

DEPARTMENT OF TRANSPORTATION  
STATE OF GEORGIA

TRAFFIC OPERATIONS

PROJECT CONCEPT REPORT

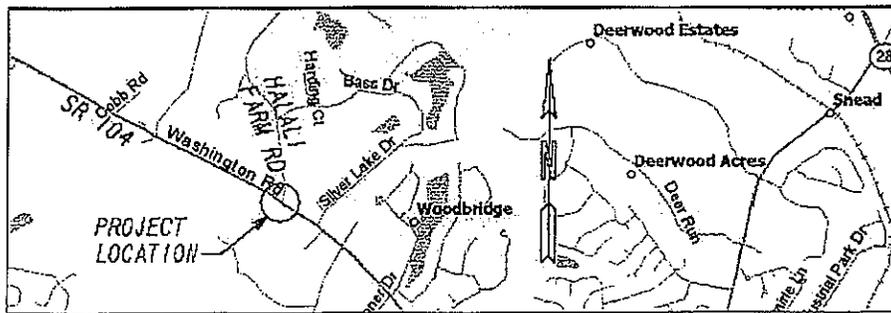
Project Number: STP-0002-00(041)

County: Columbia

P. I. Number: 0002041

Federal Route Number: N/A

State Route Number: SR 104



Prepared by:

DATE 15 MARCH 2006

  
Traffic Design Supervisor

Recommendation for approval:

DATE 3-16-06

  
State Traffic Safety & Design Administrator

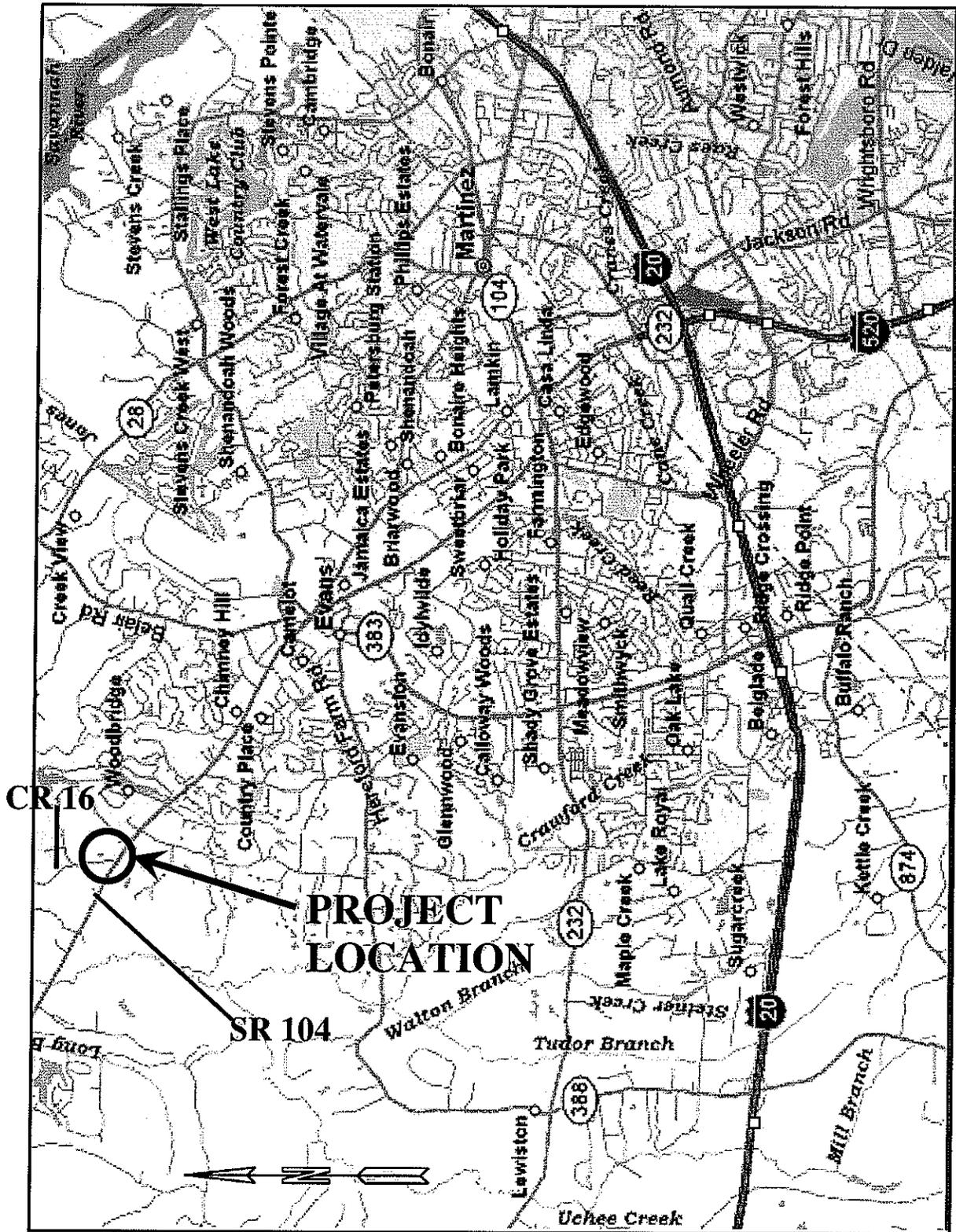
DATE 3-2-06

  
District Engineer

Approved:

DATE 3/20/06

  
Chief Engineer



**Need and Purpose:** *The intersection of SR 104(Washington Road) and CR 16(Halali Farm Road) is a "T" intersection located approximately 2.7 mile northwest of Evans, Georgia in the eastern portion of Columbia County. SR 104 (Washington Road) is a 2 lane major east west Rural Arterial Road and CR 16(Halali Road) is a 2 lane collector Road. There is a Stop control on the southbound CR 16(Halali Road). This corridor area has experienced significant growth over past few years. Southbound traffic on CR 16(Halali Farm Road) is experiencing excessive delay at this Intersection. The Traffic Engineering Report dated October 9, 2003, prepared by Columbia County Traffic Engineering Department, indicates Signal Warrants 1,2,3 and 7 are satisfied. Further this report indicates that 20 vehicular crashes occurred at this intersection in a 24 months period (06/01/2001-05/31/2003). 14 vehicular crashes involved vehicles turning left from CR 16 (Halali Farm Road) onto SR 104(Washington Road). The installation of a traffic signal at this intersection will reduce the number of crashes, improving safety and orderly progression of traffic through the intersection.*

**Description of the proposed project:** *SR 104(Washington Road) will be widen 6 ft. on the north side and 18 ft. on the southside to provide one 12 ft. westbound lane, two 12 ft. east bound lanes, one 12 ft. separate left turn lane (westbound and eastbound) and one 12 ft. separate westbound right turn lane. CR 16 (Halali Farm Road) will be widen 12 ft. on the westside to provide one 12 ft. northbound lane, one 12 ft. southbound left turn lane and one 12 ft. southbound optional turn lane. A Rural Shoulder Section is proposed for SR 104 and CR 16. The project includes the installation of a traffic signal at this location to reduce the number of crashes, improve safety and orderly progression of traffic through the intersection. The project will improve 1450 ft. of SR 104 (Washington Road) and 430 ft. of CR 16 (Halali Farm Road)*

**Is the project located in a Non-attainment area?** \_\_\_\_\_Yes    X\_\_\_\_\_No.

**PDP Classification:** Major \_\_\_\_\_ Minor X

**Federal Oversight:** Full Oversight ( ), Exempt( ), State Funded( X), or Other ( )

**Functional Classification:** SR 104 (Washington Road)-Principal Rural Arterial

**U. S. Route Number(s):** N/A                      **State Route Number(s):** 104

**Traffic (AADT):**

Current Year: (2004) 21,700              Design Year: (2030) 37,700

**Existing design features:**

- Typical Section:

SR 104- Two lane undivided rural roadway (one 12 ft. lane in each direction) west of CR 16 and 4 lane undivided rural roadway ( two 12 ft. eastbound lanes, one 12 ft. westbound lane and one 12 ft. westbound right turn lane) east of CR 16.

CR 16- Two lane undivided rural roadway (one 12 ft. lane in each direction).

- Posted speed 55 mph -SR 104, 35 mph-CR 16 Minimum radius for curve: 11,182 Ft.
- Maximum super-elevation rate for curve: RC
- Maximum grade: 4.14% -SR 104 and 3.69 % CR 16
- Width of right of way: 100 ft. -SR 104 and 60 ft. -CR 16
- ajor or structures: None
- Major interchanges or intersections along the project: SR 104 @ William Few Pkwy. & SR 104 @ Wal-Mart (Private Commercial Driveway)
- Intersection of SR 104 (Washington Road) and CR 16 (Halali Farm Road) is located at approximate Mile Post 6.90). *The project includes 1450 ft. of SR 104 (Washington Road) and 430 ft. of CR 16 (Halali Farm Road).*

**Proposed Design Features:**

- Proposed typical section(s):

SR 104- one 12 ft. lane in each direction, one 12 ft. eastbound left turn lane and 10 ft. rural shoulder (2 ft. paved + 8 ft. grassed) on the outside.

CR 16- One 12 ft. northbound lane , one 12 ft. southbound left turn lane, one 12 ft. optional left turn/right turn Lane and 10 ft. rural shoulder (2 ft. paved + 8 ft. grassed) on the outside.

- Proposed Design Speed Mainline: 45 mph-SR 104, 35 mph-CR 16
- Proposed Maximum grade Mainline 4.14 % Maximum grade allowable 6.0 %
- Proposed Maximum grade Side Street 3.69 %Maximum grade allowable 9.0 %.
- Proposed Maximum grade driveway : 15 %
- Proposed Minimum radius for curve 11182 ft. Maximum radius allowable 600 ft.
- Proposed Maximum super-elevation rate for curve: N.C. (0.02 ft./ft.)
- Right of way
  - Width : SR 104 -124 ft and CR 16 -86 ft.
  - Easements: Temporary ( ), Permanent ( X ), Utility ( ), Other ( ).
  - Type of access control: Full ( ), Partial ( ), By Permit ( X ), Other ( ).
  - Number of parcels: 12 Number of displacements: None
    - Business: \_\_\_\_\_
    - Residences: \_\_\_\_\_
    - Mobile homes: \_\_\_\_\_
    - Other: \_\_\_\_\_

Project Concept Report page 5  
 Project Number: STP-0002-00 (041)  
 P. I. Number: 0002041  
 County: Columbia

- Structures: None
- Major intersections and interchanges. SR 104 @ William Few Pkwy. & SR 104 @ Wal-Mart (Private Commercial Driveway)
- Traffic control during construction: *No offsite detour is required. All construction under traffic. Temporary lane closure may be required.*
- Design Exceptions to controlling criteria anticipated:

	<u>UNDETERMINED</u>	<u>YES</u>	<u>NO</u>
HORIZONTAL ALIGNMENT:	()	()	(X)
ROADWAY WIDTH:	()	()	(X)
SHOULDER WIDTH:	()	()	(X)
VERTICAL GRADES:	()	()	(X)
CROSS SLOPES:	()	()	(X)
STOPPING SIGHT DISTANCE:	()	(X)	()
SUPERELEVATION RATES:	()	()	(X)
HORIZONTAL CLEARANCE:	()	()	(X)
SPEED DESIGN:	()	(X)	()
VERTICAL CLEARANCE:	()	()	(X)
BRIDGE WIDTH:	()	()	(X)
BRIDGE STRUCTURAL CAPACITY:	()	()	(X)

- Design Variances;

Stopping Sight Distance: Sag Vertical Curve on mainline at the intersection does not meet K value for proposed 45 mph speed limit. Proposed design will not change the existing profile.

Speed Limit: SR 104- Existing posted speed limit is 55 mph. Proposed Design Speed is 45 mph. SR 104 is posted for a 45 mph speed limit just east of CR 16. Extending the 45 mph design just west of the CR 92 (to begin project) will provide more cost effective and safer design.

- Environmental concerns: None Anticipated.
- Level of environmental analysis:
  - Are Time Savings Procedures appropriate? Yes (X ), No ( ),
  - Categorical exclusion ( X ) Anticipated
- Utility involvements: Telephone, Cable, Power, Gas and Water

**Project responsibilities:**

- Design –GDOT
- Right of Way Acquisition-GDOT
- Relocation of Utilities –Owner of Utilities
- Letting to contract-GDOT
- Supervision of construction-GDOT
- Providing material pits-Contractor
- Providing detours-None required.

