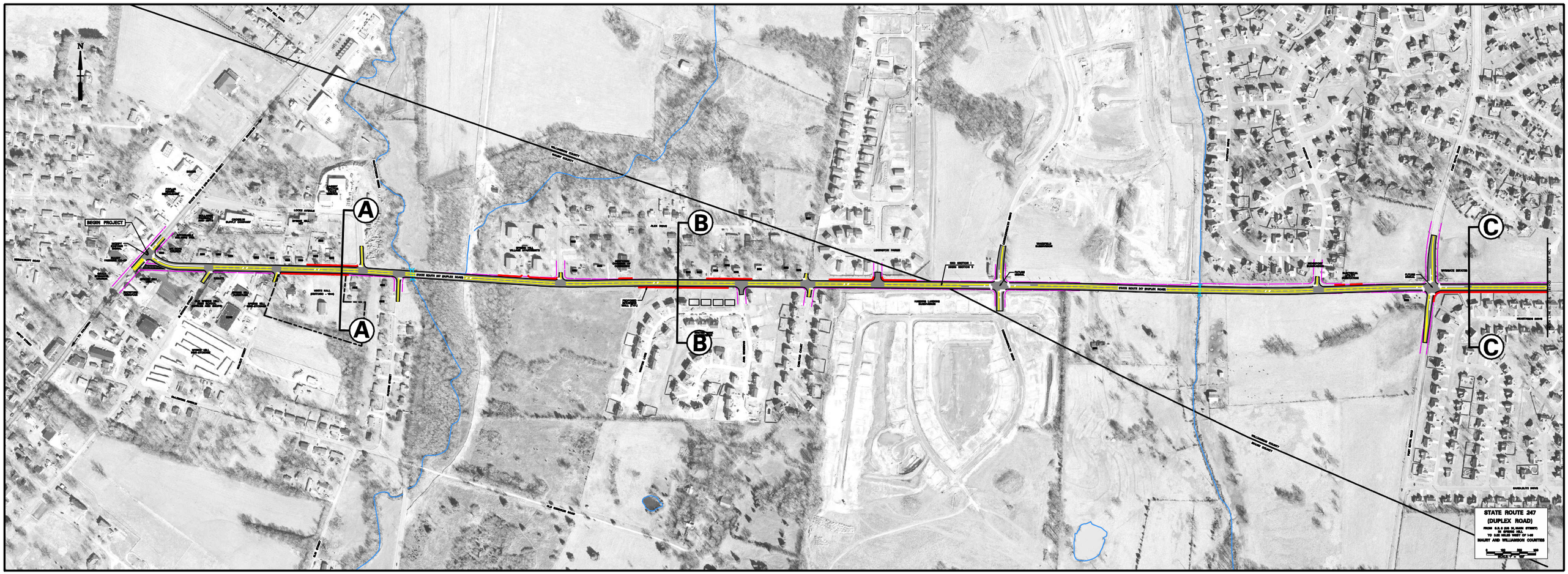
STATE ROUTE 247
(DUPLEX ROAD)

FROM S.R. 6 (US 31, MAIN STREET) IN SPRING HILL TO 0.02 MILES WEST OF I-65

MAURY AND WILLIAMSON COUNTIES

SECTION Ⓐ–Ⓐ


STATE ROUTE 247 (DUPLEX ROAD)
END PROJECT
STATE ROUTE 247
(DUPLEX ROAD)
FROM S.R.6 (US 31 MAIN STREET)
IN SPRING HILL
TO 0.25 MILES WEST OF I-65
MAURY AND WILLIAMSON COUNTIES
SCALE: 1" = 50'


N
BEGIN PROJECT
A
B
C
STATE ROUTE 247
(DUPLEX ROAD)
MAURY AND WILLIAMSON COUNTIES

COST ESTIMATES

State Route 247 (Duplex Road) Section I June 21, 2006
Cost Estimate
CEA Project No.

		Area (ac)		Cost/Acre		Total Cost
Clearing & Grubbing		1.8		$2,000		**$3,600**
Earthwork	Length (ft)	Factor		Total (yd^3)	Cost / yd^3	
	1,180	11.62		13,712	$3.00	$41,135
	380	4.44		1,687	$3.00	$5,062
			Total:	15,399	$3.00	**$46,196**
Pavement Removal	Length			Cost/lf		
	1,560			$12		**$18,720**
Drainage	Length (Miles)			Cost/mile		Total Cost
	0.30			$300,000	Urban Curb & Gutter	**$90,000**
						$90,000
Erosion Control						**$120,000**
Structures						
		Length	Width	Area	Cost/sf	Total Cost
		0	0	0	$80	$0
		0	0	0	$80	$0
	Bridge Rail		0	ft	$100.00 per ft.	$0
				Area	Cost/sf	Total Cost
		0	0	0	$15	$0
				Total Demolition Cost:		**$0**
				Total Structure Cost:		**$0**
		Length	Cost			
Fence		0	$10			**$0**
Paving			Cost	Length		Total Cost
			$125	1,560		$195,000
			$30	150		$4,500
				Total Paving Cost:		**$199,500**
Retaining Walls	Retaining Wall	Height	Length	Area	Cost/sf	
		5	765	3825	$35	**$133,875**

Maintenance of Traffic **$100,000**

Topsoil	Length	Factor	Total	Cost per		
	0	0.000	0	$4.00		$0
						$0

Seeding	Length	Factor	Total	Cost per		
	0	0.000	0	$16.00		**$0**
						$0

Sodding	Length	Factor	Total	Cost per		
	3,120	2.711	8,458	$4.00		$33,833
					Total Sod	**$33,833**

Signing **$5,000**

Signalization **$50,000**

Rock Walls	Cost	Length		Total Cost
	$150	0		$0
			Total Rock Wall Cost:	**$0**

Guardrail

	Number of Terminals		Cost	Total Cost
	0		$1,500	$0
Length of rail	0	ft	$13	$0
			Total Guardrail:	**$0**

Rip-Rap			Cost		Total Cost
	500	Tons	$15		**$7,500**

Right-of-Way

			Cost/acre	Cost			
Total acreage	1.0	acres	$25,000	$24,750			
Slope Easmt.	0.5	acres	$5,000	$2,500			
Const. Easmt.	0.5	acres	$5,000	$2,500			
2 Residences Acquired				$150,000			Total Cost
			Total	$179,750	Factor	146%	$262,435
No. of Tracts	15		Cost/tract	$10,000			$150,000
Relocate 2 Residences			2	@	$10,000		$20,000
					Total Right-of-Way Cost:		**$432,435**

Utilities

Reimbursable

	Length (ft)	Cost/ft		Total Cost
8" Sewer	1,560	$25		$39,000
			Cost/each	
Manhole	10	manholes	$1,200	$12,000

				Total Reimbursable	**$51,000**

Non-Reimbursable

	Length (ft)	Cost/ft			Total Cost
6" Water	1,560	$22			$34,320
UG Fiber	1,560	$45			$70,200
			Cost/each		
Manhole	0	manholes	$1,200		$0
Fire Hydrant	4	hydrants	$1,000		$4,000
Electric	12	Poles	$2,000		$24,000
Telephone	12	Poles	$1,500		$18,000
Cable	0	Poles	$950		$0
Guy	0	Poles	$900		$0
				Total Non-Reimbursable	**$150,520**
				Total Utility Cost:	**$201,520**

State Route 247 (Duplex Road) Section II June 21, 2006
Cost Estimate
CEA Project No.

		Area (ac)		Cost/Acre		Total Cost
Clearing & Grubbing		6.1		$2,000		**$12,200**
Earthwork	Length (ft)	Factor		Total (yd^3)	Cost / yd^3	
	2,200	5.33		11,726	$3.00	$35,178
	4,630	19.62		90,841	$3.00	$272,522
			Total:	102,567	$3.00	**$307,700**
Pavement Removal	Length			Cost/lf		
	6,830			$12		**$81,960**
Drainage	Length (Miles)			Cost/mile		Total Cost
	1.29			$300,000	Urban Curb & Gutter	**$387,000**
						$387,000
Erosion Control						**$524,000**
Structures						
		Length	Width	Area	Cost/sf	Total Cost
		40	60	2,400	$80	$192,000
		0	0	0	$80	$0
	Bridge Rail		0	ft	$100.00 per ft.	$0
				Area	Cost/sf	Total Cost
		32	40	1,280	$15	$19,200
				Total Demolition Cost:		**$19,200**
				Total Structure Cost:		**$192,000**
		Length	Cost			
Fence		0	$10			**$0**
Paving			Cost	Length		Total Cost
			$125	7,840		$980,000
			$30	450		$13,500
				Total Paving Cost:		**$993,500**
Retaining Walls	Retaining Wall	Height	Length	Area	Cost/sf	
		8	2,185	17480	$35	**$611,800**

Maintenance of Traffic **$250,000**

Topsoil	Length	Factor	Total	Cost per		
	0	0.000	0	$4.00		$0
						$0

Seeding	Length	Factor	Total	Cost per		
	0	0.000	0	$16.00		**$0**
						$0

Sodding	Length	Factor	Total	Cost per		
	13,660	3.390	46,307	$4.00		$185,230
					Total Sod	**$185,230**

Signing **$10,000**

Signalization **$150,000**

Rock Walls	Cost	Length		Total Cost
	$150	0		$0
			Total Rock Wall Cost:	**$0**

Guardrail

	Number of Terminals	Cost	Total Cost
	8	$1,500	$12,000
Length of rail 160 ft		$13	$2,080
		Total Guardrail:	**$14,080**

Rip-Rap			Cost		
	1,600	Tons	$15		**$24,000**

Right-of-Way

			Cost/acre	Cost			
Total acreage	3.3	acres	$25,000	$83,250			
Slope Easmt.	1.6	acres	$5,000	$8,000			
Const. Easmt.	1.6	acres	$5,000	$8,000			
3 Residences Acquired				$300,000			Total Cost
			Total	$399,250	Factor	146%	$582,905
No. of Tracts	56		Cost/tract	$10,000			$560,000
Relocate 3 Residences			3	@	$10,000		$30,000
					Total Right-of-Way Cost:		**$1,172,905**

Utilities

Reimbursable

	Length (ft)	Cost/ft		Total Cost
8" Sewer	6,830	$25		$170,750
			Cost/each	
Manhole	35	manholes	$1,200	$42,000

				Total Reimbursable	**$212,750**

Non-Reimbursable

	Length (ft)	Cost/ft			Total Cost
6" Water	6,830	$22			$150,260
UG Fiber	6,830	$45			$307,350
			Cost/each		
Manhole	0	manholes	$1,200		$0
Fire Hydrant	18	hydrants	$1,000		$18,000
Electric	35	Poles	$2,000		$70,000
Telephone	35	Poles	$1,500		$52,500
Cable	0	Poles	$950		$0
Guy	0	Poles	$900		$0

Total Non-Reimbursable	**$598,110**
Total Utility Cost:	**$810,860**

State Route 247 (Duplex Road) Section III June 21, 2006
Cost Estimate
CEA Project No.

		Area (ac)		Cost/Acre		Total Cost
Clearing & Grubbing		3.9		$2,000		**$7,800**
Earthwork	Length (ft)	Factor		Total (yd^3)	Cost / yd^3	
	6,780	19.62		133,024	$3.00	$399,071
	1,700	6.29		10,693	$3.00	$32,079
			Total:	143,717	$3.00	**$431,150**
Pavement Removal	Length			Cost/lf		
	8,480			$12		**$101,760**
Drainage	Length (Miles)			Cost/mile		Total Cost
	1.60			$300,000	Urban Curb & Gutter	**$480,000**
						$480,000
Erosion Control						**$524,000**
Structures						
	Length	Width		Area	Cost/sf	Total Cost
	40	60		2,400	$80	$192,000
	0	0		0	$80	$0
Bridge Rail		0		ft	$100.00 per ft.	$0
				Area	Cost/sf	Total Cost
	30	40		1,200	$15	$18,000
				Total Demolition Cost:		**$18,000**
				Total Structure Cost:		**$192,000**
	Length	Cost				
Fence	0	$10				**$0**
Paving			Cost	Length		Total Cost
			$125	8,930		$1,116,250
			$30	750		$22,500
				Total Paving Cost:		**$1,138,750**
Retaining Walls	Retaining Wall	Height	Length	Area	Cost/sf	
		5	4,235	21175	$35	**$741,125**
Maintenance of Traffic						**$300,000**
Topsoil	Length	Factor		Total	Cost per	

	0	0.000		0	$4.00		$0
							$0

Seeding	Length	Factor		Total	Cost per		
	0	0.000		0	$16.00		**$0**
							$0

Sodding	Length	Factor		Total	Cost per		
	16,960	2.710		45,962	$4.00		$183,846
						Total Sod	**$183,846**

Signing **$15,000**

Signalization **$50,000**

Rock Walls	Cost	Length			Total Cost
	$150	0			$0
		Total Rock Wall Cost:			**$0**

Guardrail		Number of Terminals		Cost		Total Cost
		8		$1,500		$12,000
	Length of rail 120 ft			$13		$1,560
			Total Guardrail:			**$13,560**

			Cost		
Rip-Rap	2,200	Tons	$15		**$33,000**

Right-of-Way

				Cost/acre	Cost		
	Total acreage	1.9	acres	$25,000	$47,500		
	Slope Easmt.	1.0	acres	$5,000	$5,000		
	Const. Easmt.	1.0	acres	$5,000	$5,000		
							Total Cost
				Total	$57,500	Factor 146%	$83,950
	No. of Tracts	40	Cost/tract	$10,000			$400,000
					Total Right-of-Way Cost:		**$483,950**

Utilities

Reimbursable

	Length (ft)	Cost/ft				Total Cost
8" Sewer	8,480	$25				$212,000
			Cost/each			
Manhole	42	manholes	$1,200			$50,400
				Total Reimbursable		**$262,400**

Non-Reimbursable

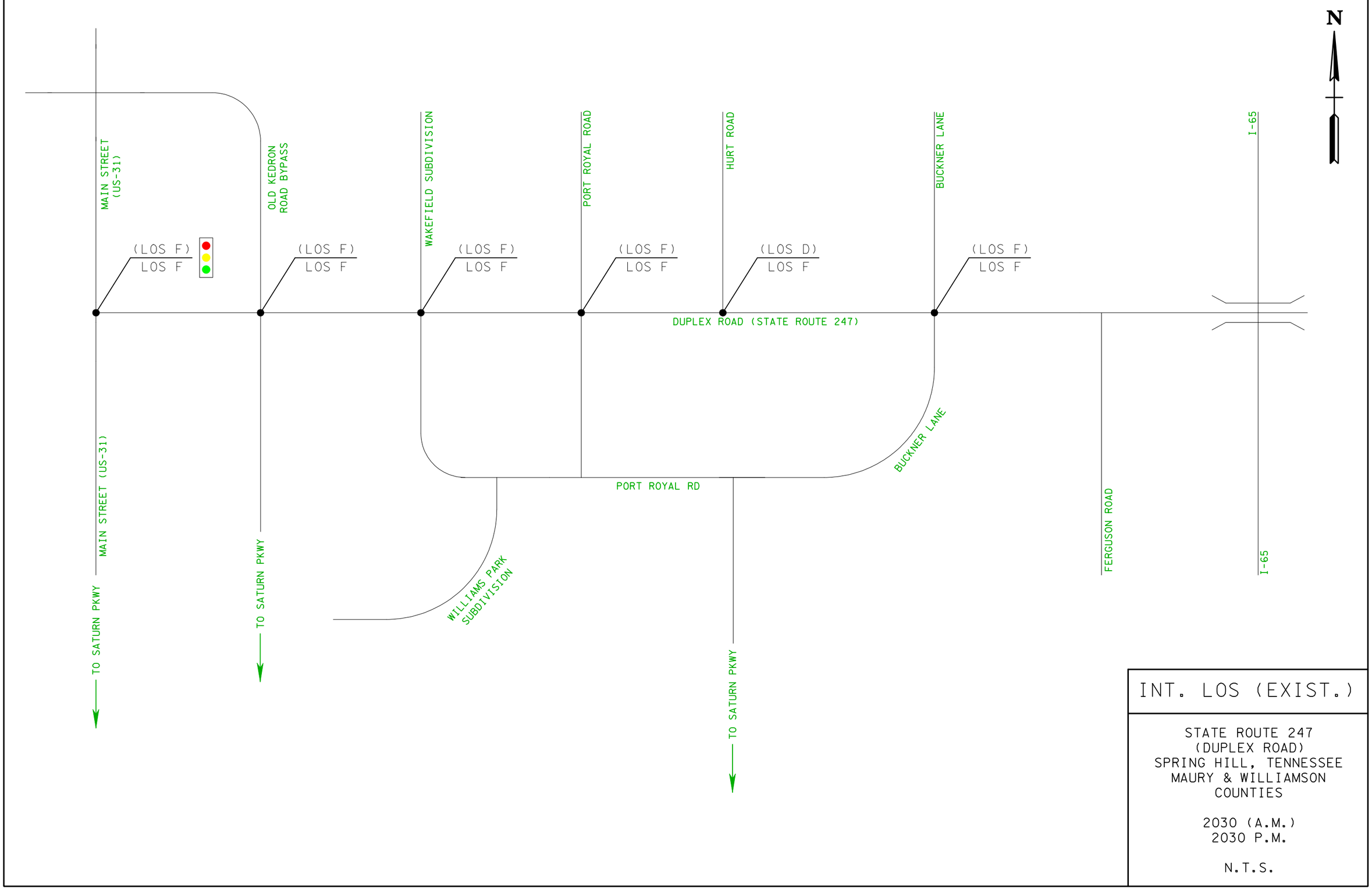
	Length (ft)	Cost/ft				Total Cost
6" Water	8,480	$22				$186,560
UG Fiber	8,480	$45				$381,600
			Cost/each			
Manhole	0	manholes	$1,200			$0
Fire Hydrant	22	hydrants	$1,000			$22,000

Electric	42	Poles	$2,000		$84,000
Telephone	42	Poles	$1,500		$63,000
Cable	0	Poles	$950		$0
Guy	0	Poles	$900		$0

Total Non-Reimbursable	**$737,160**
Total Utility Cost:	**$999,560**

CAPACITY ANALYSIS

EXISTING SYSTEM (INTERSECTIONS)



INT. LOS (EXIST.)

STATE ROUTE 247
(DUPLEX ROAD)
SPRING HILL, TENNESSEE
MAURY & WILLIAMSON
COUNTIES

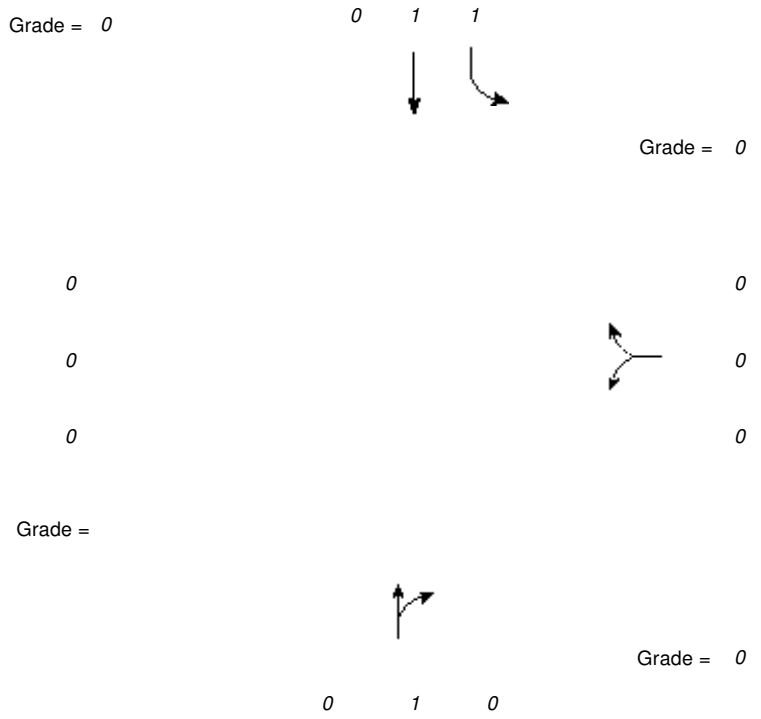
2030 (A.M.)
2030 P.M.

N.T.S.

LONG REPORT

General Information		Site Information	
Analyst	*Brian Gaffney*	Intersection	*#1*
Agency or Co.	*Clinard Engineering Associates*	Area Type	*All other areas*
Date Performed	*6/6/06*	Jurisdiction	*Maury County*
Time Period	*AM Existing*	Analysis Year	*2030*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)				*420*		*376*		*1395*	*393*	*255*	*1139*	
% Heavy veh				*4*		*4*		*0*	*0*	*0*	*0*	
PHF				*0.90*		*0.90*		*0.90*	*0.90*	*0.90*	*0.90*	
Actuated (P/A)				*P*		*P*		*P*	*P*	*P*	*P*	
Startup lost time					*2.0*			*2.0*		*2.0*	*2.0*	
Ext. eff. green					*2.0*			*2.0*		*2.0*	*2.0*	
Arrival type					*3*			*3*		*3*	*3*	
Unit Extension					*3.0*			*3.0*		*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*			*0*		*0*	*0*		*0*			
Lane Width					*12.0*			*12.0*		*12.0*	*12.0*	
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr					*0*			*0*		*0*	*0*	
Ped timing		*3.2*			*3.2*			*3.2*				

	WB Only	02	03	04	SB Only	NS Perm	07	08
Timing	G = *40.0*	G =	G =	G =	G = *10.0*	G = *90.0*	G =	G =
	Y = *5*	Y =	Y =	Y =	Y = *5*	Y = *5*	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *155.0*		

VOLUME ADJUSTMENT AND SATURATION FLOW RATE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Volume Adjustment

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume				*420*		*376*		*1395*	*393*	*255*	*1139*	
PHF				*0.90*		*0.90*		*0.90*	*0.90*	*0.90*	*0.90*	
Adj. Flow Rate				*467*		*418*		*1550*	*437*	*283*	*1266*	
Lane Group					*LR*			*TR*		*L*	*T*	
Adj. flow rate					*885*			*1987*		*283*	*1266*	
Prop. LT or RT		--		*0.528*	--	*0.472*	*0.000*	--	*0.220*	*0.000*	--	*0.000*

Saturation Flow Rate

Base satflow					*1900*			*1900*		*1900*	*1900*	
Num. of lanes	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*1*	*1*	*0*
fW					*1.000*			*1.000*		*1.000*	*1.000*	
fHV					*0.962*			*1.000*		*1.000*	*1.000*	
fg					*1.000*			*1.000*		*1.000*	*1.000*	
fp					*1.000*			*1.000*		*1.000*	*1.000*	
fbb					*1.000*			*1.000*		*1.000*	*1.000*	
fa					*1.00*			*1.00*		*1.00*	*1.00*	
fLU					*1.00*			*1.00*		*1.00*	*1.00*	
fLT			--		*0.974*	--		*1.000*	--	*0.950*	*1.000*	--
Secondary fLT			--			--			--	*0.045*		--
fRT	--			--	*0.936*		--	*0.970*		--	*1.000*	
fLpb			--		*1.000*	--		*1.000*	--	*1.000*	*1.000*	--
fRpb	--			--	*1.000*		--	*1.000*		--	*1.000*	
Adj. satflow					*1666*			*1844*		*1805*	*1900*	
Sec. adj. satflow			--			--			--	*85*		--

CAPACITY AND LOS WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Capacity Analysis

	EB			WB			NB			SB		
Lane group				*LR*			*TR*			*L*	*T*	
Adj. flow rate				*885*			*1987*			*283*	*1266*	
Satflow rate				*1666*			*1844*			*1805*	*1900*	
Lost time				*2.0*			*2.0*			*2.0*	*2.0*	
Green ratio				*0.26*			*0.58*			*0.68*	*0.68*	
Lane group cap.				*430*			*1071*			*168*	*1287*	
v/c ratio				*2.06*			*1.86*			*1.68*	*0.98*	
Flow ratio				*0.53*			*1.08*				*0.67*	
Crit. lane group		*N*		*Y*			*N*			*N*	*N*	
Sum flow ratios	*2.56*											
Lost time/cycle	*10.00*											
Critical v/c ratio	*2.74*											

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group				*LR*			*TR*			*L*	*T*	
Adj. flow rate				*885*			*1987*			*283*	*1266*	
Lane group cap.				*430*			*1071*			*168*	*1287*	
v/c ratio				*2.06*			*1.86*			*1.68*	*0.98*	
Green ratio				*0.26*			*0.58*			*0.68*	*0.68*	
Unif. delay d1				*57.5*			*32.5*			*49.7*	*24.2*	
Delay factor k				*0.50*			*0.50*			*0.50*	*0.50*	
Increm. delay d2				*484.2*			*388.5*			*332.5*	*21.5*	
PF factor				*1.000*			*1.000*			*1.000*	*1.000*	
Control delay				*541.7*			*421.0*			*382.2*	*45.7*	
Lane group LOS				*F*			*F*			*F*	*D*	
Apprch. delay				*541.7*			*421.0*			*107.1*		
Approach LOS				*F*			*F*			*F*		
Intersec. delay	*335.2*			Intersection LOS						*F*		

SUPPLEMENTAL UNIFORM DELAY WORKSHEET FOR LEFT TURNS FROM EXCLUSIVE LANES WITH PROTECTED AND PERMITTED PHASES

General Information

Project Description *SR 247 - Spring Hill*

v/c Ratio Computation

	EB	WB	NB	SB
Cycle length, C (s)	*155.0*			
Prot. phase eff. green intvl, g (s)				*10.0*
Opposed queue eff. green intvl, g_q (s)				*58.33*
Unopposed green intvl, g_u (s)				*36.67*
Red time, r(s)				*50.0*
Arrival rate, q_a (veh/s)				*0.05*
Prot. phase departure rate, s_p (veh/s)				*0.501*
Perm. phase departure rate, s_s (veh/s)				*0.06*
X_{perm}				*1.98*
X_{prot} (N/A for lagging left-turns)				*0.56*
Uniform Queue Size and Delay Computations				
Queue at start of green arrow, Q_a				*4.52*
Queue at start of unsaturated green, Q_u				*2.72*
Residual queue, Q_r				*2.19*
Uniform delay, d_1				*49.7*

Uniform Queue Size and Delay Equations

	Case	Q_a	Q_u	Q_r	d_1
If X_{perm} <= 1.0 & X_{prot} <= 1.0	1	$q_a r$	$q_a g_q$	0	$[0.5/(q_a C)][r Q_a + Q_a^{2/(s_p - q_s)} + g_q Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} <= 1.0 & X_{prot} > 1.0	2	$q_a r$	$Q_r + q_a g_q$	$Q_a - g(s_p - q_a)$	$[0.5/(q_a C)][r Q_a + g(Q_a + Q_r) + g_q (Q_r + Q_u) + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 & X_{prot} <= 1.0	3	$Q_r + q_a r$	$q_a g_q$	$Q_u - g_u(s_s - q_a)$	$[0.5/(q_a C)][g_q Q_u + g_u(Q_a + Q_r) + r(Q_r + Q_a) + Q_a^{2/(s_p - q_a)}$
If X_{perm} <= 1.0 (lagging lefts)	4	0	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 (lagging lefts)	5	$Q_u - g_u(s_s - q_a)$	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + g_u(Q_u + Q_a) + Q_a^{2/(s_p - q_a)}$

