ORIGINAL TO GENERAL FILES

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

OFFICE OF DESIGN POLICY & SUPPORT
INTERDEPARTMENTAL CORRESPONDENCE

FILE P.I. # 0000312
NHS00-0000-00(312)
Carroll County
GDOT District 6 - Cartersville
SR 1/US 27/ Martha Berry Hwy/S. Park St.
From SR 166/US 27 Alt/Commons Blvd to
McIntosh Plaza Entrance – Operational
Improvements

OFFICE Design Policy & Support

DATE May 3, 2016

FROM for Brent Story, State Design Policy Engineer

TO SEE DISTRIBUTION

SUBJECT **APPROVED REVISED CONCEPT REPORT**

Attached is the approved Revised Concept Report for the above subject project.

Attachment

DISTRIBUTION:

Hiral Patel, Director of Engineering
Joe Carpenter, Director of P3/Program Delivery
Genetha Rice-Singleton, Assistant Director of P3/Program Delivery
Albert Shelby, State Program Delivery Engineer
Darryl VanMeter, State Innovative Delivery Engineer
Bobby Hilliard, Program Control Administrator
Cindy VanDyke, State Transportation Planning Administrator
Eric Duff, State Environmental Administrator
Bill DuVall, State Bridge Engineer
Andrew Heath, State Traffic Engineer
Angela Robinson, Financial Management Administrator
Lisa Myers, State Project Review Engineer
Charles "Chuck" Hasty, State Materials Engineer
Lee Upkins, State Utilities Engineer
Paul Tanner, State Transportation Data Administrator
Attn: Systems & Classification Branch
Richard Cobb, Statewide Location Bureau Chief
Andy Casey, State Roadway Design Engineer
Attn: Frank Flanders, Design Group Manager
DeWayne Comer, District Engineer
David Acree, District Preconstruction Engineer
Sue Birnkammer, District Utilities Engineer
Albert Shelby, Project Manager
BOARD MEMBER - 3rd Congressional District

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA
PROJECT CONCEPT REPORT

Project Type:	Operational Improvement	P.I. Number:	0000312
GDOT District:	6	County:	Carroll
Federal Route Number:	US27	State Route Number:	SR1/SR16
Project Number:	NHS00-0000-00(312)		

Operational Improvements at SR1/US 27 @ ~~MacIntosh Road~~ McIntosh Plaza (Shopping Center / Business Entrance)

Submitted for approval:

C. Andy Carr — 12-10-15
State Roadway Design Engineer — Date

AS NOTED Albert V. Shelby — 12-21-15
State Program Delivery Engineer — Date

Kim M. Baird — 12-15-15
GDOT Project Manager — Date

Recommendation for approval:

* Eric Duff / KLP — 1-29-16
State Environmental Administrator — Date

* Ken Werho / KLP — 1-26-16
FOR State Traffic Engineer — Date

* Lisa Myers / KLP — 1-25-16
Project Review Engineer — Date

State Utilities Engineer — Date

* David Acree / KLP
FOR District Engineer — Date

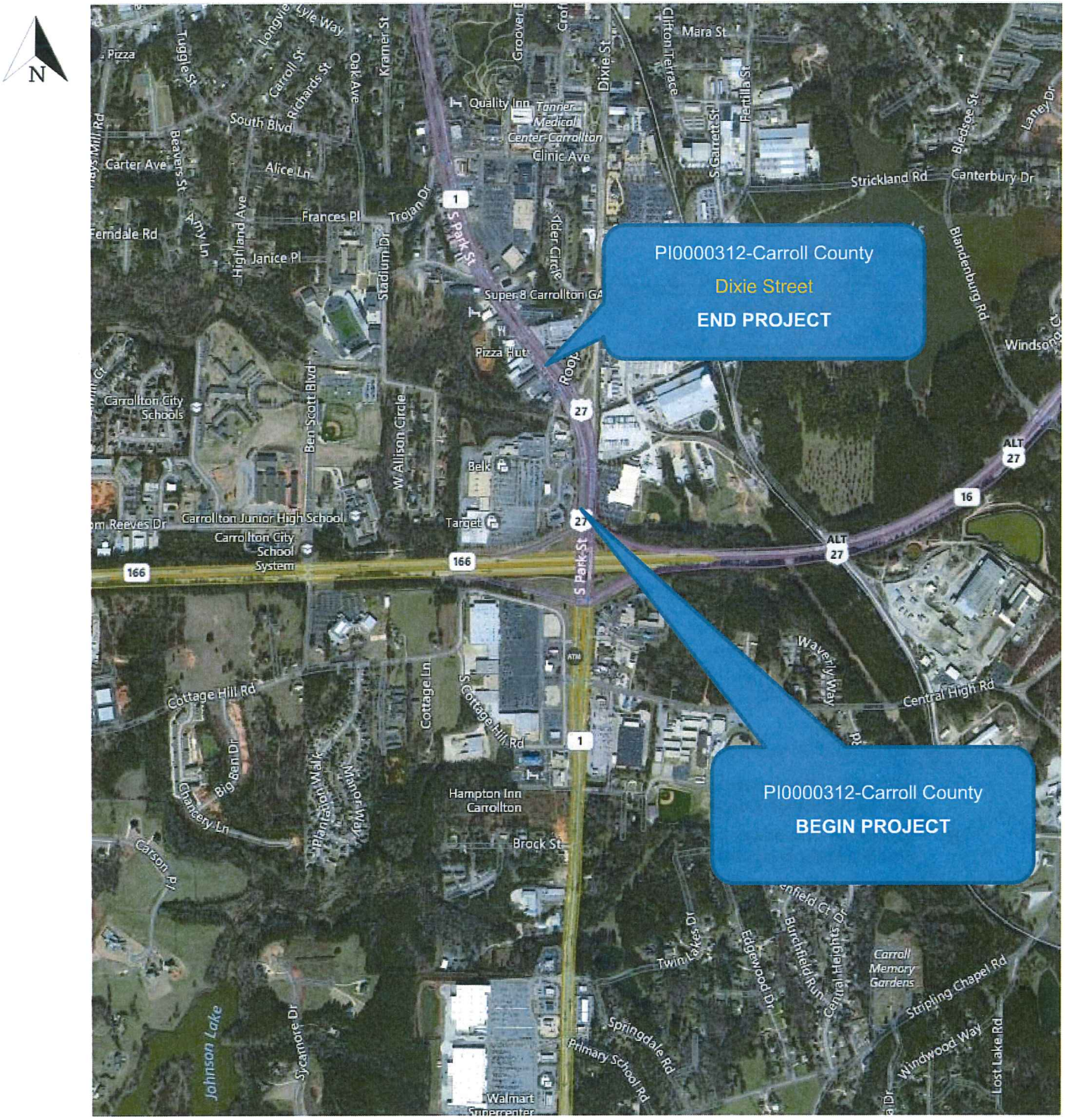
* Recommendation on file

☐ MPO Area: This project is consistent with the MPO adopted Regional Transportation Plan (RTP)/Long Range Transportation Plan (LRTP).

☒ Rural Area: This project is consistent with the goals outlined in the Statewide Transportation Plan (SWTP) and/or is included in the State Transportation Improvement Program (STIP).

Cynthia L VanRyke — 1-27-16
State Transportation Planning Administrator — Date

PROJECT LOCATION MAP



Operational Improvements at SR1/US 27 @ MacIntosh Road (Shopping Center / Business Entrance)

PLANNING AND BACKGROUND

Project Justification Statement:

This project was originally identified due to existing and future capacity needs along the roadway by a study conducted by the Office of Planning and was submitted for the SHIP committee's review at their June 28, 1999 meeting. It was approved by the SHIP committee to be added to the Department's program on July 5, 1999. At the time this project was approved by the committee, the original project name on the project proposal sheet was SR 1/US 27 from CR 526/Central Rd N to existing 6-lane section, and it was recommended to be "twinned" to PI#621990- for construction. To the project team's best knowledge, no work has been done on this project (PI#0000312) from 1999 to 2014. PI#621990- was let to construction in June of 2012 and work was completed in November of 2013. PI#621990- reconstructed the ramps and rebuilt the existing twin bridges of SR 166 to allow for longer and additional left turn lanes, but did not add any through lanes or extend beyond the ramp terminals.

SR 1/US 27, functionally classified as an urban principal arterial, is a multi-lane highway that bisects Carroll County entirely (south to north). This corridor stretches from the Georgia/Florida state line to the Georgia/Tennessee state line. SR 1/US 27 is also on the National Highway System and it is one of the corridors identified as part of Georgia's Governor's Road Improvement Program (GRIP). This segment of the US 27 GRIP corridor in Carroll County is already complete.

The major issue to be addressed by this project is the operational performance of the intersection of SR 1/US 27 at MacIntosh Road (Shopping Center / Business Entrance) which may include but not be limited to addressing the "unbalanced" 5-lane section (3 lanes northbound, 2 lanes southbound) which surrounds this intersection. The major performance goal of the project is to improve the overall level of service (LOS) for the intersection and its approaches. The chief measure of this LOS performance goal is the delay experienced by drivers at this signalized intersection. A secondary benefit of this improved operational performance (reduced queue lengths and fewer lane changes within the intersection area) is an expected reduction in crashes.

The Project Justification Statement was completed by the Office of Roadway Design.

Existing conditions: The project corridor, within the limits of this project (approximately 0.4 miles long), is a combination of a 5-lane segment (3 lanes north, 2 lanes south from the beginning of the project to Roop Street) and a 6-lane segment north of Roop Street. The project corridor has a depressed grass median, curb and gutter on the outside lanes, but no sidewalk. There is an existing box culvert between MacIntosh/Shopping Center and Roop street that will not be impacted by this project. The project is located entirely within the city limits of the City of Carrollton. This section of the SR 1/SR16/US 27 corridor is located immediately north of the interchange with SR 166, which was recently reconstructed under PI#621990-.

Other projects in the area: Streetscape PI#0010948, Carrollton Greenbelt

MPO: N/A - Project not in MPO

TIP #: *CA-001*

TIA Regional Commission: *Regional Commission*

Congressional District(s): 3

Federal Oversight: ☐ PoDI ☒ Exempt ☐ State Funded ☐ Other

Projected Traffic: ADT 24 HR T: 11 %
Current Year (2012): 37700 Open Year (2020): 41550 Design Year (2040): 60200
Traffic Projections Performed by: *GDOT Office of Planning*

Functional Classification (Mainline): Urban Principal Arterial

Complete Streets - Bicycle, Pedestrian, and/or Transit Standard Warrants:
Warrants met: ☐ None ☐ Bicycle ☒ Pedestrian ☐ Transit
KLP

Is this a 3R (Resurfacing, Restoration, & Rehabilitation) Project? ☒ No ☐ Yes

Pavement Evaluation and Recommendations
Initial Pavement Evaluation Summary Report Required? ☒ No ☐ Yes
Intial Pavement Type Selection Report Required? ☒ No ☐ Yes
Feasible Pavement Alternatives: ☒ HMA ☐ PCC ☐ HMA & PCC

DESIGN AND STRUCTURAL

Description of the proposed project: PI#0000312 is proposed to be an operational Improvement project at the intersection of SR1/SR16/US27 and MacIntosh/Shopping Center entrance. Proposed improvements include the elimination of the existing southbound left-turn trap lane (this will also convert the existing 5-lane section to a 6-lane section) and adding and extending the northbound left turn lanes. The approximate length of project is 0.4 miles and located within the city limit limits of Carrollton, GA and Carroll County.

Major Structures: N/A

Mainline Design Features: SR1/SR16/US27 (Urban Principal Arterial)

Feature	Existing	Standard*	Proposed
Typical Section			
- Number of Lanes	Varies 5-6	N/A	6
- Lane Width(s)	12'	12'	12'
- Median Width & Type	44' depressed	44' dep (55 mph)	44' depressed
- Outside Shoulder or Border Area Width	Varies - 10' typ	10'	10'
- Outside Shoulder Slope	N/A	N/A	N/A
- Inside Shoulder Width	Varies	6'	N/A
- Sidewalks	N/A	5'	N/A
- Auxiliary Lanes	LT and RT turn	N/A	LT and RT turn
- Bike Lanes	N/A	4'	N/A
Posted Speed	45 mph	N/A	45 mph
Design Speed	45 mph	N/A	45 mph
Min Horizontal Curve Radius	Unknown	711'	1000'
Maximum Superelevation Rate	Unknown	4% emax	Match existing
Maximum Grade	Unknown	6% (level terr.)	Match existing
Access Control	By Permit	N/A	By Permit
Design Vehicle	WB-67	WB-67	WB-67
Pavement Type	Asphalt	N/A	Asphalt

Major Interchanges/Intersections: SR 166 @ SR1/SR16/US27

Lighting required: ☒ No ☐ Yes

Off-site Detours Anticipated: ☒ No ☐ Yes ☐ Undetermined

Transportation Management Plan [TMP] Required: ☐ No ☒ Yes KLP
If Yes: Project classified as: ☒ Non-Significant ☐ Significant
TMP Components Anticipated: ☒ TTC ☐ TO ☐ PI

Design Exceptions to FHWA/AASHTO controlling criteria anticipated:

FHWA/AASHTO Controlling Criteria	No	Undeter-mined	Yes	Appvl Date (if applicable)
1. Design Speed	☒	☐	☐	
2. Lane Width	☒	☐	☐	
3. Shoulder Width	☒	☐	☐	
4. Bridge Width	☒	☐	☐	
5. Horizontal Alignment	☒	☐	☐	
6. Superelevation	☒	☐	☐	
7. Vertical Alignment	☒	☐	☐	
8. Grade	☒	☐	☐	
9. Stopping Sight Distance	☒	☐	☐	
10. Cross Slope	☒	☐	☐	
11. Vertical Clearance	☒	☐	☐	
12. Lateral Offset to Obstruction	☒	☐	☐	
13. Bridge Structural Capacity	☒	☐	☐	

Design Variances to GDOT Standard Criteria anticipated:

GDOT Standard Criteria	Reviewing Office	No	Undeter-mined	Yes	Appvl Date (if applicable)
1. Access Control/Median Openings	DP&S	☒	☐	☐	
2. Intersection Sight Distance	DP&S	☒	☐	☐	
3. Intersection Skew Angle	DP&S	☒	☐	☐	
4. Lateral Offset to Obstruction	DP&S	☒	☐	☐	
5. Rumble Strips	DP&S	☒	☐	☐	
6. Safety Edge	DP&S	☒	☐	☐	
7. Median Usage	DP&S	☒	☐	☐	
8. Roundabout Illumination Levels	DP&S	☒	☐	☐	
9. Complete Streets	DP&S	☒	☐	☐	
10. ADA & PROWAG	DP&S	☒	☐	☐	
11. GDOT Construction Standards	DP&S	☒	☐	☐	
12. GDOT Drainage Manual	DP&S	☒	☐	☐	
13. GDOT Bridge & Structural Manual	Bridges	☒	☐	☐	

VE Study anticipated: ☒ No ☐ Yes ☐ Completed – Date:

UTILITY AND PROPERTY

Railroad Involvement: N/A

Utility Involvements: No utility relocations are expected at this time.

SUE Required: ☒ No ☐ Yes ☐ Undetermined

Public Interest Determination Policy and Procedure recommended? ☒ No ☐ Yes

Right-of-Way (ROW): Existing width: 217 ft. Proposed width: 217 ft.

Required Right-of-Way anticipated: ☒ None ☐ Yes ☐ Undetermined
Easements anticipated: ☐ None ☐ Temporary ☐ Permanent ☐ Utility ☒ Other (driveway)

Note: Project is expected to be able to be constructed within existing right-of-way. Once property information is provided this assumption will be confirmed. If any additional propery is needed, it would be located on the eastbound approach to the intersection. Coordination is underway to determine the likelihood of the owner of the shopping center donating a small amount of driveway easement if needed.

Anticipated total number of impacted parcels:		0
Displacements anticipated:	Businesses:	0
	Residences:	0
	Other:	0
	Total Displacements:	0

Location and Design approval: ☒ Not Required ☐ Required

Impacts to USACE property anticipated? ☒ No ☐ Yes ☐ Undetermined

ROUNDABOUTS A Roundabout would not be a reasonable solution for this project because the traffic volumes exceed the planning-level thresholds.

CONTEXT SENSITIVE SOLUTIONS

Issues of Concern: None

Context Sensitive Solutions Proposed: N/A

ENVIRONMENTAL & PERMITS

Anticipated Environmental Document:
GEPA: ☐ **NEPA:** ☒ CE ☐ EA/FONSI ☐ EIS

MS4 Permit Compliance – Is the project located in a MS4 area? ☒ No ☐ Yes

Environmental Permits/Variances/Commitments/Coordination anticipated:

Permit/ Variance/ Commitment/ Coordination Anticipated	No	Yes	Remarks
1. U.S. Coast Guard Permit	☐	☐	Need to assess impacts
2. Forest Service/Corps Land	☒	☐	
3. CWA Section 404 Permit	☐	☐	Need to assess Impacts
4. 33 USC 408 Decision	☒	☐	
5. Tennessee Valley Authority Permit	☒	☐	
6. Buffer Variance	☐	☐	Need to assess Impacts
7. Coastal Zone Management Coordination	☒	☐	
8. NPDES	☒	☐	Disturbed area expected < 1AC
9. FEMA	☒	☐	
10. Cemetery Permit	☒	☐	
11. Other Permits	☒	☐	
12. Other Commitments	☐	☐	
13. Other Coordination	☐	☐	

Is a PAR required? ☒ No ☐ Yes ☐ Completed – Date:

Environmental Comments and Information:

NEPA/GEPA: Project would require a CE. No Section 4(f) uses are anticipated.