### **Coordination**

- Initial Concept Meeting date and brief summary. N/A
- Concept meeting date and brief summary. N/A
- P. A. R. meetings, dates and results. Not Required
- FEMA, USCG, and/or TVA- A Public Information Meeting will not be required.
- Public involvement. -TBD
- Local government comments. -None
- Other projects in the area. -None
- Other coordination to date.-None
- Railroads-None

### **Scheduling – Responsible Parties' Estimate**

- Time to complete the environmental process: 4 Months.
- Time to complete preliminary construction plans: 3 Months.
- Time to complete right of way plans: 1 Months.
- Time to complete the Section 404 Permit: N/A
- Time to complete final construction plans: 3 Months.
- Time to complete to purchase right of way: 6 Months.
- List other major items that will affect the project schedule: None

**Other alternates considered:** No Build.

**Comments:** None

### **Attachments:**

1. Cost Estimates: Attached
  - a. Construction including E&C,
  - b. Right of Way, and
  - c. Utilities.- TBD
2. Sketch location map-Attached
3. Typical sections-Attached
4. Accident Summary-Attached
5. Capacity analysis-Attached
6. Traffic Engineering Report –Columbia County

## Estimate Report for file "SR104-CR92"

Section ROADWAY					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
150-1000	1.00	LS	25000.00	TRAFFIC CONTROL -	25000.0
153-1300	1.00	EA	7000.00	FIELD ENGINEERS OFFICE TP 3	7000.0
201-1500	1.00	LS	10000.00	CLEARING & GRUBBING -	10000.0
205-0001	4500.00	CY	3.20	UNCLASS EXCAV	14400.0
206-0002	0.00	CY	4.96	BORROW EXCAV, INCL MATL	0.0
207-0203	0.00	CY	34.51	FOUND BK FILL MATL, TP II	0.0
310-1101	1700.00	TN	13.87	GR AGGR BASE CRS, INCL MATL	23579.0
318-3000	250.00	TN	15.63	AGGR SURF CRS	3907.5
402-1812	3500.00	TN	39.19	RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME	137165.0
402-3121	600.00	TN	36.68	RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM	22008.0
402-3131	900.00	TN	37.36	RECYCLED ASPH CONC 9.5 MM SUPERPAVE, GP 2 ONLY, INCL	33624.0
402-3190	300.00	TN	39.29	RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM	11787.0
413-1000	400.00	GL	0.96	BITUM TACK COAT	384.0
441-0016	0.00	SY	27.41	DRIVEWAY CONCRETE, 6 IN TK	0.0
441-4020	0.00	SY	27.85	CONC VALLEY GUTTER, 6 IN	0.0
441-6222	0.00	LF	11.04	CONC CURB & GUTTER, 8 IN X 30 IN, TP 2	0.0
550-1180	112.00	LF	28.01	STORM DRAIN PIPE, 18 IN, H 1-10	3137.12
550-1240	120.00	LF	33.12	STORM DRAIN PIPE, 24 IN, H 1-10	3974.39
550-1300	0.00	LF	42.73	STORM DRAIN PIPE, 30 IN, H 1-10	0.0
550-1360	0.00	LF	50.81	STORM DRAIN PIPE, 36 IN, H 1-10	0.0
550-2180	220.00	LF	22.99	SIDE DRAIN PIPE, 18 IN, H 1-10	5057.79
550-2242	0.00	LF	48.00	SIDE DRAIN PIPE, 24 IN, H 15-20	0.0
550-3318	10.00	EA	643.70	SAFETY END SECTION 18 IN, STORM DRAIN, 4:1 SLOPE	6437.0
550-3324	0.00	EA	873.39	SAFETY END SECTION 24 IN, STORM DRAIN, 4:1 SLOPE	0.0
550-3330	0.00	EA	1358.55	SAFETY END SECTION 30 IN, STORM DRAIN, 4:1 SLOPE	0.0
550-4218	2.00	EA	421.04	FLARED END SECTION 18 IN, STORM DRAIN	842.08
550-4224	2.00	EA	492.27	FLARED END SECTION 24 IN, STORM DRAIN	984.54
550-4230	0.00	EA	663.31	FLARED END SECTION 30 IN, STORM DRAIN	0.0
550-4236	0.00	EA	845.53	FLARED END SECTION 36 IN, STORM DRAIN	0.0
573-2006	500.00	LF	11.52	UNDDR PIPE INCL DRAINAGE AGGR, 6 IN	5760.0
603-6006	0.00	SY	4.42	SAND-CEMENT BAG RIP RAP, 6 IN	0.0
634-1200	20.00	EA	83.93	RIGHT OF WAY MARKERS	1678.60
641-1200	510.00	LF	12.66	GUARDRAIL, TP W	6456.6
641-5001	4.00	EA	453.70	GUARDRAIL ANCHORAGE, TP 1	1814.8
641-5012	4.00	EA	1452.62	GUARDRAIL ANCHORAGE, TP 12	5810.48
668-1100	0.00	EA	1722.84	CATCH BASIN, GP 1	0.0
668-1110	0.00	LF	173.45	CATCH BASIN, GP 1, ADDL DEPTH	0.0
668-1200	0.00	EA	2473.18	CATCH BASIN, GP 2	0.0
668-2100	1.00	EA	1946.98	DROP INLET, GP 1	1946.98
668-2105	0.00	EA	3341.71	DROP INLET, GP 1, SPCL DES	0.0
668-2110	0.00	LF	183.10	DROP INLET, GP 1, ADDL DEPTH	0.0
668-2200	0.00	EA	2162.13	DROP INLET, GP 2	0.0
668-4300	0.00	EA	1732.55	STORM SEWER MANHOLE, TP 1	0.0
668-4311	0.00	LF	201.64	STORM SEWER MANHOLE, TP 1, ADDL DEPTH, CL 1	0.0
668-4400	0.00	EA	2728.31	STORM SEWER MANHOLE, TP 2	0.0
<b>Section Sub Total:</b>					<b>\$332,754.90</b>

Section PERMANENT EROSION CONTROL					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
441-0204	100.00	SY	26.29	PLAIN CONC DITCH PAVING, 4 IN	2629.0
603-2024	50.00	SY	41.53	STN DUMPED RIP RAP, TP 1, 24 IN	2076.5
603-2182	0.00	SY	42.37	STN DUMPED RIP RAP, TP 3, 24 IN	0.0
603-7000	50.00	SY	3.93	PLASTIC FILTER FABRIC	196.5
700-6910	3.00	AC	763.82	PERMANENT GRASSING	2291.46
700-7000	6.00	TN	56.37	AGRICULTURAL LIME	338.21

700-7010	10.00	GL	18.81	LIQUID LIME	188.1
700-8000	3.00	TN	249.21	FERTILIZER MIXED GRADE	747.63
700-8100	150.00	LB	1.43	FERTILIZER NITROGEN CONTENT	214.5
710-9000	500.00	SY	4.31	PERMANENT SOIL REINFORCING MAT	2155.0
<b>Section Sub Total:</b>					<b>\$10,836.91</b>

<b>Section TEMPORARY EROSION CONTROL</b>					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
163-0232	2.00	AC	477.72	TEMPORARY GRASSING	955.44
163-0240	15.00	TN	199.33	MULCH	2989.95
163-0300	1.00	EA	1119.64	CONSTRUCTION EXIT	1119.64
163-0503	9.00	EA	470.28	CONSTRUCT AND REMOVE SILT CONTROL GATE, TP 3	4232.51
163-0520	100.00	LF	12.13	CONSTRUCT AND REMOVE TEMPORARY PIPE SLOPE DRAIN	1213.0
163-0530	0.00	LF	2.32	CONSTRUCT AND REMOVE BALED STRAW EROSION CHECK	0.0
163-0550	2.00	EA	177.83	CONSTRUCT AND REMOVE INLET SEDIMENT TRAP	355.66
165-0010	400.00	LF	0.90	MAINTENANCE OF TEMPORARY SILT FENCE, TP A	360.0
165-0020	0.00	LF	1.05	MAINTENANCE OF TEMPORARY SILT FENCE, TP B	0.0
165-0030	400.00	LF	1.18	MAINTENANCE OF TEMPORARY SILT FENCE, TP C	472.0
165-0070	0.00	LF	1.25	MAINTENANCE OF BALED STRAW EROSION CHECK	0.0
165-0087	0.00	EA	160.72	MAINTENANCE OF SILT CONTROL GATE, TP 3	0.0
165-0101	1.00	EA	357.89	MAINTENANCE OF CONSTRUCTION EXIT	357.89
165-0105	0.00	EA	81.46	MAINTENANCE OF INLET SEDIMENT TRAP	0.0
167-1000	2.00	EA	2021.32	WATER QUALITY MONITORING AND SAMPLING	4042.64
171-0010	4000.00	LF	1.82	TEMPORARY SILT FENCE, TYPE A	7280.0
171-0030	4000.00	LF	3.10	TEMPORARY SILT FENCE, TYPE C	12400.0
<b>Section Sub Total:</b>					<b>\$35,778.74</b>

<b>Section SIGNING AND MARKING</b>					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
636-1020	100.00	SF	13.12	HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING, TP 3	1312.0
636-1031	100.00	SF	17.32	HIGHWAY SIGNS, TP 1 MATL, REFL SHEETING TP 6	1732.0
636-2070	260.00	LF	6.82	GALV STEEL POSTS, TP 7	1773.2
653-0120	10.00	EA	56.18	THERMOPLASTIC PVMT MARKING, ARROW, TP 2	561.8
653-1501	8000.00	LF	0.25	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, WHITE	2000.0
653-1502	8000.00	LF	0.23	THERMOPLASTIC SOLID TRAF STRIPE, 5 IN, YELLOW	1840.0
653-1704	100.00	LF	3.20	THERMOPLASTIC SOLID TRAF STRIPE, 24 IN, WHITE	320.0
653-6004	250.00	SY	2.40	THERMOPLASTIC TRAF STRIPING, WHITE	600.0
653-6006	250.00	SY	2.53	THERMOPLASTIC TRAF STRIPING, YELLOW	632.5
654-1001	250.00	EA	3.22	RAISED PVMT MARKERS TP 1	805.0
<b>Section Sub Total:</b>					<b>\$11,576.50</b>

<b>Section TRAFFIC SIGNALIZATION</b>					
Item Number	Quantity	Units	Unit Price	Item Description	Cost
639-4004	4.00	EA	4086.72	STRAIN POLE, TP IV	16346.88
647-1000	1.00	LS	39820.26	TRAFFIC SIGNAL INSTALLATION NO - 1	39820.26
<b>Section Sub Total:</b>					<b>\$56,167.14</b>

**Total Estimated Cost: \$447,114.19**

**Subtotal Construction Cost \$447,114.19**

E&C Rate 10.0 %	\$44,711.42
Inflation Rate 5.0 % @ 2.0 Years	\$50,412.12
<hr/>	
<b>Total Construction Cost</b>	<b>\$542,237.73</b>
Right Of Way	\$50,000.00
ReImb. Utilities	\$0.00
<hr/>	
<b>Grand Total Project Cost</b>	<b>\$592,237.73</b>