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane group					*LR*			*TR*		*L*	*T*	
Init. queue/lane					*0.0*			*0.0*		*0.0*	*0.0*	
Flow rate/lane					*885*			*1987*		*283*	*1266*	
Satflow per lane					*1666*			*1844*		*249*	*1900*	
Capacity/lane					*430*			*1071*		*168*	*1287*	
Flow ratio					*0.53*			*1.08*		*1.14*	0.67	
v/c ratio					*2.06*			*1.86*		*1.68*	*0.98*	
I factor					*1.000*			*1.000*		*1.000*	*1.000*	
Arrival type					*3*			*3*		*3*	*3*	
Platoon ratio					*1.00*			*1.00*		*1.00*	*1.00*	
PF factor					*1.00*			*1.00*		*1.00*	*1.00*	
Q_1					*38.1*			*85.6*		*4.2*	*52.7*	
k_B					*0.9*			*1.8*		*0.5*	*2.0*	
Q_2					*58.6*			*118.2*		*15.5*	*16.5*	
Q avg.					*96.7*			*203.7*		*19.7*	*69.2*	

Percentile Back of Queue (95th percentile)

$f_{B\%}$					*1.6*			*1.6*		*1.6*	*1.6*	
BOQ, $Q_{\%}$					*155*			*326*		*31.9*	*111*	

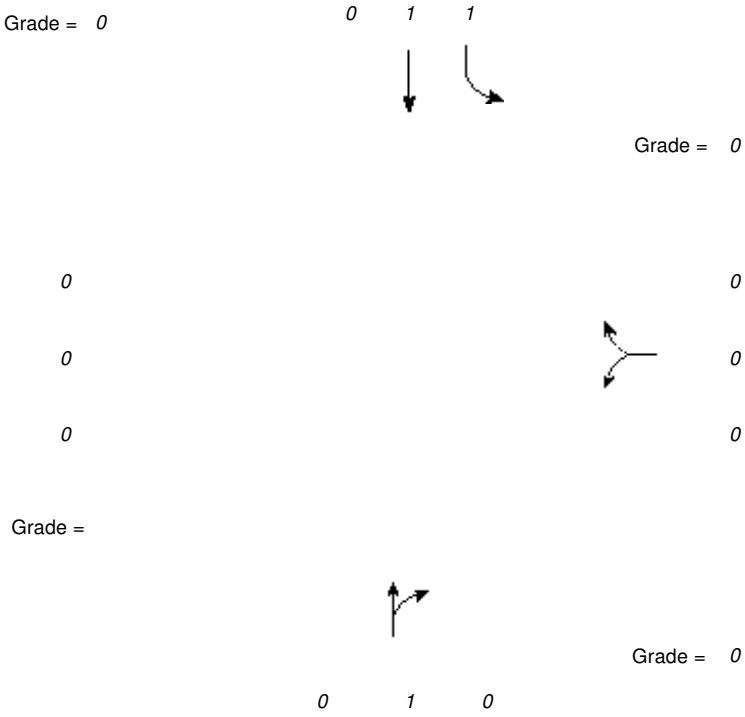
Queue Storage Ratio

Q spacing					*25.0*			*25.0*		*25.0*	*25.0*	
Q storage					*0*			*0*		*0*	*0*	
Avg. R_Q												
95% $R_{Q\%}$												

LONG REPORT

General Information		Site Information	
Analyst	*Brian Gaffney*	Intersection	*#1*
Agency or Co.	*Clinard Engineering Associates*	Area Type	*All other areas*
Date Performed	*6/6/06*	Jurisdiction	*Maury County*
Time Period	*PM Existing*	Analysis Year	*2030*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)				*450*		*381*		*2133*	*419*	*448*	*2332*	
% Heavy veh				*4*		*4*		*0*	*0*	*0*	*0*	
PHF				*0.90*		*0.90*		*0.90*	*0.90*	*0.90*	*0.90*	
Actuated (P/A)				*P*		*P*		*P*	*P*	*P*	*P*	
Startup lost time					*2.0*			*2.0*		*2.0*	*2.0*	
Ext. eff. green					*2.0*			*2.0*		*2.0*	*2.0*	
Arrival type					*3*			*3*		*3*	*3*	
Unit Extension					*3.0*			*3.0*		*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*			*0*		*0*	*0*		*0*			
Lane Width					*12.0*			*12.0*		*12.0*	*12.0*	
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr					*0*			*0*		*0*	*0*	
Ped timing	*3.2*			*3.2*			*3.2*					

	WB Only	02	03	04	SB Only	NS Perm	07	08
Timing	G = *25.0*	G =	G =	G =	G = *15.0*	G = *105.0*	G =	G =
	Y = *5*	Y =	Y =	Y =	Y = *5*	Y = *5*	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *160.0*		

VOLUME ADJUSTMENT AND SATURATION FLOW RATE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Volume Adjustment

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume				*450*		*381*		*2133*	*419*	*448*	*2332*	
PHF				*0.90*		*0.90*		*0.90*	*0.90*	*0.90*	*0.90*	
Adj. Flow Rate				*500*		*423*		*2370*	*466*	*498*	*2591*	
Lane Group					*LR*			*TR*		*L*	*T*	
Adj. flow rate					*923*			*2836*		*498*	*2591*	
Prop. LT or RT		--		*0.542*	--	*0.458*	*0.000*	--	*0.164*	*0.000*	--	*0.000*

Saturation Flow Rate

Base satflow					*1900*			*1900*		*1900*	*1900*	
Num. of lanes	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*0*	*1*	*1*	*0*
fW					*1.000*			*1.000*		*1.000*	*1.000*	
fHV					*0.962*			*1.000*		*1.000*	*1.000*	
fg					*1.000*			*1.000*		*1.000*	*1.000*	
fp					*1.000*			*1.000*		*1.000*	*1.000*	
fbb					*1.000*			*1.000*		*1.000*	*1.000*	
fa					*1.00*			*1.00*		*1.00*	*1.00*	
fLU					*1.00*			*1.00*		*1.00*	*1.00*	
fLT			--		*0.974*	--		*1.000*	--	*0.950*	*1.000*	--
Secondary fLT			--			--			--	*0.036*		--
fRT	--			--	*0.938*		--	*0.978*		--	*1.000*	
fLpb			--		*1.000*	--		*1.000*	--	*1.000*	*1.000*	--
fRpb	--			--	*1.000*		--	*1.000*		--	*1.000*	
Adj. satflow					*1669*			*1858*		*1805*	*1900*	
Sec. adj. satflow			--			--			--	*69*		--

CAPACITY AND LOS WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Capacity Analysis

	EB			WB			NB			SB		
Lane group				*LR*			*TR*			*L*	*T*	
Adj. flow rate				*923*			*2836*			*498*	*2591*	
Satflow rate				*1669*			*1858*			*1805*	*1900*	
Lost time				*2.0*			*2.0*			*2.0*	*2.0*	
Green ratio				*0.16*			*0.66*			*0.78*	*0.78*	
Lane group cap.				*261*			*1219*			*216*	*1484*	
v/c ratio				*3.54*			*2.33*			*2.31*	*1.75*	
Flow ratio				*0.55*			*1.53*				*0.78*	
Crit. lane group		*N*		*Y*			*N*			*N*	*N*	
Sum flow ratios	*5.41*											
Lost time/cycle	*10.00*											
Critical v/c ratio	*5.78*											

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group				*LR*			*TR*			*L*	*T*	
Adj. flow rate				*923*			*2836*			*498*	*2591*	
Lane group cap.				*261*			*1219*			*216*	*1484*	
v/c ratio				*3.54*			*2.33*			*2.31*	*1.75*	
Green ratio				*0.16*			*0.66*			*0.78*	*0.78*	
Unif. delay d1				*67.5*			*27.5*			*58.0*	*17.5*	
Delay factor k				*0.50*			*0.50*			*0.50*	*0.50*	
Increm. delay d2				*1151*			*599.5*			*601.9*	*338.5*	
PF factor				*1.000*			*1.000*			*1.000*	*1.000*	
Control delay				*1218*			*627.0*			*659.9*	*356.0*	
Lane group LOS				*F*			*F*			*F*	*F*	
Apprch. delay				*1218*			*627.0*			*405.0*		
Approach LOS				*F*			*F*			*F*		
Intersec. delay	*606.6*			Intersection LOS						*F*		

SUPPLEMENTAL UNIFORM DELAY WORKSHEET FOR LEFT TURNS FROM EXCLUSIVE LANES WITH PROTECTED AND PERMITTED PHASES

General Information

Project Description *SR 247 - Spring Hill*

v/c Ratio Computation

	EB	WB	NB	SB
Cycle length, C (s)	*160.0*			
Prot. phase eff. green intvl, g (s)				*15.0*
Opposed queue eff. green intvl, g_q (s)				*63.47*
Unopposed green intvl, g_u (s)				*46.53*
Red time, r(s)				*35.0*
Arrival rate, q_a (veh/s)				*0.06*
Prot. phase departure rate, s_p (veh/s)				*0.501*
Perm. phase departure rate, s_s (veh/s)				*0.05*
X_{perm}				*3.13*
X_{prot} (N/A for lagging left-turns)				*0.40*
Uniform Queue Size and Delay Computations				
Queue at start of green arrow, Q_a				*6.59*
Queue at start of unsaturated green, Q_u				*3.81*
Residual queue, Q_r				*4.49*
Uniform delay, d_1				*58.0*

Uniform Queue Size and Delay Equations

	Case	Q_a	Q_u	Q_r	d_1
If X_{perm} <= 1.0 & X_{prot} <= 1.0	1	$q_a r$	$q_a g_q$	0	$[0.5/(q_a C)][r Q_a + Q_a^{2/(s_p - q_s)} + g_q Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} <= 1.0 & X_{prot} > 1.0	2	$q_a r$	$Q_r + q_a g_q$	$Q_a - g(s_p - q_a)$	$[0.5/(q_a C)][r Q_a + g(Q_a + Q_r) + g_q (Q_r + Q_u) + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 & X_{prot} <= 1.0	3	$Q_r + q_a r$	$q_a g_q$	$Q_u - g_u(s_s - q_a)$	$[0.5/(q_a C)][g_q Q_u + g_u(Q_a + Q_r) + r(Q_r + Q_a) + Q_a^{2/(s_p - q_a)}$
If X_{perm} <= 1.0 (lagging lefts)	4	0	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 (lagging lefts)	5	$Q_u - g_u(s_s - q_a)$	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + g_u(Q_u + Q_a) + Q_a^{2/(s_p - q_a)}$

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane group					*LR*			*TR*		*L*	*T*	
Init. queue/lane					*0.0*			*0.0*		*0.0*	*0.0*	
Flow rate/lane					*923*			*2836*		*498*	*2591*	
Satflow per lane					*1669*			*1858*		*277*	*1900*	
Capacity/lane					*261*			*1219*		*216*	*1484*	
Flow ratio					*0.55*			*1.53*		*1.80*	1.36	
v/c ratio					*3.54*			*2.33*		*2.31*	*1.75*	
I factor					*1.000*			*1.000*		*1.000*	*1.000*	
Arrival type					*3*			*3*		*3*	*3*	
Platoon ratio					*1.00*			*1.00*		*1.00*	*1.00*	
PF factor					*1.00*			*1.00*		*1.00*	*1.00*	
Q_1					*41.0*			*126.0*		*5.3*	*115.2*	
k_B					*0.7*			*2.0*		*0.6*	*2.3*	
Q_2					*83.7*			*205.5*		*36.3*	*143.5*	
Q avg.					*124.7*			*331.6*		*41.6*	*258.6*	
Percentile Back of Queue (95th percentile)												
$f_{B\%}$					*1.6*			*1.6*		*1.6*	*1.6*	
BOQ, $Q_{\%}$					*200*			*530*		*66.6*	*414*	
Queue Storage Ratio												
Q spacing					*25.0*			*25.0*		*25.0*	*25.0*	
Q storage					*0*			*0*		*0*	*0*	
Avg. R_Q												
95% $R_{Q\%}$												

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brian Gaffney*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*6/6/2006*
Analysis Time Period	*AM Existing*

Site Information

Intersection	*#2*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *MJ Bypass*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*74*	*237*	*132*	*171*	*562*	*144*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*82*	*263*	*146*	*190*	*624*	*160*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Undivided*					
RT Channelized?			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*1*	*0*
Configuration	*L*		*TR*	*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*172*	*28*	*149*	*97*	*85*	*62*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*191*	*31*	*165*	*107*	*94*	*68*
Proportion of heavy vehicles, P_{HV}	*5*	*5*	*5*	*5*	*5*	*5*
Percent grade (%)	*0*			*0*		
Flared approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*1*
Configuration	*LT*		*R*	*LT*		*R*

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*LT*		*R*	*LT*		*R*
Volume, v (vph)	*82*	*190*	*222*		*165*	*201*		*68*
Capacity, c_m (vph)	*826*	*1139*	*0*		*699*	*42*		*432*
v/c ratio	*0.10*	*0.17*			*0.24*	*4.79*		*0.16*
Queue length (95%)	*0.33*	*0.60*			*0.91*	*23.13*		*0.55*

Control Delay (s/veh)	*9.8*	*8.8*			*11.7*	*1897*		*14.9*
LOS	*A*	*A*	*F*		*B*	*F*		*B*
Approach delay (s/veh)	--	--				*1421*		
Approach LOS	--	--				*F*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brian Gaffney*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*6/6/2006*
Analysis Time Period	*PM Existing*

Site Information

Intersection	*#2*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *MJ Bypass*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*122*	*594*	*115*	*160*	*588*	*145*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*135*	*660*	*127*	*177*	*653*	*161*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Undivided*					
RT Channelized?			*0*			*0*
Lanes	*1*	*1*	*0*	*1*	*1*	*0*
Configuration	*L*		*TR*	*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*177*	*31*	*160*	*172*	*30*	*66*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*196*	*34*	*177*	*191*	*33*	*73*
Proportion of heavy vehicles, P_{HV}	*5*	*5*	*5*	*5*	*5*	*5*
Percent grade (%)	*0*			*0*		
Flared approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*1*
Configuration	*LT*		*R*	*LT*		*R*

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*	*LT*		*R*	*LT*		*R*
Volume, v (vph)	*135*	*177*	*230*		*177*	*224*		*73*
Capacity, c_m (vph)	*804*	*823*	*0*		*421*	*0*		*415*
v/c ratio	*0.17*	*0.22*			*0.42*			*0.18*
Queue length (95%)	*0.60*	*0.81*			*2.04*			*0.63*

Control Delay (s/veh)	*10.4*	*10.6*			*19.6*			*15.5*
LOS	*B*	*B*	*F*		*C*	*F*		*C*
Approach delay (s/veh)	--	--						
Approach LOS	--	--						

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brian Gaffney*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*12/6/2005*
Analysis Time Period	*AM Existing*

Site Information

Intersection	*#3*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *Wakefield Subdivision*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*24*	*237*	*444*	*289*	*554*	*25*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*26*	*263*	*493*	*321*	*615*	*27*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Undivided*					
RT Channelized?			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*0*
Configuration	*L*	*T*	*R*	*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*253*	*27*	*101*	*39*	*46*	*59*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*281*	*30*	*112*	*43*	*51*	*65*
Proportion of heavy vehicles, P_{HV}	*0*	*0*	*0*	*0*	*0*	*0*
Percent grade (%)		*0*			*0*	
Flared approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
Volume, v (vph)	*26*	*321*		*423*			*159*	
Capacity, c_m (vph)	*933*	*846*		*0*			*43*	
v/c ratio	*0.03*	*0.38*					*3.70*	
Queue length (95%)	*0.09*	*1.79*					*17.84*	

Control Delay (s/veh)	*9.0*	*11.8*					*1408*	
LOS	*A*	*B*		*F*			*F*	
Approach delay (s/veh)	--	--				*1408*		
Approach LOS	--	--				*F*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brian Gaffney*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*12/6/2005*
Analysis Time Period	*PM Existing*

Site Information

Intersection	*#3*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *Wakefield Subdivision*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*107*	*594*	*244*	*231*	*479*	*41*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*118*	*660*	*271*	*256*	*532*	*45*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Undivided*					
RT Channelized?			*0*			*0*
Lanes	*1*	*1*	*1*	*1*	*1*	*0*
Configuration	*L*	*T*	*R*	*L*		*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*337*	*77*	*231*	*43*	*100*	*88*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*374*	*85*	*256*	*47*	*111*	*97*
Proportion of heavy vehicles, P_{HV}	*0*	*0*	*0*	*0*	*0*	*0*
Percent grade (%)		*0*			*0*	
Flared approach		*N*			*N*	
Storage		*0*			*0*	
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*	*L*		*LTR*			*LTR*	
Volume, v (vph)	*118*	*256*		*715*			*255*	
Capacity, c_m (vph)	*987*	*727*		*0*			*0*	
v/c ratio	*0.12*	*0.35*						
Queue length (95%)	*0.41*	*1.59*						

Control Delay (s/veh)	*9.1*	*12.6*						
LOS	*A*	*B*		*F*			*F*	
Approach delay (s/veh)	--	--						
Approach LOS	--	--						

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brian Gaffney*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*12/6/2005*
Analysis Time Period	*AM Existing*

Site Information

Intersection	*#4*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *Port Royal Road*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*36*	*28*	*313*	*101*	*522*	*116*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*40*	*31*	*347*	*112*	*580*	*128*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Undivided*					
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*258*	*71*	*35*	*182*	*117*	*88*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*286*	*78*	*38*	*202*	*130*	*97*
Proportion of heavy vehicles, P_{HV}	*0*	*0*	*0*	*0*	*0*	*0*
Percent grade (%)	*0*			*0*		
Flared approach		*Y*			*N*	
Storage		*2*			*0*	
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration	*LT*		*R*		*LTR*	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*	*LT*		*R*		*LTR*	
Volume, v (vph)	*40*	*112*	*364*		*38*		*429*	
Capacity, c_m (vph)	*882*	*1170*	*0*		*842*		*109*	
v/c ratio	*0.05*	*0.10*			*0.05*		*3.94*	
Queue length (95%)	*0.14*	*0.32*			*0.14*		*43.68*	

Control Delay (s/veh)	*9.3*	*8.4*			*9.5*		*1402*	
LOS	*A*	*A*	*F*		*A*		*F*	
Approach delay (s/veh)	--	--					*1402*	
Approach LOS	--	--					*F*	

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brian Gaffney*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*12/6/2005*
Analysis Time Period	*PM Existing*

Site Information

Intersection	*#4*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *Port Royal Road*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*161*	*408*	*299*	*81*	*350*	*188*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*178*	*453*	*332*	*90*	*388*	*208*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Undivided*					
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*268*	*196*	*81*	*198*	*256*	*133*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*297*	*217*	*90*	*220*	*284*	*147*
Proportion of heavy vehicles, P_{HV}	*0*	*0*	*0*	*0*	*0*	*0*
Percent grade (%)	*0*			*0*		
Flared approach		*Y*			*N*	
Storage		*2*			*0*	
RT Channelized?			*1*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration	*LT*		*R*		*LTR*	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*	*LT*		*R*		*LTR*	
Volume, v (vph)	*178*	*90*	*514*		*90*		*651*	
Capacity, c_m (vph)	*971*	*825*	*0*		*492*		*0*	
v/c ratio	*0.18*	*0.11*			*0.18*			
Queue length (95%)	*0.67*	*0.37*			*0.66*			

Control Delay (s/veh)	*9.5*	*9.9*			*13.9*			
LOS	*A*	*A*	*F*		*B*		*F*	
Approach delay (s/veh)	--	--						
Approach LOS	--	--						

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brian Gaffney*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*12/6/2005*
Analysis Time Period	*AM Existing*

Site Information

Intersection	*#5*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *Hurt Road*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*48*	*197*	*313*	*101*	*655*	*52*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*53*	*218*	*0*	*0*	*727*	*57*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Undivided*					
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*258*	*71*	*35*	*73*	*117*	*84*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*0*	*0*	*0*	*81*	*0*	*93*
Proportion of heavy vehicles, P_{HV}	*0*	*0*	*0*	*0*	*0*	*0*
Percent grade (%)		*0*			*0*	
Flared approach		*Y*			*N*	
Storage		*2*			*0*	
RT Channelized?			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
Volume, v (vph)	*53*						*174*	
Capacity, c_m (vph)	*826*						*299*	
v/c ratio	*0.06*						*0.58*	
Queue length (95%)	*0.21*						*3.43*	

Control Delay (s/veh)	*9.7*						*32.5*	
LOS	*A*						*D*	
Approach delay (s/veh)	--	--				*32.5*		
Approach LOS	--	--				*D*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brian Gaffney*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*12/6/2005*
Analysis Time Period	*PM Existing*

Site Information

Intersection	*#5*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *Hurt Road*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*76*	*611*	*313*	*101*	*579*	*72*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*84*	*678*	*0*	*0*	*643*	*80*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Undivided*					
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LT*					*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*258*	*71*	*35*	*51*	*117*	*40*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*0*	*0*	*0*	*56*	*0*	*44*
Proportion of heavy vehicles, P_{HV}	*0*	*0*	*0*	*0*	*0*	*0*
Percent grade (%)		*0*			*0*	
Flared approach		*Y*			*N*	
Storage		*2*			*0*	
RT Channelized?			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LT*						*LR*	
Volume, v (vph)	*84*						*100*	
Capacity, c_m (vph)	*870*						*174*	
v/c ratio	*0.10*						*0.57*	
Queue length (95%)	*0.32*						*3.05*	

Control Delay (s/veh)	*9.6*						*50.4*	
LOS	*A*						*F*	
Approach delay (s/veh)	--	--				*50.4*		
Approach LOS	--	--				*F*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brian Gaffney*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*12/6/2005*
Analysis Time Period	*AM Existing*

Site Information

Intersection	*#6*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *Buckner Lane*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*198*	*21*	*51*	*67*	*271*	*239*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*220*	*23*	*56*	*74*	*301*	*265*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Undivided*					
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*99*	*158*	*60*	*170*	*55*	*337*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*110*	*175*	*66*	*188*	*61*	*374*
Proportion of heavy vehicles, P_{HV}	*0*	*0*	*0*	*0*	*0*	*0*
Percent grade (%)	*0*			*0*		
Flared approach		*N*			*N*	
Storage		*2*			*0*	
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
Volume, v (vph)	*220*	*74*		*351*			*623*	
Capacity, c_m (vph)	*996*	*1507*		*71*			*0*	
v/c ratio	*0.22*	*0.05*		*4.94*				
Queue length (95%)	*0.84*	*0.15*		*38.43*				

Control Delay (s/veh)	*9.6*	*7.5*		*1892*				
LOS	*A*	*A*		*F*			*F*	
Approach delay (s/veh)	--	--	*1892*					
Approach LOS	--	--	*F*					

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brian Gaffney*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*12/6/2005*
Analysis Time Period	*PM Existing*

Site Information

Intersection	*#6*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *Buckner Lane*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*118*	*195*	*349*	*72*	*385*	*170*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*131*	*216*	*387*	*80*	*427*	*188*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Undivided*					
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration	*LTR*			*LTR*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*56*	*178*	*71*	*235*	*199*	*210*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*62*	*197*	*78*	*261*	*221*	*233*
Proportion of heavy vehicles, P_{HV}	*0*	*0*	*0*	*0*	*0*	*0*
Percent grade (%)	*0*			*0*		
Flared approach		*N*			*N*	
Storage		*2*			*0*	
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*0*	*0*	*1*	*0*
Configuration		*LTR*			*LTR*	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*LTR*	*LTR*		*LTR*			*LTR*	
Volume, v (vph)	*131*	*80*		*337*			*715*	
Capacity, c_m (vph)	*955*	*965*		*0*			*0*	
v/c ratio	*0.14*	*0.08*						
Queue length (95%)	*0.47*	*0.27*						

Control Delay (s/veh)	*9.4*	*9.1*						
LOS	*A*	*A*		*F*			*F*	
Approach delay (s/veh)	--	--						
Approach LOS	--	--						

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brian Gaffney*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*12/6/2005*
Analysis Time Period	*AM Existing*

Site Information

Intersection	*#7*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *Ferguson Road*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*118*	*173*	*78*	*52*	*524*	*170*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*0*	*192*	*86*	*57*	*582*	*0*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Undivided*					
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*53*	*178*	*34*	*235*	*199*	*210*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*58*	*0*	*37*	*0*	*0*	*0*
Proportion of heavy vehicles, P_{HV}	*0*	*0*	*0*	*0*	*0*	*0*
Percent grade (%)		*0*			*0*	
Flared approach		*N*			*N*	
Storage		*2*			*0*	
RT Channelized?			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*	*L*		*R*			
Volume, v (vph)		*57*	*58*		*37*			
Capacity, c_m (vph)		*1273*	*303*		*855*			
v/c ratio		*0.04*	*0.19*		*0.04*			
Queue length (95%)		*0.14*	*0.69*		*0.14*			

Control Delay (s/veh)		*8.0*	*19.7*		*9.4*			
LOS		*A*	*C*		*A*			
Approach delay (s/veh)	--	--	*15.7*					
Approach LOS	--	--	*C*					

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brian Gaffney*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*12/6/2005*
Analysis Time Period	*PM Existing*

Site Information

Intersection	*#7*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *Ferguson Road*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*118*	*448*	*53*	*34*	*549*	*170*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*0*	*497*	*58*	*37*	*610*	*0*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Undivided*					
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*78*	*178*	*52*	*235*	*199*	*210*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*86*	*0*	*57*	*0*	*0*	*0*
Proportion of heavy vehicles, P_{HV}	*0*	*0*	*0*	*0*	*0*	*0*
Percent grade (%)		*0*			*0*	
Flared approach		*N*			*N*	
Storage		*2*			*0*	
RT Channelized?			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*	*L*		*R*			
Volume, v (vph)		*37*	*86*		*57*			
Capacity, c_m (vph)		*1005*	*204*		*577*			
v/c ratio		*0.04*	*0.42*		*0.10*			
Queue length (95%)		*0.11*	*1.93*		*0.33*			

Control Delay (s/veh)		*8.7*	*34.9*		*11.9*			
LOS		*A*	*D*		*B*			
Approach delay (s/veh)	--	--	*25.8*					
Approach LOS	--	--	*D*					

EXISTING SYSTEM (ROADWAY SEGMENTS)

N

MAIN STREET (US-31)

OLD KEDRON ROAD BYPASS

WAKEFIELD SUBDIVISION

PORT ROYAL ROAD

HURT ROAD

BUCKNER LANE

I-65

LOS D (LOS D)

LOS D (LOS E)

LOS C (LOS D)

LOS C (LOS D)

LOS C (LOS D)

LOS C (LOS D)

DUPLEX ROAD (STATE ROUTE 247)

MAIN STREET (US-31)

TO SATURN PKWY

TO SATURN PKWY

WILLIAMS PARK SUBDIVISION

PORT ROYAL RD

TO SATURN PKWY

BUCKNER LANE

FERGUSON ROAD

I-65

SEGMENT LOS (EXIST.)