Ecology: After being provided a preliminary survey area we determined ecological resources (2 streams) and sent their delineations to design. The stream located within the project limits is a FEMA regulatory floodway. The current concept does not impact this stream in any way.

History: The Environmental Survey Boundary (attached to the April 2015 ISSR) was surveyed and no eligible historic resources were identified. Additional historic resource survey will be required if the project limits extend beyond what was originally field surveyed.

Archeology: The Environmental Survey Boundary was surveyed and no archaeological resources were identified, nor were any previously identified resources located within the project area. If changes are made to the footprint of this project outside of the Environmental Survey Boundary, additional archaeological survey will be required. As the report is for negative findings, SHPO concurrence is not required.

Air Quality:

Is the project located in a PM 2.5 Non-attainment area? ☐ No ☒ Yes
Is the project located in an Ozone Non-attainment area? ☐ No ☒ Yes
Carbon Monoxide hotspot analysis: ☒ Required ☐ Not Required ☐ TBD

Noise Effects: Type I Noise is anticipated

Public Involvement: Some form of public outreach may be required depending on required ROW and easement, and access change.

Major stakeholders: Major stakeholders are the traveling public and nearby businesses.

CONSTRUCTION

Issues potentially affecting constructability/construction schedule: To the enxtend possible, construction work should not occur during the Holiday Season due to increased traffic at the shopping center.

COORDINATION, ACTIVITIES, RESPONSIBILITIES, AND COSTS

Initial Concept Meeting: N/A

Concept Meeting: December 3, 2015

Project Activity	Party Responsible for Performing Task(s)
Concept Development	GDOT Office Roadway Design
Design	To be determined
Right-of-Way Acquisition	N/A
Utility Coordination (Preconstruction)	GDOT
Utility Relocation (Construction)	Utility Companies
Letting to Contract	GDOT
Construction Supervision	GDOT
Providing Material Pits	Contractor
Providing Detours	N/A
Environmental Studies, Documents, & Permits	GDOT Office of Environmental Service
Environmental Mitigation	GDOT
Construction Inspection & Materials Testing	GDOT/Contractor

Project Cost Estimate Summary and Funding Responsibilities:

	Programmed PE	ROW	Reimbursable Utility	CST*	Environmental Mitigation	Total Cost
Funded By	M001		M001	M001		
$ Amount	$253,426	$0	$285,000	$454,488	$0	$992,914
Date of Estimate	5/6/09		10/20/15	10/30/15	11/23/15	

*CST Cost includes: Construction, Engineering and Inspection, Contingencies and Liquid AC Cost Adjustment.

ALTERNATIVES DISCUSSION

Preferred Alternative: The preferred alternative proposes to improve operations at the intersection by removing the existing southbound trap lane and adding an additional northbound left turn lane while lengthening/doubling this storage going to the shopping plaza.

Estimated Property Impacts:	**0**	**Estimated Total Cost:**	**$454,488**
Estimated ROW Cost:	**$0**	**Estimated CST Time:**	**6 months**

Rationale:

The existing condition for this intersection is northbound (**NB**): one left-turn lane two through and one through-right lane. Southbound (**SB**): one left turn lane, two through, and one right turn lane. Westbound (**WB**): One left-through lane and one right lane separated by a raised bay. Eastbound (**EB**): One left-through lane and one right lane. The intersection capacity analysis results for **2020 No build** were as follows: **AM** LOS F; **PM** LOS F **2040 No Build-AM** LOS E; **PM** LOS F (See Attachments).

The improvement to this intersection's northbound approach is to construct an additional left turn lane with additional storage length from 250 feet to approximately 425 feet of storage length. This additional lane will utilize part of the existing depressed median to achieve this goal. This improvement will assist in moving the traffic into the shopping center, and require the removal/reconstruction of the existing concrete island to open up two receiving lanes.

This Operational Intersection Improvement will provide lane continuity southbound by removing the trap left turn lane and adding a through lane for southbound traffic. In the existing condition, drivers in the inside southbound travel lane are forced to turn left change lanes as they approach the intersection. This issue causes congestion and potential rear-end collisions. Shifting these lanes (though use of a compound curve) to provide the additional through lane will cause the outside edge of pavement (curb and gutter) to be pushed out approximately 6 feet not only minimizes the additional pavement but it also maintains everything within the existing ROW.

The project does not propose changes to the lane configurations on the eastbound or westbound approaches. The intersection capacity analysis results **2020 Build** were as follows: **AM** LOS B; **PM** LOS B 2040 **Build** were as follows: **AM** LOS C; **PM** LOS C (See Attachments). This intersection improvement will furthermore provide crosswalks for all pedestrian movements in the entire intersection.

No-Build Alternative:

Estimated Property Impacts:	**0**	**Estimated Total Cost:**	**$0**
Estimated ROW Cost:	**$0**	**Estimated CST Time:**	**0**

Rationale: This alternative does not addess the current operational issues.

LIST OF ATTACHMENTS/SUPPORTING DATA

1. Concept Layout
    a. Preferred Alternative
    b. Existing conditions
2. Detailed Cost Estimates:
    a. Construction including Engineering and Inspection and Contingencies
    b. Completed Liquid AC Cost Adjustment forms
    c. Utilities
3. Crash summaries
4. Traffic diagrams
5. Capacity analysis summary
6. Conforming plan's network schematics showing thru lanes.
7. Minutes of Concept Team Meeting

APPROVALS

Concur: _____
Director of Engineering

Approve: Margaret B. Pirkle _____ 4/28/16
Chief Engineer Date

PI#0000312
PREFERRED CONCEPT LAYOUT
DECEMBER 10, 2015
N
BEGIN PROJECT
BEGIN ROADWAY
CONSTRUCTION
SR 1
END ROADWAY
CONSTRUCTION
DIXIE STREET
SR 1
END PROJECT
(STRIPING/MARKING REMOVAL)
ROOP STREET
SR 166

PI#0000312
EXISTING CONCEPT LAYOUT
DECEMBER 10, 2015
SCALE: 1"=100'
N
BEGIN PROJECT
BEGIN ROADWAY
CONSTRUCTION
SR 1
END ROADWAY
CONSTRUCTION
DIXIE STREET
SR 1
END PROJECT
(STRIPING/MARKING REMOVAL)
ROOP STREET
SR 166

Processed Date: 11/2/15

DETAILED COST ESTIMATE

Georgia Department of Transportation

Job: 0000312-1

JOB NUMBER *0000312-1* **FED/STATE PROJECT NUMBER**

SPEC YEAR: *01*

DESCRIPTION: *SR 1/US 17 FROM CENTRAL RD NORTH TO DIXIE STREET*

ITEMS FOR JOB 0000312-1

100 - ROADWAY

Line Number	ITEM	QUANTITY	UNITS	PRICE	DESCRIPTION	AMOUNT
0005	150-1000	1.000	LS	$30,000.00000	TRAFFIC CONTROL - CONTROL	$30,000.00
0010	210-0100	1.000	LS	$75,000.00000	GRADING COMPLETE - COMPLETE	$75,000.00
0015	310-1101	745.000	TN	$18.81608	GR AGGR BASE CRS, INCL MATL	$14,017.98
0020	402-3121	374.000	TN	$67.83235	RECYL AC 25MM SP,GP1/2,BM&HL	$25,369.30
0025	402-3130	389.000	TN	$71.29399	RECYL AC 12.5MM SP,GP2,BM&HL	$27,733.36
0030	413-1000	183.000	GL	$3.11233	BITUM TACK COAT	$569.56
0035	432-0206	3580.000	SY	$3.70012	MILL ASPH CONC PVMT/ 1.50" DEP	$13,246.43
0040	441-6222	300.000	LF	$19.39927	CONC CURB & GUTTER/ 8"X30"TP2	$5,819.78
0045	446-2118	800.000	LF	$3.93527	HIGH STR PVMT REINF FABRIC, 18 IN WIDTH	$3,148.22
0050	632-0003	2.000	EA	$8,809.52381	CHANGEABLE MESS SIGN,PORT,TP 3	$17,619.05
					SUBTOTAL FOR ROADWAY:	**$212,523.68**

200 - EROSION CONTROL

Line Number	ITEM	QUANTITY	UNITS	PRICE	DESCRIPTION	AMOUNT
0055	163-0232	1.000	AC	$181.46525	TEMPORARY GRASSING	$181.47
0060	163-0240	16.000	TN	$282.07135	MULCH	$4,513.14
0065	163-0550	5.000	EA	$156.08602	CONS & REM INLET SEDIMENT TRAP	$780.43
0070	165-0030	2000.000	LF	$0.76258	MAINT OF TEMP SILT FENCE, TP C	$1,525.16
0075	165-0041	2000.000	LF	$0.96168	MAINT OF CHECK DAMS - ALL TYPES	$1,923.36
0080	165-0087	5.000	EA	$110.76024	MAINT OF SILT CONTROL GATE, TP 3	$553.80
0085	165-0101	1.000	EA	$492.40930	MAINT OF CONST EXIT	$492.41
0090	165-0105	5.000	EA	$44.95878	MAINT OF INLET SEDIMENT TRAP	$224.79
0095	171-0030	2000.000	LF	$3.11811	TEMPORARY SILT FENCE, TYPE C	$6,236.22
0100	643-8200	100.000	LF	$2.29569	BARRIER FENCE (ORANGE), 4 FT	$229.57
0105	700-6910	1.000	AC	$523.79235	PERMANENT GRASSING	$523.79
0110	700-8000	2.000	TN	$408.60264	FERTILIZER MIXED GRADE	$817.21
0115	700-8100	100.000	LB	$2.19237	FERTILIZER NITROGEN CONTENT	$219.24
					SUBTOTAL FOR EROSION CONTROL:	**$18,220.59**

300 - DRAINAGE

Line Number	ITEM	QUANTITY	UNITS	PRICE	DESCRIPTION	AMOUNT
0205	550-1180	500.000	LF	$29.56568	STM DR PIPE 18",H 1-10	$14,782.84
0210	668-1100	1.000	EA	$2,174.10700	CATCH BASIN, GP 1	$2,174.11
0215	668-2100	5.000	EA	$1,687.95037	DROP INLET, GP 1	$8,439.75
					SUBTOTAL FOR DRAINAGE:	**$25,396.70**

File Location: Div of Preconstruction > CES

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Processed Date: 11/2/15

DETAILED COST ESTIMATE

Georgia Department of Transportation

Job: 0000312-1

400 - SIGNAL

Line Number	ITEM	QUANTITY	UNITS	PRICE	DESCRIPTION	AMOUNT
0120	647-1000	1.000	LS	$120,000.00000	TRAF SIGNAL INSTALLATION NO - INSTALLATION	$120,000.00
					SUBTOTAL FOR SIGNAL:	**$120,000.00**

500 - SIGNING & MARKING

Line Number	ITEM	QUANTITY	UNITS	PRICE	DESCRIPTION	AMOUNT
0125	636-1020	9.000	SF	$15.90086	HWY SGN,TP1MAT,REFL SH TP3	$143.11
0130	636-1029	12.000	SF	$17.32653	HWY SGN,TP2 MATL,REFL SH TP 3	$207.92
0145	636-2070	100.000	LF	$8.46801	GALV STEEL POSTS, TP 7	$846.80
0155	653-0120	19.000	EA	$70.12530	THERM PVMT MARK, ARROW, TP 2	$1,332.38
0165	653-1501	3270.000	LF	$0.42419	THERMO SOLID TRAF ST 5 IN, WHI	$1,387.10
0170	653-1502	450.000	LF	$0.50154	THERMO SOLID TRAF ST, 5 IN YEL	$225.69
0175	653-1804	500.000	LF	$1.87022	THERM SOLID TRAF STRIPE, 8",WH	$935.11
0180	653-3501	1800.000	GLF	$0.21904	THERMO SKIP TRAF ST, 5 IN, WHI	$394.27
0185	653-6004	875.000	SY	$2.83905	THERM TRAF STRIPING, WHITE	$2,484.17
0190	653-6006	84.000	SY	$3.13799	THERM TRAF STRIPING, YELLOW	$263.59
0195	654-1001	60.000	EA	$4.33034	RAISED PVMT MARKERS TP 1	$259.82
					SUBTOTAL FOR SIGNING & MARKING:	**$8,479.96**

TOTALS FOR JOB 0000312-1

ITEMS COST:	**$384,620.93**
COST GROUP COST:	**$0.00**
ESTIMATED COST:	**$384,620.93**
CONTINGENCY PERCENT:	**0.00**
ENGINEERING AND INSPECTION:	**0.00**
ESTIMATED COST WITH CONTINGENCY AND E&I:	**$384,620.93**

File Location: Div of Preconstruction > CES

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PROJ. NO.	
P.I. NO.	0000312
DATE	10/30/2015

CALL NO.

INDEX (TYPE)	**DATE**	**INDEX**
REG. UNLEADED	Oct-15	$ 2.155
DIESEL		$ 2.485
LIQUID AC		$ 429.00

Link to Fuel and AC Index:
http://www.dot.ga.gov/doingbusiness/Materials/Pages/asphaltcementindex.aspx

LIQUID AC ADJUSTMENTS

PA=[((APM-APL)/APL)]xTMTxAPL

Asphalt

Price Adjustment (PA)				**11428.56**	**$**	**11,428.56**
Monthly Asphalt Cement Price month placed (APM)	Max. Cap	60%	$	686.40		
Monthly Asphalt Cement Price month project let (APL)			$	429.00		
Total Monthly Tonnage of asphalt cement (TMT)				44.4		

ASPHALT	**Tons**	**%AC**	**AC ton**
Leveling	0	5.0%	0
12.5 OGFC	0	5.0%	0
12.5 mm	389	5.0%	19.45
9.5 mm SP	0	5.0%	0
25 mm SP	374	5.0%	18.7
19 mm SP	125	5.0%	6.25
	888		**44.4**

BITUMINOUS TACK COAT

Price Adjustment (PA)			**$**	**745.15**	**$**	**745.15**
Monthly Asphalt Cement Price month placed (APM)	Max. Cap	60%	$	686.40		
Monthly Asphalt Cement Price month project let (APL)			$	429.00		
Total Monthly Tonnage of asphalt cement (TMT)				2.894898021		

Bitum Tack Gals	gals/ton	tons
674	232.8234	2.89489802

PROJ. NO.		CALL NO.	
P.I. NO.	0000312		
DATE	10/30/2015		

BITUMINOUS TACK COAT (surface treatment)

Price Adjustment (PA)				**0**	**$ -**
Monthly Asphalt Cement Price month placed (APM)	Max. Cap	60%	$	686.40	
Monthly Asphalt Cement Price month project let (APL)			$	429.00	
Total Monthly Tonnage of asphalt cement (TMT)				0	

Bitum Tack	SY	Gals/SY	Gals	gals/ton	tons
Single Surf. Trmt.		0.20	0	232.8234	0
Double Surf.Trmt.		0.44	0	232.8234	0
Triple Surf. Trmt		0.71	0	232.8234	0
					0

TOTAL LIQUID AC ADJUSTMENT	**$**	**12,173.71**

PROJ. NO.:	N/A
P.I. NO.	PI#0000312
DATE:	10/30/2015

Base Construction Cost		$	384,620.93
E & I	5%	$	19,231.05
Construction Contingency	10%	$	38,462.09
Subtotal Construction Cost		$	442,314.07
Liquid AC Adjustment (50 % cap)		$	12,173.71
Total Construction Cost		$	454,487.78

DEPARTMENT OF TRANSPORTATION
STATE OF GEORGIA

INTERDEPARTMENT CORRESPONDENCE

FILE NHS00-0000-00(312)
SR 1 / US 27 from Central Rd North to Dixie Street
P.I. No. 0000312

OFFICE Cartersville

DATE October 20, 2015

FROM Jun Birnkammer
District Utilities Engineer

TO Albert Shelby, State Program Delivery Engineer
ATTN: Kevin Bailey, Project Manager

SUBJECT PRELIMINARY UTILITY COST ESTIMATE

We are furnishing you with a Preliminary Utility Cost estimate for each utility with facilities potentially located within the project limits.