WASHINGTON ROAD / SR. 104 @  
HALALI FARM ROAD / C.R. 92

LEGEND

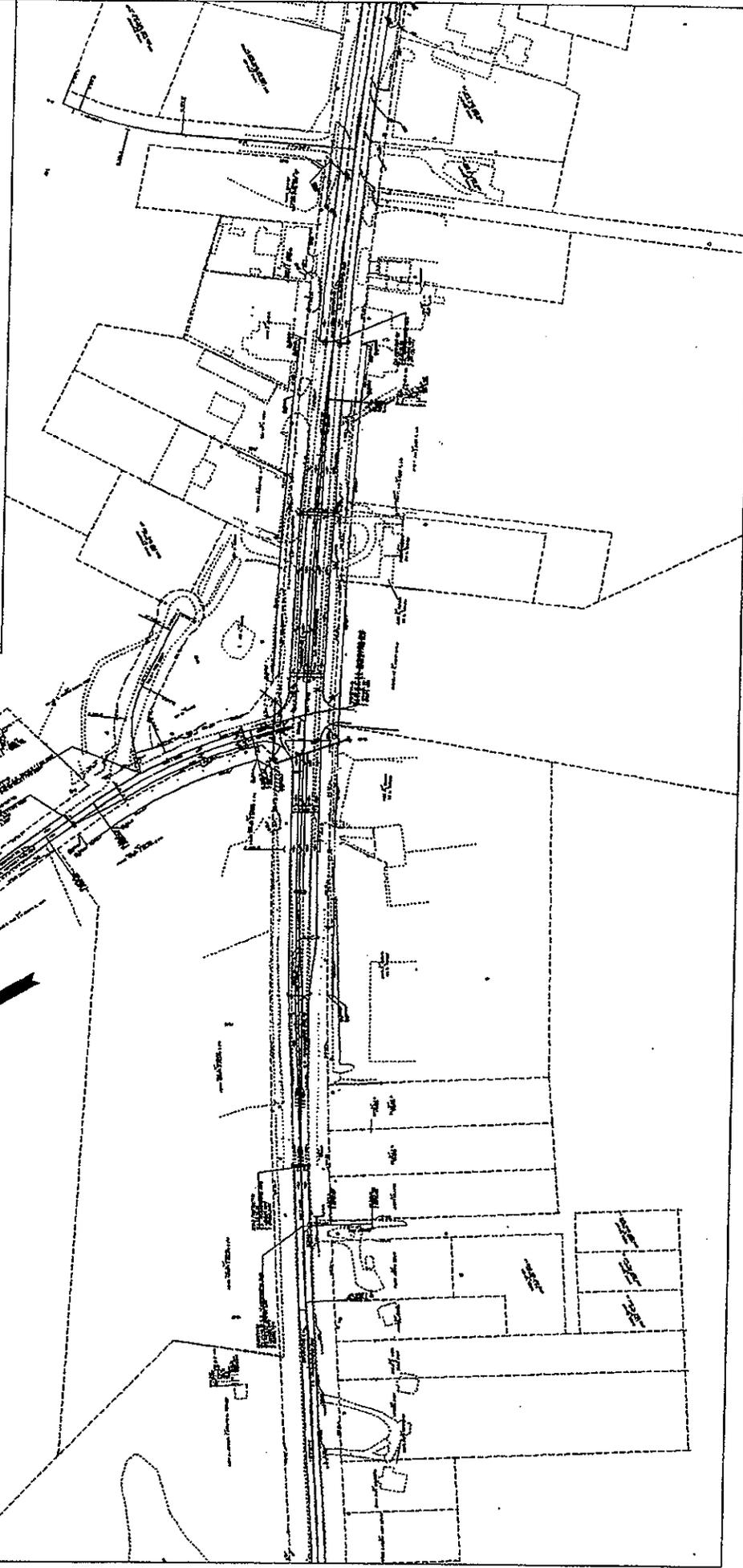
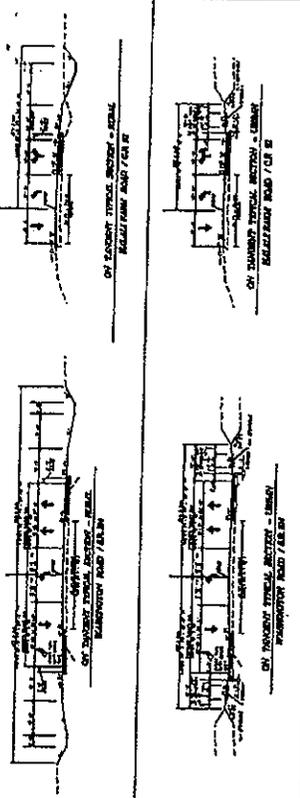
PROPOSED INTERSECTION IMPROVEMENTS

PROPOSED CONSTRUCTION LIMITS 49 M.P.S. - RURAL SECTION

PROPOSED CONSTRUCTION LIMITS 49 M.P.S. - URBAN SECTION

SCALE 1" = 100'

APRIL 24, 2008







STP-0002-00(041), COLUMBIA COUNTY, P.I. #0002041

SR 104 WASHINGTON ROAD @ HALLAIL FARM ROAD

SUB: CRASH EXPERIENCE AND COMPARISON

YEAR	ADT	DIST. MILE	ANNUAL FATAL CRASH VEHICLE CRASH MILE	FATAL CRASH MILE	STATE WIDE RATE	FATALITIES NUMBER	STATE WIDE RATE	NON-FATAL INJURY CRASH NUMBER	STATE WIDE RATE	ALL NON-FATAL INJURIES FROM FATAL NON FATAL CRASH NUMBER	STATE WIDE RATE	ALL CRASH NUMBER	STATE WIDE RATE					
2000	19930	0.4	2.90978	0	0	1.31	0	0	1.47	5	172	128	7	241	198	13	447	493
2001	20360	0.4	2.97256	0	0	1.34	0	0	1.48	8	270	142	11	371	222	20	673	660
2002	20800	0.4	3.0368	0	0	1.54	0	0	1.75	9	297	148	19	626	233	16	527	588
2003	21260	0.4	3.1025	0	0	1.18	0	0	1.27	5	162	157	6	194	243	15	484	613

FILE: PI 0002041 COLUMBIA COUNTY ACCIDENT SUMMARY

## SCORING RESULTS AS PER TOPPS 2440-2

<b>Project Number:</b>		<b>County:</b>		<b>PI No.:</b>	
<b>Report Date:</b>		<b>Concept By:</b>			
<input type="checkbox"/> CONCEPT		DOT Office:			
		Consultant:			
<b>Project Type:</b> Choose One From Each Column		<input type="checkbox"/> Major <input type="checkbox"/> Minor	<input type="checkbox"/> Urban <input type="checkbox"/> Rural	<input type="checkbox"/> ATMS <input type="checkbox"/> Bridge <input type="checkbox"/> Building <input type="checkbox"/> Interchange <input type="checkbox"/> Intersection <input type="checkbox"/> Interstate <input type="checkbox"/> New Location <input type="checkbox"/> Widening & Reconstruction <input type="checkbox"/> Miscellaneous	
<b>FOCUS AREAS</b>	<b>SCORE</b>	<b>RESULTS</b>			
Presentation					
Judgement					
Environmental					
Right of Way					
Utility					
Constructability					
Schedule					



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**MEMORANDUM**

**TO:** Mickey Michalski, P.E.

**FROM:** Scott Rumble, P.E.

**SUBJ:** Traffic Data and Traffic Analysis for the SR 104/Washington Road at CR 92/Halali Farm Road Intersection Improvement Project

**DATE:** January 5, 2005

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This memorandum summarizes the traffic data and traffic analysis completed for the SR104/Washington Road at CR 92/Halali Farm Road Intersection Improvement project.

**Traffic Data**

A peak hour turning movement count and three (3) 24-hour machine counts were collected at this intersection. These traffic counts are summarized in the Appendix of this memo. The existing 2004 A.M. and P.M. peak hour volumes and the average daily traffic (ADT) for the SR 104/Washington Road at CR 92/Halali Farm Road intersection are shown on Figure 1.

PBS&J developed traffic forecasts using the Augusta Regional Transportation Study (ARTS) travel demand model. The ARTS travel demand model is a computer model that uses population and employment data along with planned roadway improvements to forecast traffic. Between 2004 and 2030, SR 104 is projected to grow approximately 74% east of Halali Farm Road and approximately 90% west of Halali Farm Road. Halali Farm Road is forecasted to grow 27% between 2004 and 2030. The 2030 A.M. and P.M. design hour traffic and the 2030 ADT are shown on Figure 1.

**Traffic Analysis**

The CORSIM (version 5.1) traffic simulation model was used to determine the intersection level of service (LOS) during the A.M. and P.M. peak hours of operation. CORSIM is a probabilistic model that is designed to predict driver behavior and simulate travel patterns as they actually exist in the "real world." Vehicle characteristics such as speed and acceleration are incorporated into the program as well as driver characteristics such as aggressiveness and responsiveness. CORSIM produces performance measures such as density, average speed, average control delay and maximum vehicular queues that are used to evaluate the traffic operations of a roadway facility. The average control delay values provided by CORSIM were used to determine the LOS of the intersection and the maximum queues reported by CORSIM were used to determine the optimum length of turn bays at the intersection.

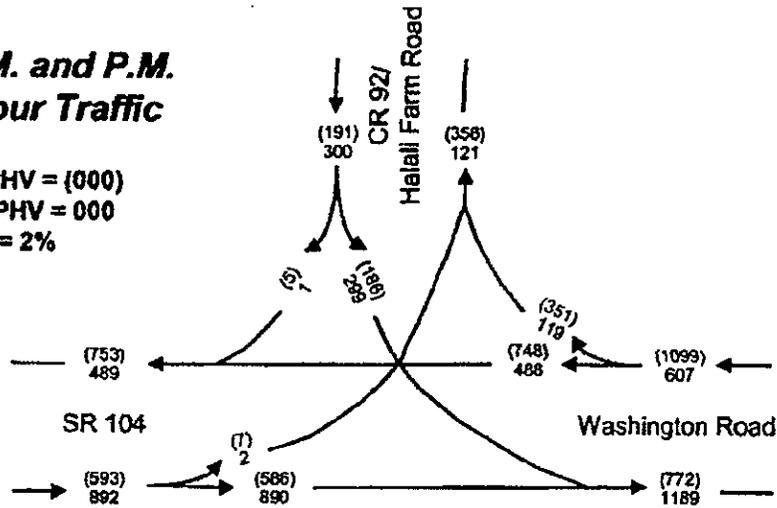
The existing conditions operational analysis using the CORSIM model showed that the intersection of SR 104/Washington Road at CR 92/Halali Farm Road is currently operating at LOS F in the A.M. peak hour and LOS E in the P.M. peak hour. (Please Table 1 for a summary of the existing conditions LOS analysis.) The reason for this poor LOS is that there are very few gaps in the peak hour traffic on SR 104 for the vehicles on Halali Farm Road to use in order to turn left onto SR 104. This causes vehicles to queue on Halali Farm Road and also creates substantial delay. The future 2030 operational analysis of the No-Build alternative (i.e. no improvements) using the CORSIM model showed that the intersection will operate at LOS F in both the A.M. and P.M. design hours of operation. (Please Table 1 for a summary of the future No-Build alternative LOS analysis.)

The Build alternative for this project includes a new signal at this intersection as well as new left-turn bays on both the southbound approach of Halali Farm Road and the eastbound approach of SR 104. The Build alternative also proposes a new through lane on the eastbound approach of SR 104. Please see Figure 2 for a schematic of the recommended intersection improvements. With these improvements, the CORSIM model shows that the intersection will operate at LOS B in both the 2030 A.M. and P.M. design hours of operation. (Please Table 1 for a summary of the future Build alternative LOS analysis.)

Additional analysis was completed to determine if the proposed additional eastbound through lane on SR 104 was necessary in order to allow the intersection to operate at an adequate LOS (i.e. LOS D or better). This analysis showed that the intersection will operate at an adequate LOS without the additional eastbound through lane on SR 104. However, the proposed additional southbound left-turn lane on Halali Farm Road will need to be lengthened to approximately 200 feet in order to offset the delay incurred when more green time is given to the SR 104 eastbound approach.

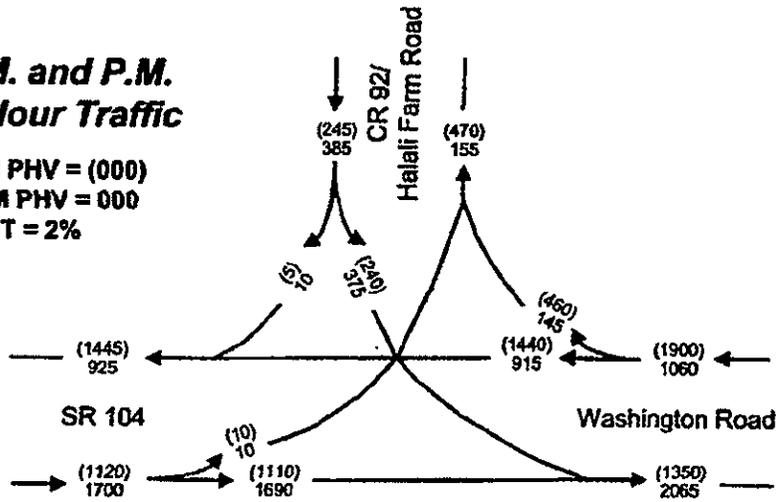
**2004 A.M. and P.M.  
Peak Hour Traffic**

2004 PM PHV = (000)  
2004 AM PHV = 000  
PHT = 2%



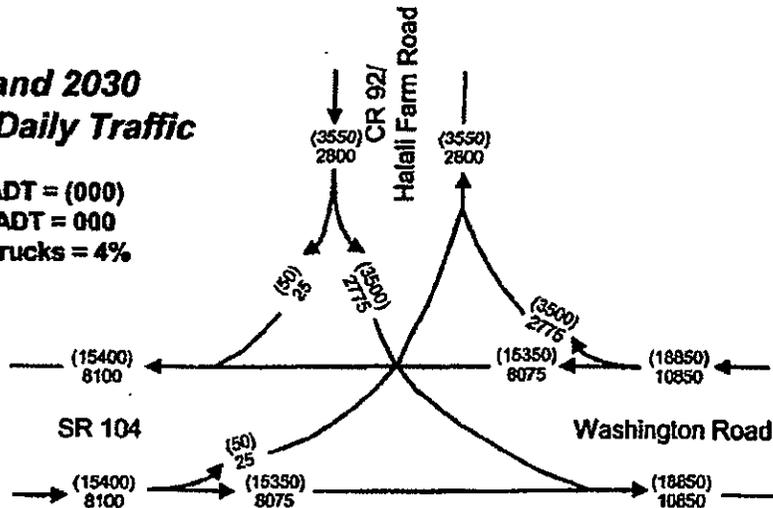
**2030 A.M. and P.M.  
Design Hour Traffic**