STATE ROUTE 247
(DUPLEX ROAD)
SPRING HILL, TENNESSEE
MAURY & WILLIAMSON
COUNTIES

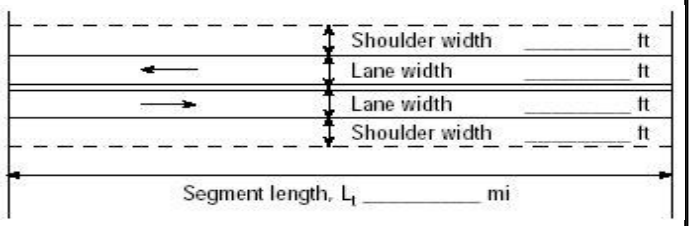
2010
(2030)

N.T.S.

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brian Gaffney	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Main St / Bypass
Date Performed	6/6/06	Jurisdiction	Maury County
Analysis Time Period	Existing	Analysis Year	2010

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	873 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	10

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	978
v_p * highest directional split proportion[2] (pc/h)	538

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	mi/h	Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Observed volume, V_f	veh/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	4.7 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	37.8 mi/h	Adj. for access points, f_A (Exhibit 20-6)	2.5 mi/h
		Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	37.8 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	2.6
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	27.6

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	974
v_p * highest directional split proportion[2] (pc/h)	536
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	57.5
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	12.9
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	70.4

Level of Service and Other Performance Measures

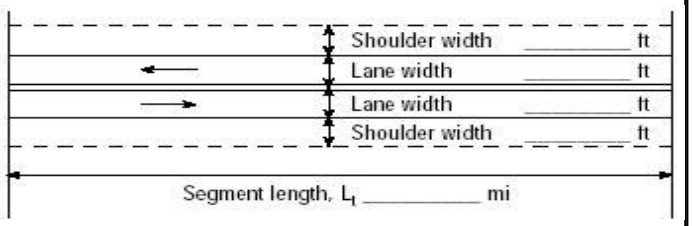
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.31
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	97
	349

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	3.5
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brian Gaffney	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Main St / Bypass
Date Performed	6/6/06	Jurisdiction	Maury County
Analysis Time Period	Existing	Analysis Year	2030

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1571 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	10

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1753
v_p * highest directional split proportion[2] (pc/h)	964

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	4.7 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	2.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	37.8 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	37.8 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	1.3
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	22.8

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1746
v_p * highest directional split proportion[2] (pc/h)	960
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	78.4
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	5.9
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	84.3

Level of Service and Other Performance Measures

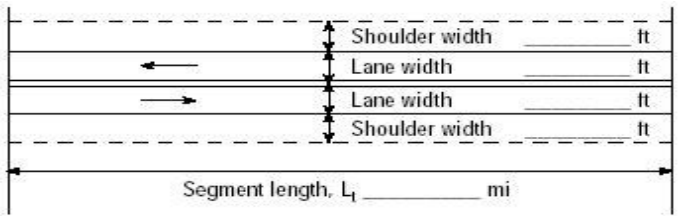
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.55
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	166
	597

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	7.3
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brian Gaffney	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Bypass / Wakefield Subdivisio
Date Performed	6/6/06	Jurisdiction	Maury County
Analysis Time Period	Existing	Analysis Year	2010

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	950 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	10

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1064
v_p * highest directional split proportion[2] (pc/h)	585

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	4.7 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	2.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	37.8 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	37.8 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	2.4
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	27.1

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1060
v_p * highest directional split proportion[2] (pc/h)	583
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	60.6
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	11.9
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	72.5

Level of Service and Other Performance Measures

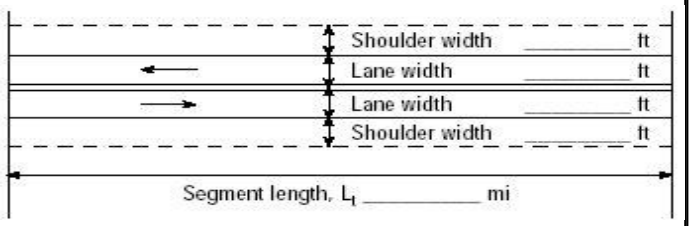
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.33
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	211
	760

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	7.8
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brian Gaffney	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Bypass / Wakefield Subdivisio
Date Performed	6/6/06	Jurisdiction	Maury County
Analysis Time Period	Existing	Analysis Year	2030

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1710 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	10

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1908
v_p * highest directional split proportion[2] (pc/h)	1049

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	4.7 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	2.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	37.8 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	37.8 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	1.2
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	21.8

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1900
v_p * highest directional split proportion[2] (pc/h)	1045
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	81.2
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	5.0
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	86.1

Level of Service and Other Performance Measures

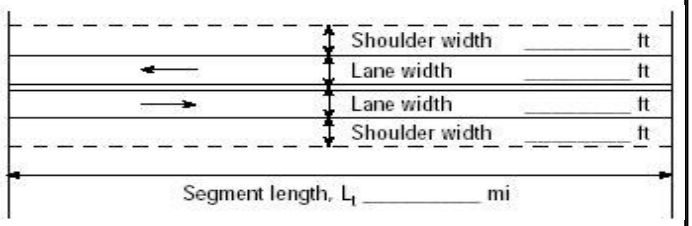
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	E
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.60
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	380
	1368

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	17.4
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brian Gaffney	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Wakefield Subd / Port Royal Rd
Date Performed	12/6/2005	Jurisdiction	Williamson County
Analysis Time Period	Existing	Analysis Year	2010

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	796 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	6

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	892
v_p * highest directional split proportion[2] (pc/h)	491

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	mi/h	Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Observed volume, V_f	veh/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	4.7 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	38.8 mi/h	Adj. for access points, f_A (Exhibit 20-6)	1.5 mi/h
		Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	38.8 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	2.8
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	29.1

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	888
v_p * highest directional split proportion[2] (pc/h)	488
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	54.2
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	13.9
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	68.1

Level of Service and Other Performance Measures

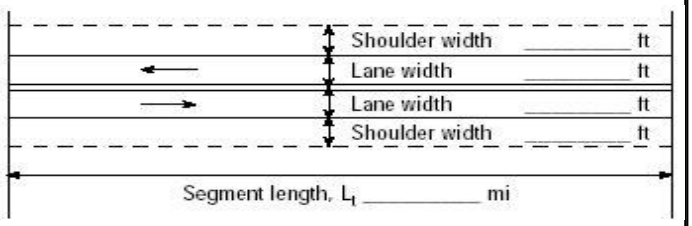
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.28
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	111
	398

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	3.8
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brian Gaffney	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Wakefield Subd / Port Royal Rd
Date Performed	12/6/2005	Jurisdiction	Williamson County
Analysis Time Period	Existing	Analysis Year	2030

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1432 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	6

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1597
v_p * highest directional split proportion[2] (pc/h)	878

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	mi/h	Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Observed volume, V_f	veh/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	4.7 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	38.8 mi/h	Adj. for access points, f_A (Exhibit 20-6)	1.5 mi/h
		Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	38.8 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	1.5
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	24.9

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1591
v_p * highest directional split proportion[2] (pc/h)	875
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	75.3
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	6.8
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	82.1

Level of Service and Other Performance Measures

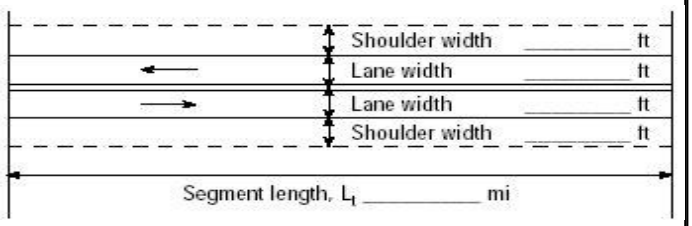
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.50
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	199
	716

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	8.0
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brian Gaffney	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Port Royal Rd / Hurt Rd
Date Performed	12/6/2005	Jurisdiction	Williamson County
Analysis Time Period	Existing	Analysis Year	2010

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	637 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	3 %
% Recreational vehicles, P_R	0%
Access points/ mi	14

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.994
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	712
v_p * highest directional split proportion[2] (pc/h)	392

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	5.3 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	3.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	36.2 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	36.2 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	3.4
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	27.3

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	710
v_p * highest directional split proportion[2] (pc/h)	391
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	46.4
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	17.5
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	63.9

Level of Service and Other Performance Measures

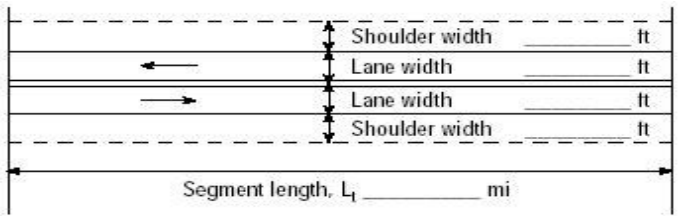
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.22
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	108
	389

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	4.0
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brian Gaffney	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Port Royal Rd / Hurt Rd
Date Performed	12/6/2005	Jurisdiction	Williamson County
Analysis Time Period	Existing	Analysis Year	2030

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1145 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	3 %
% Recreational vehicles, P_R	0%
Access points/ mi	14

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1276
v_p * highest directional split proportion[2] (pc/h)	702

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	5.3 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	3.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	36.2 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	36.2 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	1.9
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	24.4

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1272
v_p * highest directional split proportion[2] (pc/h)	700
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	67.3
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	9.5
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	76.8

Level of Service and Other Performance Measures

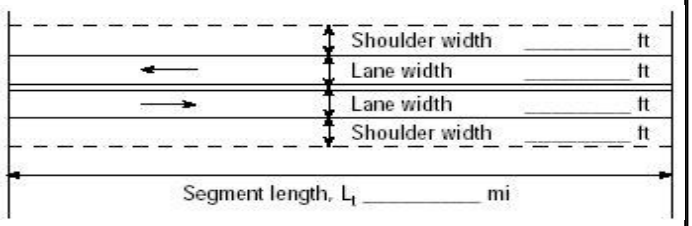
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.40
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	194
	698

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	8.0
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brian Gaffney	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Hurt Rd / Buckner Lane
Date Performed	12/6/2005	Jurisdiction	Williamson County
Analysis Time Period	Existing	Analysis Year	2010

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	637 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	3 %
% Recreational vehicles, P_R	0%
Access points/ mi	6

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.994
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	712
v_p * highest directional split proportion[2] (pc/h)	392

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	mi/h	Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Observed volume, V_f	veh/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	5.3 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	38.2 mi/h	Adj. for access points, f_A (Exhibit 20-6)	1.5 mi/h
		Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	38.2 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	3.4
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	29.3

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	710
v_p * highest directional split proportion[2] (pc/h)	391
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	46.4
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	17.5
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	63.9

Level of Service and Other Performance Measures

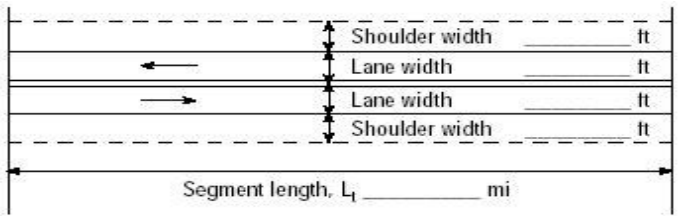
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.22
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	71
	255

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	2.4
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brian Gaffney	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Hurt Rd / Buckner Lane
Date Performed	12/6/2005	Jurisdiction	Williamson County
Analysis Time Period	Existing	Analysis Year	2030

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1145 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	3 %
% Recreational vehicles, P_R	0%
Access points/ mi	6

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1276
v_p * highest directional split proportion[2] (pc/h)	702

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	5.3 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	1.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	38.2 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	38.2 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	1.9
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	26.4

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1272
v_p * highest directional split proportion[2] (pc/h)	700
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	67.3
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	9.5
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	76.8

Level of Service and Other Performance Measures

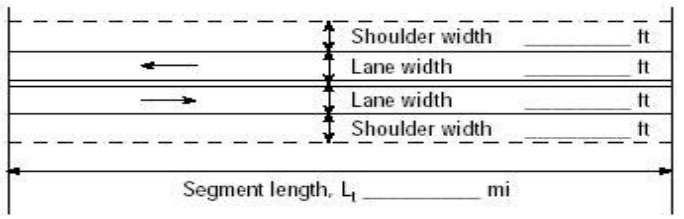
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.40
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	127
	458

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	4.8
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brian Gaffney	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Buckner Lane / Ferguson Rd
Date Performed	12/6/2005	Jurisdiction	Williamson County
Analysis Time Period	Existing	Analysis Year	2010

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	544 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	4

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	609
v_p * highest directional split proportion[2] (pc/h)	335

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	5.3 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	1.0 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	38.7 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	38.7 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	3.9
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	30.1

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	607
v_p * highest directional split proportion[2] (pc/h)	334
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	41.3
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	20.4
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	61.7

Level of Service and Other Performance Measures

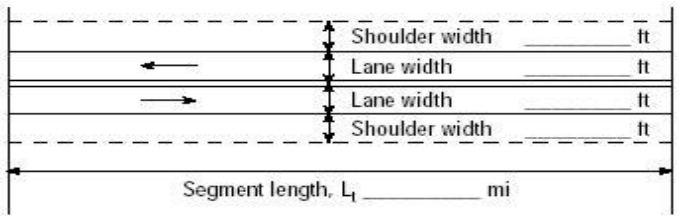
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.19
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	121
	435

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	4.0
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brian Gaffney	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Buckner Lane / Ferguson Rd
Date Performed	12/6/2005	Jurisdiction	Williamson County
Analysis Time Period	Existing	Analysis Year	2030

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	978 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	4

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1095
v_p * highest directional split proportion[2] (pc/h)	602

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	5.3 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	1.0 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	38.7 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	38.7 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	2.4
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	27.8

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1091
v_p * highest directional split proportion[2] (pc/h)	600
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	61.7
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	11.6
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	73.2

Level of Service and Other Performance Measures

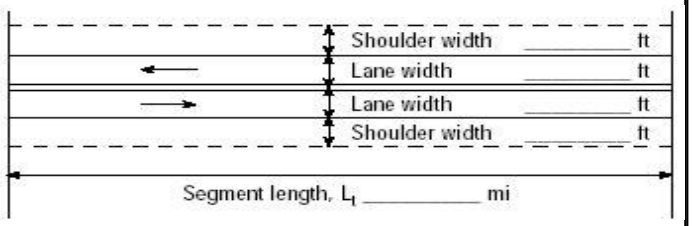
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.34
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	217
	782

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	7.8
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brian Gaffney	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Ferguson Rd / I-65
Date Performed	12/6/2005	Jurisdiction	Williamson County
Analysis Time Period	Existing	Analysis Year	2010

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	519 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	10

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.7
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.973
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	593
v_p * highest directional split proportion[2] (pc/h)	326

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
Field Measured speed, S_{FM}	mi/h	Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Observed volume, V_f	veh/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	5.3 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	37.2 mi/h	Adj. for access points, f_A (Exhibit 20-6)	2.5 mi/h
		Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	37.2 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	3.9
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	28.7

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	579
v_p * highest directional split proportion[2] (pc/h)	318
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	39.9
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	20.9
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	60.8

Level of Service and Other Performance Measures

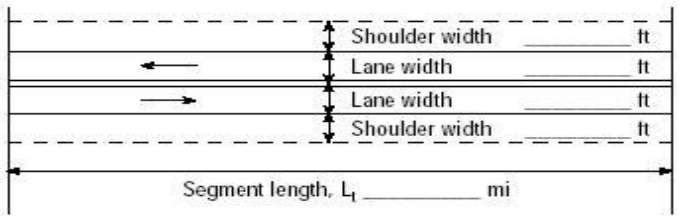
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.19
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	29
	104

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	1.0
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brian Gaffney	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Ferguson Rd / I-65
Date Performed	12/6/2005	Jurisdiction	Williamson County
Analysis Time Period	Existing	Analysis Year	2030

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	933 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	10

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1045
v_p * highest directional split proportion[2] (pc/h)	575

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	5.3 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	2.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	37.2 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	37.2 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	2.5
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	26.6

Percent Time-Spent-Following

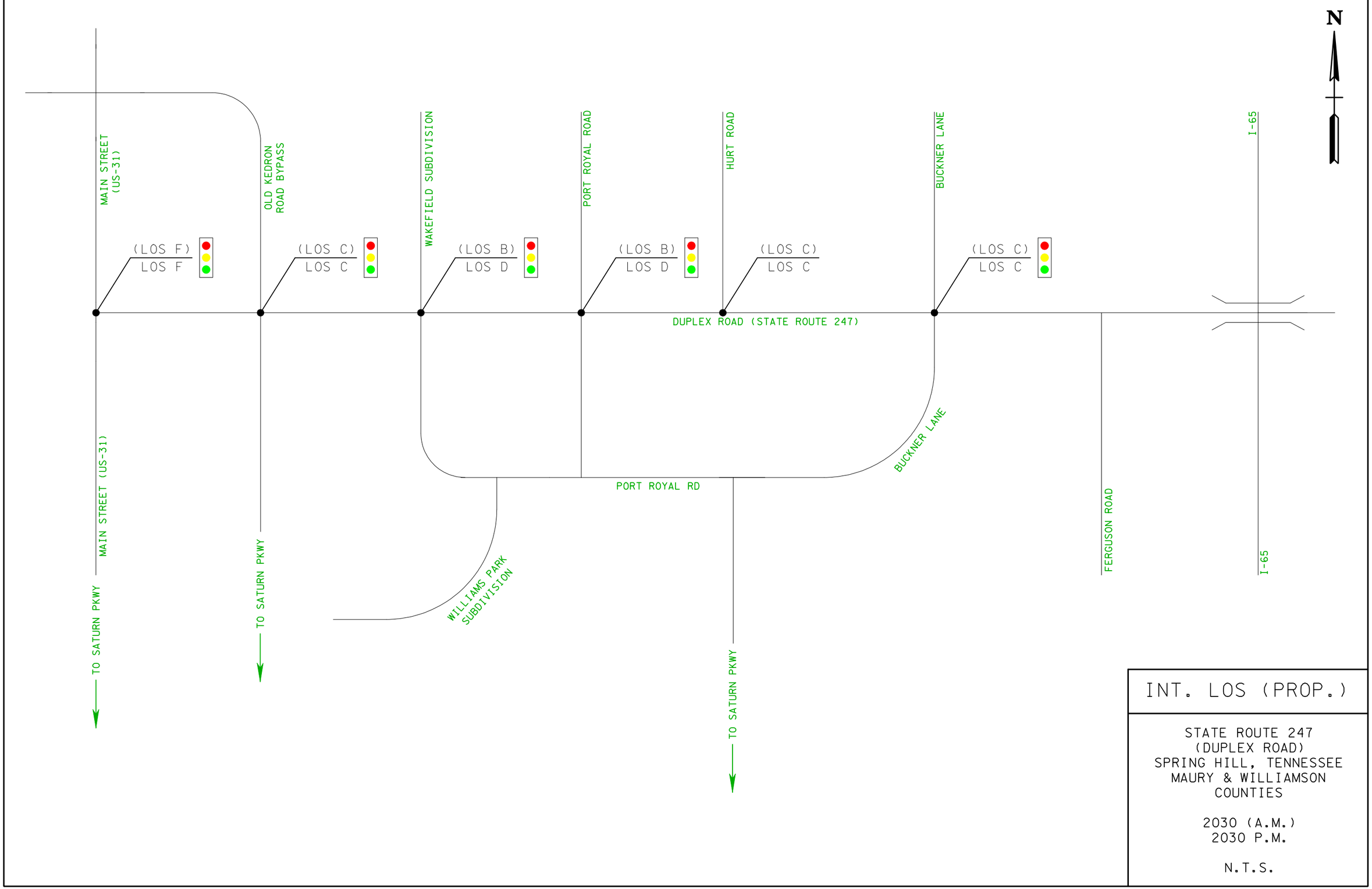
Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1041
v_p * highest directional split proportion[2] (pc/h)	573
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	59.9
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	12.1
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	72.1

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.33
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	52
	187

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	2.0
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

PROPOSED SYSTEM (INTERSECTIONS)



INT. LOS (PROP.)

STATE ROUTE 247
(DUPLEX ROAD)
SPRING HILL, TENNESSEE
MAURY & WILLIAMSON
COUNTIES

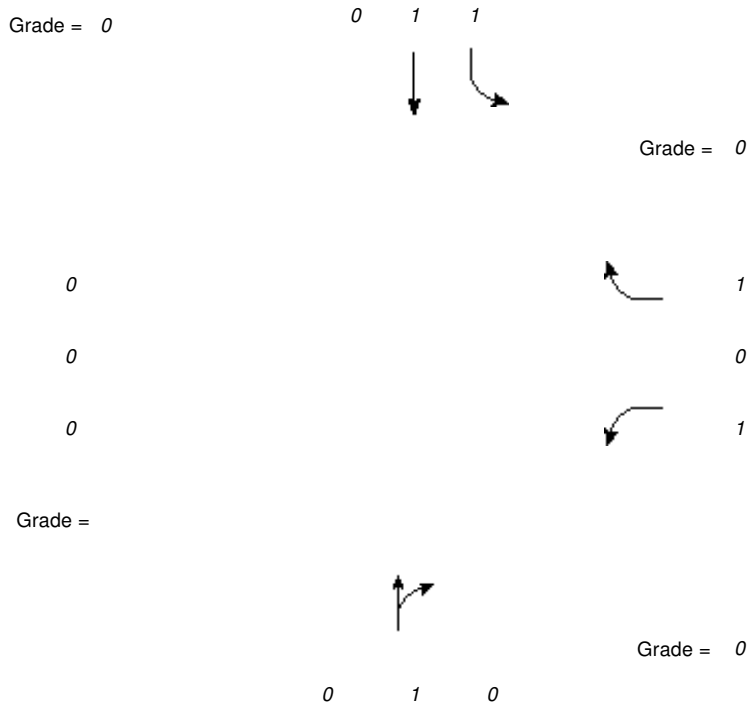
2030 (A.M.)
2030 P.M.

N.T.S.

LONG REPORT

General Information		Site Information	
Analyst	*Brady Griggs*	Intersection	*#1*
Agency or Co.	*Clinard Engineering Associates*	Area Type	*All other areas*
Date Performed	*2/9/06*	Jurisdiction	*Maury County*
Time Period	*AM Proposed*	Analysis Year	*2030*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)				*456*		*410*		*1460*	*427*	*278*	*1070*	
% Heavy veh				*4*		*4*		*0*	*0*	*0*	*0*	
PHF				*0.90*		*0.90*		*0.90*	*0.90*	*0.90*	*0.90*	
Actuated (P/A)				*P*		*P*		*P*	*P*	*P*	*P*	
Startup lost time				*2.0*		*2.0*		*2.0*		*2.0*	*2.0*	
Ext. eff. green				*2.0*		*2.0*		*2.0*		*2.0*	*2.0*	
Arrival type				*3*		*3*		*3*		*3*	*3*	
Unit Extension				*3.0*		*3.0*		*3.0*		*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*			*0*		*0*	*0*		*0*			
Lane Width				*12.0*		*12.0*		*12.0*		*12.0*	*12.0*	
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr				*0*		*0*		*0*		*0*	*0*	
Ped timing	*3.2*			*3.2*			*3.2*					

	WB Only	02	03	04	SB Only	NS Perm	07	08
Timing	G = *17.9*	G =	G =	G =	G = *13.7*	G = *88.4*	G =	G =
	Y = *5*	Y =	Y =	Y =	Y = *5*	Y = *5*	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *135.0*		

VOLUME ADJUSTMENT AND SATURATION FLOW RATE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Volume Adjustment

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume				*456*		*410*		*1460*	*427*	*278*	*1070*	
PHF				*0.90*		*0.90*		*0.90*	*0.90*	*0.90*	*0.90*	
Adj. Flow Rate				*507*		*456*		*1622*	*474*	*309*	*1189*	
Lane Group				*L*		*R*		*TR*		*L*	*T*	
Adj. flow rate				*507*		*456*		*2096*		*309*	*1189*	
Prop. LT or RT		--			--		*0.000*	--	*0.226*	*0.000*	--	*0.000*

Saturation Flow Rate

Base satflow				*1900*		*1900*		*1900*		*1900*	*1900*	
Num. of lanes	*0*	*0*	*0*	*1*	*0*	*1*	*0*	*1*	*0*	*1*	*1*	*0*
fW				*1.000*		*1.000*		*1.000*		*1.000*	*1.000*	
fHV				*0.962*		*0.962*		*1.000*		*1.000*	*1.000*	
fg				*1.000*		*1.000*		*1.000*		*1.000*	*1.000*	
fp				*1.000*		*1.000*		*1.000*		*1.000*	*1.000*	
fbb				*1.000*		*1.000*		*1.000*		*1.000*	*1.000*	
fa				*1.00*		*1.00*		*1.00*		*1.00*	*1.00*	
fLU				*1.00*		*1.00*		*1.00*		*1.00*	*1.00*	
fLT			--	*0.950*		--		*1.000*	--	*0.950*	*1.000*	--
Secondary fLT			--			--			--	*0.055*		--
fRT	--			--		*0.850*	--	*0.969*		--	*1.000*	
fLpb			--	*1.000*		--		*1.000*	--	*1.000*	*1.000*	--
fRpb	--			--		*1.000*	--	*1.000*		--	*1.000*	
Adj. satflow				*1736*		*1553*		*1842*		*1805*	*1900*	
Sec. adj. satflow			--			--			--	*104*		--

CAPACITY AND LOS WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Capacity Analysis

	EB			WB			NB			SB		
Lane group				*L*		*R*		*TR*		*L*	*T*	
Adj. flow rate				*507*		*456*		*2096*		*309*	*1189*	
Satflow rate				*1736*		*1553*		*1842*		*1805*	*1900*	
Lost time				*2.0*		*2.0*		*2.0*		*2.0*	*2.0*	
Green ratio				*0.13*		*0.27*		*0.65*		*0.79*	*0.79*	
Lane group cap.				*230*		*421*		*1206*		*255*	*1507*	
v/c ratio				*2.20*		*1.08*		*1.74*		*1.21*	*0.79*	
Flow ratio				*0.29*		*0.29*		*1.14*			*0.63*	
Crit. lane group		*N*		*Y*	*N*	*N*		*N*		*N*	*N*	
Sum flow ratios	*1.60*											
Lost time/cycle	*10.00*											
Critical v/c ratio	*1.73*											