FACILITY OWNER	NON-REIMBURSABLE		REIMBURSABLE
Atlanta Gas Light Co.	$ 693,100.00		
AT&T	$ 50,000.00		
City of Carrollton	$ 50,000.00		
Charter	$ 20,000.00		
Georgia Power Co. (Dist)			$ 275,000.00
Syncronet	$ 20,000.00		$ 10,000.00
GPC (Trans)		NO CONFLICT	
Totals	$ 833,100.00		$ 285,000.00

Total Preliminary Utility Cost Estimate $ 1,118,100.00.

If you have any questions, please contact Jennifer Deems at 678-721-5323.

JB/jd

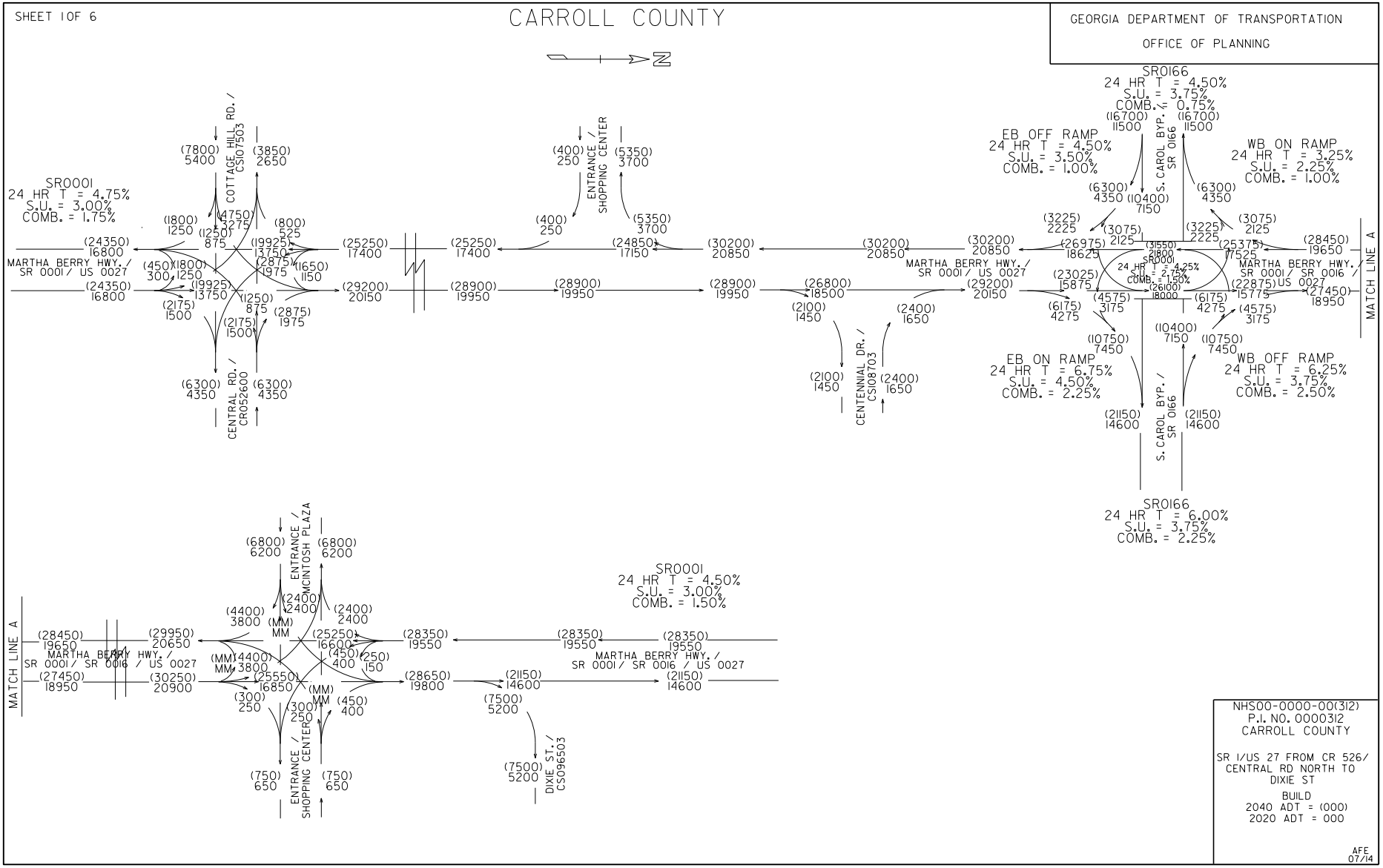
C: Lee Upkins, State Utilities Engineer (via e-mail)
File/Estimating Book

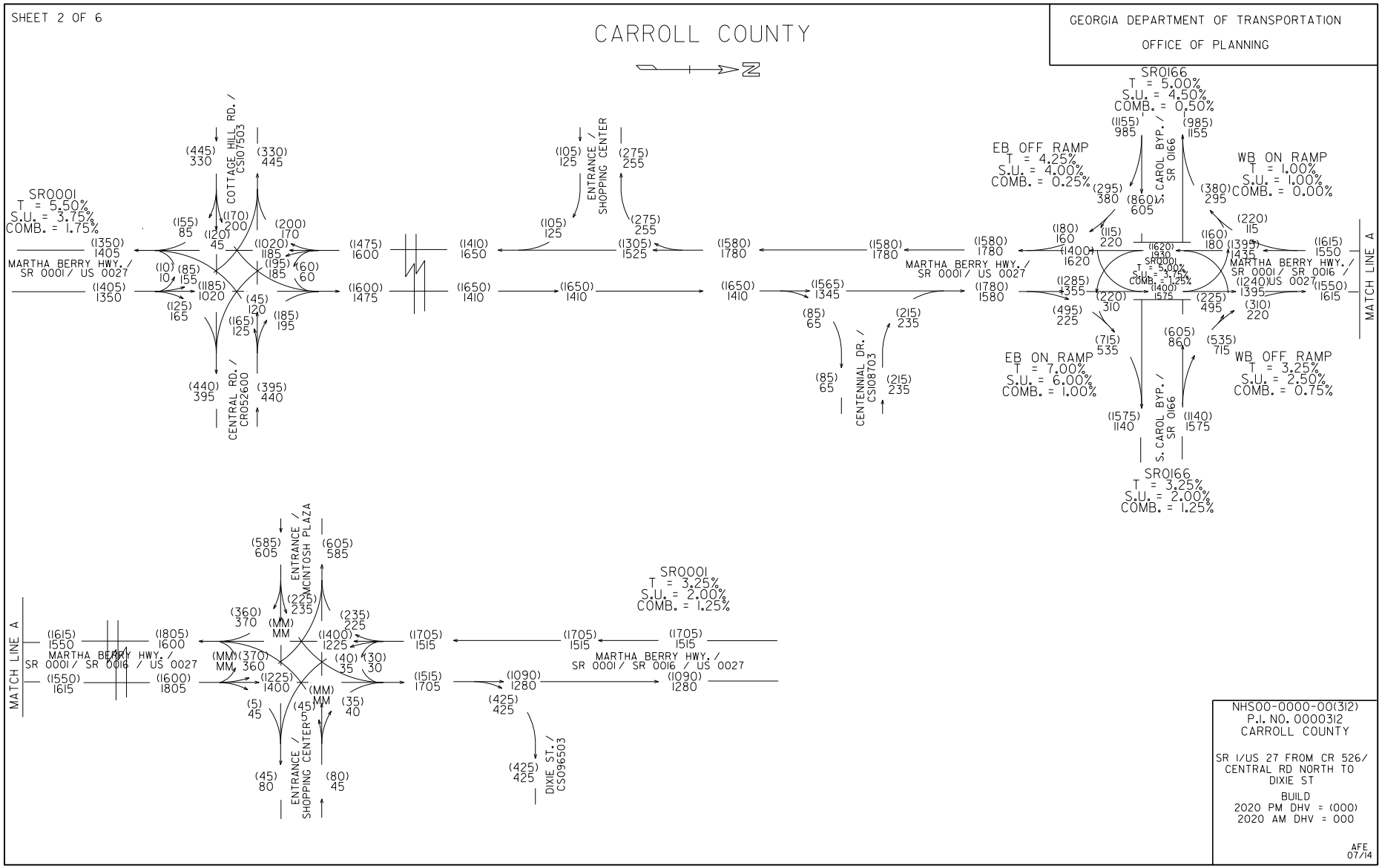
PI#0000312, Carroll County

CRASH SUMMARY

	2011		2012		2013		2014	
	SR 1	State	SR 1	State	SR 1	State	SR 1	State
Crashes	105		115		90		28	
Crash Rate	1,876	422	2,057	461	1,610	408	501	422
Injuries	29		32		17		4	
Injury Rate	518.78	99	572	119	304	103	72	103
Fatalities	0		0		0		0	
Fatality Rate	0	1.23	0	1.25	0	1.23	0	1.18

sr 1/us 17-Urban Arterial (Begin at Central Rd/End at Roop St)


SHEET 1 OF 6
CARROLL COUNTY
GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING
N
SR0001
24 HR T = 4.75%
S.U. = 3.00%
COMB. = 1.75%
MARTHA BERRY HWY. / SR 0001 / US 0027
COTTAGE HILL RD. / CS107503
CENTRAL RD. / CR052600
ENTRANCE / SHOPPING CENTER
CENTENNIAL DR. / CS108703
SR0166
24 HR T = 4.50%
S.U. = 3.75%
COMB. = 0.75%
EB OFF RAMP
24 HR T = 4.50%
S.U. = 3.50%
COMB. = 1.00%
WB ON RAMP
24 HR T = 3.25%
S.U. = 2.25%
COMB. = 1.00%
S. CAROL BYP. / SR 0166
SR0001
24 HR T = 4.25%
S.U. = 2.75%
COMB. = 1.50%
MARTHA BERRY HWY. / SR 0001 / SR 0016 / US 0027
MATCH LINE A
EB ON RAMP
24 HR T = 6.75%
S.U. = 4.50%
COMB. = 2.25%
WB OFF RAMP
24 HR T = 6.25%
S.U. = 3.75%
COMB. = 2.50%
SR0166
24 HR T = 6.00%
S.U. = 3.75%
COMB. = 2.25%
ENTRANCE / MCINTOSH PLAZA
ENTRANCE / SHOPPING CENTER
SR0001
24 HR T = 4.50%
S.U. = 3.00%
COMB. = 1.50%
DIXIE ST. / CS096503
NHS00-0000-00(312)
P.I. NO. 0000312
CARROLL COUNTY
SR 1/US 27 FROM CR 526/ CENTRAL RD NORTH TO DIXIE ST
BUILD
2040 ADT = (000)
2020 ADT = 000
AFE
07/14