2030 PM PHV = (000)  
2030 AM PHV = 000  
DHT = 2%



**2004 and 2030  
Average Daily Traffic**

2030 ADT = (000)  
2004 ADT = 000  
Daily Trucks = 4%



SR 104/Washington Rd  
at CR 92/ Halali Farm Rd  
Intersection Improvement

**Traffic Volumes**

**Figure 1**

# Table 1

## SR 104/Washington Road at CR 92/Halaji Farm Road Intersection Improvement

### Existing and Future Level of Service - A.M. & P.M. Peak Hours

2004 Existing Conditions (Unsignalized) - A.M. Peak Hour

Approach	EB			WB			NB			SB		
	LT	THRU	RT									
Movement Volume	2	---	---	---	---	---	---	---	---	---	---	---
Movement Control Delay	6.4	---	---	---	---	---	---	---	---	---	---	---
Movement LOS	A	---	---	---	---	---	---	---	---	---	---	---
Approach Volume	2	---	---	---	---	---	---	---	---	---	---	---
Approach Control Delay	6.4	---	---	---	---	---	---	---	---	---	---	---
Approach LOS	A	---	---	---	---	---	---	---	---	---	---	---
Intersection Volume	---											
Intersection Control Delay	---											
Intersection LOS	---											

2004 Existing Conditions (Unsignalized) - P.M. Peak Hour

Approach	EB			WB			NB			SB		
	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT
Movement Volume	7	---	---	---	---	---	---	---	---	---	---	---
Movement Control Delay	22.5	---	---	---	---	---	---	---	---	---	---	---
Movement LOS	C	---	---	---	---	---	---	---	---	---	---	---
Approach Volume	7	---	---	---	---	---	---	---	---	---	---	---
Approach Control Delay	22.5	---	---	---	---	---	---	---	---	---	---	---
Approach LOS	C	---	---	---	---	---	---	---	---	---	---	---
Intersection Volume	---											
Intersection Control Delay	---											
Intersection LOS	---											

2030 No-Build Alternative (Unsignalized) - A.M. Design Hour

Approach	EB			WB			NB			SB		
	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT
Movement Volume	10	---	---	---	---	---	---	---	---	---	---	---
Movement Control Delay	10.6	---	---	---	---	---	---	---	---	---	---	---
Movement LOS	B	---	---	---	---	---	---	---	---	---	---	---
Approach Volume	10	---	---	---	---	---	---	---	---	---	---	---
Approach Control Delay	10.6	---	---	---	---	---	---	---	---	---	---	---
Approach LOS	B	---	---	---	---	---	---	---	---	---	---	---
Intersection Volume	---											
Intersection Control Delay	---											
Intersection LOS	---											

2030 No-Build Alternative (Unsignalized) - P.M. Design Hour

Approach	EB			WB			NB			SB		
	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT
Movement Volume	10	---	---	---	---	---	---	---	---	---	---	---
Movement Control Delay	10.6	---	---	---	---	---	---	---	---	---	---	---
Movement LOS	B	---	---	---	---	---	---	---	---	---	---	---
Approach Volume	10	---	---	---	---	---	---	---	---	---	---	---
Approach Control Delay	10.6	---	---	---	---	---	---	---	---	---	---	---
Approach LOS	B	---	---	---	---	---	---	---	---	---	---	---
Intersection Volume	---											
Intersection Control Delay	---											
Intersection LOS	---											

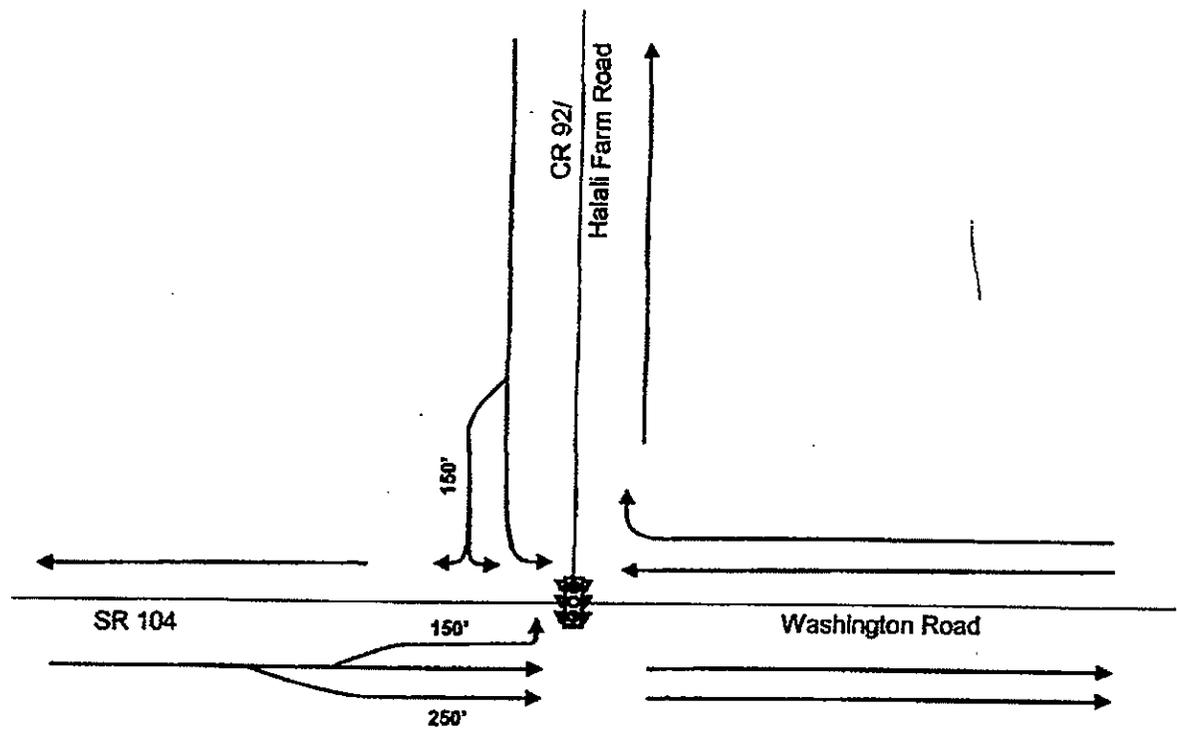
2030 Build Alternative (Signalized with Geometric Improvements) - A.M. Design Hour

Approach	EB			WB			NB			SB		
	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT
Movement Volume	10	1,680	---	915	145	---	375	---	10	---	---	---
Movement Control Delay	28.4	7.0	---	27.8	4.9	---	23.4	---	20.3	---	---	---
Movement LOS	C	A	---	C	A	---	C	---	C	---	---	---
Approach Volume	1,700	---	---	1,060	---	---	385	---	385	---	---	---
Approach Control Delay	7.2	---	---	24.7	---	---	23.3	---	23.3	---	---	---
Approach LOS	A	---	---	C	---	---	C	---	C	---	---	---
Intersection Volume	3,143											
Intersection Control Delay	15.1											
Intersection LOS	B											

2030 Build Alternative (Signalized with Geometric Improvements) - P.M. Design Hour

Approach	EB			WB			NB			SB		
	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT	LT	THRU	RT
Movement Volume	10	1,110	---	1,440	480	---	457	2.7	---	240	---	5
Movement Control Delay	45.7	2.7	---	22.2	5.5	---	D	A	---	47.1	---	25.2
Movement LOS	D	A	---	C	A	---	D	A	---	D	---	C
Approach Volume	1,120	---	---	1,900	---	---	1,900	---	---	245	---	---
Approach Control Delay	3.2	---	---	18.2	---	---	3.2	---	---	46.6	---	---
Approach LOS	A	---	---	B	---	---	A	---	---	D	---	---
Intersection Volume	3,265											
Intersection Control Delay	19.2											
Intersection LOS	B											

Note: Deficient Turning Movement, Approach or Entire Intersection



**Legend:**

150' - Minimum Required Storage Length



SR 104/Washington Rd  
at CR 92/ Halali Farm Rd  
Intersection Improvement

**Build Alternative  
Recommended  
Improvements**

**Figure 2**

**Traffic Data and Traffic Analysis for the  
SR 104/Washington Road at CR 92/Halali Farm Road  
Intersection Improvement Project**

**APPENDIX**

# SR 104/Washington Road at CR 92/Halali Farm Road Intersection Improvement Peak Hour Turning Movement Vehicular Count

INTERSECTION : SR 104/Washington Road at CR 92/Halali Farm Road  
 DATE COUNT : 11/03/04  
 DAY-OF-WEEK : Wednesday

COUNT BY: All Traffic Data  
 REPORT DATE: 1/03/05  
 COMP. BY : OSR

TIME INTERVAL	CR 92/Halali Farm Road SOUTHBOUND				SR 104/Washington Road WESTBOUND				NORTHBOUND				SR 104/Washington Road EASTBOUND				TOTALS
	L	T	R	TOTAL	L	T	R	TOTAL	L	T	R	TOTAL	L	T	R	TOTAL	
7:00 - 7:15	82	0	1	83	0	145	22	168	0	0	0	0	3	211	0	214	465
7:15 - 7:30	108	0	0	108	0	85	24	109	0	0	0	0	1	221	0	222	439
7:30 - 7:45	92	0	0	92	0	119	28	147	0	0	0	0	0	242	0	242	491
7:45 - 8:00	69	0	0	69	0	106	23	129	0	0	0	0	1	183	0	184	382
8:00 - 8:15	78	0	0	78	0	133	44	177	0	0	0	0	0	230	0	230	465
8:15 - 8:30	60	0	1	61	0	130	24	154	0	0	0	0	1	235	0	236	451
8:30 - 8:45	52	0	1	53	0	97	36	133	0	0	0	0	1	202	0	203	389
8:45 - 9:00	42	0	0	42	0	86	23	109	0	0	0	0	0	137	0	137	266
<b>TOTAL</b>	<b>583</b>	<b>0</b>	<b>3</b>	<b>586</b>	<b>0</b>	<b>902</b>	<b>224</b>	<b>1126</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>1661</b>	<b>0</b>	<b>1668</b>	<b>3380</b>
11:30 - 11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45 - 12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00 - 12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15 - 12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30 - 12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45 - 1:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00 - 1:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:15 - 1:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
4:00 - 4:15	53	0	0	53	0	182	67	249	0	0	0	0	0	157	0	157	459
4:15 - 4:30	39	0	0	39	0	148	68	216	0	0	0	0	0	149	0	149	368
4:30 - 4:45	49	0	3	52	0	159	78	237	0	0	0	0	2	146	0	148	437
4:45 - 5:00	46	0	2	48	0	177	90	267	0	0	0	0	4	148	0	152	467
5:00 - 5:15	44	0	1	45	0	186	70	256	0	0	0	0	2	150	0	152	453
5:15 - 5:30	38	0	2	40	0	198	81	279	0	0	0	0	0	148	0	148	467
5:30 - 5:45	54	0	1	55	0	185	92	277	0	0	0	0	3	140	0	143	475
5:45 - 6:00	50	0	1	51	0	178	108	286	0	0	0	0	2	148	0	150	488
<b>TOTAL</b>	<b>367</b>	<b>0</b>	<b>10</b>	<b>377</b>	<b>0</b>	<b>1414</b>	<b>654</b>	<b>2068</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>13</b>	<b>1186</b>	<b>0</b>	<b>1199</b>	<b>3644</b>
<b>GRAND TOTAL</b>	<b>950</b>	<b>0</b>	<b>13</b>	<b>963</b>	<b>0</b>	<b>2316</b>	<b>878</b>	<b>3194</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>2847</b>	<b>0</b>	<b>2867</b>	<b>7024</b>

### AM PEAK HOUR 7:00 TO 8:30

	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND		
	L	T	R	L	T	R	L	T	R	L	T	R
TURN VOLUME	299	0	1	0	488	119	0	0	0	2	690	0
APPROACH TOTAL	300			607			0			692		
PEAK HOUR FAC.	0.82			0.86			0			0.92		

	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND		
	L	T	R	L	T	R	L	T	R	L	T	R
TURN VOLUME	0	0	0	0	0	0	0	0	0	0	0	0
APPROACH TOTAL	0			0			0			0		
PEAK HOUR FAC.	0			0			0			0		