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group				*L*		*R*		*TR*		*L*	*T*	
Adj. flow rate				*507*		*456*		*2096*		*309*	*1189*	
Lane group cap.				*230*		*421*		*1206*		*255*	*1507*	
v/c ratio				*2.20*		*1.08*		*1.74*		*1.21*	*0.79*	
Green ratio				*0.13*		*0.27*		*0.65*		*0.79*	*0.79*	
Unif. delay d1				*58.5*		*49.2*		*23.3*		*43.9*	*7.7*	
Delay factor k				*0.50*		*0.50*		*0.50*		*0.50*	*0.50*	
Increm. delay d2				*555.9*		*68.0*		*335.6*		*125.9*	*4.3*	
PF factor				*1.000*		*1.000*		*1.000*		*1.000*	*1.000*	
Control delay				*614.5*		*117.2*		*358.9*		*169.8*	*12.0*	
Lane group LOS				*F*		*F*		*F*		*F*	*B*	
Apprch. delay				*379.0*			*358.9*			*44.5*		
Approach LOS				*F*			*F*			*D*		
Intersec. delay	*259.8*			Intersection LOS						*F*		

SUPPLEMENTAL UNIFORM DELAY WORKSHEET FOR LEFT TURNS FROM EXCLUSIVE LANES WITH PROTECTED AND PERMITTED PHASES

General Information

Project Description *SR 247 - Spring Hill*

v/c Ratio Computation

	EB	WB	NB	SB
Cycle length, C (s)	*135.0*			
Prot. phase eff. green intvl, g (s)				*13.7*
Opposed queue eff. green intvl, g_q (s)				*44.48*
Unopposed green intvl, g_u (s)				*48.92*
Red time, r(s)				*27.9*
Arrival rate, q_a (veh/s)				*0.07*
Prot. phase departure rate, s_p (veh/s)				*0.501*
Perm. phase departure rate, s_s (veh/s)				*0.06*
X_{perm}				*2.45*
X_{prot} (N/A for lagging left-turns)				*0.43*
Uniform Queue Size and Delay Computations				
Queue at start of green arrow, Q_a				*5.89*
Queue at start of unsaturated green, Q_u				*3.15*
Residual queue, Q_r				*3.92*
Uniform delay, d_1				*43.9*

Uniform Queue Size and Delay Equations

	Case	Q_a	Q_u	Q_r	d_1
If X_{perm} <= 1.0 & X_{prot} <= 1.0	1	$q_a r$	$q_a g_q$	0	$[0.5/(q_a C)][r Q_a + Q_a^{2/(s_p - q_s)} + g_q Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} <= 1.0 & X_{prot} > 1.0	2	$q_a r$	$Q_r + q_a g_q$	$Q_a - g(s_p - q_a)$	$[0.5/(q_a C)][r Q_a + g(Q_a + Q_r) + g_q (Q_r + Q_u) + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 & X_{prot} <= 1.0	3	$Q_r + q_a r$	$q_a g_q$	$Q_u - g_u(s_s - q_a)$	$[0.5/(q_a C)][g_q Q_u + g_u(Q_a + Q_r) + r(Q_r + Q_a) + Q_a^{2/(s_p - q_a)}$
If X_{perm} <= 1.0 (lagging lefts)	4	0	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 (lagging lefts)	5	$Q_u - g_u(s_s - q_a)$	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + g_u(Q_u + Q_a) + Q_a^{2/(s_p - q_a)}$

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

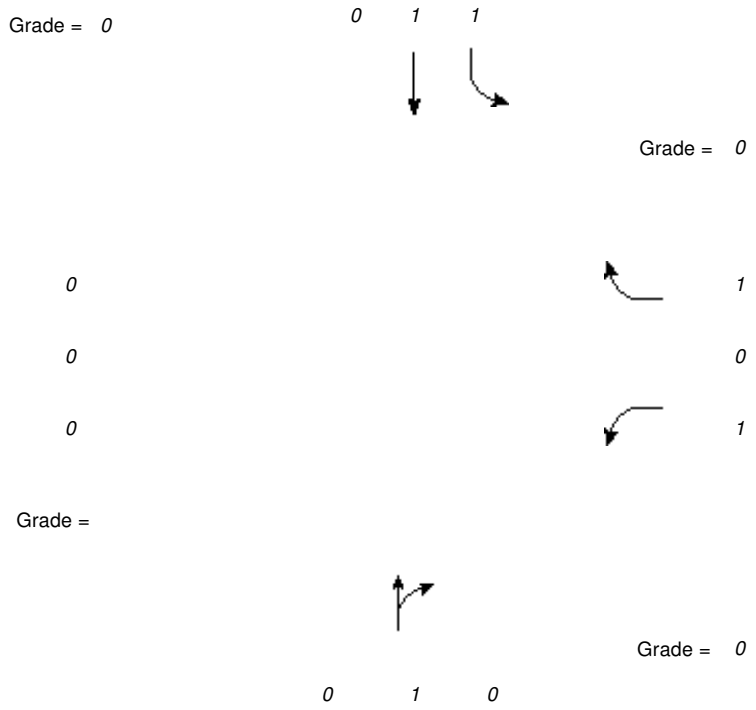
Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane group				*L*		*R*		*TR*		*L*	*T*	
Init. queue/lane				*0.0*		*0.0*		*0.0*		*0.0*	*0.0*	
Flow rate/lane				*507*		*456*		*2096*		*309*	*1189*	
Satflow per lane				*1736*		*1553*		*1842*		*322*	*1900*	
Capacity/lane				*230*		*421*		*1206*		*255*	*1507*	
Flow ratio				*0.29*		*0.29*		*1.14*		*0.96*	0.63	
v/c ratio				*2.20*		*1.08*		*1.74*		*1.21*	*0.79*	
I factor				*1.000*	*1.000*	*1.000*		*1.000*		*1.000*	*1.000*	
Arrival type				*3*		*3*		*3*		*3*	*3*	
Platoon ratio				*1.00*		*1.00*		*1.00*		*1.00*	*1.00*	
PF factor				*1.00*		*1.00*		*1.00*		*1.00*	*1.00*	
Q_1				*19.0*		*17.1*		*78.6*		*2.7*	*24.6*	
k_B				*0.5*		*0.8*		*1.7*		*0.6*	*2.0*	
Q_2				*35.6*		*9.4*		*115.2*		*9.2*	*6.5*	
Q avg.				*54.6*		*26.5*		*193.8*		*11.9*	*31.1*	
Percentile Back of Queue (95th percentile)												
$f_{B\%}$				*1.6*		*1.6*		*1.6*		*1.7*	*1.6*	
BOQ, $Q_{\%}$				*87.4*		*42.5*		*310*		*20.1*	*49.9*	
Queue Storage Ratio												
Q spacing				*25.0*		*25.0*		*25.0*		*25.0*	*25.0*	
Q storage				*0*		*0*		*0*		*0*	*0*	
Avg. R_Q												
95% $R_{Q\%}$												

LONG REPORT

General Information		Site Information	
Analyst	*Brady Griggs*	Intersection	*#1*
Agency or Co.	*Clinard Engineering Associates*	Area Type	*All other areas*
Date Performed	*2/9/06*	Jurisdiction	*Maury County*
Time Period	*PM Proposed*	Analysis Year	*2030*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)				*489*		*415*		*2137*	*456*	*489*	*1961*	
% Heavy veh				*4*		*4*		*0*	*0*	*0*	*0*	
PHF				*0.90*		*0.90*		*0.90*	*0.90*	*0.90*	*0.90*	
Actuated (P/A)				*P*		*P*		*P*	*P*	*P*	*P*	
Startup lost time				*2.0*		*2.0*		*2.0*		*2.0*	*2.0*	
Ext. eff. green				*2.0*		*2.0*		*2.0*		*2.0*	*2.0*	
Arrival type				*3*		*3*		*3*		*3*	*3*	
Unit Extension				*3.0*		*3.0*		*3.0*		*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*			*0*		*0*	*0*		*0*			
Lane Width				*12.0*		*12.0*		*12.0*		*12.0*	*12.0*	
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr				*0*		*0*		*0*		*0*	*0*	
Ped timing	*3.2*			*3.2*			*3.2*					

	WB Only	02	03	04	SB Only	NS Perm	07	08
Timing	G = *18.2*	G =	G =	G =	G = *9.5*	G = *92.3*	G =	G =
	Y = *5*	Y =	Y =	Y =	Y = *5*	Y = *5*	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *135.0*		

VOLUME ADJUSTMENT AND SATURATION FLOW RATE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Volume Adjustment

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume				*489*		*415*		*2137*	*456*	*489*	*1961*	
PHF				*0.90*		*0.90*		*0.90*	*0.90*	*0.90*	*0.90*	
Adj. Flow Rate				*543*		*461*		*2374*	*507*	*543*	*2179*	
Lane Group				*L*		*R*		*TR*		*L*	*T*	
Adj. flow rate				*543*		*461*		*2881*		*543*	*2179*	
Prop. LT or RT		--			--		*0.000*	--	*0.176*	*0.000*	--	*0.000*

Saturation Flow Rate

Base satflow				*1900*		*1900*		*1900*		*1900*	*1900*	
Num. of lanes	*0*	*0*	*0*	*1*	*0*	*1*	*0*	*1*	*0*	*1*	*1*	*0*
fW				*1.000*		*1.000*		*1.000*		*1.000*	*1.000*	
fHV				*0.962*		*0.962*		*1.000*		*1.000*	*1.000*	
fg				*1.000*		*1.000*		*1.000*		*1.000*	*1.000*	
fp				*1.000*		*1.000*		*1.000*		*1.000*	*1.000*	
fbb				*1.000*		*1.000*		*1.000*		*1.000*	*1.000*	
fa				*1.00*		*1.00*		*1.00*		*1.00*	*1.00*	
fLU				*1.00*		*1.00*		*1.00*		*1.00*	*1.00*	
fLT			--	*0.950*		--		*1.000*	--	*0.950*	*1.000*	--
Secondary fLT			--			--			--	*0.041*		--
fRT	--			--		*0.850*	--	*0.976*		--	*1.000*	
fLpb			--	*1.000*		--		*1.000*	--	*1.000*	*1.000*	--
fRpb	--			--		*1.000*	--	*1.000*		--	*1.000*	
Adj. satflow				*1736*		*1553*		*1855*		*1805*	*1900*	
Sec. adj. satflow			--			--			--	*78*		--

CAPACITY AND LOS WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Capacity Analysis

	EB			WB			NB			SB		
Lane group				*L*		*R*		*TR*		*L*	*T*	
Adj. flow rate				*543*		*461*		*2881*		*543*	*2179*	
Satflow rate				*1736*		*1553*		*1855*		*1805*	*1900*	
Lost time				*2.0*		*2.0*		*2.0*		*2.0*	*2.0*	
Green ratio				*0.13*		*0.24*		*0.68*		*0.79*	*0.79*	
Lane group cap.				*234*		*376*		*1268*		*183*	*1503*	
v/c ratio				*2.32*		*1.23*		*2.27*		*2.97*	*1.45*	
Flow ratio				*0.31*		*0.30*		*1.55*			*0.79*	
Crit. lane group		*N*		*Y*	*N*	*N*		*N*		*N*	*N*	
Sum flow ratios	*5.72*											
Lost time/cycle	*10.00*											
Critical v/c ratio	*6.17*											

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group				*L*		*R*		*TR*		*L*	*T*	
Adj. flow rate				*543*		*461*		*2881*		*543*	*2179*	
Lane group cap.				*234*		*376*		*1268*		*183*	*1503*	
v/c ratio				*2.32*		*1.23*		*2.27*		*2.97*	*1.45*	
Green ratio				*0.13*		*0.24*		*0.68*		*0.79*	*0.79*	
Unif. delay d1				*58.4*		*51.1*		*21.3*		*45.6*	*14.1*	
Delay factor k				*0.50*		*0.50*		*0.50*		*0.50*	*0.50*	
Increm. delay d2				*607.5*		*123.2*		*575.0*		*899.8*	*206.2*	
PF factor				*1.000*		*1.000*		*1.000*		*1.000*	*1.000*	
Control delay				*665.9*		*174.3*		*596.3*		*945.5*	*220.3*	
Lane group LOS				*F*		*F*		*F*		*F*	*F*	
Apprch. delay				*440.2*			*596.3*			*364.9*		
Approach LOS				*F*			*F*			*F*		
Intersec. delay	*477.3*			Intersection LOS						*F*		

SUPPLEMENTAL UNIFORM DELAY WORKSHEET FOR LEFT TURNS FROM EXCLUSIVE LANES WITH PROTECTED AND PERMITTED PHASES

General Information

Project Description *SR 247 - Spring Hill*

v/c Ratio Computation

	EB	WB	NB	SB
Cycle length, C (s)	*135.0*			
Prot. phase eff. green intvl, g (s)				*9.5*
Opposed queue eff. green intvl, g_q (s)				*51.66*
Unopposed green intvl, g_u (s)				*45.64*
Red time, r(s)				*28.2*
Arrival rate, q_a (veh/s)				*0.05*
Prot. phase departure rate, s_p (veh/s)				*0.501*
Perm. phase departure rate, s_s (veh/s)				*0.05*
X_{perm}				*2.35*
X_{prot} (N/A for lagging left-turns)				*0.40*
Uniform Queue Size and Delay Computations				
Queue at start of green arrow, Q_a				*4.27*
Queue at start of unsaturated green, Q_u				*2.63*
Residual queue, Q_r				*2.84*
Uniform delay, d_1				*45.6*

Uniform Queue Size and Delay Equations

	Case	Q_a	Q_u	Q_r	d_1
If X_{perm} <= 1.0 & X_{prot} <= 1.0	1	$q_a r$	$q_a g_q$	0	$[0.5/(q_a C)][r Q_a + Q_a^{2/(s_p - q_s)} + g_q Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} <= 1.0 & X_{prot} > 1.0	2	$q_a r$	$Q_r + q_a g_q$	$Q_a - g(s_p - q_a)$	$[0.5/(q_a C)][r Q_a + g(Q_a + Q_r) + g_q (Q_r + Q_u) + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 & X_{prot} <= 1.0	3	$Q_r + q_a r$	$q_a g_q$	$Q_u - g_u(s_s - q_a)$	$[0.5/(q_a C)][g_q Q_u + g_u(Q_a + Q_r) + r(Q_r + Q_a) + Q_a^{2/(s_p - q_a)}$
If X_{perm} <= 1.0 (lagging lefts)	4	0	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q) Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 (lagging lefts)	5	$Q_u - g_u(s_s - q_a)$	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q) Q_u + g_u(Q_u + Q_a) + Q_a^{2/(s_p - q_a)}$

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane group				*L*		*R*		*TR*		*L*	*T*	
Init. queue/lane				*0.0*		*0.0*		*0.0*		*0.0*	*0.0*	
Flow rate/lane				*543*		*461*		*2881*		*543*	*2179*	
Satflow per lane				*1736*		*1553*		*1855*		*232*	*1900*	
Capacity/lane				*234*		*376*		*1268*		*183*	*1503*	
Flow ratio				*0.31*		*0.30*		*1.55*		*2.34*	1.15	
v/c ratio				*2.32*		*1.23*		*2.27*		*2.97*	*1.45*	
I factor				*1.000*	*1.000*	*1.000*		*1.000*		*1.000*	*1.000*	
Arrival type				*3*		*3*		*3*		*3*	*3*	
Platoon ratio				*1.00*		*1.00*		*1.00*		*1.00*	*1.00*	
PF factor				*1.00*		*1.00*		*1.00*		*1.00*	*1.00*	
Q_1				*20.4*		*17.3*		*108.0*		*4.6*	*81.7*	
k_B				*0.5*		*0.8*		*1.8*		*0.5*	*2.0*	
Q_2				*39.6*		*13.8*		*204.8*		*45.7*	*90.6*	
Q avg.				*59.9*		*31.1*		*312.8*		*50.3*	*172.3*	

Percentile Back of Queue (95th percentile)

$f_{B\%}$				*1.6*		*1.6*		*1.6*		*1.6*	*1.6*	
BOQ, $Q_{\%}$				*95.9*		*49.8*		*501*		*80.4*	*276*	

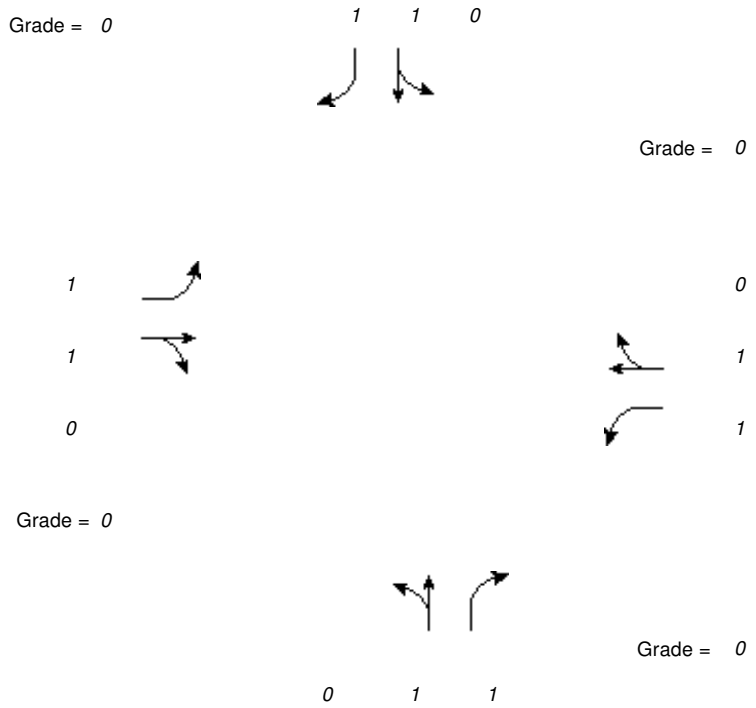
Queue Storage Ratio

Q spacing				*25.0*		*25.0*		*25.0*		*25.0*	*25.0*	
Q storage				*0*		*0*		*0*		*0*	*0*	
Avg. R_Q												
95% $R_{Q\%}$												

LONG REPORT

General Information		Site Information	
Analyst	*Brian Gaffney*	Intersection	*#2*
Agency or Co.	*Clinard Engineering Associates*	Area Type	*All other areas*
Date Performed	*6/6/06*	Jurisdiction	*Maury County*
Time Period	*AM Proposed*	Analysis Year	*2030*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*74*	*237*	*132*	*171*	*562*	*144*	*172*	*28*	*149*	*97*	*85*	*62*
% Heavy veh	*4*	*4*	*4*	*4*	*4*	*4*	*5*	*5*	*5*	*5*	*5*	*5*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time	*2.0*	*2.0*		*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*
Ext. eff. green	*2.0*	*2.0*		*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*
Arrival type	*3*	*3*		*3*	*3*			*3*	*3*		*3*	*3*
Unit Extension	*3.0*	*3.0*		*3.0*	*3.0*			*3.0*	*3.0*		*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*0*	*0*		*0*
Lane Width	*12.0*	*12.0*		*12.0*	*12.0*			*12.0*	*12.0*		*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*		*0*	*0*			*0*	*0*		*0*	*0*
Ped timing	*3.2*			*3.2*			*3.2*			*3.2*		

	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = *30.0*	G =	G =	G =	G = *20.0*	G =	G =	G =
	Y = *5*	Y =	Y =	Y =	Y = *5*	Y =	Y =	Y =
Duration of Analysis (hrs) = *0.25*					Cycle Length C = *60.0*			

VOLUME ADJUSTMENT AND SATURATION FLOW RATE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Volume Adjustment

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume	*74*	*237*	*132*	*171*	*562*	*144*	*172*	*28*	*149*	*97*	*85*	*62*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Adj. Flow Rate	*82*	*263*	*147*	*190*	*624*	*160*	*191*	*31*	*166*	*108*	*94*	*69*
Lane Group	*L*	*TR*		*L*	*TR*			*LT*	*R*		*LT*	*R*
Adj. flow rate	*82*	*410*		*190*	*784*			*222*	*166*		*202*	*69*
Prop. LT or RT	*0.000*	--	*0.359*	*0.000*	--	*0.204*	*0.860*	--	*0.000*	*0.535*	--	*0.000*

Saturation Flow Rate

Base satflow	*1900*	*1900*		*1900*	*1900*			*1900*	*1900*		*1900*	*1900*
Num. of lanes	*1*	*1*	*0*	*1*	*1*	*0*	*0*	*1*	*1*	*0*	*1*	*1*
fW	*1.000*	*1.000*		*1.000*	*1.000*			*1.000*	*1.000*		*1.000*	*1.000*
fHV	*0.962*	*0.962*		*0.962*	*0.962*			*0.952*	*0.952*		*0.952*	*0.952*
fg	*1.000*	*1.000*		*1.000*	*1.000*			*1.000*	*1.000*		*1.000*	*1.000*
fp	*1.000*	*1.000*		*1.000*	*1.000*			*1.000*	*1.000*		*1.000*	*1.000*
fbb	*1.000*	*1.000*		*1.000*	*1.000*			*1.000*	*1.000*		*1.000*	*1.000*
fa	*1.00*	*1.00*		*1.00*	*1.00*			*1.00*	*1.00*		*1.00*	*1.00*
fLU	*1.00*	*1.00*		*1.00*	*1.00*			*1.00*	*1.00*		*1.00*	*1.00*
fLT	*0.146*	*1.000*	--	*0.455*	*1.000*	--		*0.527*	--		*0.622*	--
Secondary fLT			--			--			--			--
fRT	--	*0.946*		--	*0.969*		--	*1.000*	*0.850*	--	*1.000*	*0.850*
fLpb	*1.000*	*1.000*	--	*1.000*	*1.000*	--		*1.000*	--		*1.000*	--
fRpb	--	*1.000*		--	*1.000*		--	*1.000*	*1.000*	--	*1.000*	*1.000*
Adj. satflow	*266*	*1729*		*831*	*1771*			*953*	*1538*		*1126*	*1538*
Sec. adj. satflow			--			--			--			--

CAPACITY AND LOS WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Capacity Analysis

	EB			WB			NB			SB	
Lane group	*L*	*TR*		*L*	*TR*		*LT*	*R*		*LT*	*R*
Adj. flow rate	*82*	*410*		*190*	*784*		*222*	*166*		*202*	*69*
Satflow rate	*266*	*1729*		*831*	*1771*		*953*	*1538*		*1126*	*1538*
Lost time	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*
Green ratio	*0.50*	*0.50*		*0.50*	*0.50*		*0.33*	*0.33*		*0.33*	*0.33*
Lane group cap.	*133*	*865*		*416*	*886*		*318*	*513*		*375*	*513*
v/c ratio	*0.62*	*0.47*		*0.46*	*0.88*		*0.70*	*0.32*		*0.54*	*0.13*
Flow ratio	*0.31*	*0.24*		*0.23*	*0.44*		*0.23*	*0.11*		*0.18*	*0.04*
Crit. lane group	*N*	*N*		*N*	*Y*		*Y*	*N*		*N*	*N*
Sum flow ratios	*0.68*										
Lost time/cycle	*10.00*										
Critical v/c ratio	*0.81*										

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB	
Lane group	*L*	*TR*		*L*	*TR*		*LT*	*R*		*LT*	*R*
Adj. flow rate	*82*	*410*		*190*	*784*		*222*	*166*		*202*	*69*
Lane group cap.	*133*	*865*		*416*	*886*		*318*	*513*		*375*	*513*
v/c ratio	*0.62*	*0.47*		*0.46*	*0.88*		*0.70*	*0.32*		*0.54*	*0.13*
Green ratio	*0.50*	*0.50*		*0.50*	*0.50*		*0.33*	*0.33*		*0.33*	*0.33*
Unif. delay d1	*10.8*	*9.8*		*9.7*	*13.5*		*17.4*	*14.9*		*16.3*	*14.0*
Delay factor k	*0.50*	*0.50*		*0.50*	*0.50*		*0.50*	*0.50*		*0.50*	*0.50*
Increm. delay d2	*19.5*	*1.9*		*3.6*	*12.6*		*12.0*	*1.7*		*5.5*	*0.5*
PF factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*
Control delay	*30.4*	*11.7*		*13.3*	*26.0*		*29.4*	*16.6*		*21.7*	*14.5*
Lane group LOS	*C*	*B*		*B*	*C*		*C*	*B*		*C*	*B*
Apprch. delay	*14.8*			*23.5*			*23.9*			*19.9*	
Approach LOS	*B*			*C*			*C*			*B*	
Intersec. delay	*21.1*			Intersection LOS						*C*	

SUPPLEMENTAL UNIFORM DELAY WORKSHEET FOR LEFT TURNS FROM EXCLUSIVE LANES WITH PROTECTED AND PERMITTED PHASES

General Information

Project Description *SR 247 - Spring Hill*

v/c Ratio Computation

	EB	WB	NB	SB
Cycle length, C (s)	*60.0*			
Prot. phase eff. green intvl, g (s)				
Opposed queue eff. green intvl, g_q (s)				
Unopposed green intvl, g_u (s)				
Red time, r(s)				
Arrival rate, q_a (veh/s)				
Prot. phase departure rate, s_p (veh/s)				
Perm. phase departure rate, s_s (veh/s)				
X_{perm}				
X_{prot} (N/A for lagging left-turns)				
Uniform Queue Size and Delay Computations				
Queue at start of green arrow, Q_a				
Queue at start of unsaturated green, Q_u				
Residual queue, Q_r				
Uniform delay, d_1				

Uniform Queue Size and Delay Equations

	Case	Q_a	Q_u	Q_r	d_1
If X_{perm} <= 1.0 & X_{prot} <= 1.0	1	$q_a r$	$q_a g_q$	0	$[0.5/(q_a C)][r Q_a + Q_a^{2/(s_p - q_s)} + g_q Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} <= 1.0 & X_{prot} > 1.0	2	$q_a r$	$Q_r + q_a g_q$	$Q_a - g(s_p - q_a)$	$[0.5/(q_a C)][r Q_a + g(Q_a + Q_r) + g_q (Q_r + Q_u) + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 & X_{prot} <= 1.0	3	$Q_r + q_a r$	$q_a g_q$	$Q_u - g_u(s_s - q_a)$	$[0.5/(q_a C)][g_q Q_u + g_u(Q_a + Q_r) + r(Q_r + Q_a) + Q_a^{2/(s_p - q_a)}$
If X_{perm} <= 1.0 (lagging lefts)	4	0	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 (lagging lefts)	5	$Q_u - g_u(s_s - q_a)$	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + g_u(Q_u + Q_a) + Q_a^{2/(s_p - q_a)}$