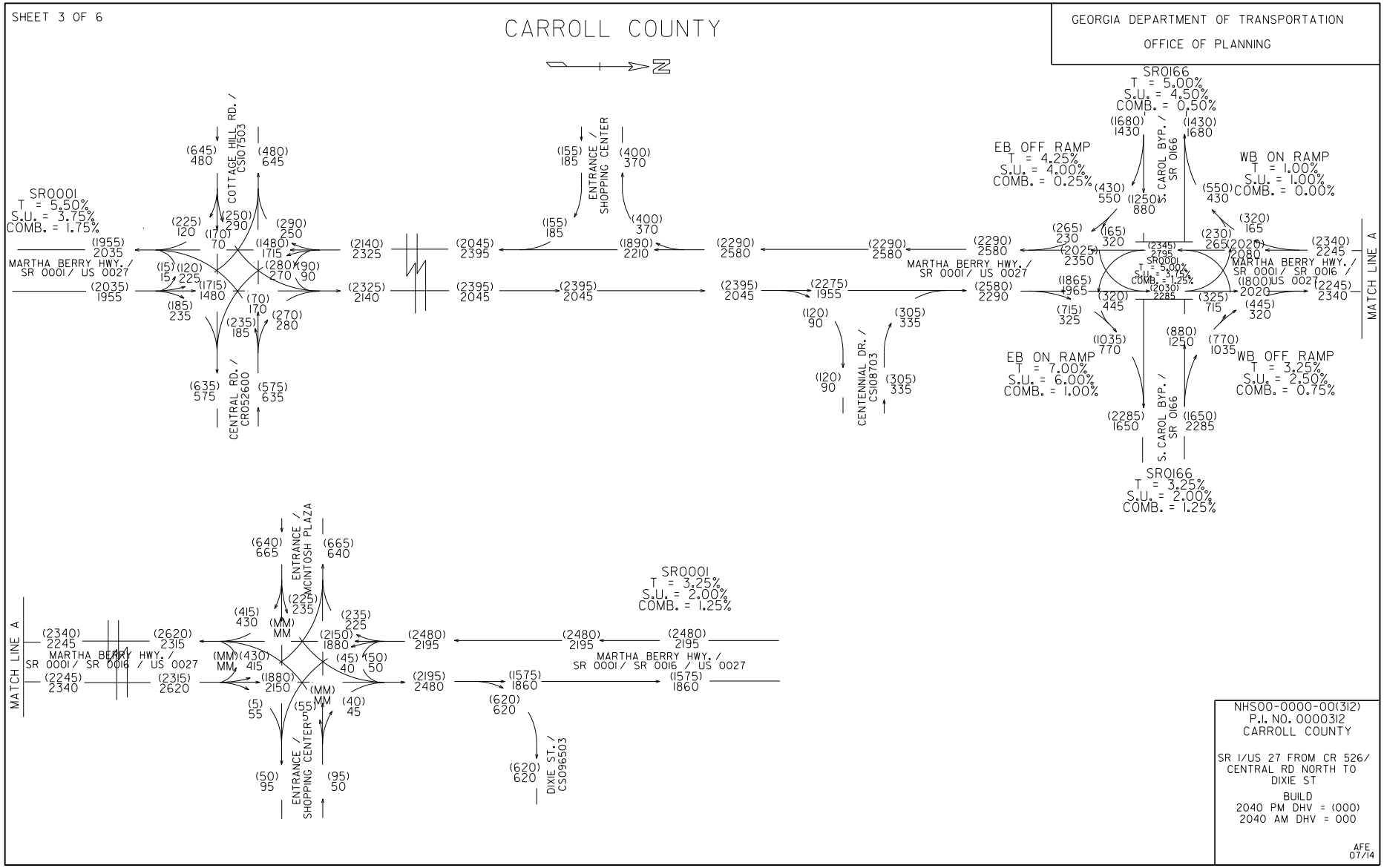


NHS00-0000-00(312)
P.I. NO. 0000312
CARROLL COUNTY

SR 1/US 27 FROM CR 526/ CENTRAL RD NORTH TO DIXIE ST

BUILD
2020 PM DHV = (000)
2020 AM DHV = 000

AFE
07/14

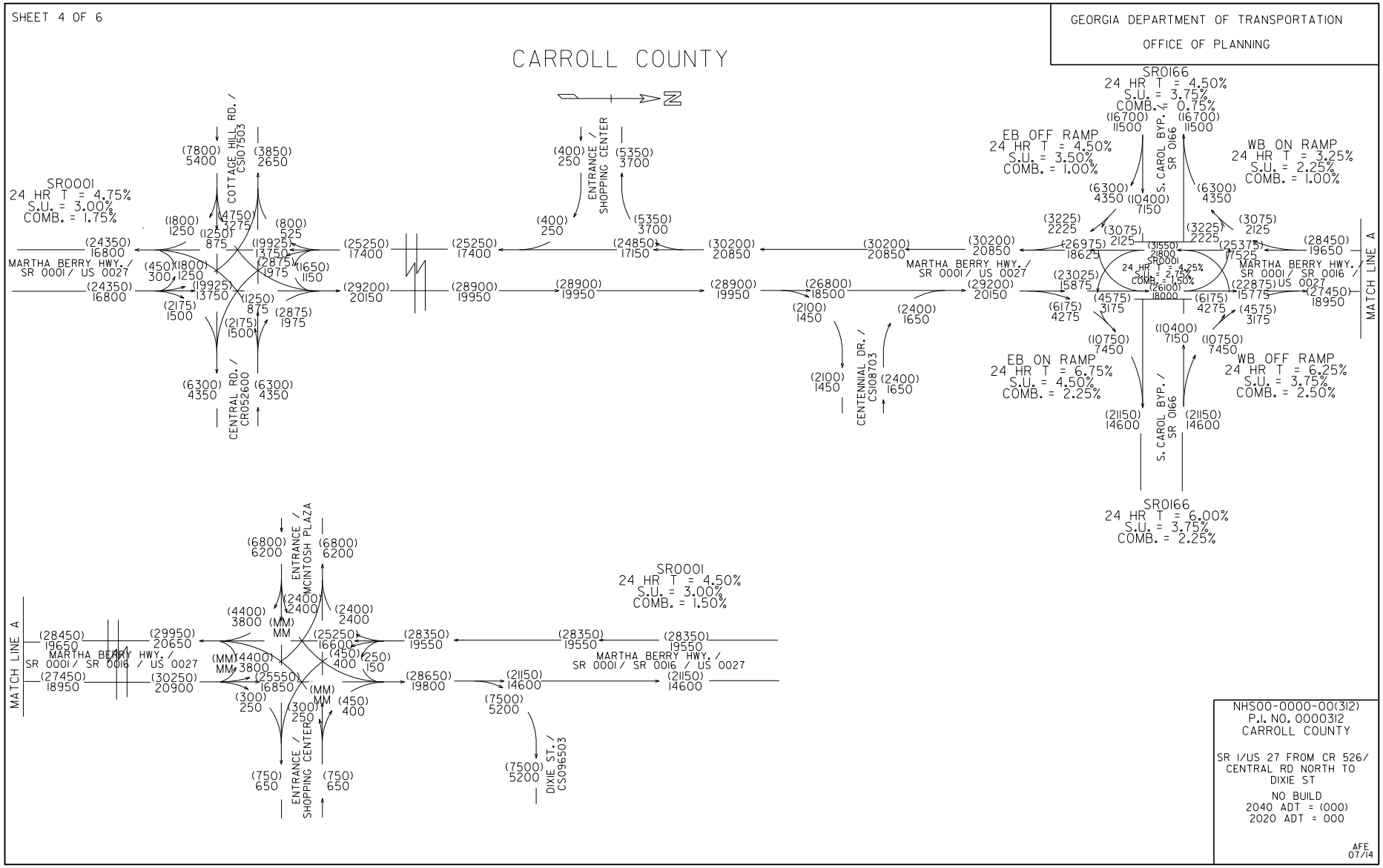


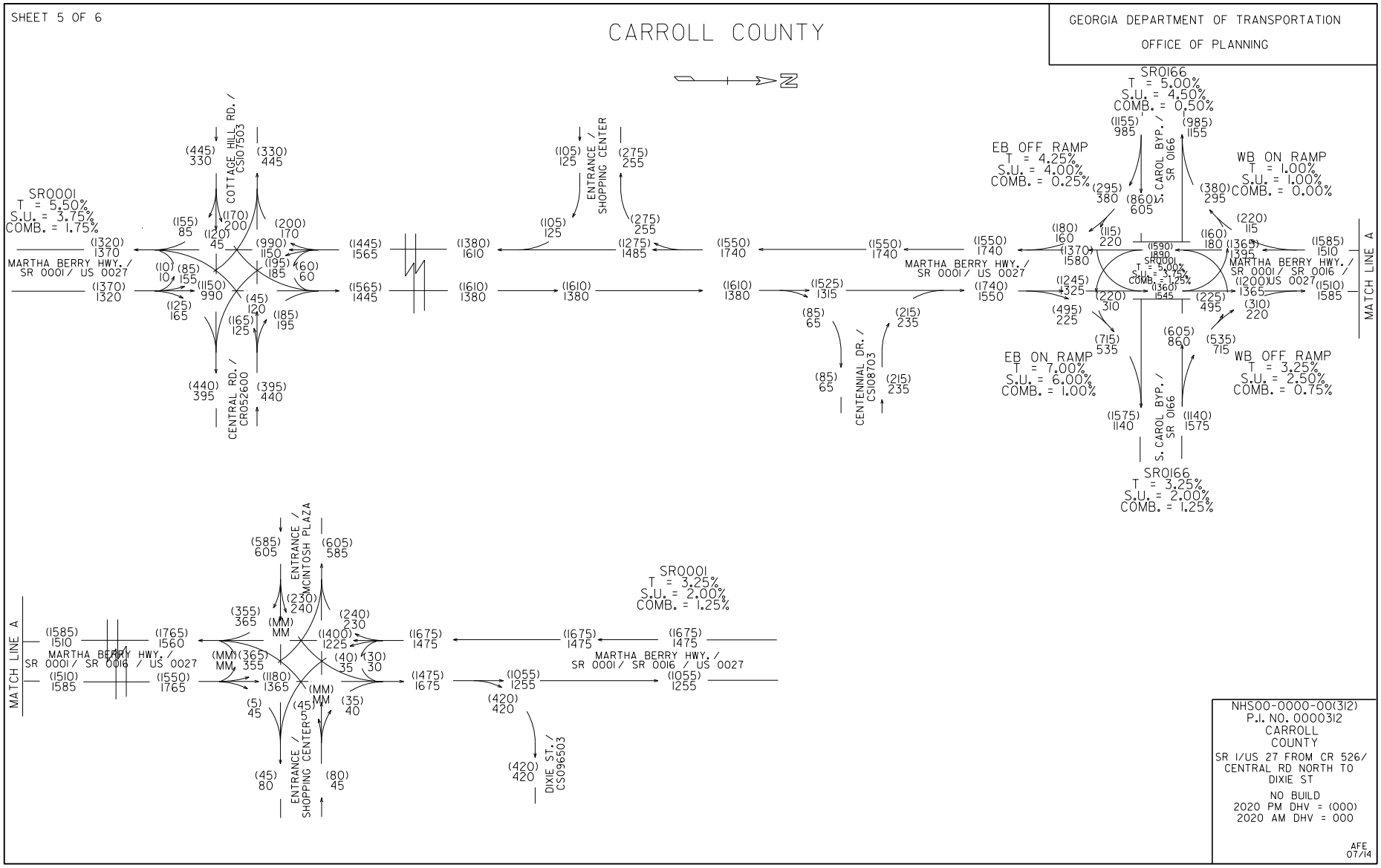
NHS00-0000-00(312)
P.I. NO. 0000312
CARROLL COUNTY

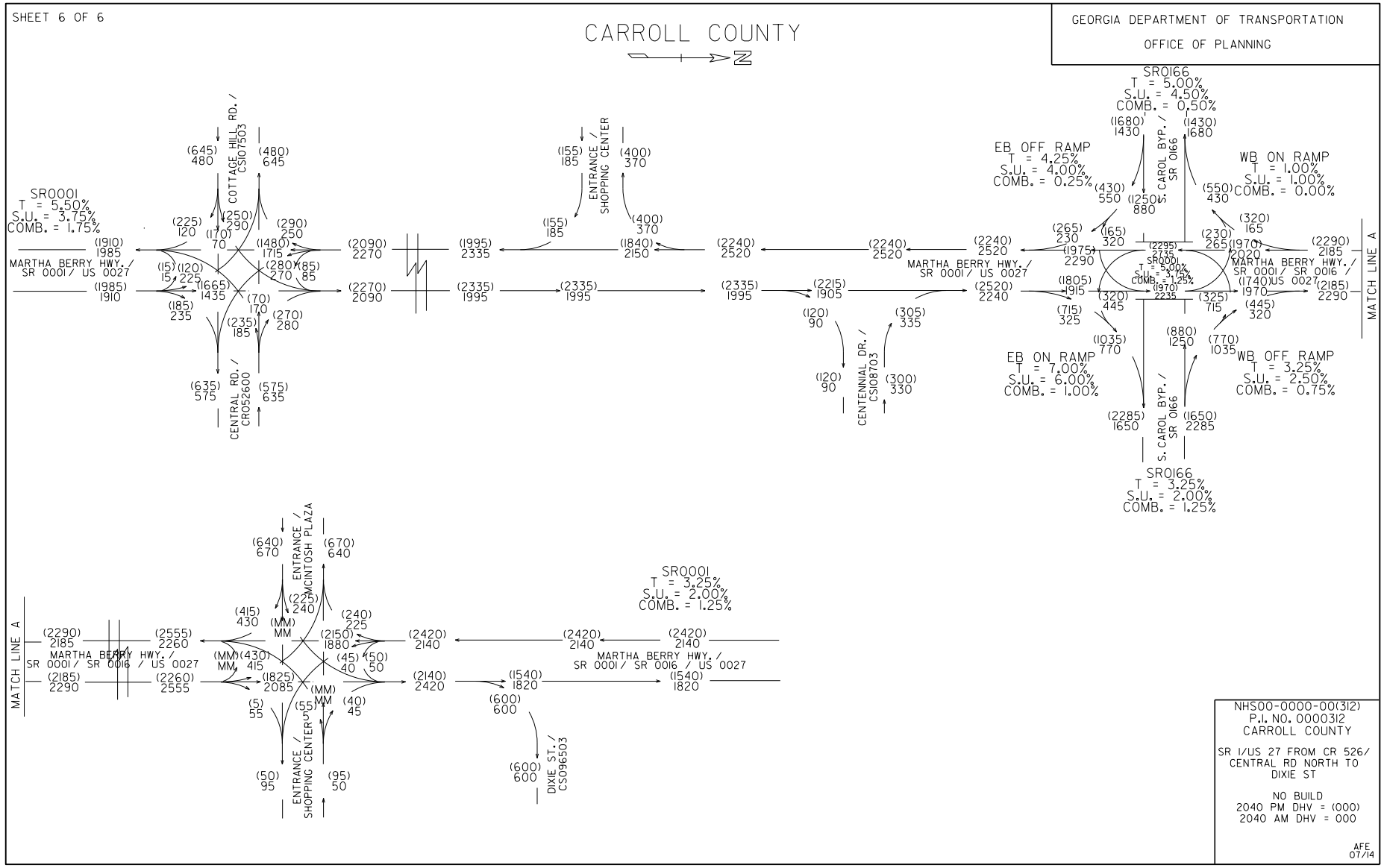
SR 1/US 27 FROM CR 526/ CENTRAL RD NORTH TO DIXIE ST

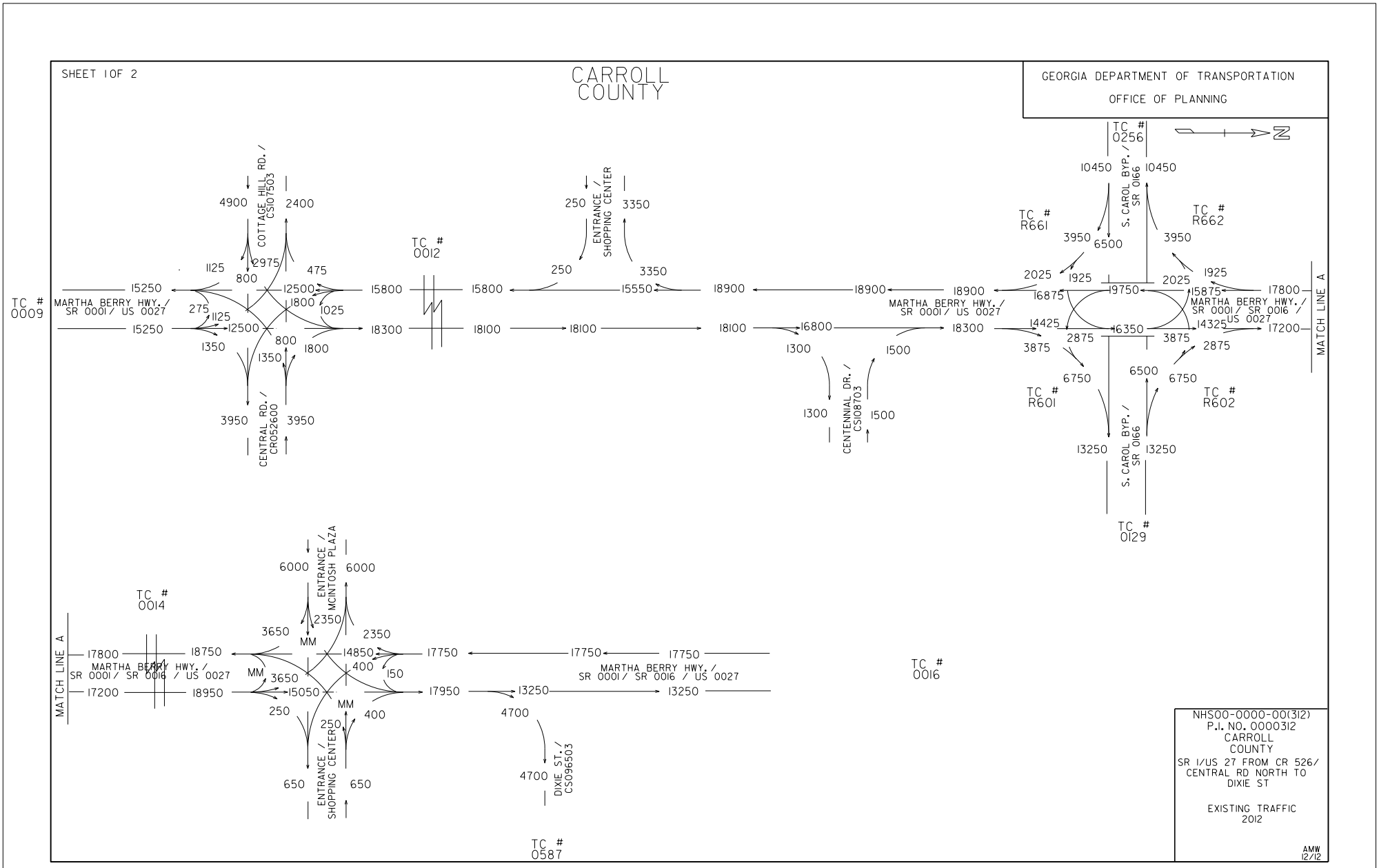
BUILD
2040 PM DHV = (000)
2040 AM DHV = 000

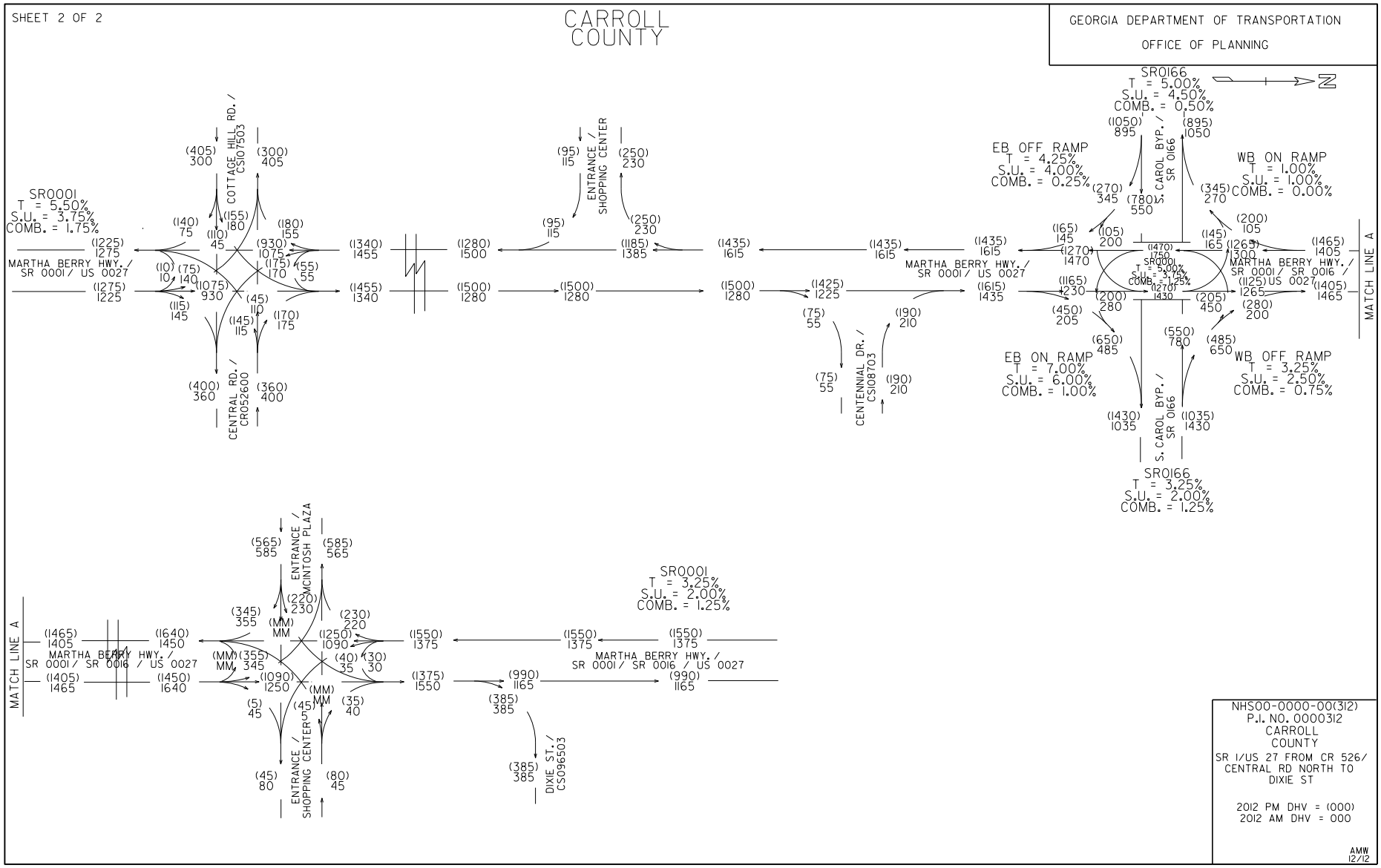
AFE
07/14


SHEET 4 OF 6
GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING
CARROLL COUNTY
N
SR0001
24 HR T = 4.75%
S.U. = 3.00%
COMB. = 1.75%
MARTHA BERRY HWY. / SR 0001 / US 0027
COTTAGE HILL RD. / CS107503
CENTRAL RD. / CR052600
ENTRANCE / SHOPPING CENTER
CENTENNIAL DR. / CS108703
SR0166
24 HR T = 4.50%
S.U. = 3.75%
COMB. = 0.75%
EB OFF RAMP
24 HR T = 4.50%
S.U. = 3.50%
COMB. = 1.00%
WB ON RAMP
24 HR T = 3.25%
S.U. = 2.25%
COMB. = 1.00%
S. CAROL BYP. / SR 0166
SR0001
24 HR T = 4.25%
S.U. = 2.75%
COMB. = 1.50%
MARTHA BERRY HWY. / SR 0001 / US 0027
MARTHA BERRY HWY. / SR 0016 / US 0027
MATCH LINE A
EB ON RAMP
24 HR T = 6.75%
S.U. = 4.50%
COMB. = 2.25%
WB OFF RAMP
24 HR T = 6.25%
S.U. = 3.75%
COMB. = 2.50%
SR0166
24 HR T = 6.00%
S.U. = 3.75%
COMB. = 2.25%
ENTRANCE / MCINTOSH PLAZA
SR0001
24 HR T = 4.50%
S.U. = 3.00%
COMB. = 1.50%
MARTHA BERRY HWY. / SR 0001 / SR 0016 / US 0027
MARTHA BERRY HWY. / SR 0001 / SR 0016 / US 0027
ENTRANCE / SHOPPING CENTER
DIXIE ST. / CS096503
NHS00-0000-00(312)
P.I. NO. 0000312
CARROLL COUNTY
SR 1/US 27 FROM CR 526/ CENTRAL RD NORTH TO DIXIE ST
NO BUILD
2040 ADT = (000)
2020 ADT = 000
AFE
07/14