### PM PEAK HOUR 5:00 TO 6:00

	SOUTHBOUND			WESTBOUND			NORTHBOUND			EASTBOUND		
	L	T	R	L	T	R	L	T	R	L	T	R
TURN VOLUME	186	0	5	0	748	351	0	0	0	7	586	0
APPROACH TOTAL	191			1099			0			593		
PEAK HOUR FAC.	0.87			0.96			0			0.98		

INTERSECTION CONTROL :  UNSIGNALIZED  SIGNALIZED  ACTUATED  PRETIMED  SEMI-ACTUATED

# SR 104/Washington Road at CR 92/Halali Farm Road Intersection Improvement 24-Hour Bi-Directional Machine Count

Street: SR 104/Washington Road      Location: East of CR 92/Halali Farm Road

Hour Starting	1st		2nd		3rd		4th		Total		TOTAL
	Eastbound	Westbound									
12:00 AM	9	14	4	14	9	14	2	10	24	52	76
1:00 AM	5	5	2	13	8	11	6	3	21	32	53
2:00 AM	4	5	3	8	5	5	7	6	19	24	43
3:00 AM	4	3	6	5	6	2	7	2	22	12	34
4:00 AM	16	4	13	1	18	4	38	5	83	14	97
5:00 AM	34	11	53	11	76	12	102	22	265	56	321
6:00 AM	122	39	190	63	224	128	237	255	773	483	1,256
7:00 AM	298	172	329	114	340	148	288	122	1,225	558	1,781
8:00 AM	311	180	302	174	287	148	188	118	1,088	618	1,684
9:00 AM	189	123	189	122	196	143	163	112	717	500	1,217
10:00 AM	150	123	133	109	147	103	148	105	578	440	1,018
11:00 AM	160	108	164	158	157	137	164	142	645	543	1,188
12:00 PM	138	168	138	139	138	154	142	145	656	606	1,162
1:00 PM	130	155	134	175	124	180	158	184	546	694	1,240
2:00 PM	126	160	126	202	142	229	198	177	592	768	1,360
3:00 PM	206	214	203	238	260	236	212	200	881	888	1,769
4:00 PM	214	260	190	223	202	243	198	272	804	998	1,802
5:00 PM	194	269	194	286	200	284	204	296	792	1,145	1,937
6:00 PM	187	299	154	286	124	271	137	224	602	1,080	1,682
7:00 PM	110	203	85	185	74	184	64	164	333	736	1,089
8:00 PM	64	149	59	146	55	119	41	115	219	528	748
9:00 PM	40	83	34	99	33	62	42	63	149	307	456
10:00 PM	20	66	22	63	26	45	27	32	95	196	291
11:00 PM	18	37	20	32	13	35	4	20	55	124	179
Total	2,749	2,850	2,726	2,854	2,844	2,895	2,743	2,782	11,082	11,401	22,483

Peak Hour Directional Volume Summary

Eastbound	Westbound	Total
1,211	624	1,835
Eastbound	Westbound	Total
792	1,145	1,937

Note: The PM peak-to-daily ratio was used to calculate the ADT for each approach of the intersection. The peak hour turning movement counts (TMC) supplied the PM peak hour volumes for the ADT calculations. The TMC volumes are inherently adjusted for trucks and buses. These 24-hour counts are not adjusted for trucks and buses.

Twenty-Four Hour Volumes: 22,483 Vehicles Per Day

A.M. Peak Hour (between 7 - 9) Is From 7:30 AM TO 8:30 AM  
Volume of 1,835 Is 8.2% Of 24-Hour Volume

P.M. Peak Hour (between 4 - 6) Is From 5:00 PM TO 6:00 PM  
Volume of 1,937 Is 8.6% Of 24-Hour Volume

Machine Count Made By: All Traffic Data Services, Inc.  
Day-of-Week of Count: Wednesday  
Date of Count: 11/03/04  
Report Prepared By: OSR  
Date Report Prepared: 1/03/05

# SR 104/Washington Road at CR 92/Halall Farm Road Intersection Improvement 24-Hour Bi-Directional Machine Count

Street: SR 104/Washington Road

Location: West of CR 92/Halall Farm Road

Hour Starting	1st		2nd		3rd		4th		Total		TOTAL
	Eastbound	Westbound									
12:00 AM	6	12	4	10	7	10	2	9	19	41	60
1:00 AM	3	7	2	12	8	12	6	4	19	35	54
2:00 AM	2	1	3	8	5	4	7	6	17	19	36
3:00 AM	3	2	4	3	9	4	4	2	20	8	28
4:00 AM	14	3	12	1	18	3	25	4	69	11	80
5:00 AM	28	10	39	10	54	8	76	16	197	44	241
6:00 AM	82	34	130	58	161	112	180	230	563	432	985
7:00 AM	216	146	223	86	248	116	186	96	873	444	1,317
8:00 AM	239	134	242	142	214	108	145	92	839	476	1,315
9:00 AM	139	88	126	84	150	102	128	80	541	354	895
10:00 AM	125	89	116	82	113	72	120	76	474	319	793
11:00 AM	118	82	126	117	108	104	133	104	485	407	892
12:00 PM	107	111	112	97	108	112	103	112	430	432	862
1:00 PM	94	106	96	138	91	124	136	140	417	508	925
2:00 PM	92	114	95	157	119	187	177	136	483	594	1,077
3:00 PM	178	168	186	188	204	188	163	131	729	675	1,404
4:00 PM	163	190	154	151	156	165	156	182	629	688	1,317
5:00 PM	150	184	156	214	146	188	156	193	608	789	1,397
6:00 PM	144	201	130	187	111	156	97	143	482	687	1,169
7:00 PM	85	121	75	111	59	93	48	116	257	441	708
8:00 PM	48	114	40	101	41	78	28	76	155	369	524
9:00 PM	32	54	28	76	25	42	34	48	119	220	339
10:00 PM	18	40	17	40	20	34	23	26	78	140	218
11:00 PM	17	30	14	30	13	21	2	17	46	98	144
Total	2,100	2,051	2,130	2,101	2,188	2,040	2,131	2,039	8,549	8,231	16,780

Twenty-Four Hour Volume: 16,780 Vehicles Per Day

A.M. Peak Hour (between 7 - 9) Is From 7:30 AM TO 8:30 AM  
Volume of 1,402 Is 8.4% Of 24-Hour Volume

P.M. Peak Hour (between 4 - 6) Is From 5:00 PM TO 6:00 PM  
Volume of 1,397 Is 8.3% Of 24-Hour Volume

Machine Count Made By: All Traffic Data Services, Inc.

Day-of-Week of Count: Wednesday

Date of Count: 11/03/04

Report Prepared By: OSR

Date Report Prepared: 1/03/05

### Peak Hour Directional Volume Summary

Eastbound	Westbound	Total
914	486	1,402
Eastbound	Westbound	Total
608	789	1,397

Note: The PM peak-to-daily ratio was used to calculate the ADT for each approach of the intersection. The peak hour turning movement counts (TMC) supplied the PM peak hour volumes for the ADT calculations. The TMC volumes are inherently adjusted for trucks and buses. These 24-hour counts are not adjusted for trucks and buses.

# SR 104/Washington Road at CR 92/Halali Farm Road Intersection Improvement 24-Hour Bi-Directional Machine Count

Street: **CR 92/Halali Farm Road** Location: **North of SR 104/Washington Road**

Hour	1st		2nd		3rd		4th		Total	
	Northbound	Southbound								
12:00 AM	3	3	4	0	4	2	2	0	13	5
1:00 AM	0	2	2	0	1	0	0	0	3	2
2:00 AM	4	1	0	0	1	0	0	0	5	1
3:00 AM	1	1	1	1	1	0	0	0	3	2
4:00 AM	1	2	0	1	1	1	0	11	2	15
5:00 AM	0	8	1	12	2	24	5	27	8	71
6:00 AM	3	40	6	57	12	66	22	79	45	242
7:00 AM	24	67	23	116	38	74	20	61	105	287
8:00 AM	42	84	25	65	40	49	22	44	129	423
9:00 AM	39	54	31	48	36	45	31	36	137	371
10:00 AM	34	29	25	17	34	34	26	28	121	183
11:00 AM	27	41	36	44	36	41	35	31	134	108
12:00 PM	54	35	38	28	42	27	33	41	167	157
1:00 PM	48	40	39	31	55	32	43	25	185	131
2:00 PM	46	32	48	36	39	31	45	25	178	128
3:00 PM	51	34	57	29	67	50	67	41	242	154
4:00 PM	65	55	70	34	76	54	91	45	302	188
5:00 PM	74	47	81	44	98	61	106	46	358	218
6:00 PM	98	51	75	42	81	34	64	38	318	188
7:00 PM	55	26	57	23	52	18	49	28	213	165
8:00 PM	48	15	53	20	41	13	39	15	181	95
9:00 PM	32	7	23	6	23	10	16	7	93	63
10:00 PM	25	6	18	5	11	7	7	4	61	30
11:00 PM	7	1	4	7	14	0	5	2	30	22
Total	781	681	719	666	805	673	728	634	3,033	2,654

Twenty-Four Hour Volume: **5,687** Vehicles Per Day

A.M. Peak Hour (between 7 - 9) Is From **7:15 AM** To **8:15 AM**  
Volume of **458** Is **8.1%** Of 24-Hour Volume

P.M. Peak Hour (between 4 - 6) Is From **5:00 PM** To **6:00 PM**  
Volume of **556** Is **9.8%** Of 24-Hour Volume

Machine Count Made By: **All Traffic Data Services, Inc.**  
 Day-of-Week of Count: **Wednesday**  
 Date of Count: **11/03/04**  
 Report Prepared By: **OSR**  
 Date Report Prepared: **1/03/05**

### Peak Hour Directional Volume Summary

Northbound		Southbound		Total
723	335	358	198	458
Total		Total		3,033

Note: The PM peak-to-daily ratio was used to calculate the ADT for each approach of the intersection. The peak hour turning movement counts (TMC) supplied the PM peak hour volumes for the ADT calculations. The TMC volumes are inherently adjusted for trucks and buses. These 24-hour counts are not adjusted for trucks and buses.



**LOCATION:**

The intersection of SR 104 and Halali Farm Road is a three legged intersection that is located in the eastern portion of Columbia County and is approximately 2.63 miles from the intersection of SR 104 and SR 383 and approximately 7.56 miles from the intersection of SR 104 and SR 47/SR 150.

**REASON FOR INVESTIGATION:**

A traffic signal has been requested for the location of SR 104 at Halali Farm Road. This corridor area has experienced significant growth over the past few years including the development of several residential lots in close proximity to the intersection of SR 104 at Halali Farm Road. In order to properly evaluate the traffic signal request, an analysis of the traffic signal warrants contained in the Manual on Uniform Traffic Control Devices (MUTCD) Millennium edition was conducted.

**DESCRIPTION OF THE INTERSECTION:**

A description of each intersecting approach leg is provided below:

- SR 104 is a four lane facility on the east side of the intersection of Halali Farm Road and on the west side, SR 104 is a two lane facility. There is a right turn lane for the westbound direction for turning onto Halali Farm Road from SR 104. Halali Farm Road intersects SR 104 at the bottom of a sag vertical curve, which also experiences some horizontal curvature at the intersection. SR 104 is a heavily traveled major arterial.
- Halali Farm Road is currently a two lane roadway. There is one approach lane for the southbound approach of Halali Farm Road and the approach contains a downgrade at the intersection with SR 104. Halali Farm Road serves as a through movement road for several residential developments in the area.

**TRAFFIC VOLUMES IN VEHICLES PER DAY (VPD):**

YEAR	SR104 @ MP 5.53, Count Station 145 DOT Raw Count (VPD)	Halali Farm Road South of Hardy McManus County Raw Count (VPD)
2002	22,808	N/A
2003	N/A	4,846

Turning movement counts are attached and appear in Appendix D.

**EXISTING TRAFFIC CONTROL:**

- SR 104 at Halali Farm Road operates with minor street stop control only.
- Halali Farm Road is the minor street containing a stop controlled approach.

**VEHICULAR SPEEDS:**

- The posted speed limit on SR 104 is 55 MPH
- The posted speed limit on Halali Farm Road is 35 MPH

**PEDESTRIAN MOVEMENTS:**

- No pedestrian features were present at the intersection.
- During the course of the turning movement count periods, pedestrian crossings were not observed.

**DELAY:**

Recurring excessive delay was observed for the southbound approach of Halali Farm Road during multiple peak hour periods resulting in periods of significant vehicle queuing. Specifically, a stopped time delay study revealed that the highest vehicle-hours/hour of delay occurred during the AM peak hour period from 7:00 am to 8:00 am and was recorded to be 4.65 vehicle-hours/hour. Correspondingly, the average queue was 4.65 vehicles and the maximum queue length was 18 vehicles during the AM peak.