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane group	*L*	*TR*		*L*	*TR*			*LT*	*R*		*LT*	*R*
Init. queue/lane	*0.0*	*0.0*		*0.0*	*0.0*			*0.0*	*0.0*		*0.0*	*0.0*
Flow rate/lane	*82*	*410*		*190*	*784*			*222*	*166*		*202*	*69*
Satflow per lane	*266*	*1729*		*831*	*1771*			*953*	*1538*		*1126*	*1538*
Capacity/lane	*133*	*865*		*416*	*886*			*318*	*513*		*375*	*513*
Flow ratio	*0.31*	*0.24*		*0.23*	*0.44*			*0.23*	*0.11*		0.18	*0.04*
v/c ratio	*0.62*	*0.47*		*0.46*	*0.88*			*0.70*	*0.32*		*0.54*	*0.13*
I factor	*1.000*	*1.000*		*1.000*	*1.000*			*1.000*	*1.000*		*1.000*	*1.000*
Arrival type	*3*	*3*		*3*	*3*			*3*	*3*		*3*	*3*
Platoon ratio	*1.00*	*1.00*		*1.00*	*1.00*			*1.00*	*1.00*		*1.00*	*1.00*
PF factor	*1.00*	*1.00*		*1.00*	*1.00*			*1.00*	*1.00*		*1.00*	*1.00*
Q_1	*1.0*	*4.5*		*2.1*	*11.7*			*3.2*	*2.1*		*2.7*	*0.8*
k_B	*0.2*	*0.8*		*0.5*	*0.8*			*0.4*	*0.5*		*0.4*	*0.5*
Q_2	*0.3*	*0.7*		*0.4*	*4.5*			*0.8*	*0.3*		*0.5*	*0.1*
Q avg.	*1.3*	*5.2*		*2.4*	*16.2*			*4.0*	*2.3*		*3.2*	*0.9*

Percentile Back of Queue (95th percentile)

$f_{B\%}$	*2.4*	*2.0*		*2.2*	*1.6*			*2.0*	*2.2*		*2.1*	*2.4*
BOQ, $Q_{\%}$	*3.1*	*10.1*		*5.4*	*26.6*			*8.3*	*5.2*		*6.9*	*2.2*

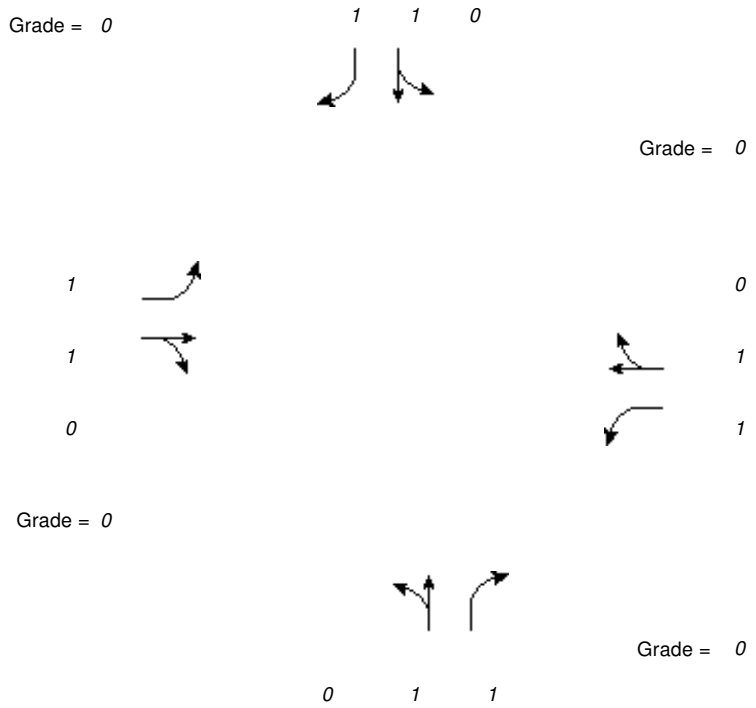
Queue Storage Ratio

Q spacing	*25.0*	*25.0*		*25.0*	*25.0*			*25.0*	*25.0*		*25.0*	*25.0*
Q storage	*0*	*0*		*0*	*0*			*0*	*0*		*0*	*0*
Avg. R_Q												
95% $R_{Q\%}$												

LONG REPORT

General Information		Site Information	
Analyst	*Brian Gaffney*	Intersection	*#2*
Agency or Co.	*Clinard Engineering Associates*	Area Type	*All other areas*
Date Performed	*6/6/06*	Jurisdiction	*Maury County*
Time Period	*PM Proposed*	Analysis Year	*2030*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*122*	*594*	*115*	*160*	*588*	*145*	*177*	*31*	*160*	*172*	*30*	*66*
% Heavy veh	*4*	*4*	*4*	*4*	*4*	*4*	*5*	*5*	*5*	*5*	*5*	*5*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time	*2.0*	*2.0*		*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*
Ext. eff. green	*2.0*	*2.0*		*2.0*	*2.0*			*2.0*	*2.0*		*2.0*	*2.0*
Arrival type	*3*	*3*		*3*	*3*			*3*	*3*		*3*	*3*
Unit Extension	*3.0*	*3.0*		*3.0*	*3.0*			*3.0*	*3.0*		*3.0*	*3.0*
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*0*	*0*		*0*
Lane Width	*12.0*	*12.0*		*12.0*	*12.0*			*12.0*	*12.0*		*12.0*	*12.0*
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*		*0*	*0*			*0*	*0*		*0*	*0*
Ped timing	*3.2*			*3.2*			*3.2*			*3.2*		

	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = *45.0*	G =	G =	G =	G = *25.0*	G =	G =	G =
	Y = *5*	Y =	Y =	Y =	Y = *5*	Y =	Y =	Y =
Duration of Analysis (hrs) = *0.25*					Cycle Length C = *80.0*			

VOLUME ADJUSTMENT AND SATURATION FLOW RATE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Volume Adjustment

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume	*122*	*594*	*115*	*160*	*588*	*145*	*177*	*31*	*160*	*172*	*30*	*66*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Adj. Flow Rate	*136*	*660*	*128*	*178*	*653*	*161*	*197*	*34*	*178*	*191*	*33*	*73*
Lane Group	*L*	*TR*		*L*	*TR*			*LT*	*R*		*LT*	*R*
Adj. flow rate	*136*	*788*		*178*	*814*			*231*	*178*		*224*	*73*
Prop. LT or RT	*0.000*	--	*0.162*	*0.000*	--	*0.198*	*0.853*	--	*0.000*	*0.853*	--	*0.000*

Saturation Flow Rate

Base satflow	*1900*	*1900*		*1900*	*1900*			*1900*	*1900*		*1900*	*1900*
Num. of lanes	*1*	*1*	*0*	*1*	*1*	*0*	*0*	*1*	*1*	*0*	*1*	*1*
fW	*1.000*	*1.000*		*1.000*	*1.000*			*1.000*	*1.000*		*1.000*	*1.000*
fHV	*0.962*	*0.962*		*0.962*	*0.962*			*0.952*	*0.952*		*0.952*	*0.952*
fg	*1.000*	*1.000*		*1.000*	*1.000*			*1.000*	*1.000*		*1.000*	*1.000*
fp	*1.000*	*1.000*		*1.000*	*1.000*			*1.000*	*1.000*		*1.000*	*1.000*
fbb	*1.000*	*1.000*		*1.000*	*1.000*			*1.000*	*1.000*		*1.000*	*1.000*
fa	*1.00*	*1.00*		*1.00*	*1.00*			*1.00*	*1.00*		*1.00*	*1.00*
fLU	*1.00*	*1.00*		*1.00*	*1.00*			*1.00*	*1.00*		*1.00*	*1.00*
fLT	*0.168*	*1.000*	--	*0.186*	*1.000*	--		*0.459*	--		*0.449*	--
Secondary fLT			--			--			--			--
fRT	--	*0.976*		--	*0.970*		--	*1.000*	*0.850*	--	*1.000*	*0.850*
fLpb	*1.000*	*1.000*	--	*1.000*	*1.000*	--		*1.000*	--		*1.000*	--
fRpb	--	*1.000*		--	*1.000*		--	*1.000*	*1.000*	--	*1.000*	*1.000*
Adj. satflow	*307*	*1782*		*339*	*1773*			*830*	*1538*		*813*	*1538*
Sec. adj. satflow			--			--			--			--

CAPACITY AND LOS WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Capacity Analysis

	EB			WB			NB			SB	
Lane group	*L*	*TR*		*L*	*TR*		*LT*	*R*		*LT*	*R*
Adj. flow rate	*136*	*788*		*178*	*814*		*231*	*178*		*224*	*73*
Satflow rate	*307*	*1782*		*339*	*1773*		*830*	*1538*		*813*	*1538*
Lost time	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*
Green ratio	*0.56*	*0.56*		*0.56*	*0.56*		*0.31*	*0.31*		*0.31*	*0.31*
Lane group cap.	*173*	*1002*		*191*	*997*		*259*	*481*		*254*	*481*
v/c ratio	*0.79*	*0.79*		*0.93*	*0.82*		*0.89*	*0.37*		*0.88*	*0.15*
Flow ratio	*0.44*	*0.44*		*0.53*	*0.46*		*0.28*	*0.12*		*0.28*	*0.05*
Crit. lane group	*N*	*N*		*Y*	*N*		*Y*	*N*		*N*	*N*
Sum flow ratios	*0.80*										
Lost time/cycle	*10.00*										
Critical v/c ratio	*0.92*										

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB	
Lane group	*L*	*TR*		*L*	*TR*		*LT*	*R*		*LT*	*R*
Adj. flow rate	*136*	*788*		*178*	*814*		*231*	*178*		*224*	*73*
Lane group cap.	*173*	*1002*		*191*	*997*		*259*	*481*		*254*	*481*
v/c ratio	*0.79*	*0.79*		*0.93*	*0.82*		*0.89*	*0.37*		*0.88*	*0.15*
Green ratio	*0.56*	*0.56*		*0.56*	*0.56*		*0.31*	*0.31*		*0.31*	*0.31*
Unif. delay d1	*13.7*	*13.7*		*16.1*	*14.2*		*26.2*	*21.4*		*26.1*	*19.8*
Delay factor k	*0.50*	*0.50*		*0.50*	*0.50*		*0.50*	*0.50*		*0.50*	*0.50*
Increm. delay d2	*29.3*	*6.2*		*49.4*	*7.4*		*33.8*	*2.2*		*32.7*	*0.7*
PF factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*
Control delay	*43.0*	*19.9*		*65.5*	*21.5*		*60.0*	*23.6*		*58.8*	*20.5*
Lane group LOS	*D*	*B*		*E*	*C*		*E*	*C*		*E*	*C*
Apprch. delay	*23.3*			*29.4*			*44.2*			*49.4*	
Approach LOS	*C*			*C*			*D*			*D*	
Intersec. delay	*31.8*			Intersection LOS						*C*	

SUPPLEMENTAL UNIFORM DELAY WORKSHEET FOR LEFT TURNS FROM EXCLUSIVE LANES WITH PROTECTED AND PERMITTED PHASES

General Information

Project Description *SR 247 - Spring Hill*

v/c Ratio Computation

	EB	WB	NB	SB
Cycle length, C (s)	*80.0*			
Prot. phase eff. green intvl, g (s)				
Opposed queue eff. green intvl, g_q (s)				
Unopposed green intvl, g_u (s)				
Red time, r(s)				
Arrival rate, q_a (veh/s)				
Prot. phase departure rate, s_p (veh/s)				
Perm. phase departure rate, s_s (veh/s)				
X_{perm}				
X_{prot} (N/A for lagging left-turns)				
Uniform Queue Size and Delay Computations				
Queue at start of green arrow, Q_a				
Queue at start of unsaturated green, Q_u				
Residual queue, Q_r				
Uniform delay, d_1				

Uniform Queue Size and Delay Equations

	Case	Q_a	Q_u	Q_r	d_1
If X_{perm} <= 1.0 & X_{prot} <= 1.0	1	$q_a r$	$q_a g_q$	0	$[0.5/(q_a C)][r Q_a + Q_a^{2/(s_p - q_s)} + g_q Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} <= 1.0 & X_{prot} > 1.0	2	$q_a r$	$Q_r + q_a g_q$	$Q_a - g(s_p - q_a)$	$[0.5/(q_a C)][r Q_a + g(Q_a + Q_r) + g_q (Q_r + Q_u) + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 & X_{prot} <= 1.0	3	$Q_r + q_a r$	$q_a g_q$	$Q_u - g_u(s_s - q_a)$	$[0.5/(q_a C)][g_q Q_u + g_u(Q_a + Q_r) + r(Q_r + Q_a) + Q_a^{2/(s_p - q_a)}$
If X_{perm} <= 1.0 (lagging lefts)	4	0	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 (lagging lefts)	5	$Q_u - g_u(s_s - q_a)$	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + g_u(Q_u + Q_a) + Q_a^{2/(s_p - q_a)}$

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane group	*L*	*TR*		*L*	*TR*			*LT*	*R*		*LT*	*R*
Init. queue/lane	*0.0*	*0.0*		*0.0*	*0.0*			*0.0*	*0.0*		*0.0*	*0.0*
Flow rate/lane	*136*	*788*		*178*	*814*			*231*	*178*		*224*	*73*
Satflow per lane	*307*	*1782*		*339*	*1773*			*830*	*1538*		*813*	*1538*
Capacity/lane	*173*	*1002*		*191*	*997*			*259*	*481*		*254*	*481*
Flow ratio	*0.44*	*0.44*		*0.53*	*0.46*			*0.28*	*0.12*		0.28	*0.05*
v/c ratio	*0.79*	*0.79*		*0.93*	*0.82*			*0.89*	*0.37*		*0.88*	*0.15*
I factor	*1.000*	*1.000*		*1.000*	*1.000*			*1.000*	*1.000*		*1.000*	*1.000*
Arrival type	*3*	*3*		*3*	*3*			*3*	*3*		*3*	*3*
Platoon ratio	*1.00*	*1.00*		*1.00*	*1.00*			*1.00*	*1.00*		*1.00*	*1.00*
PF factor	*1.00*	*1.00*		*1.00*	*1.00*			*1.00*	*1.00*		*1.00*	*1.00*
Q_1	*2.4*	*13.7*		*3.6*	*14.6*			*4.9*	*3.1*		*4.7*	*1.2*
k_B	*0.3*	*1.1*		*0.3*	*1.0*			*0.4*	*0.6*		*0.4*	*0.6*
Q_2	*0.9*	*3.4*		*2.0*	*4.0*			*2.1*	*0.4*		*2.0*	*0.1*
Q avg.	*3.3*	*17.2*		*5.7*	*18.6*			*7.0*	*3.4*		*6.7*	*1.3*

Percentile Back of Queue (95th percentile)

$f_{B\%}$	*2.1*	*1.6*		*1.9*	*1.6*			*1.8*	*2.1*		*1.9*	*2.4*
BOQ, $Q_{\%}$	*7.0*	*28.0*		*10.9*	*30.2*			*12.9*	*7.2*		*12.5*	*3.0*

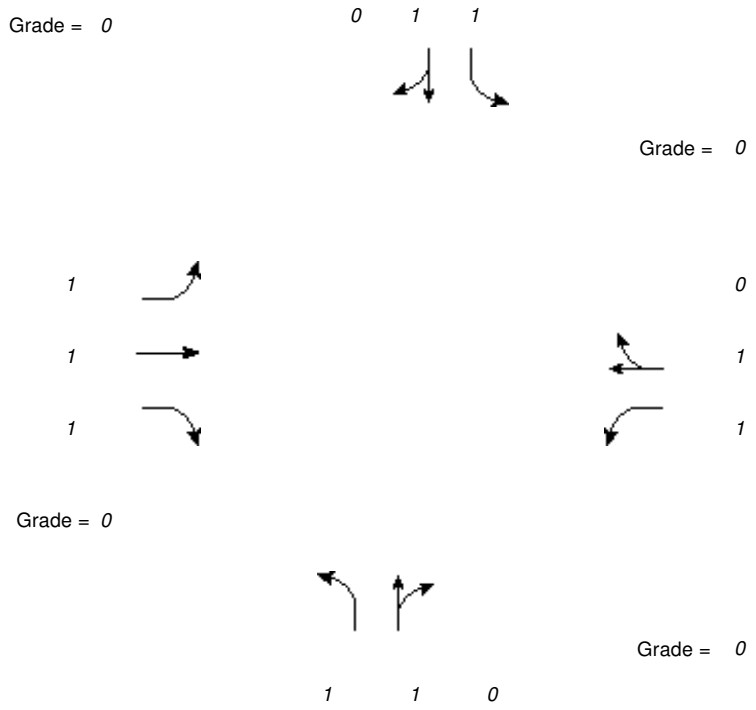
Queue Storage Ratio

Q spacing	*25.0*	*25.0*		*25.0*	*25.0*			*25.0*	*25.0*		*25.0*	*25.0*
Q storage	*0*	*0*		*0*	*0*			*0*	*0*		*0*	*0*
Avg. R_Q												
95% $R_{Q\%}$												

LONG REPORT

General Information		Site Information	
Analyst	*Brady Griggs*	Intersection	*#3*
Agency or Co.	*Clinard Engineering Associates*	Area Type	*All other areas*
Date Performed	*2/9/06*	Jurisdiction	*Maury County*
Time Period	*AM Proposed*	Analysis Year	*2030*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*24*	*237*	*444*	*289*	*554*	*25*	*253*	*27*	*101*	*39*	*45*	*59*
% Heavy veh	*4*	*4*	*4*	*4*	*4*	*4*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Ext. eff. green	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Arrival type	*3*	*3*	*3*	*3*	*3*		*3*	*3*		*3*	*3*	
Unit Extension	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*0*	*0*		*0*
Lane Width	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*	*0*	*0*	*0*		*0*	*0*		*0*	*0*	
Ped timing	*3.2*			*3.2*			*3.2*			*3.2*		

	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = *30.0*	G =	G =	G =	G = *20.0*	G =	G =	G =
	Y = *5*	Y =	Y =	Y =	Y = *5*	Y =	Y =	Y =
Duration of Analysis (hrs) = *0.25*					Cycle Length C = *60.0*			

VOLUME ADJUSTMENT AND SATURATION FLOW RATE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Volume Adjustment

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume	24	237	444	289	554	25	253	27	101	39	45	59
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow Rate	27	263	493	321	616	28	281	30	112	43	50	66
Lane Group	L	T	R	L	TR		L	TR		L	TR	
Adj. flow rate	27	263	493	321	644		281	142		43	116	
Prop. LT or RT	0.000	--	0.000	0.000	--	0.043	0.000	--	0.789	0.000	--	0.569

Saturation Flow Rate

Base satflow	1900	1900	1900	1900	1900		1900	1900		1900	1900	
Num. of lanes	1	1	1	1	1	0	1	1	0	1	1	0
fW	1.000	1.000	1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fHV	0.962	0.962	0.962	0.962	0.962		1.000	1.000		1.000	1.000	
fg	1.000	1.000	1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fp	1.000	1.000	1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fbb	1.000	1.000	1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fa	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
fLU	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
fLT	0.256	1.000	--	0.594	1.000	--	0.682	1.000	--	0.666	1.000	--
Secondary fLT			--			--			--			--
fRT	--	1.000	0.850	--	0.993		--	0.882		--	0.915	
fLpb	1.000	1.000	--	1.000	1.000	--	1.000	1.000	--	1.000	1.000	--
fRpb	--	1.000	1.000	--	1.000		--	1.000		--	1.000	
Adj. satflow	468	1827	1553	1086	1815		1296	1675		1266	1738	
Sec. adj. satflow			--			--			--			--

CAPACITY AND LOS WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	*L*	*T*	*R*	*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*27*	*263*	*493*	*321*	*644*		*281*	*142*		*43*	*116*	
Satflow rate	*468*	*1827*	*1553*	*1086*	*1815*		*1296*	*1675*		*1266*	*1738*	
Lost time	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Green ratio	*0.50*	*0.50*	*0.50*	*0.50*	*0.50*		*0.33*	*0.33*		*0.33*	*0.33*	
Lane group cap.	*234*	*914*	*777*	*543*	*908*		*432*	*558*		*422*	*579*	
v/c ratio	*0.12*	*0.29*	*0.63*	*0.59*	*0.71*		*0.65*	*0.25*		*0.10*	*0.20*	
Flow ratio	*0.06*	*0.14*	*0.32*	*0.30*	*0.35*		*0.22*	*0.08*		*0.03*	*0.07*	
Crit. lane group	*N*	*N*	*N*	*N*	*Y*		*Y*	*N*		*N*	*N*	
Sum flow ratios	*0.57*											
Lost time/cycle	*10.00*											
Critical v/c ratio	*0.69*											

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group	*L*	*T*	*R*	*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*27*	*263*	*493*	*321*	*644*		*281*	*142*		*43*	*116*	
Lane group cap.	*234*	*914*	*777*	*543*	*908*		*432*	*558*		*422*	*579*	
v/c ratio	*0.12*	*0.29*	*0.63*	*0.59*	*0.71*		*0.65*	*0.25*		*0.10*	*0.20*	
Green ratio	*0.50*	*0.50*	*0.50*	*0.50*	*0.50*		*0.33*	*0.33*		*0.33*	*0.33*	
Unif. delay d1	*8.0*	*8.8*	*11.0*	*10.6*	*11.6*		*17.0*	*14.6*		*13.8*	*14.3*	
Delay factor k	*0.50*	*0.50*	*0.50*	*0.50*	*0.50*		*0.50*	*0.50*		*0.50*	*0.50*	
Increm. delay d2	*1.0*	*0.8*	*3.9*	*4.7*	*4.7*		*7.4*	*1.1*		*0.5*	*0.8*	
PF factor	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Control delay	*9.0*	*9.6*	*14.9*	*15.3*	*16.3*		*24.4*	*15.7*		*14.3*	*15.1*	
Lane group LOS	*A*	*A*	*B*	*B*	*B*		*C*	*B*		*B*	*B*	
Apprch. delay	*12.9*			*16.0*			*21.5*			*14.9*		
Approach LOS	*B*			*B*			*C*			*B*		
Intersec. delay	*15.9*			Intersection LOS						*B*		

SUPPLEMENTAL UNIFORM DELAY WORKSHEET FOR LEFT TURNS FROM EXCLUSIVE LANES WITH PROTECTED AND PERMITTED PHASES

General Information

Project Description *SR 247 - Spring Hill*

v/c Ratio Computation

	EB	WB	NB	SB
Cycle length, C (s)	*60.0*			
Prot. phase eff. green intvl, g (s)				
Opposed queue eff. green intvl, g_q (s)				
Unopposed green intvl, g_u (s)				
Red time, r(s)				
Arrival rate, q_a (veh/s)				
Prot. phase departure rate, s_p (veh/s)				
Perm. phase departure rate, s_s (veh/s)				
X_{perm}				
X_{prot} (N/A for lagging left-turns)				
Uniform Queue Size and Delay Computations				
Queue at start of green arrow, Q_a				
Queue at start of unsaturated green, Q_u				
Residual queue, Q_r				
Uniform delay, d_1				

Uniform Queue Size and Delay Equations

	Case	Q_a	Q_u	Q_r	d_1
If X_{perm} <= 1.0 & X_{prot} <= 1.0	1	$q_a r$	$q_a g_q$	0	$[0.5/(q_a C)][r Q_a + Q_a^{2/(s_p - q_s)} + g_q Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} <= 1.0 & X_{prot} > 1.0	2	$q_a r$	$Q_r + q_a g_q$	$Q_a - g(s_p - q_a)$	$[0.5/(q_a C)][r Q_a + g(Q_a + Q_r) + g_q (Q_r + Q_u) + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 & X_{prot} <= 1.0	3	$Q_r + q_a r$	$q_a g_q$	$Q_u - g_u(s_s - q_a)$	$[0.5/(q_a C)][g_q Q_u + g_u(Q_a + Q_r) + r(Q_r + Q_a) + Q_a^{2/(s_p - q_a)}$
If X_{perm} <= 1.0 (lagging lefts)	4	0	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 (lagging lefts)	5	$Q_u - g_u(s_s - q_a)$	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + g_u(Q_u + Q_a) + Q_a^{2/(s_p - q_a)}$

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane group	*L*	*T*	*R*	*L*	*TR*		*L*	*TR*		*L*	*TR*	
Init. queue/lane	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*	
Flow rate/lane	*27*	*263*	*493*	*321*	*644*		*281*	*142*		*43*	*116*	
Satflow per lane	*468*	*1827*	*1553*	*1086*	*1815*		*1296*	*1675*		*1266*	*1738*	
Capacity/lane	*234*	*914*	*777*	*543*	*908*		*432*	*558*		*422*	*579*	
Flow ratio	*0.06*	*0.14*	*0.32*	*0.30*	*0.35*		*0.22*	*0.08*		*0.03*	0.07	
v/c ratio	*0.12*	*0.29*	*0.63*	*0.59*	*0.71*		*0.65*	*0.25*		*0.10*	*0.20*	
I factor	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Arrival type	*3*	*3*	*3*	*3*	*3*		*3*	*3*		*3*	*3*	
Platoon ratio	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
PF factor	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
Q_1	*0.2*	*2.6*	*6.0*	*3.8*	*8.3*		*4.0*	*1.7*		*0.5*	*1.4*	
k_B	*0.3*	*0.8*	*0.7*	*0.6*	*0.8*		*0.5*	*0.6*		*0.5*	*0.6*	
Q_2	*0.0*	*0.3*	*1.2*	*0.8*	*1.9*		*0.9*	*0.2*		*0.1*	*0.1*	
Q avg.	*0.3*	*2.9*	*7.2*	*4.6*	*10.2*		*4.8*	*1.9*		*0.5*	*1.5*	

Percentile Back of Queue (95th percentile)

$f_{B\%}$	*2.5*	*2.2*	*1.8*	*2.0*	*1.7*		*2.0*	*2.3*		*2.5*	*2.3*	
BOQ, $Q_{\%}$	*0.7*	*6.2*	*13.3*	*9.2*	*17.6*		*9.6*	*4.4*		*1.4*	*3.6*	