SHEET 5 OF 6
CARROLL COUNTY
GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING
N
SR0001
T = 5.50%
S.U. = 3.75%
COMB. = 1.75%
MARTHA BERRY HWY. / SR 0001 / US 0027
COTTAGE HILL RD. / CS107503
CENTRAL RD. / CR052600
ENTRANCE / SHOPPING CENTER
CENTENNIAL DR. / CS108703
SR0166
T = 5.00%
S.U. = 4.50%
COMB. = 0.50%
S. CAROL BYP. / SR 0166
EB OFF RAMP
T = 4.25%
S.U. = 4.00%
COMB. = 0.25%
WB ON RAMP
T = 1.00%
S.U. = 1.00%
COMB. = 0.00%
SR0001
T = 5.00%
S.U. = 3.75%
COMB. = 1.25%
EB ON RAMP
T = 7.00%
S.U. = 6.00%
COMB. = 1.00%
WB OFF RAMP
T = 3.25%
S.U. = 2.50%
COMB. = 0.75%
SR0166
T = 3.25%
S.U. = 2.00%
COMB. = 1.25%
MATCH LINE A
ENTRANCE / MCINTOSH PLAZA
ENTRANCE / SHOPPING CENTER
SR0001
T = 3.25%
S.U. = 2.00%
COMB. = 1.25%
DIXIE ST. / CS096503
NHS00-0000-00(312)
P.I. NO. 0000312
CARROLL COUNTY
SR 1/US 27 FROM CR 526/ CENTRAL RD NORTH TO DIXIE ST
NO BUILD
2020 PM DHV = (000)
2020 AM DHV = 000
AFE
07/14


SHEET 6 OF 6
CARROLL COUNTY
N
GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING
SR0001
T = 5.50%
S.U. = 3.75%
COMB. = 1.75%
MARTHA BERRY HWY. / SR 0001 / US 0027
COTTAGE HILL RD. / CS107503
CENTRAL RD. / CR052600
ENTRANCE / SHOPPING CENTER
CENTENNIAL DR. / CS108703
SR0166
T = 5.00%
S.U. = 4.50%
COMB. = 0.50%
S. CAROL BYP. / SR 0166
EB OFF RAMP
T = 4.25%
S.U. = 4.00%
COMB. = 0.25%
WB ON RAMP
T = 1.00%
S.U. = 1.00%
COMB. = 0.00%
SR0001
T = 5.00%
S.U. = 3.75%
COMB. = 1.25%
MARTHA BERRY HWY. / SR 0001 / SR 0016 / US 0027
EB ON RAMP
T = 7.00%
S.U. = 6.00%
COMB. = 1.00%
WB OFF RAMP
T = 3.25%
S.U. = 2.50%
COMB. = 0.75%
SR0166
T = 3.25%
S.U. = 2.00%
COMB. = 1.25%
MATCH LINE A
ENTRANCE / MCINTOSH PLAZA
ENTRANCE / SHOPPING CENTER
SR0001
T = 3.25%
S.U. = 2.00%
COMB. = 1.25%
DIXIE ST. / CS096503
NHS00-0000-00(312)
P.I. NO. 0000312
CARROLL COUNTY
SR 1/US 27 FROM CR 526/ CENTRAL RD NORTH TO DIXIE ST
NO BUILD
2040 PM DHV = (000)
2040 AM DHV = 000
AFE
07/14


SHEET 1 OF 2
CARROLL COUNTY
GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING
TC # 0009
MARTHA BERRY HWY. / SR 0001 / US 0027
15250
12500
15250
12500
4900
2400
COTTAGE HILL RD. / CS107503
2975
800
1125
475
275
1125
1800
1025
1350
800
1350
1800
3950
3950
CENTRAL RD. / CR052600
TC # 0012
15800
15800
18300
18100
18100
250
ENTRANCE / SHOPPING CENTER
3350
250
3350
15550
18900
18900
18900
16800
1300
1300
CENTENNIAL DR. / CS108703
1500
1500
MARTHA BERRY HWY. / SR 0001 / US 0027
18300
TC # 0256
10450
10450
S. CAROL BYP. / SR 0166
TC # R661
TC # R662
3950
6500
3950
2025
1925
2025
1925
16875
19750
15875
17800
MATCH LINE A
MARTHA BERRY HWY. / SR 0001 / SR 0016 / US 0027
14425
16350
14325
17200
2875
3875
2875
3875
6750
6500
6750
TC # R601
TC # R602
13250
13250
S. CAROL BYP. / SR 0166
TC # 0129
TC # 0014
MATCH LINE A
17800
18750
17200
18950
MARTHA BERRY HWY. / SR 0001 / SR 0016 / US 0027
6000
6000
ENTRANCE / MCINTOSH PLAZA
2350
3650
2350
MM
14850
17750
17750
17750
400
150
MM
3650
15050
17950
13250
13250
MARTHA BERRY HWY. / SR 0001 / SR 0016 / US 0027
250
MM
250
400
4700
4700
DIXIE ST. / CS096503
650
650
ENTRANCE / SHOPPING CENTER
TC # 0587
TC # 0016
NHS00-0000-00(312)
P.I. NO. 0000312
CARROLL COUNTY
SR 1/US 27 FROM CR 526/ CENTRAL RD NORTH TO DIXIE ST
EXISTING TRAFFIC 2012
AMW 12/12


SHEET 2 OF 2
CARROLL COUNTY
GEORGIA DEPARTMENT OF TRANSPORTATION
OFFICE OF PLANNING
N
SR0166
T = 5.00%
S.U. = 4.50%
COMB. = 0.50%
(1050) 895
(895) 1050
S. CAROL BYP. / SR 0166
EB OFF RAMP
T = 4.25%
S.U. = 4.00%
COMB. = 0.25%
WB ON RAMP
T = 1.00%
S.U. = 1.00%
COMB. = 0.00%
(270) 345
(780) 550
(345) 270
(105) 200
(200) 105
(145) 165
(165) 145
(1270) 1470
(1470) 1750
SR0001
T = 5.00%
S.U. = 3.75%
COMB. = 1.25%
(1270) 1430
(1265) 1300
(1465) 1405
MARTHA BERRY HWY. / SR 0001 / SR 0016 / US 0027
(1125) 1265
(1405) 1465
(1165) 1230
(200) 280
(205) 450
(280) 200
(450) 205
(650) 485
(550) 780
(485) 650
EB ON RAMP
T = 7.00%
S.U. = 6.00%
COMB. = 1.00%
WB OFF RAMP
T = 3.25%
S.U. = 2.50%
COMB. = 0.75%
(1430) 1035
(1035) 1430
S. CAROL BYP. / SR 0166
SR0166
T = 3.25%
S.U. = 2.00%
COMB. = 1.25%
MATCH LINE A
(1435) 1615
(1435) 1615
(1615) 1435
MARTHA BERRY HWY. / SR 0001 / US 0027
(1425) 1225
(1500) 1280
(1500) 1280
(1500) 1280
(1280) 1500
(1185) 1385
(250) 230
(250) 230
(95) 115
(95) 115
ENTRANCE / SHOPPING CENTER
(190) 210
(190) 210
(75) 55
(75) 55
CENTENNIAL DR. / CS108703
(1340) 1455
(1455) 1340
(405) 300
(300) 405
COTTAGE HILL RD. / CS107503
(155) 180
(110) 45
(140) 75
(180) 155
(930) 1075
(175) 170
(55) 55
(1225) 1275
SR0001
T = 5.50%
S.U. = 3.75%
COMB. = 1.75%
MARTHA BERRY HWY. / SR 0001 / US 0027
(10) 10
(75) 140
(1075) 930
(115) 145
(45) 110
(145) 115
(170) 175
(1275) 1225
(400) 360
(360) 400
CENTRAL RD. / CR052600
(565) 585
(585) 565
ENTRANCE / MCINTOSH PLAZA
(220) 230
(230) 220
(345) 355
(MM) MM
(1250) 1090
(1550) 1375
(1550) 1375
(1550) 1375
SR0001
T = 3.25%
S.U. = 2.00%
COMB. = 1.25%
(1465) 1405
(1640) 1450
MARTHA BERRY HWY. / SR 0001 / SR 0016 / US 0027
(MM) MM
(355) 345
(40) 35
(30) 30
(1375) 1550
(990) 1165
(990) 1165
(1405) 1465
(1450) 1640
(1090) 1250
(5) 45
(45) MM
(35) 40
(385) 385
(385) 385
DIXIE ST. / CS096503
(45) 80
(80) 45
ENTRANCE / SHOPPING CENTER
NHS00-0000-00(312)
P.I. NO. 0000312
CARROLL COUNTY
SR 1/US 27 FROM CR 526/ CENTRAL RD NORTH TO DIXIE ST
2012 PM DHV = (000)
2012 AM DHV = 000
AMW
12/12

Operational Analysis

Signalized Intersection Capacity Analysis: SR1 & Macintosh (6)

Approach	Lane Group	2020 – Opening Year– No Build – (SYNCHRO)							
		AM				PM			
		V/C	Delay (s/veh)	LOS		V/C	Delay (s/veh)	LOS	
Northbound F	L	2.90	890.0	F	F	2.79	838.5	F	F
	T, R	0.82	19.1	B		0.77	26.7	C	
Southbound F	L	0.51	38.4	D		0.52	36.8	D	
	T	1.20	121.9	F		1.30	163.1	F	
	R	0.36	3.9	A		0.38	3.9	A	
Eastbound B	L,T	0.64	24.1	C		0.61	20.9	C	
	R	0.62	11.6	B		0.58	9.8	A	
Westbound A	L,T	0.03	11.0	B		0.14	12.2	B	
	R	0.07	0.3	A		0.06	0.2	A	
Approach	**Lane Group**	**2040 – Design Year– No Build – (SYNCHRO)**							
		AM				**PM**			
		V/C	**Delay (s/veh)**	**LOS**		**V/C**	**Delay (s/veh)**	**LOS**	
Northbound F	L	1.18	148.8	F	E	3.27	1044.8	F	F
	T, R	0.73	21.9	C		1.18	111.5	F	
Southbound F	L	0.51	68.0	E		0.71	51.9	D	
	T	1.12	93.0	F		2.00	472.4	F	
	R	0.28	8.2	A		0.38	3.9	A	
Eastbound F	L, T	1.21	177.7	F		0.60	20.8	C	
	R	0.85	30.4	C		0.68	13.2	B	
Westbound B	L, T	0.07	49.4	D		0.17	12.6	B	
	R	0.15	5.8	A		0.07	0.3	A	

Lanes, Volumes, Timings
6: SR 1 & Macintosh

2020 AM_No Build

12/8/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Volume (vph)	240	10	365	5	10	40	365	1365	45	30	35	1225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		263	0		123	325		0		829	
Storage Lanes	0		1	0		1	1		0		1	
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.95	1.00	0.95
Frt			0.850			0.850		0.995				
Flt Protected		0.954			0.985		0.950				0.950	
Satd. Flow (prot)	0	1776	1568	0	1835	1583	1752	5012	0	0	1760	3505
Flt Permitted		0.723			0.918		0.950				0.950	
Satd. Flow (perm)	0	1346	1568	0	1710	1583	1752	5012	0	0	1760	3505
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			220			169		11				
Link Speed (mph)		30			30			45				45
Link Distance (ft)		263			191			636				829
Travel Time (s)		6.0			4.3			9.6				12.6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	3%	2%	2%	2%	3%	3%	2%	2%	3%	3%
Adj. Flow (vph)	261	11	397	5	11	43	397	1484	49	33	38	1332
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	272	397	0	16	43	397	1533	0	0	71	1332
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		0			0			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	Prot	NA
Protected Phases		4			8		5	2		1	1	6
Permitted Phases	4		4	8		8						
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	8.0	20.0		8.0	8.0	23.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	8.0	20.0		8.0	8.0	23.0
Total Split (%)	39.2%	39.2%	39.2%	39.2%	39.2%	39.2%	15.7%	39.2%		15.7%	15.7%	45.1%
Maximum Green (s)	16.0	16.0	16.0	16.0	16.0	16.0	4.0	16.0		4.0	4.0	16.1
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.9
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	3.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)		4.0	4.0		4.0	4.0	4.0	4.0			4.0	6.9
Lead/Lag							Lead	Lag		Lead	Lead	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0				5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0		11.0				11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0				0
Act Effct Green (s)		16.0	16.0		16.0	16.0	4.0	19.0			4.0	16.1
Actuated g/C Ratio		0.31	0.31		0.31	0.31	0.08	0.37			0.08	0.32
v/c Ratio		0.64	0.62		0.03	0.07	2.90	0.82			0.51	1.20

Lanes, Volumes, Timings
6: SR 1 & Macintosh

12/8/2015

Lane Group	SBR
Lane Configurations	
Volume (vph)	230
Ideal Flow (vphpl)	1900
Storage Length (ft)	260
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1568
Flt Permitted	
Satd. Flow (perm)	1568
Right Turn on Red	Yes
Satd. Flow (RTOR)	250
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.92
Heavy Vehicles (%)	3%
Adj. Flow (vph)	250
Shared Lane Traffic (%)	
Lane Group Flow (vph)	250
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Minimum Split (s)	23.0
Total Split (s)	23.0
Total Split (%)	45.1%
Maximum Green (s)	16.1
Yellow Time (s)	3.9
All-Red Time (s)	3.0
Lost Time Adjust (s)	0.0
Total Lost Time (s)	6.9
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	16.1
Actuated g/C Ratio	0.32
v/c Ratio	0.38

Lanes, Volumes, Timings
6: SR 1 & Macintosh

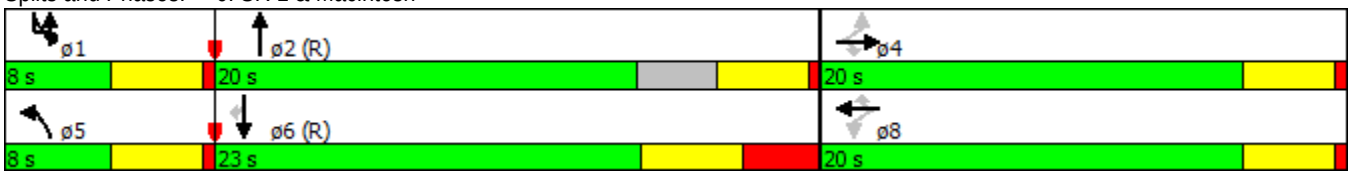
12/8/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Control Delay		24.1	11.6		12.4	0.2	890.0	19.1			38.4	121.9
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Total Delay		24.1	11.6		12.4	0.2	890.0	19.1			38.4	121.9
LOS		C	B		B	A	F	B			D	F
Approach Delay		16.7			3.5			198.2				100.5
Approach LOS		B			A			F				F

Intersection Summary

Area Type: Other
Cycle Length: 51
Actuated Cycle Length: 51
Offset: 43 (84%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Pretimed
Maximum v/c Ratio: 2.90
Intersection Signal Delay: 129.9 Intersection LOS: F
Intersection Capacity Utilization 87.0% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 6: SR 1 & Macintosh



Lanes, Volumes, Timings
6: SR 1 & Macintosh

12/8/2015

Lane Group	SBR
Control Delay	4.2
Queue Delay	0.0
Total Delay	4.2
LOS	A
Approach Delay	
Approach LOS	