**PARKING:**

There was no parking observed or expected at the intersection.

**ACCIDENT HISTORY:**

Year								Severity		
	Rear-end	Side-swipe	Angle	Head-on	Left-Turn	Struck Object	Run off the road	Total	Injury	Fatal
6/01 to 5/02	1	0	7	0	0	1	0	9	3	0
6/02 to 5/03	1	0	7	1	1	0	1	11	6	0

A review of the accident data revealed that there did appear to be an extraordinary number crashes involving the left turn movement from Halali Farm Road being struck by traffic traveling on SR 104, as indicated in back to back 12 month analysis periods. Specifically, the total number crashes susceptible to correction by a traffic signal in 12 month periods for two most recent years include 7 from 2001 to 2002 and 7 from 2002 to 2003.

**ADJACENT SIGNALIZED INTERSECTIONS:**

The nearest adjacent signalized intersection to the west is approximately 1.70 miles and is the intersection of State Route 104 @ William Few Parkway. The nearest adjacent

signalized intersection to the east is approximately 1.68 miles and is the intersection of SR 104 @ Wal- Mart private driveway. No signalized intersections are present on Halali Farm Road.

#### **TRAFFIC SIGNAL WARRANT ANALYSIS:**

The Millennium edition of the MUTCD suggests that an investigation of the need for a traffic control signal shall include an analysis of the applicable factors contained in the traffic control signal warrants. Traffic signal warrants 1 through 7 were evaluated with available engineering and traffic investigation data. Warrant 8 was not evaluated since one or more traffic signal warrants had already been satisfied and therefore satisfaction of this warrant was not necessary. If prior warrants had not been met and since predicted growth is expected in the area, warrant 8 may have been applied to possibly address future traffic volumes, which are expected to increase significantly in this area.

The resulting traffic signal warrant analysis indicated that 4 of the 8 traffic signal warrants were satisfied. Specifically, the following traffic signal warrants were satisfied:

- Warrant 1, Eight Hour Vehicular Volume
- Warrant 2, Four Hour Vehicular Volume
- Warrant 3, Peak Hour
- Warrant 7, Crash Experience

A summary of the evaluated traffic signal warrants is provided in Appendix C Traffic Signal Warrant Analysis Summary.

#### **RECOMMENDATION:**

The resulting traffic signal warrant analysis revealed that one or more traffic control signal warrants were met. Specifically, warrants 1, 2, 3, and 7 were met with the individual warrant criteria being significantly met. The anticipation is that the installation of a traffic control signal at this location will likely improve the overall safety and operation of the intersection.

Due to the current location of the intersection, consideration will need to be given to potential geometric improvements that would need to accompany a traffic signal at this location. In particular, traffic signal visibility and the affect of vehicle queuing on SR 104 during the red interval for SR 104 and available stopping sight distance may need to be considered. In addition geometric improvements consisting of auxiliary turn lanes on SR 104 and Halali Farm Road will need to be examined. For example, due to the significant left turn movement from Halali Farm Road to SR 104 and given future expected growth in this area, possible geometric improvements that would improve signal operation include double left turn lanes and a separate right turn only lane for Halali Farm Road.

Traffic Engineering Report  
State Route 104 and Halali Farm Road  
Date Prepared: October 9, 2003  
Page 5 of 21

**TRAFFIC ENGINEERING REPORT APPENDIX CONTENTS:**

- Existing Conditions Sketch.....APPENDIX A
- Signal Plan Concept.....APPENDIX B
- Traffic Signal Warrant Analysis Summary.....APPENDIX C
- Turning Movement County Summary Sheet.....APPENDIX D
- Accident Diagram.....APPENDIX E

Traffic Engineering Report  
State Route 104 and Halali Farm Road  
Date Prepared: October 9, 2003  
Page 6 of 21

**APPENDIX A: EXISTING CONDITIONS SKETCH**

**SEE NEXT PAGE**

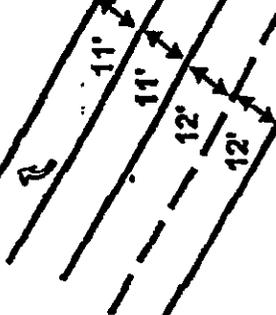
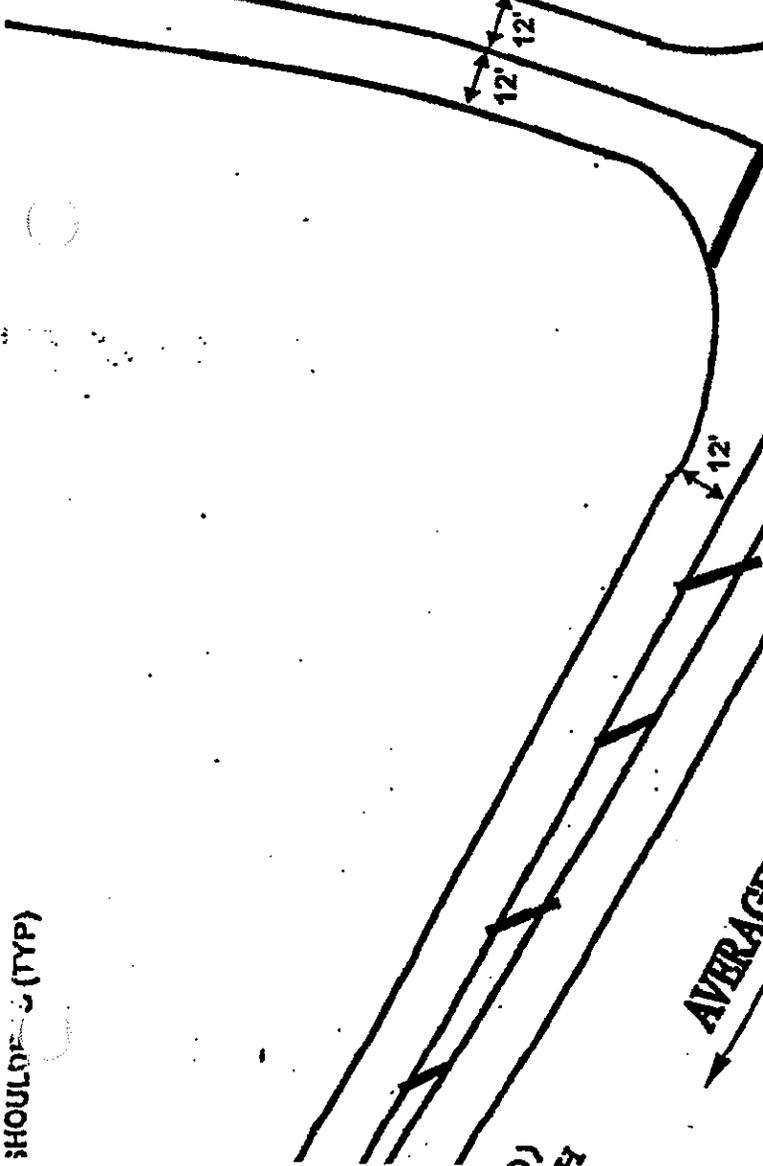


HALALI FARM ROAD  
POSTED SPEED LIMIT 35 MPH

SR 104 (WASHING)  
POSTED SPEED LIM.

AVERAGED SIGHT DISTANCE APP. 748 FT

AVERAGED SIGHT DISTANCE APP. 710 FT



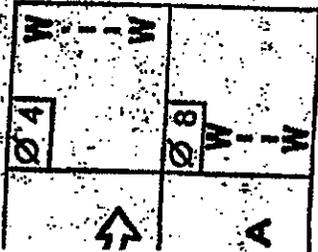
SHOULD BE (TYP)

Traffic Engineering Report  
State Route 104 and Halaji Farm Road  
Date Prepared: October 9, 2003  
Page 7 of 21

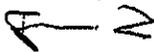
**APPENDIX B: SIGNAL PLAN CONCEPT**

**SEE NEXT PAGE**

GRAM



HALAL FARM ROAD



TYPE 1 FULL BOX FOR LOOP LEAD-IN, (TYP)

TYPE 3 FULL BOX FOR CABINET

- (2) 1 IN CONDUIT
- (2) 4 IN CONDUIT

INSTALL 3/2 BASE MTD. CABINET WITH WORK PADS AND CONTROLLER.

INSTALL PED POLE, PED SIGNALS, PUSHBUTTONS, AND SIGNS, (TYP)

6 FT X 40 FT QUADRUPOLE LOOP, (TYP)

INSTALL TYPE IV STRAIN POLES, (TYP)

TYPE 2 FULL BOX FOR SIGNAL POLE, (TYP)

(1) 2 IN CONDUIT FOR LOOP LEAD-IN CABLE, (TYP)

TYPE 1 1 LOOP LEI

INSTALL PED POLE, PED SIGNALS, PUSHBUTTONS, AND SIGNS, (TYP)

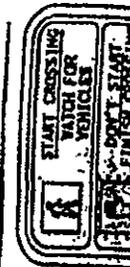
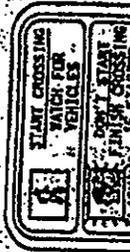
INSTALL TYPE IV STRAIN POLES, (TYP)

SR 104

SIGNS

PEDESTRIAN SIGNALS

PEDESTRIAN SIGNALS





**Table 4C-1. Warrant 1, Eight-Hour Vehicular Volume**

Condition A—Minimum Vehicular Volume							
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)			Vehicles per hour on higher-volume minor-street approach (one direction only)		
Major Street	Minor Street	100% <sup>a</sup>	80% <sup>b</sup>	70% <sup>c</sup>	100% <sup>a</sup>	80% <sup>b</sup>	70% <sup>c</sup>
1.....	1.....	500	400	350	150	120	105
2 or more...	1.....	600	460	420	150	120	105
2 or more...	2 or more...	600	480	420	200	160	140
1.....	2 or more....	500	400	350	200	160	140

Condition B—Interruption of Continuous Traffic							
Number of lanes for moving traffic on each approach		Vehicles per hour on major street (total of both approaches)			Vehicles per hour on higher-volume minor-street approach (one direction only)		
Major Street	Minor Street	100% <sup>a</sup>	80% <sup>b</sup>	70% <sup>c</sup>	100% <sup>a</sup>	80% <sup>b</sup>	70% <sup>c</sup>
1.....	1.....	750	600	525	75	60	53
2 or more...	1.....	900	720	630	75	60	53
2 or more...	2 or more...	900	720	630	100	80	70
1.....	2 or more....	750	600	525	100	80	70

<sup>a</sup> Basic minimum hourly volume.

<sup>b</sup> Used for combination of Conditions A and B after adequate trial of other remedial measures.

<sup>c</sup> May be used when the major-street speed exceeds 70 km/h (40 mph) or in an isolated community with a population of less than 10,000.