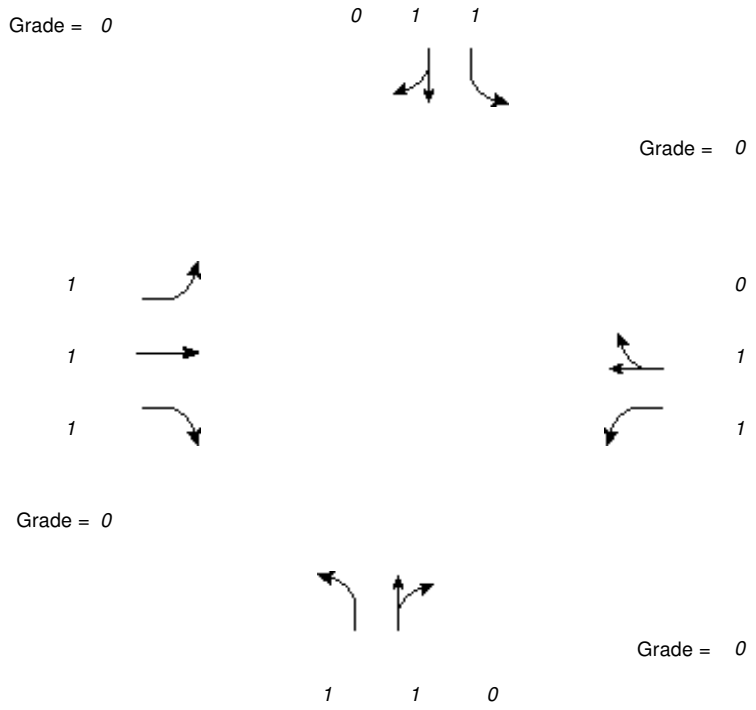
Queue Storage Ratio

Q spacing	*25.0*	*25.0*	*25.0*	*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*	
Q storage	*0*	*0*	*0*	*0*	*0*		*0*	*0*		*0*	*0*	
Avg. R_Q												
95% $R_{Q\%}$												

LONG REPORT

General Information		Site Information	
Analyst	*Brady Griggs*	Intersection	*#3*
Agency or Co.	*Clinard Engineering Associates*	Area Type	*All other areas*
Date Performed	*2/9/06*	Jurisdiction	*Maury County*
Time Period	*PM Proposed*	Analysis Year	*2030*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*107*	*594*	*244*	*231*	*479*	*41*	*337*	*77*	*231*	*43*	*100*	*88*
% Heavy veh	*4*	*4*	*4*	*4*	*4*	*4*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Ext. eff. green	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Arrival type	*3*	*3*	*3*	*3*	*3*		*3*	*3*		*3*	*3*	
Unit Extension	*3.0*	*3.0*	*3.0*	*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*0*	*0*		*0*
Lane Width	*12.0*	*12.0*	*12.0*	*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*	*0*	*0*	*0*		*0*	*0*		*0*	*0*	
Ped timing	*3.2*			*3.2*			*3.2*			*3.2*		

	Excl. Left	EW Perm	03	04	Excl. Left	NS Perm	07	08
Timing	G = *10.0*	G = *35.0*	G =	G =	G = *5.0*	G = *25.0*	G =	G =
	Y = *5*	Y = *5*	Y =	Y =	Y = *5*	Y = *5*	Y =	Y =
Duration of Analysis (hrs) = *0.25*					Cycle Length C = *95.0*			

VOLUME ADJUSTMENT AND SATURATION FLOW RATE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Volume Adjustment

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume	*107*	*594*	*244*	*231*	*479*	*41*	*337*	*77*	*231*	*43*	*100*	*88*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Adj. Flow Rate	*119*	*660*	*271*	*257*	*532*	*46*	*374*	*86*	*257*	*48*	*111*	*98*
Lane Group	*L*	*T*	*R*	*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*119*	*660*	*271*	*257*	*578*		*374*	*343*		*48*	*209*	
Prop. LT or RT	*0.000*	--	*0.000*	*0.000*	--	*0.080*	*0.000*	--	*0.749*	*0.000*	--	*0.469*

Saturation Flow Rate

Base satflow	*1900*	*1900*	*1900*	*1900*	*1900*		*1900*	*1900*		*1900*	*1900*	
Num. of lanes	*1*	*1*	*1*	*1*	*1*	*0*	*1*	*1*	*0*	*1*	*1*	*0*
fW	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fHV	*0.962*	*0.962*	*0.962*	*0.962*	*0.962*		*1.000*	*1.000*		*1.000*	*1.000*	
fg	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fp	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fbb	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fa	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
fLU	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
fLT	*0.950*	*1.000*	--	*0.950*	*1.000*	--	*0.950*	*1.000*	--	*0.950*	*1.000*	--
Secondary fLT	*0.130*		--	*0.100*		--	*0.435*		--	*0.250*		--
fRT	--	*1.000*	*0.850*	--	*0.988*		--	*0.888*		--	*0.930*	
fLpb	*1.000*	*1.000*	--	*1.000*	*1.000*	--	*1.000*	*1.000*	--	*1.000*	*1.000*	--
fRpb	--	*1.000*	*1.000*	--	*1.000*		--	*1.000*		--	*1.000*	
Adj. satflow	*1736*	*1827*	*1553*	*1736*	*1805*		*1805*	*1686*		*1805*	*1766*	
Sec. adj. satflow	*237*		--	*183*		--	*826*		--	*475*		--

CAPACITY AND LOS WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	*L*	*T*	*R*	*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*119*	*660*	*271*	*257*	*578*		*374*	*343*		*48*	*209*	
Satflow rate	*1736*	*1827*	*1553*	*1736*	*1805*		*1805*	*1686*		*1805*	*1766*	
Lost time	*2.0*	*2.0*	*2.0*	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Green ratio	*0.53*	*0.37*	*0.37*	*0.53*	*0.37*		*0.37*	*0.26*		*0.37*	*0.26*	
Lane group cap.	*283*	*673*	*572*	*260*	*665*		*356*	*444*		*245*	*465*	
v/c ratio	*0.42*	*0.98*	*0.47*	*0.99*	*0.87*		*1.05*	*0.77*		*0.20*	*0.45*	
Flow ratio		*0.36*	*0.17*		*0.32*			*0.20*			*0.12*	
Crit. lane group	*N*	*N*	*N*	*N*	*N*		*N*	*N*		*N*	*N*	
Sum flow ratios	*0.90*											
Lost time/cycle	*10.00*											
Critical v/c ratio	*1.01*											

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group	*L*	*T*	*R*	*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*119*	*660*	*271*	*257*	*578*		*374*	*343*		*48*	*209*	
Lane group cap.	*283*	*673*	*572*	*260*	*665*		*356*	*444*		*245*	*465*	
v/c ratio	*0.42*	*0.98*	*0.47*	*0.99*	*0.87*		*1.05*	*0.77*		*0.20*	*0.45*	
Green ratio	*0.53*	*0.37*	*0.37*	*0.53*	*0.37*		*0.37*	*0.26*		*0.37*	*0.26*	
Unif. delay d1	*16.4*	*29.7*	*23.0*	*26.7*	*27.9*		*33.7*	*32.4*		*21.0*	*29.2*	
Delay factor k	*0.50*	*0.50*	*0.50*	*0.50*	*0.50*		*0.50*	*0.50*		*0.50*	*0.50*	
Increm. delay d2	*4.5*	*30.3*	*2.8*	*53.0*	*14.4*		*61.6*	*12.3*		*1.8*	*3.1*	
PF factor	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Control delay	*20.9*	*59.9*	*25.8*	*79.6*	*42.3*		*95.3*	*44.7*		*22.7*	*32.4*	
Lane group LOS	*C*	*E*	*C*	*E*	*D*		*F*	*D*		*C*	*C*	
Apprch. delay	*46.7*			*53.8*			*71.1*			*30.6*		
Approach LOS	*D*			*D*			*E*			*C*		
Intersec. delay	*53.4*			Intersection LOS						*D*		

SUPPLEMENTAL UNIFORM DELAY WORKSHEET FOR LEFT TURNS FROM EXCLUSIVE LANES WITH PROTECTED AND PERMITTED PHASES

General Information

Project Description *SR 247 - Spring Hill*

v/c Ratio Computation

	EB	WB	NB	SB
Cycle length, C (s)	*95.0*			
Prot. phase eff. green intvl, g (s)	*10.0*	*10.0*	*5.0*	*5.0*
Opposed queue eff. green intvl, g_q (s)	*28.38*	*34.74*	*9.20*	*16.48*
Unopposed green intvl, g_u (s)	*11.62*	*5.26*	*20.80*	*13.52*
Red time, r(s)	*45.0*	*45.0*	*60.0*	*60.0*
Arrival rate, q_a (veh/s)	*0.03*	*0.07*	*0.10*	*0.01*
Prot. phase departure rate, s_p (veh/s)	*0.482*	*0.482*	*0.501*	*0.501*
Perm. phase departure rate, s_s (veh/s)	*0.23*	*0.39*	*0.33*	*0.29*
X_{perm}	*0.50*	*1.40*	*0.43*	*0.10*
X_{prot} (N/A for lagging left-turns)	*0.38*	*0.81*	*2.56*	*0.35*
Uniform Queue Size and Delay Computations				
Queue at start of green arrow, Q_a	*1.49*	*4.03*	*5.93*	*0.80*
Queue at start of unsaturated green, Q_u	*0.94*	*2.48*	*5.68*	*0.22*
Residual queue, Q_r	*0.00*	*0.82*	*3.92*	*0.00*
Uniform delay, d_1	*16.4*	*26.7*	*33.7*	*21.0*

Uniform Queue Size and Delay Equations

	Case	Q_a	Q_u	Q_r	d_1
If X_{perm} <= 1.0 & X_{prot} <= 1.0	1	$q_a r$	$q_a g_q$	0	$[0.5/(q_a C)][rQ_a + Q_a^{2/(s_p - q_s)} + g_q Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} <= 1.0 & X_{prot} > 1.0	2	$q_a r$	$Q_r + q_a g_q$	$Q_a - g(s_p - q_a)$	$[0.5/(q_a C)][rQ_a + g(Q_a + Q_r) + g_q (Q_r + Q_u) + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 & X_{prot} <= 1.0	3	$Q_r + q_a r$	$q_a g_q$	$Q_u - g_u(s_s - q_a)$	$[0.5/(q_a C)][g_q Q_u + g_u(Q_a + Q_r) + r(Q_r + Q_a) + Q_a^{2/(s_p - q_a)}$
If X_{perm} <= 1.0 (lagging lefts)	4	0	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 (lagging lefts)	5	$Q_u - g_u(s_s - q_a)$	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + g_u(Q_u + Q_a) + Q_a^{2/(s_p - q_a)}$

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane group	*L*	*T*	*R*	*L*	*TR*		*L*	*TR*		*L*	*TR*	
Init. queue/lane	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*	
Flow rate/lane	*119*	*660*	*271*	*257*	*578*		*374*	*343*		*48*	*209*	
Satflow per lane	*537*	*1827*	*1553*	*494*	*1805*		*966*	*1686*		*665*	*1766*	
Capacity/lane	*283*	*673*	*572*	*260*	*665*		*356*	*444*		*245*	*465*	
Flow ratio	*0.22*	*0.36*	*0.17*	*0.52*	*0.32*		*0.39*	*0.20*		*0.07*	0.12	
v/c ratio	*0.42*	*0.98*	*0.47*	*0.99*	*0.87*		*1.05*	*0.77*		*0.20*	*0.45*	
I factor	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Arrival type	*3*	*3*	*3*	*3*	*3*		*3*	*3*		*3*	*3*	
Platoon ratio	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
PF factor	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
Q_1	*1.6*	*17.2*	*5.5*	*3.6*	*14.2*		*6.6*	*8.4*		*0.8*	*4.6*	
k_B	*0.5*	*0.9*	*0.8*	*0.5*	*0.9*		*0.6*	*0.7*		*0.4*	*0.7*	
Q_2	*0.3*	*7.8*	*0.7*	*3.7*	*4.3*		*6.4*	*2.0*		*0.1*	*0.6*	
Q avg.	*1.9*	*25.1*	*6.2*	*7.3*	*18.4*		*13.0*	*10.3*		*0.9*	*5.2*	

Percentile Back of Queue (95th percentile)

$f_{B\%}$	*2.3*	*1.6*	*1.9*	*1.8*	*1.6*		*1.7*	*1.7*		*2.4*	*2.0*	
BOQ, $Q_{\%}$	*4.4*	*40.3*	*11.7*	*13.3*	*29.9*		*21.8*	*17.9*		*2.2*	*10.1*	

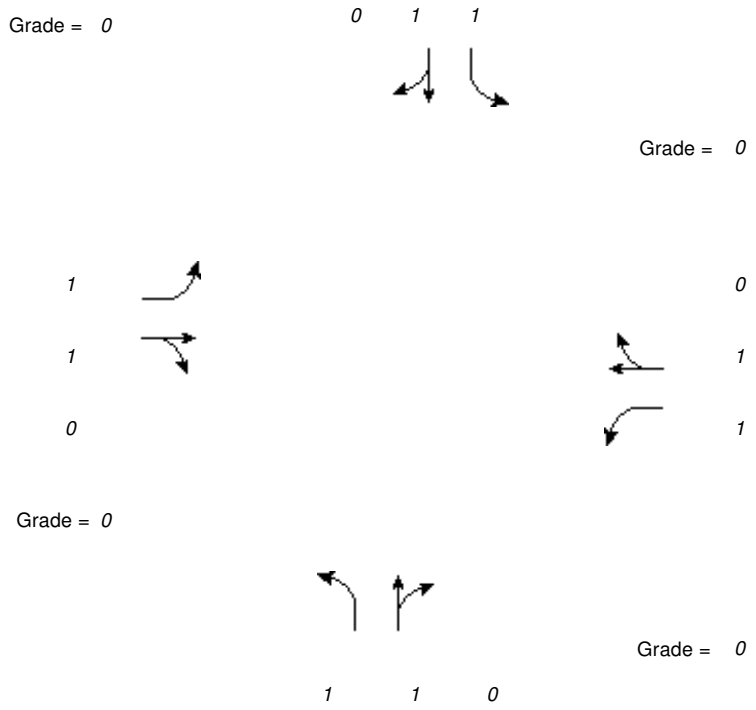
Queue Storage Ratio

Q spacing	*25.0*	*25.0*	*25.0*	*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*	
Q storage	*0*	*0*	*0*	*0*	*0*		*0*	*0*		*0*	*0*	
Avg. R_Q												
95% $R_{Q\%}$												

LONG REPORT

General Information		Site Information	
Analyst	*Brady Griggs*	Intersection	*#4*
Agency or Co.	*Clinard Engineering Associates*	Area Type	*All other areas*
Date Performed	*2/9/06*	Jurisdiction	*Maury County*
Time Period	*AM Proposed*	Analysis Year	*2030*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*36*	*28*	*313*	*101*	*522*	*116*	*258*	*71*	*35*	*182*	*117*	*88*
% Heavy veh	*4*	*4*	*4*	*4*	*4*	*4*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Ext. eff. green	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Arrival type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Unit Extension	*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*0*	*0*		*0*
Lane Width	*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Ped timing	*3.2*			*3.2*			*3.2*			*3.2*		

	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = *25.0*	G =	G =	G =	G = *15.0*	G =	G =	G =
	Y = *5*	Y =	Y =	Y =	Y = *5*	Y =	Y =	Y =
Duration of Analysis (hrs) = *0.25*					Cycle Length C = *50.0*			

VOLUME ADJUSTMENT AND SATURATION FLOW RATE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Volume Adjustment

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume	*36*	*28*	*313*	*101*	*522*	*116*	*258*	*71*	*35*	*182*	*117*	*88*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Adj. Flow Rate	*40*	*31*	*348*	*112*	*580*	*129*	*287*	*79*	*39*	*202*	*130*	*98*
Lane Group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*40*	*379*		*112*	*709*		*287*	*118*		*202*	*228*	
Prop. LT or RT	*0.000*	--	*0.918*	*0.000*	--	*0.182*	*0.000*	--	*0.331*	*0.000*	--	*0.430*

Saturation Flow Rate

Base satflow	*1900*	*1900*		*1900*	*1900*		*1900*	*1900*		*1900*	*1900*	
Num. of lanes	*1*	*1*	*0*	*1*	*1*	*0*	*1*	*1*	*0*	*1*	*1*	*0*
fW	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fHV	*0.962*	*0.962*		*0.962*	*0.962*		*1.000*	*1.000*		*1.000*	*1.000*	
fg	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fp	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fbb	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fa	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
fLU	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
fLT	*0.218*	*1.000*	--	*0.501*	*1.000*	--	*0.613*	*1.000*	--	*0.681*	*1.000*	--
Secondary fLT			--			--			--			--
fRT	--	*0.862*		--	*0.973*		--	*0.950*		--	*0.936*	
fLpb	*1.000*	*1.000*	--	*1.000*	*1.000*	--	*1.000*	*1.000*	--	*1.000*	*1.000*	--
fRpb	--	*1.000*		--	*1.000*		--	*1.000*		--	*1.000*	
Adj. satflow	*398*	*1575*		*915*	*1777*		*1165*	*1806*		*1294*	*1777*	
Sec. adj. satflow			--			--			--			--

CAPACITY AND LOS WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*40*	*379*		*112*	*709*		*287*	*118*		*202*	*228*	
Satflow rate	*398*	*1575*		*915*	*1777*		*1165*	*1806*		*1294*	*1777*	
Lost time	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Green ratio	*0.50*	*0.50*		*0.50*	*0.50*		*0.30*	*0.30*		*0.30*	*0.30*	
Lane group cap.	*199*	*788*		*458*	*889*		*350*	*542*		*388*	*533*	
v/c ratio	*0.20*	*0.48*		*0.24*	*0.80*		*0.82*	*0.22*		*0.52*	*0.43*	
Flow ratio	*0.10*	*0.24*		*0.12*	*0.40*		*0.25*	*0.07*		*0.16*	*0.13*	
Crit. lane group	*N*	*N*		*N*	*Y*		*Y*	*N*		*N*	*N*	
Sum flow ratios	*0.65*											
Lost time/cycle	*10.00*											
Critical v/c ratio	*0.81*											

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*40*	*379*		*112*	*709*		*287*	*118*		*202*	*228*	
Lane group cap.	*199*	*788*		*458*	*889*		*350*	*542*		*388*	*533*	
v/c ratio	*0.20*	*0.48*		*0.24*	*0.80*		*0.82*	*0.22*		*0.52*	*0.43*	
Green ratio	*0.50*	*0.50*		*0.50*	*0.50*		*0.30*	*0.30*		*0.30*	*0.30*	
Unif. delay d1	*6.9*	*8.2*		*7.1*	*10.4*		*16.2*	*13.1*		*14.5*	*14.1*	
Delay factor k	*0.50*	*0.50*		*0.50*	*0.50*		*0.50*	*0.50*		*0.50*	*0.50*	
Increm. delay d2	*2.3*	*2.1*		*1.3*	*7.4*		*19.0*	*0.9*		*4.9*	*2.5*	
PF factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Control delay	*9.2*	*10.3*		*8.4*	*17.8*		*35.2*	*14.0*		*19.4*	*16.6*	
Lane group LOS	*A*	*B*		*A*	*B*		*D*	*B*		*B*	*B*	
Apprch. delay	*10.2*			*16.5*			*29.1*			*17.9*		
Approach LOS	*B*			*B*			*C*			*B*		
Intersec. delay	*18.0*			Intersection LOS						*B*		

SUPPLEMENTAL UNIFORM DELAY WORKSHEET FOR LEFT TURNS FROM EXCLUSIVE LANES WITH PROTECTED AND PERMITTED PHASES

General Information

Project Description *SR 247 - Spring Hill*

v/c Ratio Computation

	EB	WB	NB	SB
Cycle length, C (s)	*50.0*			
Prot. phase eff. green intvl, g (s)				
Opposed queue eff. green intvl, g_q (s)				
Unopposed green intvl, g_u (s)				
Red time, r(s)				
Arrival rate, q_a (veh/s)				
Prot. phase departure rate, s_p (veh/s)				
Perm. phase departure rate, s_s (veh/s)				
X_{perm}				
X_{prot} (N/A for lagging left-turns)				
Uniform Queue Size and Delay Computations				
Queue at start of green arrow, Q_a				
Queue at start of unsaturated green, Q_u				
Residual queue, Q_r				
Uniform delay, d_1				

Uniform Queue Size and Delay Equations

	Case	Q_a	Q_u	Q_r	d_1
If X_{perm} <= 1.0 & X_{prot} <= 1.0	1	$q_a r$	$q_a g_q$	0	$[0.5/(q_a C)][r Q_a + Q_a^{2/(s_p - q_s)} + g_q Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} <= 1.0 & X_{prot} > 1.0	2	$q_a r$	$Q_r + q_a g_q$	$Q_a - g(s_p - q_a)$	$[0.5/(q_a C)][r Q_a + g(Q_a + Q_r) + g_q (Q_r + Q_u) + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 & X_{prot} <= 1.0	3	$Q_r + q_a r$	$q_a g_q$	$Q_u - g_u(s_s - q_a)$	$[0.5/(q_a C)][g_q Q_u + g_u(Q_a + Q_r) + r(Q_r + Q_a) + Q_a^{2/(s_p - q_a)}$
If X_{perm} <= 1.0 (lagging lefts)	4	0	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 (lagging lefts)	5	$Q_u - g_u(s_s - q_a)$	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + g_u(Q_u + Q_a) + Q_a^{2/(s_p - q_a)}$

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Init. queue/lane	*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*	
Flow rate/lane	*40*	*379*		*112*	*709*		*287*	*118*		*202*	*228*	
Satflow per lane	*398*	*1575*		*915*	*1777*		*1165*	*1806*		*1294*	*1777*	
Capacity/lane	*199*	*788*		*458*	*889*		*350*	*542*		*388*	*533*	
Flow ratio	*0.10*	*0.24*		*0.12*	*0.40*		*0.25*	*0.07*		*0.16*	0.13	
v/c ratio	*0.20*	*0.48*		*0.24*	*0.80*		*0.82*	*0.22*		*0.52*	*0.43*	
I factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Arrival type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Platoon ratio	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
PF factor	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
Q_1	*0.3*	*3.5*		*0.9*	*8.2*		*3.7*	*1.2*		*2.3*	*2.5*	
k_B	*0.2*	*0.6*		*0.4*	*0.7*		*0.4*	*0.5*		*0.4*	*0.5*	
Q_2	*0.1*	*0.6*		*0.1*	*2.5*		*1.4*	*0.1*		*0.4*	*0.4*	
Q avg.	*0.4*	*4.1*		*1.0*	*10.7*		*5.1*	*1.4*		*2.7*	*2.9*	

Percentile Back of Queue (95th percentile)

$f_{B\%}$	*2.5*	*2.0*		*2.4*	*1.7*		*2.0*	*2.4*		*2.2*	*2.2*	
BOQ, $Q_{\%}$	*0.9*	*8.3*		*2.5*	*18.3*		*10.0*	*3.2*		*6.0*	*6.3*	

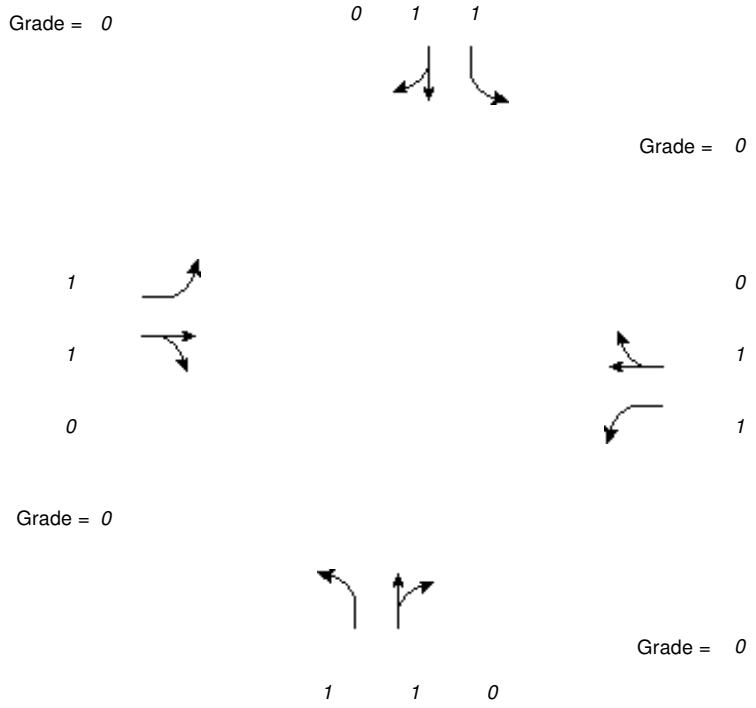
Queue Storage Ratio

Q spacing	*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*	
Q storage	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Avg. R_Q												
95% $R_{Q\%}$												

LONG REPORT

General Information		Site Information	
Analyst	*Brady Griggs*	Intersection	*#4*
Agency or Co.	*Clinard Engineering Associates*	Area Type	*All other areas*
Date Performed	*2/9/06*	Jurisdiction	*Maury County*
Time Period	*PM Proposed*	Analysis Year	*2030*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*161*	*408*	*299*	*81*	*350*	*188*	*268*	*196*	*81*	*198*	*256*	*133*
% Heavy veh	*4*	*4*	*4*	*4*	*4*	*4*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Ext. eff. green	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Arrival type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Unit Extension	*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*0*	*0*		*0*
Lane Width	*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Ped timing	*3.2*			*3.2*			*3.2*			*3.2*		

	EW Perm	02	03	04	Excl. Left	NS Perm	07	08
Timing	G = *45.0*	G =	G =	G =	G = *10.0*	G = *20.0*	G =	G =
	Y = *5*	Y =	Y =	Y =	Y = *5*	Y = *5*	Y =	Y =
Duration of Analysis (hrs) = *0.25*						Cycle Length C = *90.0*		

VOLUME ADJUSTMENT AND SATURATION FLOW RATE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Volume Adjustment

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume	*161*	*408*	*299*	*81*	*350*	*188*	*268*	*196*	*81*	*198*	*256*	*133*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Adj. Flow Rate	*179*	*453*	*332*	*90*	*389*	*209*	*298*	*218*	*90*	*220*	*284*	*148*
Lane Group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*179*	*785*		*90*	*598*		*298*	*308*		*220*	*432*	
Prop. LT or RT	*0.000*	--	*0.423*	*0.000*	--	*0.349*	*0.000*	--	*0.292*	*0.000*	--	*0.343*

Saturation Flow Rate

Base satflow	*1900*	*1900*		*1900*	*1900*		*1900*	*1900*		*1900*	*1900*	
Num. of lanes	*1*	*1*	*0*	*1*	*1*	*0*	*1*	*1*	*0*	*1*	*1*	*0*
fW	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fHV	*0.962*	*0.962*		*0.962*	*0.962*		*1.000*	*1.000*		*1.000*	*1.000*	
fg	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fp	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fbb	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fa	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
fLU	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
fLT	*0.269*	*1.000*	--	*0.124*	*1.000*	--	*0.950*	*1.000*	--	*0.950*	*1.000*	--
Secondary fLT			--			--	*0.160*		--	*0.242*		--
fRT	--	*0.937*		--	*0.948*		--	*0.956*		--	*0.949*	
fLpb	*1.000*	*1.000*	--	*1.000*	*1.000*	--	*1.000*	*1.000*	--	*1.000*	*1.000*	--
fRpb	--	*1.000*		--	*1.000*		--	*1.000*		--	*1.000*	
Adj. satflow	*492*	*1711*		*227*	*1731*		*1805*	*1817*		*1805*	*1802*	
Sec. adj. satflow			--			--	*304*		--	*459*		--