Intersection Summary

Lanes, Volumes, Timings
6:

2020 PM_NB

12/2/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Volume (vph)	230	10	355	45	10	35	375	1180	5	30	40	1400
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		263	0		123	325		0		829	
Storage Lanes	0		1	0		1	1		0		1	
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.95	1.00	0.95
Frt			0.850			0.850		0.999				
Flt Protected		0.954			0.961		0.950				0.950	
Satd. Flow (prot)	0	1776	1568	0	1790	1583	1752	5031	0	0	1760	3505
Flt Permitted		0.691			0.709		0.950				0.950	
Satd. Flow (perm)	0	1287	1568	0	1321	1583	1752	5031	0	0	1760	3505
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			220			114		1				
Link Speed (mph)		30			30			30				30
Link Distance (ft)		263			191			636				829
Travel Time (s)		6.0			4.3			14.5				18.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	3%	2%	2%	2%	3%	3%	2%	2%	3%	3%
Adj. Flow (vph)	250	11	386	49	11	38	408	1283	5	33	43	1522
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	261	386	0	60	38	408	1288	0	0	76	1522
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		0			0			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	Prot	NA
Protected Phases		4			8		5	2		1	1	6
Permitted Phases	4		4	8		8						
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	8.0	20.0		8.0	8.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	8.0	20.0		8.0	8.0	20.0
Total Split (%)	41.7%	41.7%	41.7%	41.7%	41.7%	41.7%	16.7%	41.7%		16.7%	16.7%	41.7%
Maximum Green (s)	16.0	16.0	16.0	16.0	16.0	16.0	4.0	16.0		4.0	4.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)		4.0	4.0		4.0	4.0	4.0	4.0			4.0	4.0
Lead/Lag							Lead	Lag		Lead	Lead	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0				5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0		11.0				11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0				0
Act Effct Green (s)		16.0	16.0		16.0	16.0	4.0	16.0			4.0	16.0
Actuated g/C Ratio		0.33	0.33		0.33	0.33	0.08	0.33			0.08	0.33
v/c Ratio		0.61	0.58		0.14	0.06	2.79	0.77			0.52	1.30

Lanes, Volumes, Timings
6:

12/2/2015

Lane Group	SBR
Lane Configurations	
Volume (vph)	240
Ideal Flow (vphpl)	1900
Storage Length (ft)	260
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1568
Flt Permitted	
Satd. Flow (perm)	1568
Right Turn on Red	Yes
Satd. Flow (RTOR)	261
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.92
Heavy Vehicles (%)	3%
Adj. Flow (vph)	261
Shared Lane Traffic (%)	
Lane Group Flow (vph)	261
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Minimum Split (s)	20.0
Total Split (s)	20.0
Total Split (%)	41.7%
Maximum Green (s)	16.0
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	0.0
Total Lost Time (s)	4.0
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	16.0
Actuated g/C Ratio	0.33
v/c Ratio	0.38

Lanes, Volumes, Timings
6:

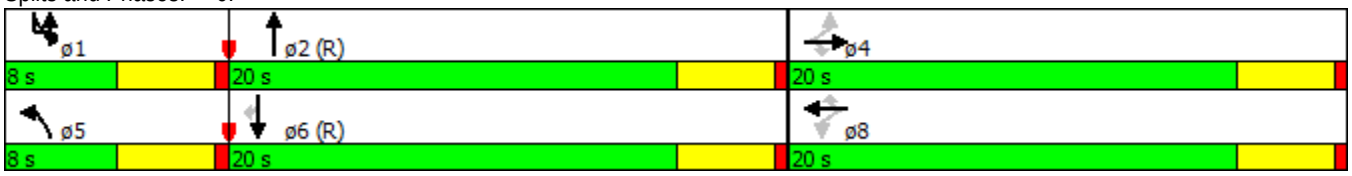
12/2/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Control Delay		20.9	9.8		12.2	0.2	838.5	26.7			36.8	163.1
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Total Delay		20.9	9.8		12.2	0.2	838.5	26.7			36.8	163.1
LOS		C	A		B	A	F	C			D	F
Approach Delay		14.3			7.6			222.0				135.6
Approach LOS		B			A			F				F

Intersection Summary

Area Type: Other
Cycle Length: 48
Actuated Cycle Length: 48
Offset: 40 (83%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 90
Control Type: Pretimed
Maximum v/c Ratio: 2.79
Intersection Signal Delay: 148.5 Intersection LOS: F
Intersection Capacity Utilization 89.4% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 6:



Lanes, Volumes, Timings
6:

12/2/2015

Lane Group	SBR
Control Delay	3.9
Queue Delay	0.0
Total Delay	3.9
LOS	A
Approach Delay	
Approach LOS	

Intersection Summary

Lanes, Volumes, Timings
6:

2040 AM_NB

12/2/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Volume (vph)	240	10	430	5	10	45	425	2085	55	50	40	1880
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		263	0		123	325		0		829	
Storage Lanes	0		1	0		1	1		0		1	
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.95	1.00	0.95
Frt			0.850			0.850		0.996				
Flt Protected		0.954			0.985		0.950				0.950	
Satd. Flow (prot)	0	1776	1568	0	1835	1583	1752	5017	0	0	1762	3505
Flt Permitted		0.723			0.789		0.950				0.950	
Satd. Flow (perm)	0	1346	1568	0	1470	1583	1752	5017	0	0	1762	3505
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			345			71		5				
Link Speed (mph)		30			30			30				30
Link Distance (ft)		263			191			636				829
Travel Time (s)		6.0			4.3			14.5				18.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	3%	2%	2%	2%	3%	3%	2%	2%	3%	3%
Adj. Flow (vph)	261	11	467	5	11	49	462	2266	60	54	43	2043
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	272	467	0	16	49	462	2326	0	0	97	2043
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		0			0			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	Prot	NA
Protected Phases		4			8		5	2		1	1	6
Permitted Phases	4		4	8		8						
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	8.0	20.0		8.0	8.0	20.0
Total Split (s)	27.0	27.0	27.0	27.0	27.0	27.0	35.0	92.0		19.0	19.0	76.0
Total Split (%)	19.6%	19.6%	19.6%	19.6%	19.6%	19.6%	25.4%	66.7%		13.8%	13.8%	55.1%
Maximum Green (s)	23.0	23.0	23.0	23.0	23.0	23.0	31.0	88.0		15.0	15.0	72.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)		4.0	4.0		4.0	4.0	4.0	4.0			4.0	4.0
Lead/Lag							Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0				5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0		11.0				11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0				0
Act Effct Green (s)		23.0	23.0		23.0	23.0	31.0	88.0			15.0	72.0
Actuated g/C Ratio		0.17	0.17		0.17	0.17	0.22	0.64			0.11	0.52
v/c Ratio		1.21	0.85		0.07	0.15	1.18	0.73			0.51	1.12

Lanes, Volumes, Timings
6:

12/2/2015

Lane Group	SBR
Lane Configurations	
Volume (vph)	225
Ideal Flow (vphpl)	1900
Storage Length (ft)	260
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1568
Flt Permitted	
Satd. Flow (perm)	1568
Right Turn on Red	Yes
Satd. Flow (RTOR)	142
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.92
Heavy Vehicles (%)	3%
Adj. Flow (vph)	245
Shared Lane Traffic (%)	
Lane Group Flow (vph)	245
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Minimum Split (s)	20.0
Total Split (s)	76.0
Total Split (%)	55.1%
Maximum Green (s)	72.0
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	0.0
Total Lost Time (s)	4.0
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	72.0
Actuated g/C Ratio	0.52
v/c Ratio	0.28

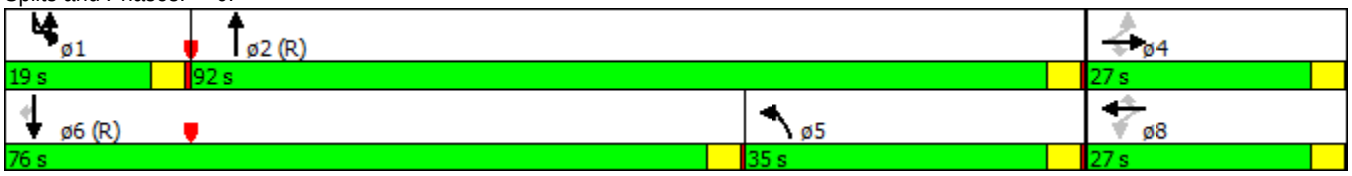
Lanes, Volumes, Timings
6:

12/2/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Control Delay		177.7	30.4		49.4	5.8	148.8	18.5			68.0	93.0
Queue Delay		0.0	0.0		0.0	0.0	0.0	3.3			0.0	0.0
Total Delay		177.7	30.4		49.4	5.8	148.8	21.9			68.0	93.0
LOS		F	C		D	A	F	C			E	F
Approach Delay		84.6			16.5			42.9				83.3
Approach LOS		F			B			D				F

Intersection Summary	
Area Type: Other	
Cycle Length: 138	
Actuated Cycle Length: 138	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 150	
Control Type: Pretimed	
Maximum v/c Ratio: 1.21	
Intersection Signal Delay: 63.9	Intersection LOS: E
Intersection Capacity Utilization 106.0%	ICU Level of Service G
Analysis Period (min) 15	

Splits and Phases: 6:



Lanes, Volumes, Timings
6:

12/2/2015

Lane Group	SBR
Control Delay	8.2
Queue Delay	0.0
Total Delay	8.2
LOS	A
Approach Delay	
Approach LOS	

Intersection Summary

2040 PM_NB

Lanes, Volumes, Timings
6:

12/2/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Volume (vph)	225	10	415	55	10	40	440	1825	5	50	45	2150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		263	0		123	325		0		829	
Storage Lanes	0		1	0		1	1		0		1	
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.91	0.91	0.95	1.00	0.95
Frt			0.850			0.850						
Flt Protected		0.954			0.959		0.950				0.950	
Satd. Flow (prot)	0	1776	1568	0	1786	1583	1752	5036	0	0	1761	3505
Flt Permitted		0.684			0.687		0.950				0.950	
Satd. Flow (perm)	0	1274	1568	0	1280	1583	1752	5036	0	0	1761	3505
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			218			114		1				
Link Speed (mph)		30			30			30				30
Link Distance (ft)		263			191			636				829
Travel Time (s)		6.0			4.3			14.5				18.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	3%	2%	2%	2%	3%	3%	2%	2%	3%	3%
Adj. Flow (vph)	245	11	451	60	11	43	478	1984	5	54	49	2337
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	256	451	0	71	43	478	1989	0	0	103	2337
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		0			0			12				12
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	Prot	NA
Protected Phases		4			8		5	2		1	1	6
Permitted Phases	4		4	8		8						
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	8.0	20.0		8.0	8.0	20.0
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	8.0	20.0		8.0	8.0	20.0
Total Split (%)	41.7%	41.7%	41.7%	41.7%	41.7%	41.7%	16.7%	41.7%		16.7%	16.7%	41.7%
Maximum Green (s)	16.0	16.0	16.0	16.0	16.0	16.0	4.0	16.0		4.0	4.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)		4.0	4.0		4.0	4.0	4.0	4.0			4.0	4.0
Lead/Lag							Lead	Lag		Lead	Lead	Lag
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0				5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0		11.0				11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0				0
Act Effct Green (s)		16.0	16.0		16.0	16.0	4.0	16.0			4.0	16.0
Actuated g/C Ratio		0.33	0.33		0.33	0.33	0.08	0.33			0.08	0.33
v/c Ratio		0.60	0.68		0.17	0.07	3.27	1.18			0.71	2.00

Lanes, Volumes, Timings
6:

12/2/2015

Lane Group	SBR
Lane Configurations	
Volume (vph)	240
Ideal Flow (vphpl)	1900
Storage Length (ft)	260
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1568
Flt Permitted	
Satd. Flow (perm)	1568
Right Turn on Red	Yes
Satd. Flow (RTOR)	261
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.92
Heavy Vehicles (%)	3%
Adj. Flow (vph)	261
Shared Lane Traffic (%)	
Lane Group Flow (vph)	261
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Minimum Split (s)	20.0
Total Split (s)	20.0
Total Split (%)	41.7%
Maximum Green (s)	16.0
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	0.0
Total Lost Time (s)	4.0
Lead/Lag	Lag
Lead-Lag Optimize?	Yes
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	16.0
Actuated g/C Ratio	0.33
v/c Ratio	0.38

Lanes, Volumes, Timings
6:

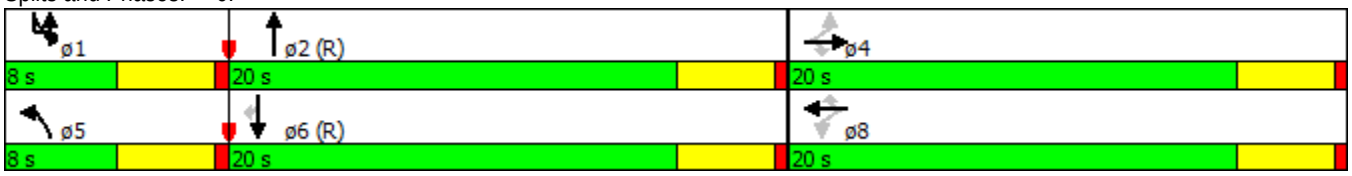
12/2/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Control Delay		20.8	13.2		12.6	0.3	1044.8	111.5			51.9	472.4
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Total Delay		20.8	13.2		12.6	0.3	1044.8	111.5			51.9	472.4
LOS		C	B		B	A	F	F			D	F
Approach Delay		16.0			8.0			292.3				411.1
Approach LOS		B			A			F				F

Intersection Summary

Area Type: Other
Cycle Length: 48
Actuated Cycle Length: 48
Offset: 40 (83%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 150
Control Type: Pretimed
Maximum v/c Ratio: 3.27
Intersection Signal Delay: 307.9 Intersection LOS: F
Intersection Capacity Utilization 113.5% ICU Level of Service H
Analysis Period (min) 15

Splits and Phases: 6:



Lanes, Volumes, Timings
6:

12/2/2015

Lane Group	SBR
Control Delay	3.9
Queue Delay	0.0
Total Delay	3.9
LOS	A
Approach Delay	
Approach LOS	

Intersection Summary

Operational Analysis (Proposed Network)

Signalized Intersection Capacity Analysis: SR1 & Macintosh (6)

Approach	Lane Group	2020 – Opening Year– Build – (SYNCHRO) (6)							
		AM				PM			
		V/C	Delay (s/veh)	LOS		V/C	Delay (s/veh)	LOS	
Northbound	L	0.63	34.4	C	B	0.71	31.3	C	B
B	T, R	0.70	23.5	B		0.56	8.7	A	
Southbound	L	0.40	45.4	D		0.43	46.4	D	
C	T	0.74	28.5	C		0.74	25.0	C	
	R	0.34	4.3	A		0.32	3.5	A	
Eastbound	L,T	0.61	33.1	C		0.69	39.7	D	
C	R	0.52	5.1	A		0.56	8.1	A	
Westbound	L, T	0.03	21.2	C		0.17	25.5	C	
B	R	0.07	0.2	A		0.07	0.3	A	
Approach	**Lane Group**	**2040 – Design Year– Build – (SYNCHRO)**							
		AM				**PM**			
		V/C	**Delay (s/veh)**	**LOS**		**V/C**	**Delay (s/veh)**	**LOS**	
Northbound	L	0.77	48.7	D	C	0.91	60.0	E	C
C	T, R	0.86	19.1	C		0.75	17.0	B	
Southbound	L	0.60	72.7	E		0.50	54.3	D	
C	T	0.86	35.7	D		0.91	31.4	C	
	R	0.29	5.7	A		0.28	3.6	A	
Eastbound	L, T	0.76	59.2	E		0.89	72.8	E	
D	R	0.73	21.1	C		0.80	27.6	C	
Westbound	L, T	0.04	36.3	D		0.35	41.5	D	
C	R	0.10	3.4	A		0.10	0.8	A	