**WARRANT 1. EIGHT-HOUR VEHICULAR VOLUME (analysis of field data)**

**1. Standard 1, Condition A with 70 percent traffic volume option**

Number of lanes for moving traffic on each approach			Vehicles per hour on major street (total of both approaches)			Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	Y or N	Hour	70%	Data	Met	70%	Data	Met
1	1	y	7-8 AM	350	1518	Y	105	288	Y
			8-9 AM	350	1268	Y	105	179	Y
2 or more	1		12-1 PM	350	1149	Y	105	164	Y
2 or more	2 or more		1-2 PM	350	1069	Y	105	108	Y
1	2 or more		2-3 PM	350	1249	Y	105	98	N
			3-4 PM	350	1548	Y	105	174	Y
			4-5 PM	350	1445	Y	105	200	Y
			5-6 PM	350	1665	Y	105	241	Y
						8			7
						YES			NO

Standard 1, Condition A with 70 percent traffic volume option met: NO

2. Standard 1, Condition B with 70 percent traffic volume option

Number of lanes for moving traffic on each approach			Vehicles per hour on major street (total of both approaches)			Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	Y or N	Hour	70%	Data	Met	70%	Data	Met
1	1	y	7-8 AM	525	1518	Y	53	288	Y
			12-1 PM	525	1268	Y	53	179	Y
2 or more	1		1-2 PM	525	1149	Y	53	164	Y
2 or more	2 or more		2-3 PM	525	1069	Y	53	108	Y
1	2 or more		3-4 PM	525	1249	Y	53	98	Y
			4-5 PM	525	1548	Y	53	174	Y
			5-6 PM	525	1445	Y	53	200	Y
			6-7 PM	525	1665	Y	53	241	Y
						8			8
						YES			YES

Standard 1, Condition B with 70 percent traffic volume option met: YES

3. Standard 1, Condition A with 100 percent traffic volume option

Number of lanes for moving traffic on each approach			Vehicles per hour on major street (total of both approaches)			Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	Y or N	Hour	100%	Data	Met	100%	Data	Met
1	1		7-8 AM	500		N	200		N
			12-1 PM	500		N	200		N
2 or more	1		1-2 PM	500		N	200		N
2 or more	2 or more		2-3 PM	500		N	200		N
1	2 or more	y	3-4 PM	500		N	200		N
			4-5 PM	500		N	200		N
			5-6 PM	500		N	200		N
			6-7 PM	500		N	200		N
						0			0
						NO			NO

Standard 1, Condition A with 100 percent traffic volume option met: N/A

4. Standard 1, Condition B with 100 percent traffic volume option

Number of lanes for moving traffic on each approach			Vehicles per hour on major street (total of both approaches)			Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	Y or N	Hour	100%	Data	Met	100%	Data	Met
1	1		7-8 AM	750		N	100		N
			12-1 PM	750		N	100		N
2 or more	1		1-2 PM	750		N	100		N
2 or more	2 or more		2-3 PM	750		N	100		N
1	2 or more	y	3-4 PM	750		N	100		N
			4-5 PM	750		N	100		N
			5-6 PM	750		N	100		N
			6-7 PM	750		N	100		N
						0			0
						NO			NO

Standard 1, Condition B with 100 percent traffic volume option met: N/A

5. Standard 2, Condition A AND Condition B with 80 percent traffic volume option  
 Condition A with the 80 percent volume option

Number of lanes for moving traffic on each approach			Vehicles per hour on major street (total of both approaches)			Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	Y or N	Hour	80%	Data	Met	80%	Data	Met
1	1		7-8 AM	400	400	Y	160	400	Y
2 or more	1		12-1 PM	400	400	Y	160	400	Y
2 or more	2 or more		1-2 PM	400	400	Y	160	400	Y
1	2 or more	y	2-3 PM	400	400	Y	160	400	Y
			3-4 PM	400	400	Y	160	400	Y
			4-5 PM	400	400	Y	160	400	Y
			5-6 PM	400	400	Y	160	400	Y
			6-7 PM	400	400	Y	160	400	Y
						8			8
						YES			YES

Standard 2, Condition A with 80 percent traffic volume option met: YES

Condition B with the 80 percent volume option

Number of lanes for moving traffic on each approach			Vehicles per hour on major street (total of both approaches)			Vehicles per hour on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	Y or N	Hour	80%	Data	Met	80%	Data	Met
1	1		7-8 AM	600		N	80		N
2 or more	1		12-1 PM	600		N	80		N
2 or more	2 or more		1-2 PM	600		N	80		N
1	2 or more	y	2-3 PM	600		N	80		N
			3-4 PM	600		N	80		N
			4-5 PM	600		N	80		N
			5-6 PM	600		N	80		N
			6-7 PM	600		N	80		N
						0			0
						NO			NO

Standard 2, Condition B with 80 percent traffic volume option met: N/A

Standard 2, Conditions A AND B with 80 percent traffic volume option met: NO

**WARRANT 1 MET: YES**

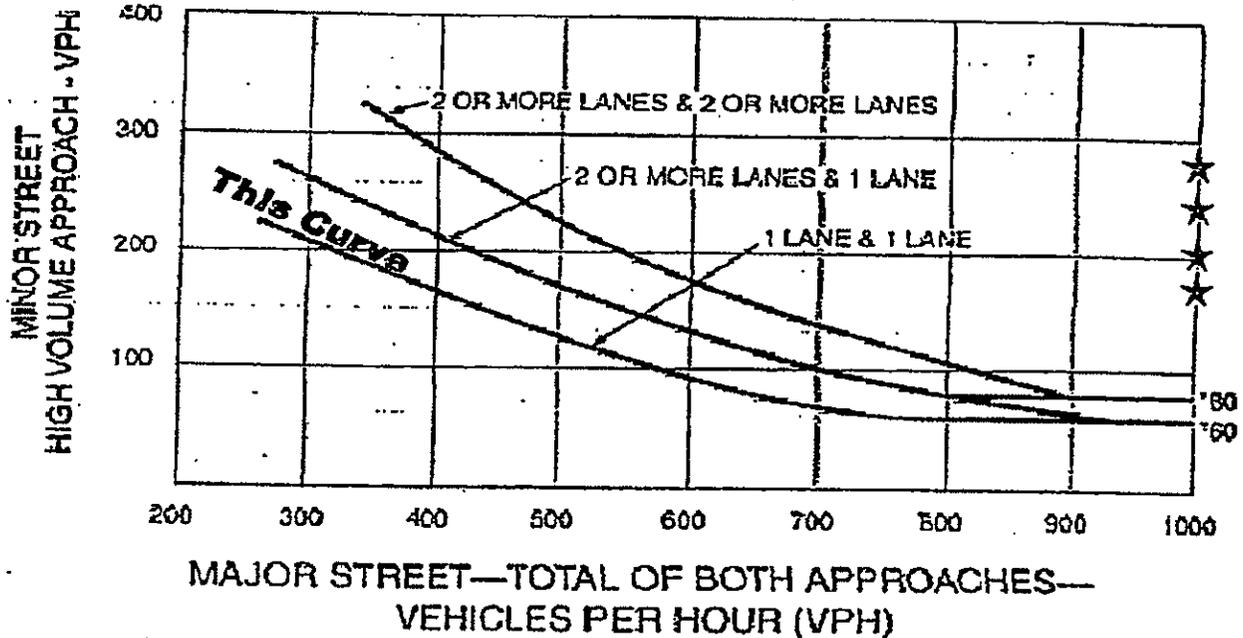
**COMMENTS:**

Collected data values were significantly above the minimum given warrant values for Condition B (Interruption of Continuous Traffic) with the 70 percent volume level option.

**ADDITIONAL CONSIDERATIONS REGARDING SATISFACTION OF THE EIGHT HOUR VEHICULAR VOLUME WARRANT:**

- 1.) The study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count against the above signal warrants. Thus, right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a one-lane approach with only the traffic volume in the through/left-turn lane considered (MUTCD, p. 4C-2).
- 2.) If there is no appreciable delay or traffic conflicts, then the right turns should not be counted (TCDH, p. 268).

**Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)**  
 (COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h (40 mph) ON MAJOR STREET)



\*Note: 60 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

Hour	major street (total of both approaches) 70% Factor	minor-street approach (one direction only) 70% Factor	Met
7-8 AM	1518	288	Y
8-9 AM	1268	179	Y
4-5 PM	1445	200	Y
5-6 PM	1665	241	Y
MET:			YES

Enter Y or N for all 4 hours based on position of the 4 plotted points on the graph. Highlight applicable curve on the printout.

**WARRANT 2 MET: YES**

**COMMENTS:**  
 Plotted data points were significantly above the applicable curve.

- ADDITIONAL CONSIDERATIONS REGARDING SATISFACTION OF THE FOUR HOUR VEHICULAR VOLUME WARRANT:**
- 1.) The study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count against the above signal warrants. Thus, right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a one-lane approach with only the traffic volume in the through/right-turn lane considered (MUTCD, p. 4C-2).
  - 2.) If there is no appreciable delay or traffic conflicts, then the right turns should not be counted (TCDH, p. 262).

**WARRANT 3, PEAK HOUR (explanation)**

**Support:**

The Peak Hour signal warrant is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street.

**Standard:**

This signal warrant shall be applied only in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

The need for a traffic control signal shall be considered if an engineering study finds that the criteria in either of the following two categories are met:

**Category A.** If all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:

1. The total stopped time delay experienced by the traffic on one minor street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach; or 5 vehicle-hours for a two-lane approach, and
2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes, and
3. The total entering volume serviced during the hour equals or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

**OR**

**Category B.** The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor-street approach (one direction only) for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.

**Option:**

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 70 km/h (40 mph), or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-4 may be used in place of Figure 4C-3 to satisfy the criteria in the second category of the Standard.

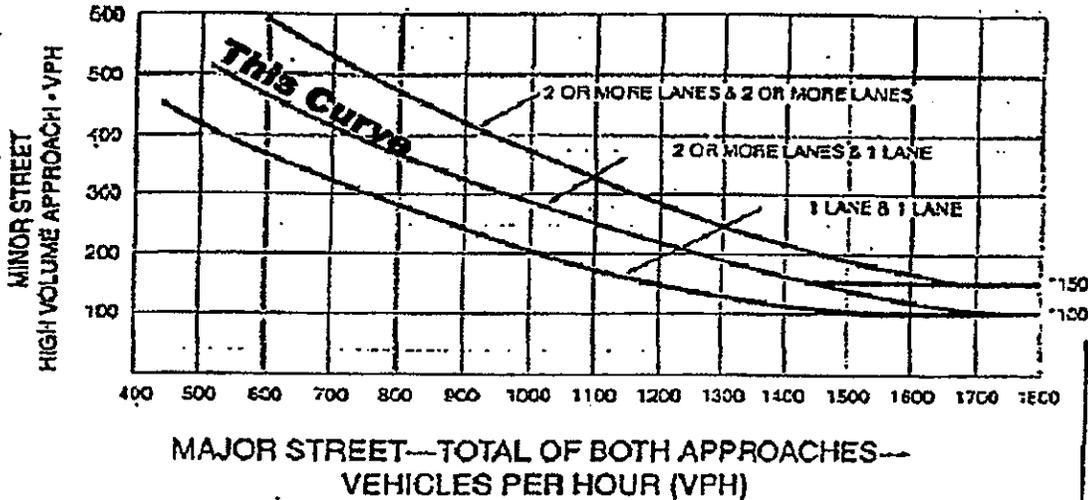
**WARRANT 3, PEAK HOUR (analysis of field data)**

Category A	stopped time delay for one minor street approach (one direction only) controlled by a stop sign	Hour	
Condition 1		7-8 AM	
		Met	
	1 lane approach: 4.65	Y	
	2 lane approach:	N/A	Y
Condition 2	volume on the same minor-street approach (one direction only)	Met	
	1 lane approach: 288	Y	
	2 lane approach:	N/A	Y
Condition 3	total entering volume serviced during the hour		
	3 approaches: 1806	Y	
	4 or more approaches:	N/A	Y

Category A Met: Y

**Category B**

**Figure 4C-3. Warrant 3, Peak Hour**



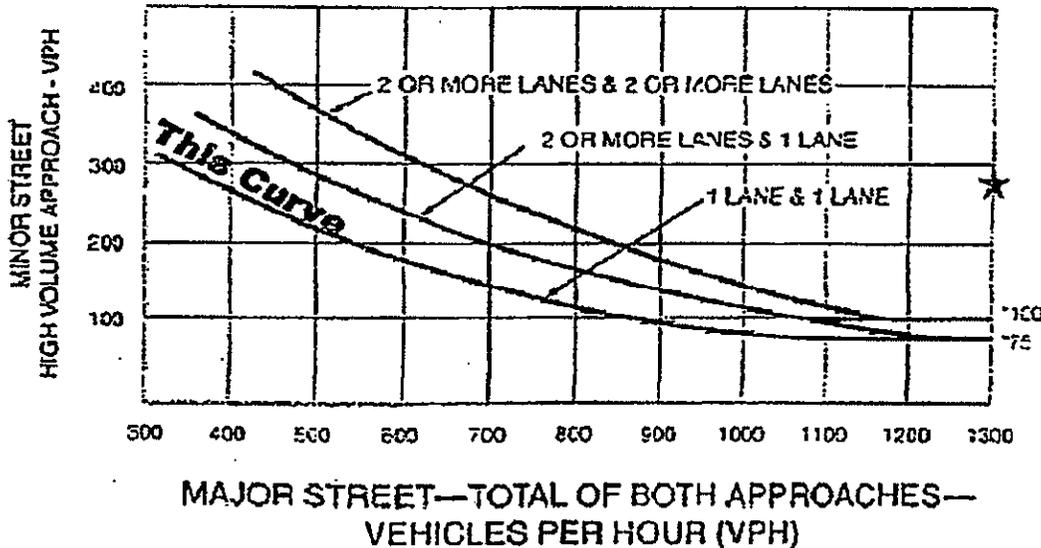
Enter Y or N for the one hour based on position of the one hour plotted point on the graph. Highlight applicable curve on the printout.

\*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

	Met	Peak Hour	major street (total of both approaches)	minor-street approach (one direction only)	Met
Category B Met:	N/A	5-6 PM			

**Figure 4C-4. Warrant 3, Peak Hour (70% Factor)**

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 70 km/h (40 mph) ON MAJOR STREET)



Enter Y or N for the one hour based on position of the one hour plotted point on the graph. Highlight applicable curve on the printout.