CAPACITY AND LOS WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*179*	*785*		*90*	*598*		*298*	*308*		*220*	*432*	
Satflow rate	*492*	*1711*		*227*	*1731*		*1805*	*1817*		*1805*	*1802*	
Lost time	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Green ratio	*0.50*	*0.50*		*0.50*	*0.50*		*0.39*	*0.22*		*0.39*	*0.22*	
Lane group cap.	*246*	*856*		*114*	*866*		*285*	*404*		*329*	*400*	
v/c ratio	*0.73*	*0.92*		*0.79*	*0.69*		*1.05*	*0.76*		*0.67*	*1.08*	
Flow ratio	*0.36*	*0.46*		*0.40*	*0.35*			*0.17*			*0.22*	
Crit. lane group	*N*	*Y*		*N*	*N*		*N*	*N*		*N*	*N*	
Sum flow ratios	*0.89*											
Lost time/cycle	*10.00*											
Critical v/c ratio	*1.00*											

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*179*	*785*		*90*	*598*		*298*	*308*		*220*	*432*	
Lane group cap.	*246*	*856*		*114*	*866*		*285*	*404*		*329*	*400*	
v/c ratio	*0.73*	*0.92*		*0.79*	*0.69*		*1.05*	*0.76*		*0.67*	*1.08*	
Green ratio	*0.50*	*0.50*		*0.50*	*0.50*		*0.39*	*0.22*		*0.39*	*0.22*	
Unif. delay d1	*17.7*	*20.8*		*18.6*	*17.2*		*22.8*	*32.8*		*20.6*	*35.0*	
Delay factor k	*0.50*	*0.50*		*0.50*	*0.50*		*0.50*	*0.50*		*0.50*	*0.50*	
Increm. delay d2	*17.1*	*16.2*		*41.2*	*4.5*		*65.7*	*12.8*		*10.3*	*68.1*	
PF factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Control delay	*34.8*	*37.0*		*59.8*	*21.7*		*88.5*	*45.5*		*30.9*	*103.1*	
Lane group LOS	*C*	*D*		*E*	*C*		*F*	*D*		*C*	*F*	
Apprch. delay	*36.6*			*26.7*			*66.7*			*78.8*		
Approach LOS	*D*			*C*			*E*			*E*		
Intersec. delay	*50.0*			Intersection LOS						*D*		

SUPPLEMENTAL UNIFORM DELAY WORKSHEET FOR LEFT TURNS FROM EXCLUSIVE LANES WITH PROTECTED AND PERMITTED PHASES

General Information

Project Description *SR 247 - Spring Hill*

v/c Ratio Computation

	EB	WB	NB	SB
Cycle length, C (s)	*90.0*			
Prot. phase eff. green intvl, g (s)			*10.0*	*10.0*
Opposed queue eff. green intvl, g_q (s)			*21.00*	*14.45*
Unopposed green intvl, g_u (s)			*4.00*	*10.55*
Red time, r(s)			*55.0*	*55.0*
Arrival rate, q_a (veh/s)			*0.08*	*0.06*
Prot. phase departure rate, s_p (veh/s)			*0.501*	*0.501*
Perm. phase departure rate, s_s (veh/s)			*0.53*	*0.30*
X_{perm}			*0.94*	*0.48*
X_{prot} (N/A for lagging left-turns)			*1.03*	*0.79*
Uniform Queue Size and Delay Computations				
Queue at start of green arrow, Q_a			*4.35*	*3.36*
Queue at start of unsaturated green, Q_u			*1.53*	*0.88*
Residual queue, Q_r			*0.13*	*0.00*
Uniform delay, d_1			*22.8*	*20.6*

Uniform Queue Size and Delay Equations

	Case	Q_a	Q_u	Q_r	d_1
If X_{perm} <= 1.0 & X_{prot} <= 1.0	1	$q_a r$	$q_a g_q$	0	$[0.5/(q_a C)][r Q_a + Q_a^{2/(s_p - q_s)} + g_q Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} <= 1.0 & X_{prot} > 1.0	2	$q_a r$	$Q_r + q_a g_q$	$Q_a - g(s_p - q_a)$	$[0.5/(q_a C)][r Q_a + g(Q_a + Q_r) + g_q (Q_r + Q_u) + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 & X_{prot} <= 1.0	3	$Q_r + q_a r$	$q_a g_q$	$Q_u - g_u(s_s - q_a)$	$[0.5/(q_a C)][g_q Q_u + g_u(Q_a + Q_r) + r(Q_r + Q_a) + Q_a^{2/(s_p - q_a)}$
If X_{perm} <= 1.0 (lagging lefts)	4	0	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q) Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 (lagging lefts)	5	$Q_u - g_u(s_s - q_a)$	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q) Q_u + g_u(Q_u + Q_a) + Q_a^{2/(s_p - q_a)}$

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Init. queue/lane	*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*	
Flow rate/lane	*179*	*785*		*90*	*598*		*298*	*308*		*220*	*432*	
Satflow per lane	*492*	*1711*		*227*	*1731*		*733*	*1817*		*844*	*1802*	
Capacity/lane	*246*	*856*		*114*	*866*		*285*	*404*		*329*	*400*	
Flow ratio	*0.36*	*0.46*		*0.40*	*0.35*		*0.41*	*0.17*		*0.26*	0.24	
v/c ratio	*0.73*	*0.92*		*0.79*	*0.69*		*1.05*	*0.76*		*0.67*	*1.08*	
I factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Arrival type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Platoon ratio	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
PF factor	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
Q_1	*3.5*	*18.1*		*1.9*	*11.4*		*5.1*	*7.2*		*3.6*	*10.8*	
k_B	*0.4*	*1.0*		*0.2*	*1.0*		*0.5*	*0.6*		*0.5*	*0.6*	
Q_2	*1.0*	*6.5*		*0.7*	*2.2*		*5.1*	*1.7*		*1.0*	*8.0*	
Q avg.	*4.5*	*24.6*		*2.6*	*13.6*		*10.2*	*8.9*		*4.6*	*18.8*	

Percentile Back of Queue (95th percentile)

$f_{B\%}$	*2.0*	*1.6*		*2.2*	*1.7*		*1.7*	*1.8*		*2.0*	*1.6*	
BOQ, $Q_{\%}$	*9.1*	*39.6*		*5.7*	*22.6*		*17.7*	*15.8*		*9.2*	*30.6*	

Queue Storage Ratio

Q spacing	*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*	
Q storage	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Avg. R_Q												
95% $R_{Q\%}$												

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brady Griggs*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*2/9/06*
Analysis Time Period	*AM Proposed*

Site Information

Intersection	*#5*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *Hurt Road*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*48*	*197*	*313*	*101*	*655*	*52*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*53*	*218*	*0*	*0*	*727*	*57*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Two Way Left Turn Lane*					
RT Channelized?			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*0*
Configuration	*L*	*T*				*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*258*	*71*	*35*	*73*	*117*	*84*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*0*	*0*	*0*	*81*	*0*	*93*
Proportion of heavy vehicles, P_{HV}	*0*	*0*	*0*	*0*	*0*	*0*
Percent grade (%)		*0*			*0*	
Flared approach		*Y*			*N*	
Storage		*2*			*0*	
RT Channelized?			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*						*LR*	
Volume, v (vph)	*53*						*174*	
Capacity, c_m (vph)	*826*						*434*	
v/c ratio	*0.06*						*0.40*	
Queue length (95%)	*0.21*						*1.90*	

Control Delay (s/veh)	*9.7*						*18.7*	
LOS	*A*						*C*	
Approach delay (s/veh)	--	--				*18.7*		
Approach LOS	--	--				*C*		

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brady Griggs*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*2/9/06*
Analysis Time Period	*PM Proposed*

Site Information

Intersection	*#5*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *Hurt Road*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*76*	*611*	*313*	*101*	*579*	*72*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*84*	*678*	*0*	*0*	*643*	*80*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Two Way Left Turn Lane*					
RT Channelized?			*0*			*0*
Lanes	*1*	*1*	*0*	*0*	*1*	*0*
Configuration	*L*	*T*				*TR*
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*258*	*71*	*35*	*51*	*117*	*40*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*0*	*0*	*0*	*56*	*0*	*44*
Proportion of heavy vehicles, P_{HV}	*0*	*0*	*0*	*0*	*0*	*0*
Percent grade (%)		*0*			*0*	
Flared approach		*Y*			*N*	
Storage		*2*			*0*	
RT Channelized?			*0*			*0*
Lanes	*0*	*0*	*0*	*0*	*0*	*0*
Configuration					*LR*	

Control Delay, Queue Length, Level of Service

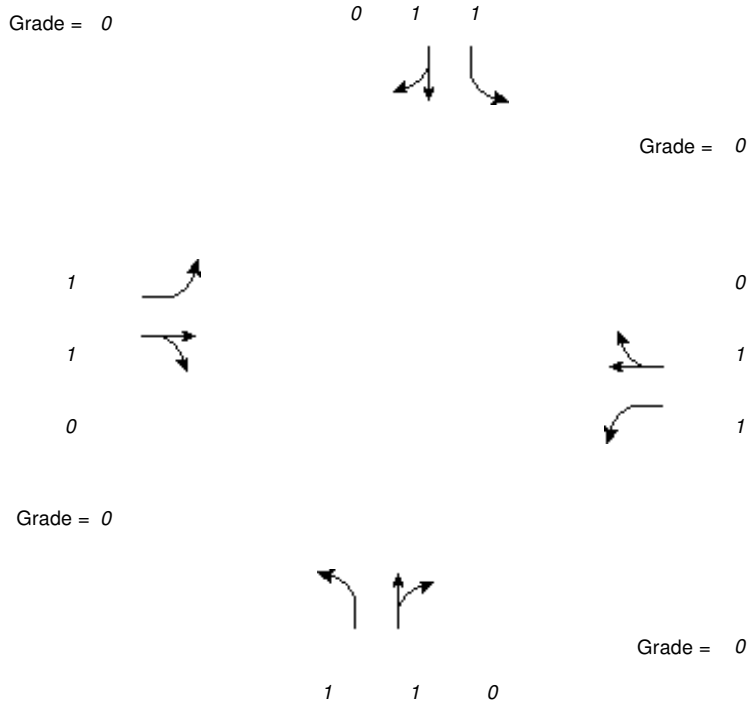
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	*L*						*LR*	
Volume, v (vph)	*84*						*100*	
Capacity, c_m (vph)	*870*						*408*	
v/c ratio	*0.10*						*0.25*	
Queue length (95%)	*0.32*						*0.95*	

Control Delay (s/veh)	*9.6*						*16.7*	
LOS	*A*						*C*	
Approach delay (s/veh)	--	--				*16.7*		
Approach LOS	--	--				*C*		

LONG REPORT

General Information		Site Information	
Analyst	*Brady Griggs*	Intersection	*#6*
Agency or Co.	*Clinard Engineering Associates*	Area Type	*All other areas*
Date Performed	*2/9/06*	Jurisdiction	*Maury County*
Time Period	*AM Proposed*	Analysis Year	*2030*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*198*	*21*	*51*	*67*	*271*	*239*	*99*	*158*	*60*	*170*	*55*	*337*
% Heavy veh	*4*	*4*	*4*	*4*	*4*	*4*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Ext. eff. green	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Arrival type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Unit Extension	*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*0*	*0*		*0*
Lane Width	*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Ped timing	*3.2*			*3.2*			*3.2*			*3.2*		

	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = *30.0*	G =	G =	G =	G = *20.0*	G =	G =	G =
	Y = *5*	Y =	Y =	Y =	Y = *5*	Y =	Y =	Y =
Duration of Analysis (hrs) = *0.25*					Cycle Length C = *60.0*			

VOLUME ADJUSTMENT AND SATURATION FLOW RATE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Volume Adjustment

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume	*198*	*21*	*51*	*67*	*271*	*239*	*99*	*158*	*60*	*170*	*55*	*337*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Adj. Flow Rate	*220*	*23*	*57*	*74*	*301*	*266*	*110*	*176*	*67*	*189*	*61*	*374*
Lane Group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*220*	*80*		*74*	*567*		*110*	*243*		*189*	*435*	
Prop. LT or RT	*0.000*	--	*0.712*	*0.000*	--	*0.469*	*0.000*	--	*0.276*	*0.000*	--	*0.860*

Saturation Flow Rate

Base satflow	*1900*	*1900*		*1900*	*1900*		*1900*	*1900*		*1900*	*1900*	
Num. of lanes	*1*	*1*	*0*	*1*	*1*	*0*	*1*	*1*	*0*	*1*	*1*	*0*
fW	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fHV	*0.962*	*0.962*		*0.962*	*0.962*		*1.000*	*1.000*		*1.000*	*1.000*	
fg	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fp	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fbb	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fa	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
fLU	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
fLT	*0.319*	*1.000*	--	*0.705*	*1.000*	--	*0.312*	*1.000*	--	*0.570*	*1.000*	--
Secondary fLT			--			--			--			--
fRT	--	*0.893*		--	*0.930*		--	*0.959*		--	*0.871*	
fLpb	*1.000*	*1.000*	--	*1.000*	*1.000*	--	*1.000*	*1.000*	--	*1.000*	*1.000*	--
fRpb	--	*1.000*		--	*1.000*		--	*1.000*		--	*1.000*	
Adj. satflow	*583*	*1632*		*1288*	*1698*		*593*	*1821*		*1083*	*1655*	
Sec. adj. satflow			--			--			--			--

CAPACITY AND LOS WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*220*	*80*		*74*	*567*		*110*	*243*		*189*	*435*	
Satflow rate	*583*	*1632*		*1288*	*1698*		*593*	*1821*		*1083*	*1655*	
Lost time	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Green ratio	*0.50*	*0.50*		*0.50*	*0.50*		*0.33*	*0.33*		*0.33*	*0.33*	
Lane group cap.	*292*	*816*		*644*	*849*		*198*	*607*		*361*	*552*	
v/c ratio	*0.75*	*0.10*		*0.11*	*0.67*		*0.56*	*0.40*		*0.52*	*0.79*	
Flow ratio	*0.38*	*0.05*		*0.06*	*0.33*		*0.19*	*0.13*		*0.17*	*0.26*	
Crit. lane group	*Y*	*N*		*N*	*N*		*N*	*N*		*N*	*Y*	
Sum flow ratios	*0.64*											
Lost time/cycle	*10.00*											
Critical v/c ratio	*0.77*											

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*220*	*80*		*74*	*567*		*110*	*243*		*189*	*435*	
Lane group cap.	*292*	*816*		*644*	*849*		*198*	*607*		*361*	*552*	
v/c ratio	*0.75*	*0.10*		*0.11*	*0.67*		*0.56*	*0.40*		*0.52*	*0.79*	
Green ratio	*0.50*	*0.50*		*0.50*	*0.50*		*0.33*	*0.33*		*0.33*	*0.33*	
Unif. delay d1	*12.0*	*7.9*		*8.0*	*11.3*		*16.4*	*15.4*		*16.2*	*18.1*	
Delay factor k	*0.50*	*0.50*		*0.50*	*0.50*		*0.50*	*0.50*		*0.50*	*0.50*	
Increm. delay d2	*16.4*	*0.2*		*0.4*	*4.1*		*10.8*	*2.0*		*5.3*	*10.9*	
PF factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Control delay	*28.4*	*8.1*		*8.3*	*15.4*		*27.1*	*17.4*		*21.5*	*29.0*	
Lane group LOS	*C*	*A*		*A*	*B*		*C*	*B*		*C*	*C*	
Apprch. delay	*23.0*			*14.6*			*20.4*			*26.7*		
Approach LOS	*C*			*B*			*C*			*C*		
Intersec. delay	*20.9*			Intersection LOS						*C*		

SUPPLEMENTAL UNIFORM DELAY WORKSHEET FOR LEFT TURNS FROM EXCLUSIVE LANES WITH PROTECTED AND PERMITTED PHASES

General Information

Project Description *SR 247 - Spring Hill*

v/c Ratio Computation

	EB	WB	NB	SB
Cycle length, C (s)	*60.0*			
Prot. phase eff. green intvl, g (s)				
Opposed queue eff. green intvl, g_q (s)				
Unopposed green intvl, g_u (s)				
Red time, r(s)				
Arrival rate, q_a (veh/s)				
Prot. phase departure rate, s_p (veh/s)				
Perm. phase departure rate, s_s (veh/s)				
X_{perm}				
X_{prot} (N/A for lagging left-turns)				
Uniform Queue Size and Delay Computations				
Queue at start of green arrow, Q_a				
Queue at start of unsaturated green, Q_u				
Residual queue, Q_r				
Uniform delay, d_1				

Uniform Queue Size and Delay Equations

	Case	Q_a	Q_u	Q_r	d_1
If X_{perm} <= 1.0 & X_{prot} <= 1.0	1	$q_a r$	$q_a g_q$	0	$[0.5/(q_a C)][r Q_a + Q_a^{2/(s_p - q_s)} + g_q Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} <= 1.0 & X_{prot} > 1.0	2	$q_a r$	$Q_r + q_a g_q$	$Q_a - g(s_p - q_a)$	$[0.5/(q_a C)][r Q_a + g(Q_a + Q_r) + g_q (Q_r + Q_u) + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 & X_{prot} <= 1.0	3	$Q_r + q_a r$	$q_a g_q$	$Q_u - g_u(s_s - q_a)$	$[0.5/(q_a C)][g_q Q_u + g_u(Q_a + Q_r) + r(Q_r + Q_a) + Q_a^{2/(s_p - q_a)}$
If X_{perm} <= 1.0 (lagging lefts)	4	0	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 (lagging lefts)	5	$Q_u - g_u(s_s - q_a)$	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + g_u(Q_u + Q_a) + Q_a^{2/(s_p - q_a)}$

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Init. queue/lane	*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*	
Flow rate/lane	*220*	*80*		*74*	*567*		*110*	*243*		*189*	*435*	
Satflow per lane	*583*	*1632*		*1288*	*1698*		*593*	*1821*		*1083*	*1655*	
Capacity/lane	*292*	*816*		*644*	*849*		*198*	*607*		*361*	*552*	
Flow ratio	*0.38*	*0.05*		*0.06*	*0.33*		*0.19*	*0.13*		*0.17*	0.26	
v/c ratio	*0.75*	*0.10*		*0.11*	*0.67*		*0.56*	*0.40*		*0.52*	*0.79*	
I factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Arrival type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Platoon ratio	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
PF factor	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
Q_1	*2.9*	*0.7*		*0.7*	*7.1*		*1.5*	*3.1*		*2.5*	*6.6*	
k_B	*0.4*	*0.7*		*0.6*	*0.8*		*0.3*	*0.6*		*0.4*	*0.6*	
Q_2	*1.0*	*0.1*		*0.1*	*1.5*		*0.3*	*0.4*		*0.5*	*1.9*	
Q avg.	*3.9*	*0.8*		*0.7*	*8.6*		*1.8*	*3.5*		*3.0*	*8.4*	

Percentile Back of Queue (95th percentile)

$f_{B\%}$	*2.1*	*2.5*		*2.5*	*1.8*		*2.3*	*2.1*		*2.1*	*1.8*	
BOQ, $Q_{\%}$	*8.1*	*1.9*		*1.8*	*15.3*		*4.2*	*7.4*		*6.4*	*15.0*	

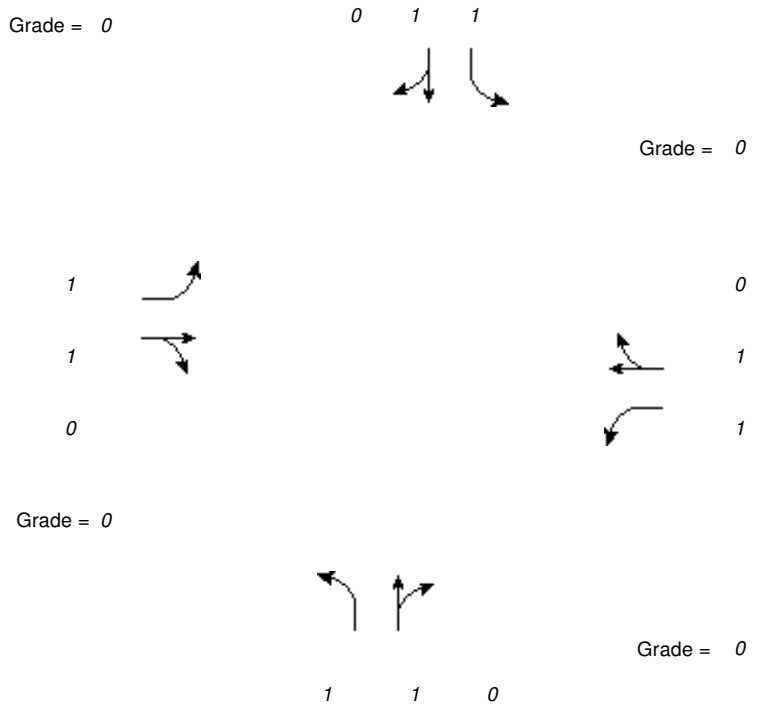
Queue Storage Ratio

Q spacing	*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*	
Q storage	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Avg. R_Q												
95% $R_{Q\%}$												

LONG REPORT

General Information		Site Information	
Analyst	*Brady Griggs*	Intersection	*#6*
Agency or Co.	*Clinard Engineering Associates*	Area Type	*All other areas*
Date Performed	*2/9/06*	Jurisdiction	*Maury County*
Time Period	*PM Proposed*	Analysis Year	*2030*

Intersection Geometry



Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume (vph)	*118*	*195*	*349*	*72*	*385*	*170*	*56*	*178*	*71*	*235*	*199*	*210*
% Heavy veh	*4*	*4*	*4*	*4*	*4*	*4*	*0*	*0*	*0*	*0*	*0*	*0*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Actuated (P/A)	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*	*P*
Startup lost time	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Ext. eff. green	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Arrival type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Unit Extension	*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*		*3.0*	*3.0*	
Ped/Bike/RTOR Volume	*0*		*0*	*0*		*0*	*0*		*0*	*0*		*0*
Lane Width	*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*		*12.0*	*12.0*	
Parking (Y or N)	*N*		*N*	*N*		*N*	*N*		*N*	*N*		*N*
Parking/hr												
Bus stops/hr	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Ped timing	*3.2*			*3.2*			*3.2*			*3.2*		

	EW Perm	02	03	04	NS Perm	06	07	08
Timing	G = *30.0*	G =	G =	G =	G = *20.0*	G =	G =	G =
	Y = *5*	Y =	Y =	Y =	Y = *5*	Y =	Y =	Y =
Duration of Analysis (hrs) = *0.25*					Cycle Length C = *60.0*			

VOLUME ADJUSTMENT AND SATURATION FLOW RATE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Volume Adjustment

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Volume	*118*	*195*	*349*	*72*	*385*	*170*	*56*	*178*	*71*	*235*	*199*	*210*
PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Adj. Flow Rate	*131*	*217*	*388*	*80*	*428*	*189*	*62*	*198*	*79*	*261*	*221*	*233*
Lane Group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*131*	*605*		*80*	*617*		*62*	*277*		*261*	*454*	
Prop. LT or RT	*0.000*	--	*0.641*	*0.000*	--	*0.306*	*0.000*	--	*0.285*	*0.000*	--	*0.513*

Saturation Flow Rate

Base satflow	*1900*	*1900*		*1900*	*1900*		*1900*	*1900*		*1900*	*1900*	
Num. of lanes	*1*	*1*	*0*	*1*	*1*	*0*	*1*	*1*	*0*	*1*	*1*	*0*
fW	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fHV	*0.962*	*0.962*		*0.962*	*0.962*		*1.000*	*1.000*		*1.000*	*1.000*	
fg	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fp	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fbb	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
fa	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
fLU	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
fLT	*0.278*	*1.000*	--	*0.288*	*1.000*	--	*0.288*	*1.000*	--	*0.522*	*1.000*	--
Secondary fLT			--			--			--			--
fRT	--	*0.904*		--	*0.954*		--	*0.957*		--	*0.923*	
fLpb	*1.000*	*1.000*	--	*1.000*	*1.000*	--	*1.000*	*1.000*	--	*1.000*	*1.000*	--
fRpb	--	*1.000*		--	*1.000*		--	*1.000*		--	*1.000*	
Adj. satflow	*508*	*1651*		*526*	*1743*		*548*	*1819*		*992*	*1754*	
Sec. adj. satflow			--			--			--			--

CAPACITY AND LOS WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Capacity Analysis

	EB			WB			NB			SB		
Lane group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*131*	*605*		*80*	*617*		*62*	*277*		*261*	*454*	
Satflow rate	*508*	*1651*		*526*	*1743*		*548*	*1819*		*992*	*1754*	
Lost time	*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*		*2.0*	*2.0*	
Green ratio	*0.50*	*0.50*		*0.50*	*0.50*		*0.33*	*0.33*		*0.33*	*0.33*	
Lane group cap.	*254*	*826*		*263*	*872*		*183*	*606*		*331*	*585*	
v/c ratio	*0.52*	*0.73*		*0.30*	*0.71*		*0.34*	*0.46*		*0.79*	*0.78*	
Flow ratio	*0.26*	*0.37*		*0.15*	*0.35*		*0.11*	*0.15*		*0.26*	*0.26*	
Crit. lane group	*N*	*Y*		*N*	*N*		*N*	*N*		*Y*	*N*	
Sum flow ratios	*0.63*											
Lost time/cycle	*10.00*											
Critical v/c ratio	*0.76*											

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Lane group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Adj. flow rate	*131*	*605*		*80*	*617*		*62*	*277*		*261*	*454*	
Lane group cap.	*254*	*826*		*263*	*872*		*183*	*606*		*331*	*585*	
v/c ratio	*0.52*	*0.73*		*0.30*	*0.71*		*0.34*	*0.46*		*0.79*	*0.78*	
Green ratio	*0.50*	*0.50*		*0.50*	*0.50*		*0.33*	*0.33*		*0.33*	*0.33*	
Unif. delay d1	*10.1*	*11.8*		*8.8*	*11.6*		*15.0*	*15.7*		*18.1*	*18.0*	
Delay factor k	*0.50*	*0.50*		*0.50*	*0.50*		*0.50*	*0.50*		*0.50*	*0.50*	
Increm. delay d2	*7.3*	*5.7*		*3.0*	*4.8*		*5.0*	*2.5*		*17.2*	*9.7*	
PF factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Control delay	*17.4*	*17.5*		*11.8*	*16.4*		*20.0*	*18.2*		*35.3*	*27.7*	
Lane group LOS	*B*	*B*		*B*	*B*		*B*	*B*		*D*	*C*	
Apprch. delay	*17.5*			*15.9*			*18.5*			*30.5*		
Approach LOS	*B*			*B*			*B*			*C*		
Intersec. delay	*20.9*			Intersection LOS						*C*		