Lanes, Volumes, Timings
6: SR 1 & Macintosh

2020 AM_PROPOSSED NETWORK

12/7/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Volume (vph)	235	10	370	5	10	40	370	1400	45	30	35	1225
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		263	0		123	450		0		400	
Storage Lanes	0		1	0		1	2		0		1	
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.91	0.91	0.91	1.00	0.91
Frt			0.850			0.850		0.995				
Flt Protected		0.954			0.985		0.950				0.950	
Satd. Flow (prot)	0	1776	1568	0	1835	1583	3400	5012	0	0	1760	5036
Flt Permitted		0.723			0.930		0.950				0.950	
Satd. Flow (perm)	0	1346	1568	0	1732	1583	3400	5012	0	0	1760	5036
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			402			109		7				
Link Speed (mph)		30			30			30				30
Link Distance (ft)		263			191			636				829
Travel Time (s)		6.0			4.3			14.5				18.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	3%	2%	2%	2%	3%	3%	2%	2%	3%	3%
Adj. Flow (vph)	255	11	402	5	11	43	402	1522	49	33	38	1332
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	266	402	0	16	43	402	1571	0	0	71	1332
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		0			0			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	Prot	NA
Protected Phases		4			8		5	2		1	1	6
Permitted Phases	4		4	8		8						
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	8.0	20.0		8.0	8.0	20.0
Total Split (s)	33.0	33.0	33.0	33.0	33.0	33.0	21.0	44.0		13.0	13.0	36.0
Total Split (%)	36.7%	36.7%	36.7%	36.7%	36.7%	36.7%	23.3%	48.9%		14.4%	14.4%	40.0%
Maximum Green (s)	29.0	29.0	29.0	29.0	29.0	29.0	17.0	40.0		9.0	9.0	32.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)		4.0	4.0		4.0	4.0	4.0	4.0			4.0	4.0
Lead/Lag							Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0				5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0		11.0				11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0				0
Act Effct Green (s)		29.0	29.0		29.0	29.0	17.0	40.0			9.0	32.0
Actuated g/C Ratio		0.32	0.32		0.32	0.32	0.19	0.44			0.10	0.36
v/c Ratio		0.61	0.52		0.03	0.07	0.63	0.70			0.40	0.74

Lanes, Volumes, Timings
6: SR 1 & Macintosh

2020 AM_PROPOSED NETWORK

12/7/2015

Lane Group	SBR
Lane Configurations	↱
Volume (vph)	225
Ideal Flow (vphpl)	1900
Storage Length (ft)	260
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1568
Flt Permitted	
Satd. Flow (perm)	1568
Right Turn on Red	Yes
Satd. Flow (RTOR)	245
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.92
Heavy Vehicles (%)	3%
Adj. Flow (vph)	245
Shared Lane Traffic (%)	
Lane Group Flow (vph)	245
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Minimum Split (s)	20.0
Total Split (s)	36.0
Total Split (%)	40.0%
Maximum Green (s)	32.0
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	0.0
Total Lost Time (s)	4.0
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	32.0
Actuated g/C Ratio	0.36
v/c Ratio	0.34

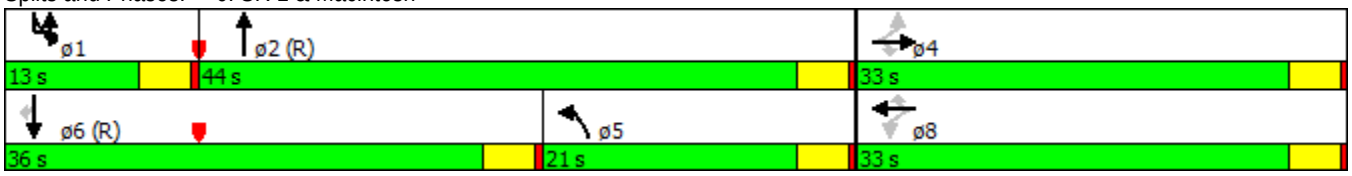
Lanes, Volumes, Timings
6: SR 1 & Macintosh

12/7/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Control Delay		33.1	5.1		21.2	0.2	28.6	12.8			45.4	28.5
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Total Delay		33.1	5.1		21.2	0.2	28.6	12.8			45.4	28.5
LOS		C	A		C	A	C	B			D	C
Approach Delay		16.3			5.9			16.1				25.7
Approach LOS		B			A			B				C

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 28 (31%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 60	
Control Type: Pretimed	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 19.6	Intersection LOS: B
Intersection Capacity Utilization 64.4%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6: SR 1 & Macintosh



Lanes, Volumes, Timings
6: SR 1 & Macintosh

12/7/2015

Lane Group	SBR
Control Delay	4.3
Queue Delay	0.0
Total Delay	4.3
LOS	A
Approach Delay	
Approach LOS	

Intersection Summary

Lanes, Volumes, Timings
6:

2020 PM_proposed network

12/7/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Volume (vph)	225	10	360	45	10	35	370	1225	5	30	40	1400
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		263	0		123	450		0		400	
Storage Lanes	0		1	0		1	2		0		1	
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.91	0.91	0.91	1.00	0.91
Frt			0.850			0.850		0.999				
Flt Protected		0.954			0.961		0.950				0.950	
Satd. Flow (prot)	0	1776	1568	0	1790	1583	3400	5031	0	0	1760	5036
Flt Permitted		0.691			0.674		0.950				0.950	
Satd. Flow (perm)	0	1287	1568	0	1255	1583	3400	5031	0	0	1760	5036
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			345			109		1				
Link Speed (mph)		30			30			30				30
Link Distance (ft)		263			191			636				829
Travel Time (s)		6.0			4.3			14.5				18.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	3%	2%	2%	2%	3%	3%	2%	2%	3%	3%
Adj. Flow (vph)	245	11	391	49	11	38	402	1332	5	33	43	1522
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	256	391	0	60	38	402	1337	0	0	76	1522
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		0			0			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	Prot	NA
Protected Phases		4			8		5	2		1	1	6
Permitted Phases	4		4	8		8						
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	8.0	20.0		8.0	8.0	20.0
Total Split (s)	30.0	30.0	30.0	30.0	30.0	30.0	19.0	47.0		13.0	13.0	41.0
Total Split (%)	33.3%	33.3%	33.3%	33.3%	33.3%	33.3%	21.1%	52.2%		14.4%	14.4%	45.6%
Maximum Green (s)	26.0	26.0	26.0	26.0	26.0	26.0	15.0	43.0		9.0	9.0	37.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)		4.0	4.0		4.0	4.0	4.0	4.0			4.0	4.0
Lead/Lag							Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0				5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0		11.0				11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0				0
Act Effct Green (s)		26.0	26.0		26.0	26.0	15.0	43.0			9.0	37.0
Actuated g/C Ratio		0.29	0.29		0.29	0.29	0.17	0.48			0.10	0.41
v/c Ratio		0.69	0.56		0.17	0.07	0.71	0.56			0.43	0.74

Lanes, Volumes, Timings
6:

12/7/2015

Lane Group	SBR
Lane Configurations	↱
Volume (vph)	235
Ideal Flow (vphpl)	1900
Storage Length (ft)	260
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1568
Flt Permitted	
Satd. Flow (perm)	1568
Right Turn on Red	Yes
Satd. Flow (RTOR)	255
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.92
Heavy Vehicles (%)	3%
Adj. Flow (vph)	255
Shared Lane Traffic (%)	
Lane Group Flow (vph)	255
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Minimum Split (s)	20.0
Total Split (s)	41.0
Total Split (%)	45.6%
Maximum Green (s)	37.0
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	0.0
Total Lost Time (s)	4.0
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	37.0
Actuated g/C Ratio	0.41
v/c Ratio	0.32

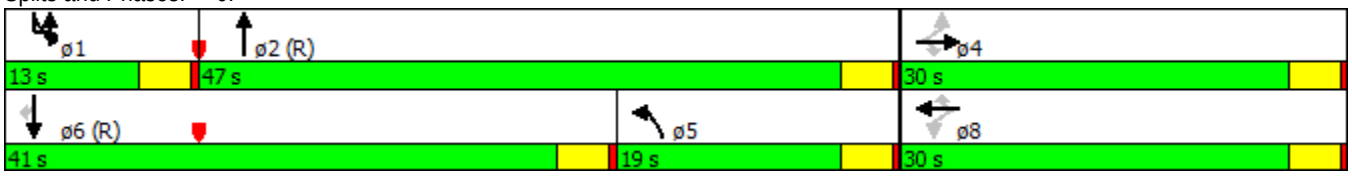
Lanes, Volumes, Timings
6:

12/7/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Control Delay		39.7	8.1		25.5	0.3	31.3	8.7			46.4	25.0
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Total Delay		39.7	8.1		25.5	0.3	31.3	8.7			46.4	25.0
LOS		D	A		C	A	C	A			D	C
Approach Delay		20.6			15.7			13.9				22.9
Approach LOS		C			B			B				C

Intersection Summary	
Area Type: Other	
Cycle Length: 90	
Actuated Cycle Length: 90	
Offset: 24 (27%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 60	
Control Type: Pretimed	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 18.8	Intersection LOS: B
Intersection Capacity Utilization 67.3%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 6:



Lanes, Volumes, Timings
6:

12/7/2015

Lane Group	SBR
Control Delay	3.5
Queue Delay	0.0
Total Delay	3.5
LOS	A
Approach Delay	
Approach LOS	

Intersection Summary

Lanes, Volumes, Timings 6:

2040 AM_PROPOSED NETWORK

12/7/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Volume (vph)	235	10	430	5	10	45	425	2150	55	50	40	1880
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		263	0		123	450		0		400	
Storage Lanes	0		1	0		1	2		0		1	
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.91	0.91	0.91	1.00	0.91
Frt			0.850			0.850		0.996				
Flt Protected		0.954			0.985		0.950				0.950	
Satd. Flow (prot)	0	1776	1568	0	1835	1583	3400	5017	0	0	1762	5036
Flt Permitted		0.723			0.924		0.950				0.950	
Satd. Flow (perm)	0	1346	1568	0	1721	1583	3400	5017	0	0	1762	5036
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			315			76		5				
Link Speed (mph)		30			30			30				30
Link Distance (ft)		263			191			636				829
Travel Time (s)		6.0			4.3			14.5				18.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	3%	2%	2%	2%	3%	3%	2%	2%	3%	3%
Adj. Flow (vph)	255	11	467	5	11	49	462	2337	60	54	43	2043
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	266	467	0	16	49	462	2397	0	0	97	2043
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		0			0			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	Prot	NA
Protected Phases		4			8		5	2		1	1	6
Permitted Phases	4		4	8		8						
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	8.0	20.0		8.0	8.0	20.0
Total Split (s)	38.0	38.0	38.0	38.0	38.0	38.0	27.0	76.0		16.0	16.0	65.0
Total Split (%)	29.2%	29.2%	29.2%	29.2%	29.2%	29.2%	20.8%	58.5%		12.3%	12.3%	50.0%
Maximum Green (s)	34.0	34.0	34.0	34.0	34.0	34.0	23.0	72.0		12.0	12.0	61.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)		4.0	4.0		4.0	4.0	4.0	4.0			4.0	4.0
Lead/Lag							Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0				5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0		11.0				11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0				0
Act Effct Green (s)		34.0	34.0		34.0	34.0	23.0	72.0			12.0	61.0
Actuated g/C Ratio		0.26	0.26		0.26	0.26	0.18	0.55			0.09	0.47
v/c Ratio		0.76	0.73		0.04	0.10	0.77	0.86			0.60	0.86

Lanes, Volumes, Timings
6:

12/7/2015

Lane Group	SBR
Lane Configurations	↱
Volume (vph)	225
Ideal Flow (vphpl)	1900
Storage Length (ft)	263
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1568
Flt Permitted	
Satd. Flow (perm)	1568
Right Turn on Red	Yes
Satd. Flow (RTOR)	197
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.92
Heavy Vehicles (%)	3%
Adj. Flow (vph)	245
Shared Lane Traffic (%)	
Lane Group Flow (vph)	245
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Minimum Split (s)	20.0
Total Split (s)	65.0
Total Split (%)	50.0%
Maximum Green (s)	61.0
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	0.0
Total Lost Time (s)	4.0
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	61.0
Actuated g/C Ratio	0.47
v/c Ratio	0.29

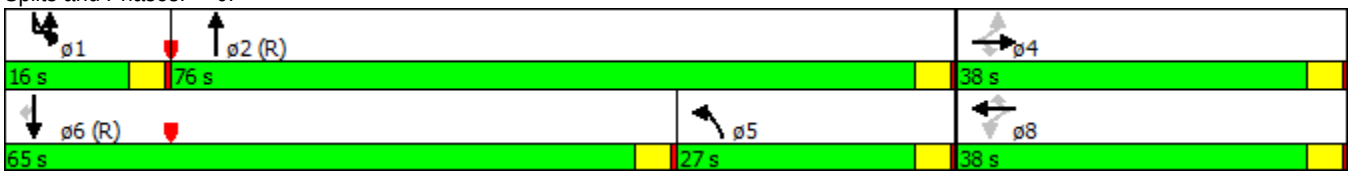
Lanes, Volumes, Timings
6:

12/7/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Control Delay		59.2	21.1		36.3	3.4	48.7	19.1			72.7	35.7
Queue Delay		0.0	0.0		0.0	0.0	0.0	2.1			0.0	0.0
Total Delay		59.2	21.1		36.3	3.4	48.7	21.3			72.7	35.7
LOS		E	C		D	A	D	C			E	D
Approach Delay		34.9			11.5			25.7				34.1
Approach LOS		C			B			C				C

Intersection Summary	
Area Type: Other	
Cycle Length: 130	
Actuated Cycle Length: 130	
Offset: 28 (22%), Referenced to phase 2:NBT and 6:SBT, Start of Green	
Natural Cycle: 75	
Control Type: Pretimed	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 30.0	Intersection LOS: C
Intersection Capacity Utilization 78.7%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 6:



Lanes, Volumes, Timings
6:

12/7/2015

Lane Group	SBR
Control Delay	5.7
Queue Delay	0.0
Total Delay	5.7
LOS	A
Approach Delay	
Approach LOS	

Intersection Summary

Lanes, Volumes, Timings 6:

2040 PM_PROPOSED NETWORK

12/7/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Lane Configurations												
Volume (vph)	225	10	415	55	10	40	440	1880	5	50	45	2150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		263	0		123	450		0		400	
Storage Lanes	0		1	0		1	2		0		1	
Taper Length (ft)	25			25			25				25	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.91	0.91	0.91	1.00	0.91
Frt			0.850			0.850						
Flt Protected		0.954			0.959		0.950				0.950	
Satd. Flow (prot)	0	1776	1568	0	1786	1583	3400	5036	0	0	1761	5036
Flt Permitted		0.684			0.480		0.950				0.950	
Satd. Flow (perm)	0	1274	1568	0	894	1583	3400	5036	0	0	1761	5036
Right Turn on Red			Yes			Yes			Yes			
Satd. Flow (RTOR)			270			89						
Link Speed (mph)		30			30			30				30
Link Distance (ft)		263			191			636				829
Travel Time (s)		6.0			4.3			14.5				18.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	3%	3%	2%	2%	2%	3%	3%	2%	2%	3%	3%
Adj. Flow (vph)	245	11	451	60	11	43	478	2043	5	54	49	2337
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	256	451	0	71	43	478	2048	0	0	103	2337
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	R NA	Left	Left
Median Width(ft)		0			0			24				24
Link Offset(ft)		0			0			0				0
Crosswalk Width(ft)		16			16			16				16
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	9	15	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA		Prot	Prot	NA
Protected Phases		4			8		5	2		1	1	6
Permitted Phases	4		4	8		8						
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	8.0	20.0		8.0	8.0	20.0
Total Split (s)	29.0	29.0	29.0	29.0	29.0	29.0	21.0	64.0		17.0	17.0	60.0
Total Split (%)	26.4%	26.4%	26.4%	26.4%	26.4%	26.4%	19.1%	58.2%		15.5%	15.5%	54.5%
Maximum Green (s)	25.0	25.0	25.0	25.0	25.0	25.0	17.0	60.0		13.0	13.0	56.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Total Lost Time (s)		4.0	4.0		4.0	4.0	4.0	4.0			4.0	4.0
Lead/Lag							Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?							Yes	Yes		Yes	Yes	Yes
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0				5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0		11.0				11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0		0				0
Act Effct Green (s)		25.0	25.0		25.0	25.0	17.0	60.0			13.0	56.0
Actuated g/C Ratio		0.23	0.23		0.23	0.23	0.15	0.55			0.12	0.51
v/c Ratio		0.89	0.80		0.35	0.10	0.91	0.75			0.50	0.91

Lanes, Volumes, Timings
6:

12/7/2015

Lane Group	SBR
Lane Configurations	↱
Volume (vph)	235
Ideal Flow (vphpl)	1900
Storage Length (ft)	260
Storage Lanes	1
Taper Length (ft)	
Lane Util. Factor	1.00
Frt	0.850
Flt Protected	
Satd. Flow (prot)	1568
Flt Permitted	
Satd. Flow (perm)	1568
Right Turn on Red	Yes
Satd. Flow (RTOR)	226
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	0.92
Heavy Vehicles (%)	3%
Adj. Flow (vph)	255
Shared Lane Traffic (%)	
Lane Group Flow (vph)	255
Enter Blocked Intersection	No
Lane Alignment	Right
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	1.00
Turning Speed (mph)	9
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Minimum Split (s)	20.0
Total Split (s)	60.0
Total Split (%)	54.5%
Maximum Green (s)	56.0
Yellow Time (s)	3.5
All-Red Time (s)	0.5
Lost Time Adjust (s)	0.0
Total Lost Time (s)	4.0
Lead/Lag	Lead
Lead-Lag Optimize?	Yes
Walk Time (s)	5.0
Flash Dont Walk (s)	11.0
Pedestrian Calls (#/hr)	0
Act Effct Green (s)	56.0
Actuated g/C Ratio	0.51
v/c Ratio	0.28

Lanes, Volumes, Timings
6:

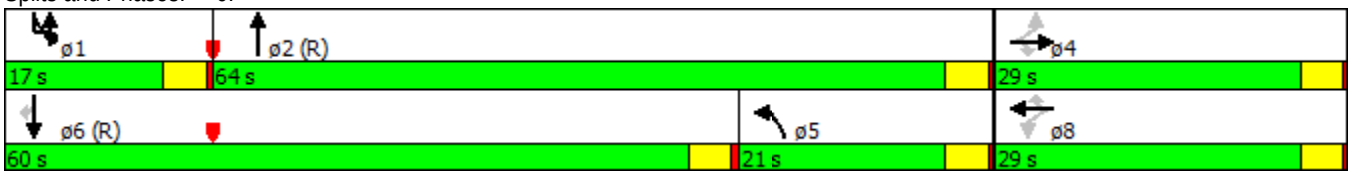
12/7/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBU	SBL	SBT
Control Delay		72.8	27.6		41.5	0.8	60.0	16.7			54.3	31.4
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.2			0.0	0.0
Total Delay		72.8	27.6		41.5	0.8	60.0	17.0			54.3	31.4
LOS		E	C		D	A	E	B			D	C
Approach Delay		44.0			26.2			25.1				29.7
Approach LOS		D			C			C				C

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green
Natural Cycle: 80
Control Type: Pretimed
Maximum v/c Ratio: 0.91
Intersection Signal Delay: 29.4 Intersection LOS: C
Intersection Capacity Utilization 83.8% ICU Level of Service E
Analysis Period (min) 15

Splits and Phases: 6:



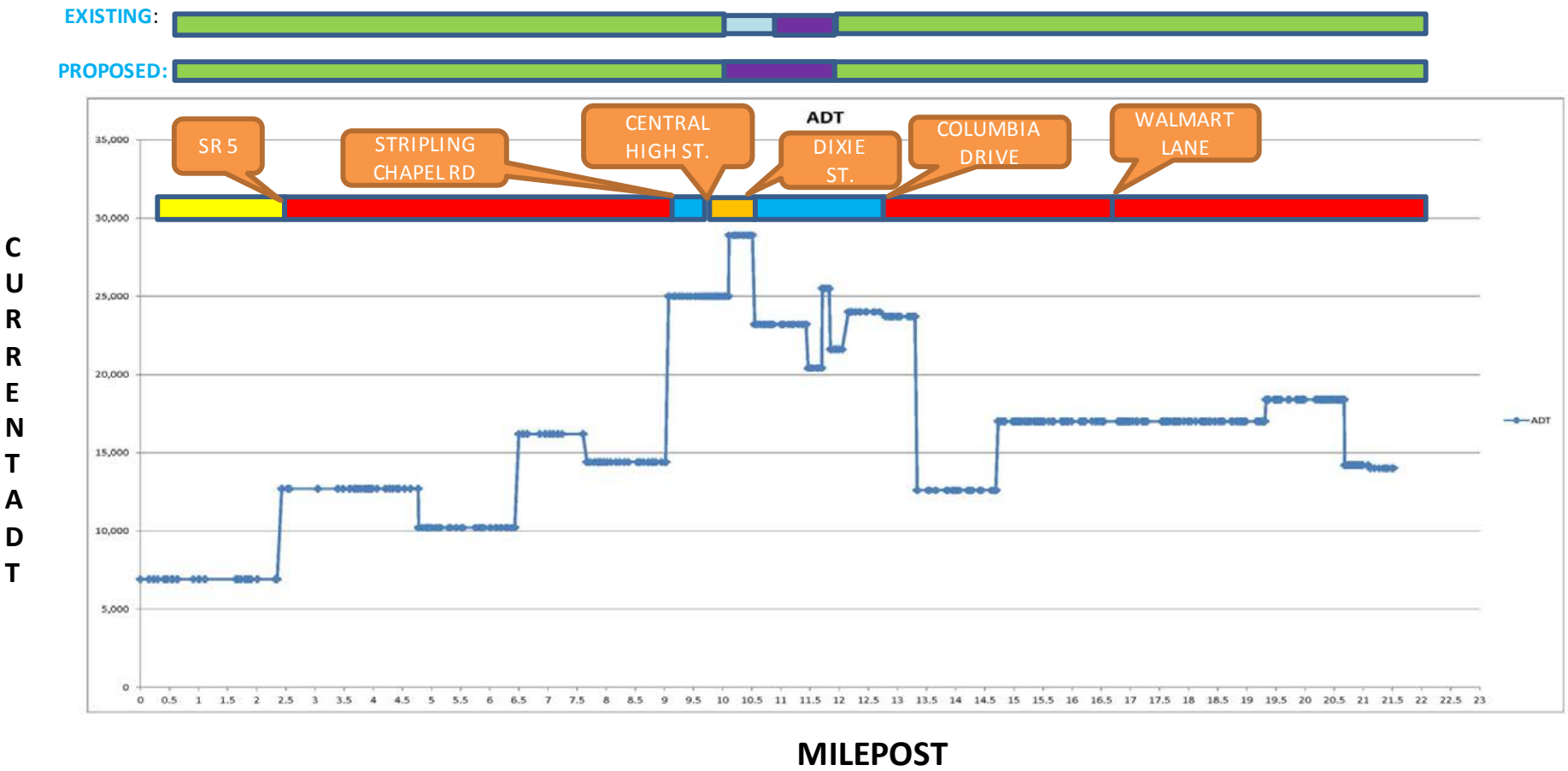
Lanes, Volumes, Timings
6:

12/7/2015

Lane Group	SBR
Control Delay	3.6
Queue Delay	0.0
Total Delay	3.6
LOS	A
Approach Delay	
Approach LOS	

Intersection Summary

TRAFFIC ANALYSIS CARROLL COUNTY FROM SR1 TO I-20 (MP 0 TO MP 20.92)



CAPACITY ANALYSIS SUMMARY

DESIGN YEAR LOS B-HCS MULTILAN ANALYSIS USING PERMANENT TRAFFIC STATION COUNTS

DESIGN YEAR LOS A-HCS MULTILANE ANALYSIS USING PERMANENT TRAFFIC STATION COUNTS

LOS NOT COMPUTED. AREA OUTSIDE PROJECT SPECIFIC TRAFFIC DIAGRAMS AND HCS MULTILANE ANALYSIS DOES NOT APPLY (Average Signal Spacing = 0.77 miles)

SEE TABULAR INTERSECTION LOS SUMMARY. SYNCHRO MODEL USING PROJECT SPECIFIC TRAFFIC DIAGRAMS

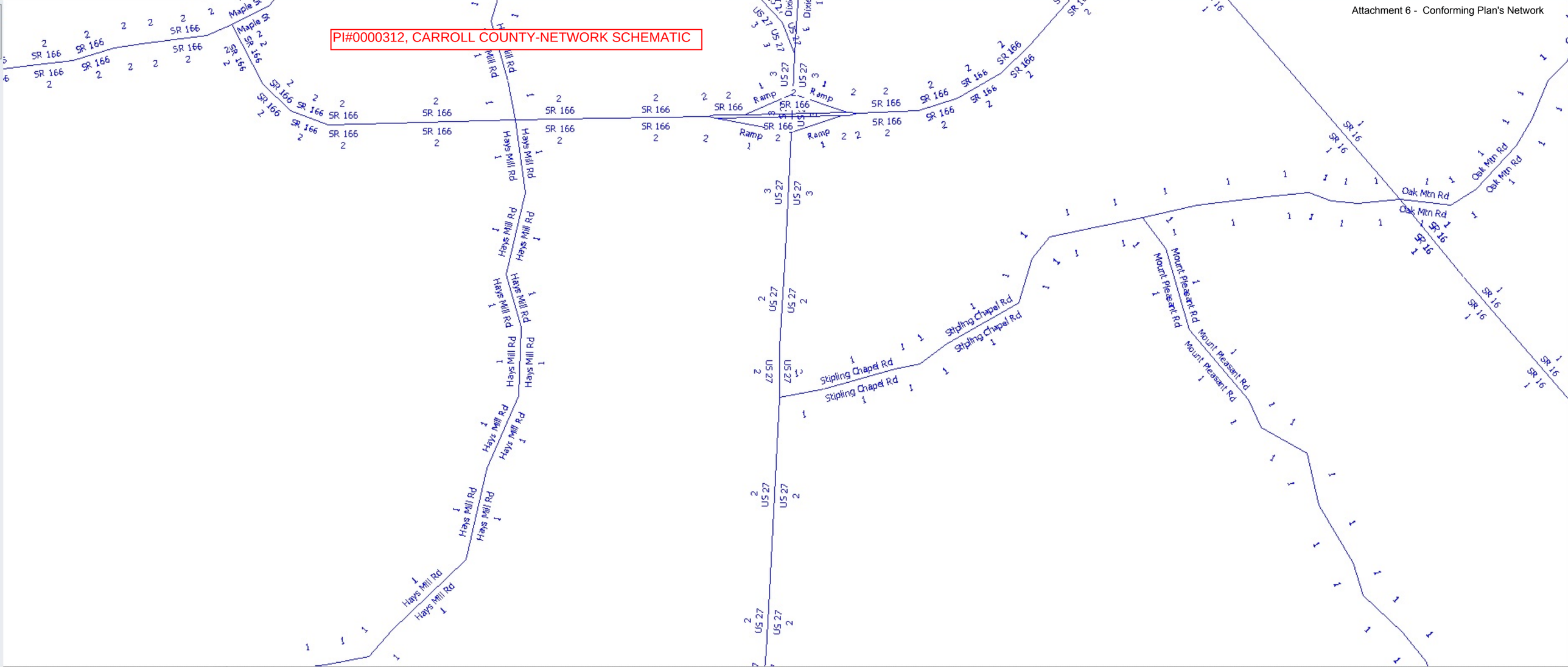
NUMBER OF LANES

4 LANES

6 LANES

5 LANES

PI#0000312, CARROLL COUNTY-NETWORK SCHEMATIC



PI#0000312 - Carroll County
SR1/SR16/US27 @ MacIntosh Road (Shopping Center/Business Entrance, Operational Improvements
Meeting Minutes – Concept Team Meeting, December 3rd, 2015, District 6 Office

- Attendees: See attached sign-in sheet
- Discussion Items:
  - Sam Woods opened the general discussions by stating that this is a scoping phase project, currently only scheduled up to approved concept. Because of this, some discussions may differ from the typical Concept Team Meeting. For example, the justification statement notes that widening is not warranted based on planning level analysis but recommends that the scope be revisited by Design within the scoping phase. Much of the information currently shown for this project is assumed to be old and carried over from older programmed projects – for example, information shown on the preconstruction status report with respect to termini, type of work, cost, etc. appear to from an older project and/or related to PI#621990- (recently completed interchange reconstruction project which did not add any additional north/south through lanes to the existing 4-lane section across SR 166). Bottom line – if there are major discrepancies noted between existing project documents and the recently developed preferred alternative, it can be reasonably assumed that the projects documents will be updated to reflect this new preferred alternative once the concept report is approved.
  - Sam then discussed the overall scoping work which led to the identification of the preferred alternative:
    - Sources of information used for this work include full traffic diagrams with turning movements for on SR1/SR16 from Central Road to MacIntosh Road (Shopping Center Entrance), permanent traffic count stations for traffic information outside these intersections, aerial photography, and existing signal information.
    - HCS Multilane analysis was used, along with projecting the peak hour permanent counts using the same growth rates as the project traffic diagrams, to determine than an acceptable level of service (LOS) of A/B is expected in the design year. This methodology was used to analyze SR1/SR16 starting from the county lines, working north and south towards our traffic diagram coverage until this methodology no longer applied (signal spacing greater than 2 miles).
    - Synchro models were used to analyze the signalized intersection network within the coverage of our project traffic diagrams. Of these four intersections, the two ramp terminals perform acceptably considering the recent interchange reconstruction project, the intersection at Central Street was recently improved by a project that upgraded the signal and minor leg approaches. An intersection improvement adding dual lefts to the major approaches may be considered at Central Street in the future. However, the most immediate and biggest need was identified as the intersection of SR1/SR16 with MacIntosh Road (Shopping Center Entrance), which became the focus of this project.
    - The segments of SR1/SR16 between the HCS multilane analysis and the Synchro models were not analyzed explicitly since the required traffic data was not available.
      - Considering the acceptable LOS for the north/south through movements of the signalized intersections in the Synchro model (highest traffic section of this roadway) it is reasonable to assume there is no overwhelming need for widening by an additional through lane.
      - Based on permanent traffic count stations and making assumptions about traffic drops based on side street ADTs, if a widening project (4 lane to 6 lane) were to become warranted in the future it would likely begin at (and tie to) the 6-lane section proposed by this project (north of the bridge over SR166) and extend south to Stripling Chapel Road, for an approximate length of 1.1 miles. This potential project would require reconstructing the recently completed bridge and interchange of SR1/SR16 at SR166.
    - Following this discussion, Sam asked the audience if they had any major concerns with the approach taken, or the basic results of the scoping work determining that an intersection improvement project should be programmed. The CTM audience did not express any concerns and this direction of the project was generally accepted.

- The CTM audience then gathered around the layout of the existing conditions at this intersection:
  - SR1/SR16 in the northbound direction is a 4-lane roadway (2 lanes in each direction) from the southern county line heading north to the interchange with SR166. An additional northbound thru lane is "added" at the SR166 ramp terminal, and the north bound direction continues with three thru lanes until "dropping" this lane at South Street.
  - In the reverse direction, the southbound lanes "add" a third through lane at South street, but instead of "dropping" this lane at the interchange with SR166 (as the northbound "adds" this lane), it is "dropped" at the upstream intersection with MacIntosh Road/Shopping Center Entrance when it becomes a trap left turn lane into a business drive. This configuration only allows two southbound thru lanes at this intersection.
- The CTM team then reviewed the proposed layout of this intersection:
  - Northbound approach: no change is being proposed to the through lane configuration, however the northbound left turn movement will be improved by lengthening the existing turn bay and providing an additional left turning lane. In order to receive both of these lanes, one existing concrete island will need to be removed on the west leg. Also, the southbound right turn which is currently free flow, will be converted to a yield condition to yield to the northbound lefts where appropriate.
  - Southbound approach: through the use of a compound curve (within the acceptable ratio of radii) the southbound lanes will be "pulled" to the west in order to provide the additional (3rd) southbound thru lane and have the lanes line up with the receiving lanes south of the intersection. The southbound left turn will remain virtually in the same location, but the southbound right turn lane will be pushed out (new curb and gutter but within existing ROW). This new additional thru lane will line up with the lane that eventually becomes a right turn only lane onto the SR166 ramp. Because of this change, the eastbound right (which is currently free flow) will now have to yield to this southbound through movement where appropriate. These proposed changes would remove the 5-lane section, converting into a 6-lane section. In addition it would remove the trap left lane from the intersection of MacIntosh/Shopping Center Entrance and replace it with a trap right at the SR166 interchange, mirroring the northbound configuration
  - Comments:
    - Bill Dungan (Construction) recommended contacting the development owner (through the City of Carrollton) to see if they would be willing to donate easement in the chance that a minor amount would be needed at the entrance to the shopping center. Note – City of Carrollton Manager has been contacted; we are awaiting the contact information for the developer to start these discussions.
    - Grant Waldrop (District Traffic Engineer) recommended adding cross walks and landing pads on the eastern and northern crossings. Grant also recommended removing the striped islands and proposing either raised concrete islands if minimum size requirements can be met. If not, remove the island completely and connect the cross walks straight into the landing pad. These comments will be implemented.
    - Grant Waldrop introduced the idea of potential improvements to the eastbound approach of the SR1/SR16 intersection with Roop Street (next intersection north). If the grade could be raised, it might be enough to improve sight distance across the intersection and remove the split phase. This received mixed feedback from the CTM audience – adding scope that is not required to have this be a workable project, but on the other hand wanting to fix a nearby problem if reasonable to do so. Potential complications of adding this work include limited space (about 150-ft of roadway to work with), proximity to a FEMA regulatory floodway, and possibility of additional utility relocations. CTM members asked if any survey was available in this area.
      - After the CTM, it was discovered that there is no survey in this area from past projects. An informal request has been made to pick up the minimum about of information to make a concept level decision on whether this scope should be

added. It is anticipated at this time that this scope will not be added to the project based on the risks listed above.

- Kevin Bailey then led the CTM team through the draft concept report. Minor comments were received from various attendees, but no major revisions to the report were proposed. Construction personnel brought up the likely need to limit work during the holiday shopping season in the area.

- Action Items:
  - PM – Coordinate with development owner on likelihood of donated easement (small) if needed by project. Roadway Design has begun this coordination but will pass it off to PM once a contact has been identified.
  - Roadway Design – study eastbound approach to Roop Street. If improvements can be made without major risk at this location, they will be considered for addition into this project.
  - Roadway Design – update report and attachments based on comments received; submit to PM for review.

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