SUPPLEMENTAL UNIFORM DELAY WORKSHEET FOR LEFT TURNS FROM EXCLUSIVE LANES WITH PROTECTED AND PERMITTED PHASES

General Information

Project Description *SR 247 - Spring Hill*

v/c Ratio Computation

	EB	WB	NB	SB
Cycle length, C (s)	*60.0*			
Prot. phase eff. green intvl, g (s)				
Opposed queue eff. green intvl, g_q (s)				
Unopposed green intvl, g_u (s)				
Red time, r(s)				
Arrival rate, q_a (veh/s)				
Prot. phase departure rate, s_p (veh/s)				
Perm. phase departure rate, s_s (veh/s)				
X_{perm}				
X_{prot} (N/A for lagging left-turns)				
Uniform Queue Size and Delay Computations				
Queue at start of green arrow, Q_a				
Queue at start of unsaturated green, Q_u				
Residual queue, Q_r				
Uniform delay, d_1				

Uniform Queue Size and Delay Equations

	Case	Q_a	Q_u	Q_r	d_1
If X_{perm} <= 1.0 & X_{prot} <= 1.0	1	$q_a r$	$q_a g_q$	0	$[0.5/(q_a C)][r Q_a + Q_a^{2/(s_p - q_s)} + g_q Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} <= 1.0 & X_{prot} > 1.0	2	$q_a r$	$Q_r + q_a g_q$	$Q_a - g(s_p - q_a)$	$[0.5/(q_a C)][r Q_a + g(Q_a + Q_r) + g_q (Q_r + Q_u) + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 & X_{prot} <= 1.0	3	$Q_r + q_a r$	$q_a g_q$	$Q_u - g_u(s_s - q_a)$	$[0.5/(q_a C)][g_q Q_u + g_u(Q_a + Q_r) + r(Q_r + Q_a) + Q_a^{2/(s_p - q_a)}$
If X_{perm} <= 1.0 (lagging lefts)	4	0	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + Q_u^{2/(s_s - q_a)}$
If X_{perm} > 1.0 (lagging lefts)	5	$Q_u - g_u(s_s - q_a)$	$q_a(r + g_q)$	0	$[0.5/(q_a C)][r + g_q)Q_u + g_u(Q_u + Q_a) + Q_a^{2/(s_p - q_a)}$

BACK-OF-QUEUE WORKSHEET

General Information

Project Description *SR 247 - Spring Hill*

Average Back of Queue

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Lane group	*L*	*TR*		*L*	*TR*		*L*	*TR*		*L*	*TR*	
Init. queue/lane	*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*		*0.0*	*0.0*	
Flow rate/lane	*131*	*605*		*80*	*617*		*62*	*277*		*261*	*454*	
Satflow per lane	*508*	*1651*		*526*	*1743*		*548*	*1819*		*992*	*1754*	
Capacity/lane	*254*	*826*		*263*	*872*		*183*	*606*		*331*	*585*	
Flow ratio	*0.26*	*0.37*		*0.15*	*0.35*		*0.11*	*0.15*		*0.26*	0.26	
v/c ratio	*0.52*	*0.73*		*0.30*	*0.71*		*0.34*	*0.46*		*0.79*	*0.78*	
I factor	*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*		*1.000*	*1.000*	
Arrival type	*3*	*3*		*3*	*3*		*3*	*3*		*3*	*3*	
Platoon ratio	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
PF factor	*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*		*1.00*	*1.00*	
Q_1	*1.5*	*8.0*		*0.8*	*8.0*		*0.8*	*3.6*		*3.9*	*6.8*	
k_B	*0.3*	*0.8*		*0.3*	*0.8*		*0.3*	*0.6*		*0.4*	*0.6*	
Q_2	*0.3*	*1.9*		*0.1*	*1.8*		*0.1*	*0.5*		*1.3*	*1.8*	
Q avg.	*1.8*	*9.9*		*0.9*	*9.7*		*0.9*	*4.1*		*5.2*	*8.6*	

Percentile Back of Queue (95th percentile)

$f_{B\%}$	*2.3*	*1.7*		*2.4*	*1.7*		*2.4*	*2.0*		*2.0*	*1.8*	
BOQ, $Q_{\%}$	*4.2*	*17.2*		*2.3*	*17.0*		*2.2*	*8.4*		*10.2*	*15.4*	

Queue Storage Ratio

Q spacing	*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*		*25.0*	*25.0*	
Q storage	*0*	*0*		*0*	*0*		*0*	*0*		*0*	*0*	
Avg. R_Q												
95% $R_{Q\%}$												

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brian Gaffney*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*2/23/2006*
Analysis Time Period	*AM Proposed*

Site Information

Intersection	*#7*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *Ferguson Road*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*118*	*173*	*78*	*52*	*524*	*170*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*0*	*192*	*86*	*57*	*582*	*0*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Undivided*					
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*53*	*178*	*34*	*235*	*199*	*210*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*58*	*0*	*37*	*0*	*0*	*0*
Proportion of heavy vehicles, P_{HV}	*0*	*0*	*0*	*0*	*0*	*0*
Percent grade (%)		*0*			*0*	
Flared approach		*N*			*N*	
Storage		*2*			*0*	
RT Channelized?			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*	*L*		*R*			
Volume, v (vph)		*57*	*58*		*37*			
Capacity, c_m (vph)		*1273*	*303*		*855*			
v/c ratio		*0.04*	*0.19*		*0.04*			
Queue length (95%)		*0.14*	*0.69*		*0.14*			

Control Delay (s/veh)		*8.0*	*19.7*		*9.4*			
LOS		*A*	*C*		*A*			
Approach delay (s/veh)	--	--	*15.7*					
Approach LOS	--	--	*C*					

TWO-WAY STOP CONTROL SUMMARY

General Information

Analyst	*Brian Gaffney*
Agency/Co.	*Clinard Engineering Associates*
Date Performed	*2/23/2006*
Analysis Time Period	*PM Proposed*

Site Information

Intersection	*#7*
Jurisdiction	*Williamson County*
Analysis Year	*2030*

Project Description *SR-247 - Spring Hill*

East/West Street: *SR 247* | North/South Street: *Ferguson Road*

Intersection Orientation: *East-West* | Study Period (hrs): *0.25*

Vehicle Volumes and Adjustments

Major Street	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume (veh/h)	*118*	*448*	*53*	*34*	*549*	*170*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*0*	*497*	*58*	*37*	*610*	*0*
Proportion of heavy vehicles, P_{HV}	*4*	--	--	*4*	--	--
Median type	*Undivided*					
RT Channelized?			*0*			*0*
Lanes	*0*	*1*	*1*	*0*	*1*	*0*
Configuration		*T*	*R*	*LT*		
Upstream Signal		*0*			*0*	

Minor Street	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (veh/h)	*78*	*178*	*52*	*235*	*199*	*210*
Peak-hour factor, PHF	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*	*0.90*
Hourly Flow Rate (veh/h)	*86*	*0*	*57*	*0*	*0*	*0*
Proportion of heavy vehicles, P_{HV}	*0*	*0*	*0*	*0*	*0*	*0*
Percent grade (%)		*0*			*0*	
Flared approach		*N*			*N*	
Storage		*2*			*0*	
RT Channelized?			*0*			*0*
Lanes	*1*	*0*	*1*	*0*	*0*	*0*
Configuration	*L*		*R*			

Control Delay, Queue Length, Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration		*LT*	*L*		*R*			
Volume, v (vph)		*37*	*86*		*57*			
Capacity, c_m (vph)		*1005*	*204*		*577*			
v/c ratio		*0.04*	*0.42*		*0.10*			
Queue length (95%)		*0.11*	*1.93*		*0.33*			

Control Delay (s/veh)		*8.7*	*34.9*		*11.9*			
LOS		*A*	*D*		*B*			
Approach delay (s/veh)	--	--	*25.8*					
Approach LOS	--	--	*D*					

PROPOSED SYSTEM (ROADWAY SEGMENTS)

N

MAIN STREET (US-31)

OLD KEDRON ROAD BYPASS

WAKEFIELD SUBDIVISION

PORT ROYAL ROAD

HURT ROAD

BUCKNER LANE

I-65

LOS C (LOS D)

LOS C (LOS D)

LOS C (LOS D)

LOS C (LOS C)

LOS C (LOS C)

LOS C (LOS C)

DUPLEX ROAD (STATE ROUTE 247)

MAIN STREET (US-31)

TO SATURN PKWY

TO SATURN PKWY

WILLIAMS PARK SUBDIVISION

PORT ROYAL RD

TO SATURN PKWY

BUCKNER LANE

FERGUSON ROAD

I-65

SEGMENT LOS (PROP.)

STATE ROUTE 247
(DUPLEX ROAD)
SPRING HILL, TENNESSEE
MAURY & WILLIAMSON
COUNTIES

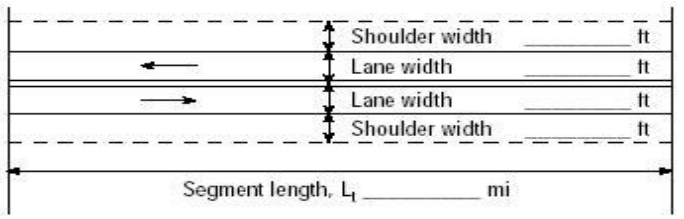
2010
(2030)

N.T.S.

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brady Griggs	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Main St / Bypass
Date Performed	2/9/06	Jurisdiction	Maury County
Analysis Time Period	Proposed	Analysis Year	2010

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	655 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	10

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	734
v_p * highest directional split proportion[2] (pc/h)	404

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	2.6 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	2.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	39.9 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	39.9 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	3.3
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	30.9

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	731
v_p * highest directional split proportion[2] (pc/h)	402
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	47.4
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	16.9
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	64.3

Level of Service and Other Performance Measures

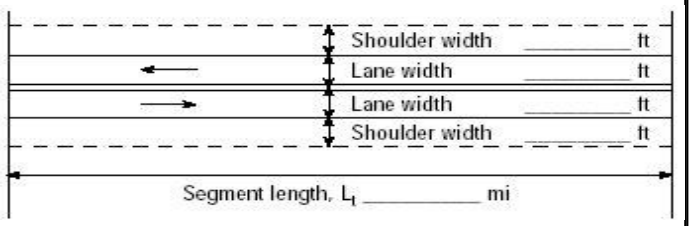
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.23
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	73
	262

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	2.4
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brady Griggs	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Main St / Bypass
Date Performed	2/9/06	Jurisdiction	Maury County
Analysis Time Period	Proposed	Analysis Year	2030

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1178 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	10

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1314
v_p * highest directional split proportion[2] (pc/h)	723

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	2.6 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	2.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	39.9 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	39.9 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	1.9
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	27.8

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1309
v_p * highest directional split proportion[2] (pc/h)	720
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	68.4
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	9.0
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	77.4

Level of Service and Other Performance Measures

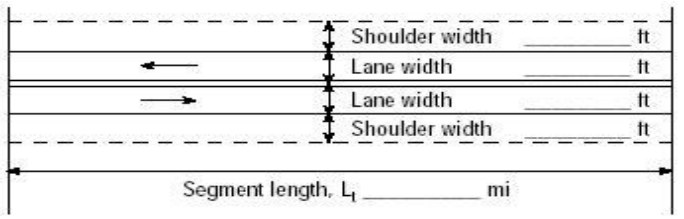
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.41
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	131
	471

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	4.7
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brady Griggs	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Bypass / Wakefield Subdivisio
Date Performed	2/9/06	Jurisdiction	Maury County
Analysis Time Period	Proposed	Analysis Year	2010

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	713 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	10

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	799
v_p * highest directional split proportion[2] (pc/h)	439

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	2.6 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	2.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	39.9 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	39.9 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	3.0
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	30.7

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	795
v_p * highest directional split proportion[2] (pc/h)	437
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	50.3
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	15.0
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	65.3

Level of Service and Other Performance Measures

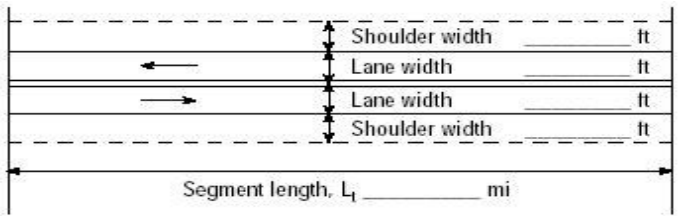
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.25
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	158
	570

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	5.1
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brady Griggs	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Bypass / Wakefield Subdivisio
Date Performed	2/9/06	Jurisdiction	Maury County
Analysis Time Period	Proposed	Analysis Year	2030

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1283 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	10

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1431
v_p * highest directional split proportion[2] (pc/h)	787

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	2.6 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	2.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	39.9 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	39.9 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	1.7
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	27.1

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.0
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	1.000
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1426
v_p * highest directional split proportion[2] (pc/h)	784
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	71.4
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	7.8
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	79.3

Level of Service and Other Performance Measures

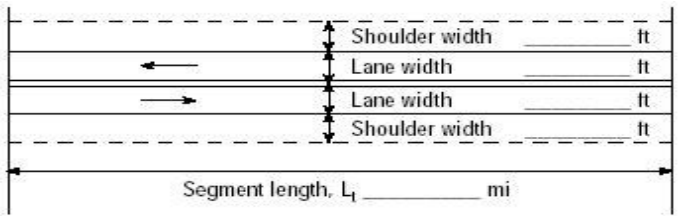
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.45
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	285
	1026

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	10.5
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brady Griggs	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Wakefield Subd / Port Royal Rd
Date Performed	2/9/06	Jurisdiction	Williamson County
Analysis Time Period	Proposed	Analysis Year	2010

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	597 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	6

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	669
v_p * highest directional split proportion[2] (pc/h)	368

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	2.6 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	1.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	40.9 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	40.9 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	3.6
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	32.1

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	666
v_p * highest directional split proportion[2] (pc/h)	366
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	44.3
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	18.7
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	63.0

Level of Service and Other Performance Measures

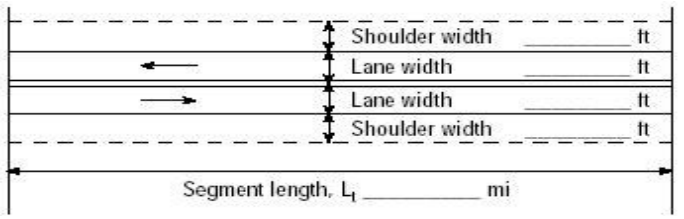
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.21
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	83
	299

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	2.6
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brady Griggs	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Wakefield Subd / Port Royal Rd
Date Performed	2/9/06	Jurisdiction	Williamson County
Analysis Time Period	Proposed	Analysis Year	2030

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	1074 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	6

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1198
v_p * highest directional split proportion[2] (pc/h)	659

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	2.6 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	1.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	40.9 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	40.9 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	2.1
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	29.5

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	1198
v_p * highest directional split proportion[2] (pc/h)	659
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	65.1
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	10.3
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	75.4

Level of Service and Other Performance Measures

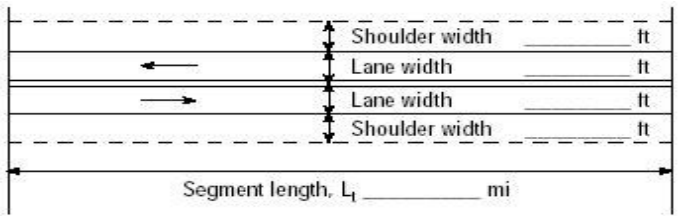
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	D
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.37
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	149
	537

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	5.1
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brady Griggs	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Port Royal Rd / Hurt Rd
Date Performed	2/9/06	Jurisdiction	Williamson County
Analysis Time Period	Proposed	Analysis Year	2010

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	478 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	3 %
% Recreational vehicles, P_R	0%
Access points/ mi	14

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.7
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.979
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	542
v_p * highest directional split proportion[2] (pc/h)	298

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	2.6 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	3.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	38.9 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	38.9 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	4.1
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	30.6

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	533
v_p * highest directional split proportion[2] (pc/h)	293
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	37.4
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	21.6
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	59.0

Level of Service and Other Performance Measures

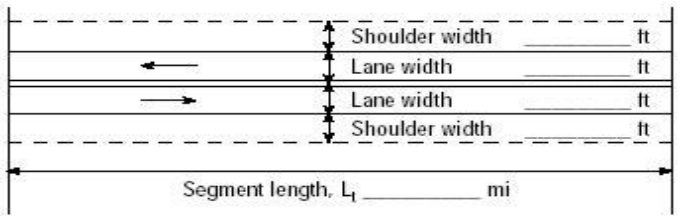
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.17
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	81
	292

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	2.6
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brady Griggs	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Port Royal Rd / Hurt Rd
Date Performed	2/9/06	Jurisdiction	Williamson County
Analysis Time Period	Proposed	Analysis Year	2030

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	859 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	3 %
% Recreational vehicles, P_R	0%
Access points/ mi	14

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.994
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	960
v_p * highest directional split proportion[2] (pc/h)	528

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	2.6 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	3.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	38.9 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	38.9 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	2.7
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	28.8

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	957
v_p * highest directional split proportion[2] (pc/h)	526
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	56.9
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	13.1
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	70.0

Level of Service and Other Performance Measures

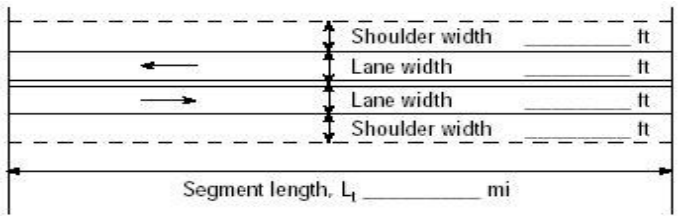
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.30
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	146
	524

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	5.1
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brady Griggs	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Hurt Rd / Buckner Lane
Date Performed	2/9/06	Jurisdiction	Williamson County
Analysis Time Period	Proposed	Analysis Year	2010

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	478 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	3 %
% Recreational vehicles, P_R	0%
Access points/ mi	6

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.7
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.979
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	542
v_p * highest directional split proportion[2] (pc/h)	298

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	2.6 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	1.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	40.9 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	40.9 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	4.1
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	32.6

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	533
v_p * highest directional split proportion[2] (pc/h)	293
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	37.4
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	21.6
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	59.0

Level of Service and Other Performance Measures

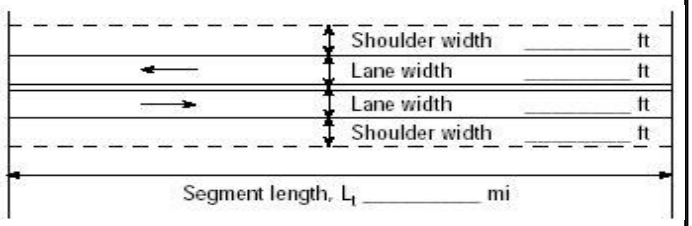
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.17
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	53
	191

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	1.6
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brady Griggs	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Hurt Rd / Buckner Lane
Date Performed	2/9/06	Jurisdiction	Williamson County
Analysis Time Period	Proposed	Analysis Year	2030

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	859 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	3 %
% Recreational vehicles, P_R	0%
Access points/ mi	6

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.994
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	960
v_p * highest directional split proportion[2] (pc/h)	528

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	2.6 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	1.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	40.9 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	40.9 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	2.7
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	30.8

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.997
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	957
v_p * highest directional split proportion[2] (pc/h)	526
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	56.9
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	13.1
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	70.0

Level of Service and Other Performance Measures

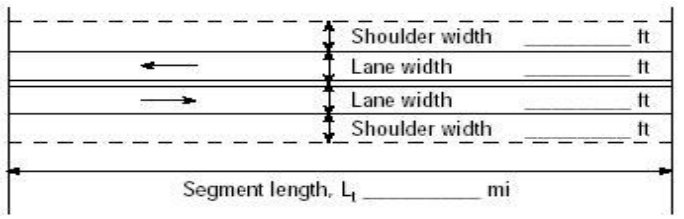
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.30
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	95
	344

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	3.1
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brady Griggs	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Buckner Lane / Ferguson Rd
Date Performed	12/6/2005	Jurisdiction	Williamson County
Analysis Time Period	Proposed	Analysis Year	2010

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	408 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	4

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.7
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.973
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	466
v_p * highest directional split proportion[2] (pc/h)	256

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	2.6 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	1.0 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	41.4 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	41.4 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	4.3
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	33.5

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	455
v_p * highest directional split proportion[2] (pc/h)	250
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	33.0
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	22.7
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	55.7

Level of Service and Other Performance Measures

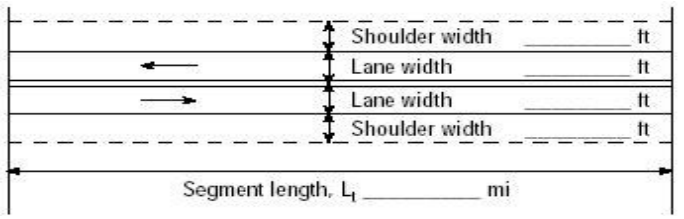
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.15
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	91
	326

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	2.7
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brady Griggs	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Buckner Lane / Ferguson Rd
Date Performed	2/9/06	Jurisdiction	Williamson County
Analysis Time Period	Proposed	Analysis Year	2030

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	734 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	4

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	822
v_p * highest directional split proportion[2] (pc/h)	452

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	2.6 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	1.0 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	41.4 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	41.4 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	3.0
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	32.1

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	819
v_p * highest directional split proportion[2] (pc/h)	450
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	51.3
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	14.7
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	66.0

Level of Service and Other Performance Measures

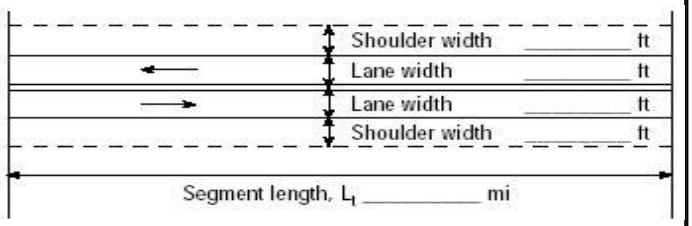
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.26
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	163
	587

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	5.1
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brady Griggs	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Ferguson Rd / I-65
Date Performed	12/6/2005	Jurisdiction	Williamson County
Analysis Time Period	Proposed	Analysis Year	2010

Input Data



Show North Arrow

☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	389 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	10

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.7
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.973
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	444
v_p * highest directional split proportion[2] (pc/h)	244

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	2.6 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	2.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	39.9 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	39.9 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	4.4
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	32.1

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	434
v_p * highest directional split proportion[2] (pc/h)	239
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	31.7
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	23.0
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	54.7

Level of Service and Other Performance Measures

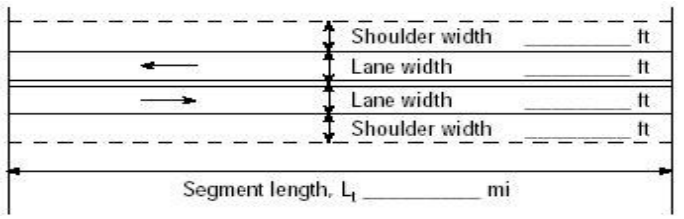
Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	B
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.14
Peak 15-min veh-miles of travel,VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	22
	78

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	0.7
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	

TWO-WAY TWO-LANE HIGHWAY SEGMENT WORKSHEET

General Information		***Site Information***	
Analyst	Brady Griggs	Highway	SR 247
Agency or Company	Clinard Engineering Associates	From/To	Ferguson Rd / I-65
Date Performed	2/9/06	Jurisdiction	Williamson County
Analysis Time Period	Proposed	Analysis Year	2030

Input Data



☐ Class I highway ☑ Class II highway

Terrain ☑ Level ☐ Rolling

Two-way hourly volume	700 veh/h
Directional split	55 / 45
Peak-hour factor, PHF	0.90
No-passing zone	100
% Trucks and Buses , P_T	4 %
% Recreational vehicles, P_R	0%
Access points/ mi	10

Average Travel Speed

Grade adjustment factor, f_G (Exhibit 20-7)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-9)	1.2
Passenger-car equivalents for RVs, E_R (Exhibit 20-9)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.992
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	784
v_p * highest directional split proportion[2] (pc/h)	431

Free-Flow Speed from Field Measurement		Estimated Free-Flow Speed	
		Base free-flow speed, $BFFS_{FM}$	45.0 mi/h
Field Measured speed, S_{FM}	mi/h	Adj. for lane width and shoulder width[3], f_{LS} (Exhibit 20-5)	2.6 mi/h
Observed volume, V_f	veh/h	Adj. for access points, f_A (Exhibit 20-6)	2.5 mi/h
Free-flow speed, FFS $FFS=S_{FM}+0.00776(V_f/f_{HV})$	39.9 mi/h	Free-flow speed, FFS $(FSS=BFFS-f_{LS}-f_A)$	39.9 mi/h

Adj. for no-passing zones, f_{np} (mi/h) (Exhibit 20-11)	3.1
Average travel speed, ATS (mi/h) $ATS=FFS-0.00776v_p-f_{np}$	30.7

Percent Time-Spent-Following

Grade Adjustment factor, f_G (Exhibit 20-8)	1.00
Passenger-car equivalents for trucks, E_T (Exhibit 20-10)	1.1
Passenger-car equivalents for RVs, E_R (Exhibit 20-10)	1.0
Heavy-vehicle adjustment factor, f_{HV} $f_{HV}=1/(1+P_T(E_T-1)+P_R(E_R-1))$	0.996
Two-way flow rate[1], v_p (pc/h) $v_p=V/(PHF * f_G * f_{HV})$	781
v_p * highest directional split proportion[2] (pc/h)	430
Base percent time-spent-following, BPTSF(%) $BPTSF=100(1-e^{-0.000879v_p})$	49.7
Adj. for directional distribution and no-passing zone, $f_{d/hp}$(%)(Exh. 20-12)	15.4
Percent time-spent-following, PTSF(%) $PTSF=BPTSF+f_{d/np}$	65.1

Level of Service and Other Performance Measures

Level of service, LOS (Exhibit 20-3 for Class I or 20-4 for Class II)	C
Volume to capacity ratio v/c $v/c=V_p/3{,}200$	0.25
Peak 15-min veh-miles of travel, VMT_{15} (veh- mi) $VMT_{15}=0.25L_t(V/PHF)$	39
	140

Peak-hour vehicle-miles of travel, VMT_{60} (veh- mi) $VMT_{60}=V*L_t$	
Peak 15-min total travel time, TT_{15}(veh-h) $TT_{15}= VMT_{15}/ATS$	1.3
Notes	
1. If v_p >= 3,200 pc/h, terminate analysis-the LOS is F. 2. If highest directional split v_p>= 1,700 pc/h, terminated anlysis-the LOS is F.	