\*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 vph applies as the lower threshold volume for a minor-street approach with one lane.

	Met	Peak Hour	major street (total of both approaches)	minor-street approach (one direction only)	Met
Category B Met: (70% Factor)	Y	7-8 AM	1518	288	Y

**WARRANT 3 MET: YES**

**COMMENTS:**

Collected data significantly satisfied both category A and category B requirements.

**ADDITIONAL CONSIDERATIONS REGARDING SATISFACTION OF THE PEAK HOUR WARRANT:**

1.) Alternatives to a short-term peak hour need could be the following:

- An adjustment to staggered work times and/or shift changes.
- Additional minor street approach lanes.
- Special turn lanes.
- Other specific site improvements to reduce intersection delays (i.e., additional entrance/exit to distribute trips onto the network).

2.) The study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count against the above signal warrants. Thus, right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a one-lane approach with only the traffic volume in the through/left-turn lane considered (MUTCD, p. 4C-2).

3.) If there is no appreciable delay or traffic conflicts, then the right turns should not be counted (TCDH, p. 268).

**WARRANT 7, CRASH EXPERIENCE (explanation)**

**Support:**

The Crash Experience signal warrant conditions are intended for application where the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.

**Standard:**

The need for a traffic control signal shall be considered if an engineering study finds that all of the following criteria are met:

A. Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency;

and

B. Five or more reported crashes, of types susceptible to correction by a traffic control signal, have occurred within a 12-month period, each crash involving personal injury or property damage apparently exceeding the applicable requirements for a reportable crash;

and

C. For each of any 8 hours of an average day, the vehicles per hour (vph) given in both of the 80 percent columns of Condition A in Table 4C-1 (see Section 4C.02), or the vph in both of the 80 percent columns of Condition B in Table 4C-1 exists on the major-street and the higher-volume minor-street approach, respectively, to the intersection, or the volume of pedestrian traffic is not less than 80 percent of the requirements specified in the Pedestrian Volume warrant. These major-street and minor-street volumes shall be for the same 8 hours. On the minor street, the higher volume shall not be required to be on the same approach during each of the 8 hours.

**Additional Comments (from TCDH, p. 270):**

The engineering study should address analyzing alternatives that are less restrictive than a traffic control signal. The less restrictive measures do not necessarily have to be in place at least 12 months to provide accident data relative to their effectiveness.

Note that the reducible property damage collisions must have damage exceeding the minimum statutory limits in the local ordinances or state law. This also provides some assurance of enforcement investigation and a more detailed collision report for analysis.

Typical examples of reducible and non-reducible collisions at an intersection with a traffic control signal include:

**Reducible**

Right-angle collisions  
Left-turn collision  
Right-angle pedestrian collisions  
Parking collisions

**Non-Reducible**

Rear-end collisions  
Side-swipe collisions  
Head-on collisions

**WARRANT 7, CRASH EXPERIENCE (analysis)**

Alternatives have failed to reduce the crash frequency:

Measures tried: Roadway realignment to bring Halali Farm more at a 90 degree approach angle and recently additional pavement markings were added to the existing westbound right turn lane.

Number of applicable crashes reported in the last 12 months:

6/2001 to 5/2002: 7 crashes involving left turn from Halali Farm Road  
6/2002 to 5/2003: 7 crashes involving left turn from Halali Farm Road

Enter Y or N

Met  
Y

Enter Number of crashes from  
Columbia County Sheriff's  
Office Georgia Uniform Motor  
Vehicle Accident Reports.

7 Met  
Y

80% Vehicular Volumes of Condition A or Condition B

Condition A with the 80 percent volumes

Number of lanes for moving traffic on each approach			Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)		
Major Street	Minor Street	Y or N	Hour	80%	Data	Met	80%	Data	Met
1	1	Y	7-8 AM	400	1518	Y	120	288	Y
2 or more	1		8-9 AM	400	1268	Y	120	179	Y
2 or more	2 or more		12-1 PM	400	1149	Y	120	164	Y
1	2 or more		1-2 PM	400	1069	Y	120	108	N
			2-3 PM	400	1249	Y	120	98	N
			3-4 PM	400	1548	Y	120	174	Y
			4-5 PM	400	1445	Y	120	200	Y
			5-6 PM	400	1665	Y	120	241	Y
						8			6
						YES			NO

Condition A with 80 percent traffic volumes met: N

Condition B with the 80 percent volumes

Number of lanes for moving traffic on each approach			Vehicles per hour on major street (total of both approaches)				Vehicles per hour on higher-volume minor-street approach (one direction only)		
Major Street	Minor Street	Y or N	Hour	80%	Data	Met	80%	Data	Met
1	1	Y	7-8 AM	600	1518	Y	60	288	Y
2 or more	1		12-1 PM	600	1268	Y	60	179	Y
2 or more	2 or more		1-2 PM	600	1149	Y	60	164	Y
1	2 or more		2-3 PM	600	1069	Y	60	108	Y
			3-4 PM	600	1249	Y	60	98	Y
			4-5 PM	600	1548	Y	60	174	Y
			5-6 PM	600	1445	Y	60	200	Y
			6-7 PM	600	1665	Y	60	241	Y
						8			8
						YES			YES

Condition B with 80 percent traffic volumes met: Y

ADDITIONAL CONSIDERATIONS REGARDING SATISFACTION OF THE EIGHT HOUR VEHICULAR VOLUME WARRANT:

- 1.) The study should consider the effects of the right-turn vehicles from the minor-street approaches. Engineering judgment should be used to determine what, if any, portion of the right-turn traffic is subtracted from the minor-street traffic count when evaluating the count against the above signal warrants. Thus, right-turn traffic should not be included in the minor-street volume if the movement enters the major street with minimal conflict. The approach should be evaluated as a one-lane approach with only the traffic volume in the through/left-turn lane considered (MUTCD, p. 4C-2).
- 2.) If there is no appreciable delay or traffic conflicts, then the right turns should not be counted (TCDH, p. 268).

**80% Pedestrian Volumes**

Over 4 Hours	Pedestrian Volume	Met	During 1 Hour	Pedestrian Volume	Met
7-8 AM	0	N	8-9 AM	0	N
8-9 AM	0	N			
2-3 PM	0	N			
3-4 PM	0	N			
		Met:			N

**Vehicular or Pedestrian Volume Met: Y**

**WARRANT 7 MET: YES**

**COMMENTS:**

Crash data satisfied the minimum warrant criteria which included those crash types (left turn from minor road) whose frequency of occurrence may be expected to be reduced through the application of a traffic control signal. Similarly, condition B with the 80 percent traffic volume criteria was easily met.

APPENDIX D: TURNING MOVEMENT COUNT SUMMARY SHEET



PEAK HOUR TURNING MOVEMENT COUNT  
 DATA COLLECTED: SEPTEMBER 11, 2003 (THURS.)  
 LEGEND: AM PEAK  
 (AFTERNOON PEAK)  
 [PM PEAK]

# Columbia County Traffic Engineering

Traffic Engineering Report  
 State Route 104 and Halali Farm Road  
 Date Prepared: October 9, 2003  
 Page 20 of 21

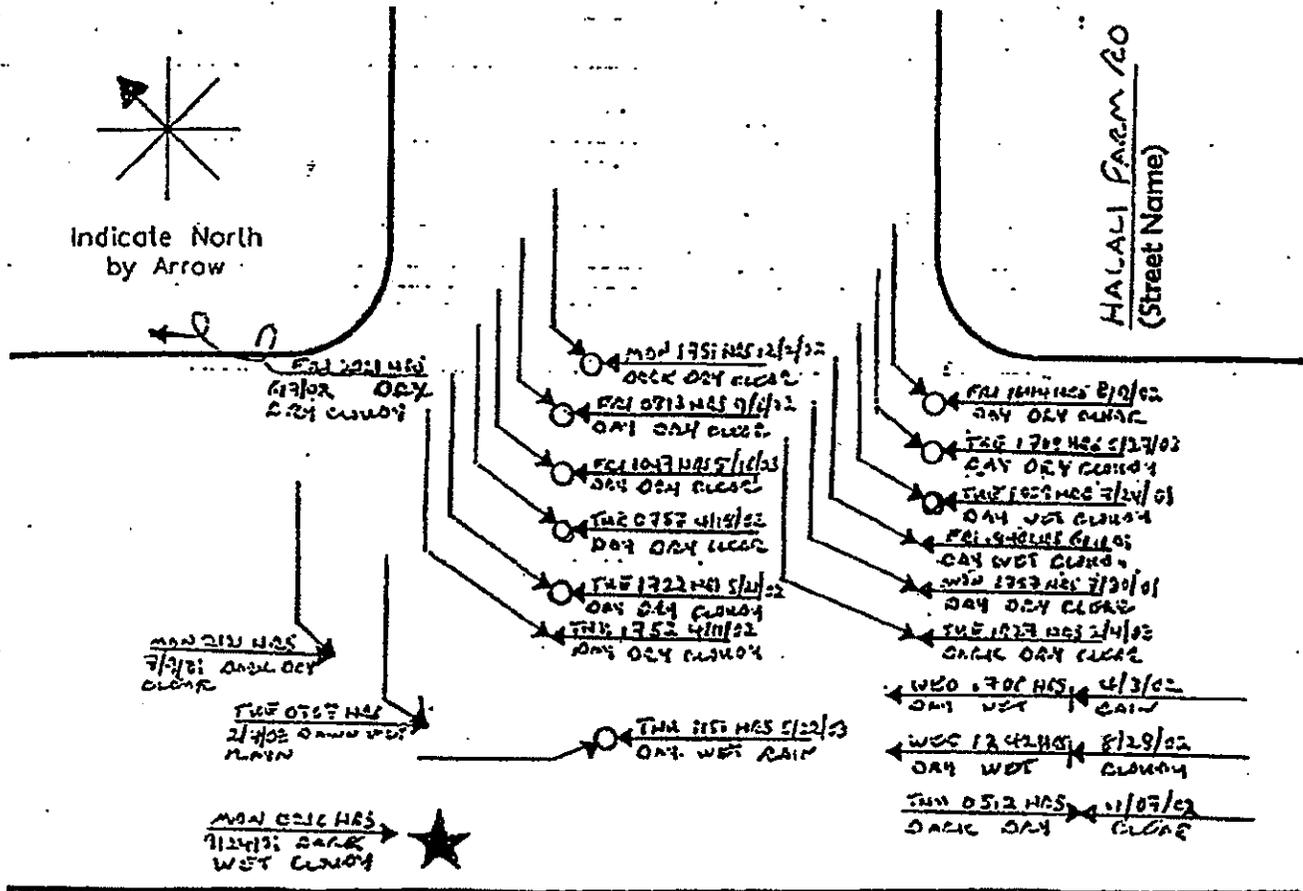
File Name : Halali Farm @ Washington Rd  
 Site Code : 09110301  
 Start Date : 09/11/2003  
 Page No : 1

Groups Printed- All Vehicles

Start Time	HALALI FARM RD Southbound				SR 104 (WASHINGTON RD) Westbound				UNDEVELOPED PROPERTY Northbound				SR 104 (WASHINGTON RD) Eastbound				Int. Total
	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
07:00 AM	75	0	5	0	0	214	24	0	0	0	0	0	2	214	0	0	534
07:15 AM	71	0	4	0	0	128	18	0	0	0	0	0	1	239	0	0	481
07:30 AM	71	0	0	0	0	83	29	0	0	0	0	0	0	242	0	0	425
07:45 AM	60	0	2	0	0	94	32	0	0	0	0	0	0	198	0	0	388
Total	277	0	11	0	0	519	103	0	0	0	0	0	3	893	0	0	1806
08:00 AM	46	0	2	0	0	126	30	0	0	0	0	0	3	165	0	0	372
08:15 AM	41	0	1	0	0	125	27	0	0	0	0	0	2	220	0	0	416
08:30 AM	50	0	5	0	0	92	29	0	0	0	0	0	2	203	0	0	381
08:45 AM	33	0	1	0	0	84	23	0	0	0	0	0	2	135	0	0	278
Total	170	0	9	0	0	427	109	0	0	0	0	0	9	723	0	0	1447
12:00 PM	48	0	3	0	0	108	47	0	0	0	0	0	0	118	0	0	324
12:15 PM	38	0	2	0	0	116	43	0	0	0	0	0	4	119	0	0	322
12:30 PM	41	0	2	0	0	132	34	0	0	0	0	0	0	110	0	0	319
12:45 PM	30	0	0	0	0	135	49	0	0	0	0	0	0	134	0	0	348
Total	157	0	7	0	0	491	173	0	0	0	0	0	4	481	0	0	1313
01:00 PM	23	0	0	0	0	98	40	0	0	0	0	0	1	104	0	0	266
01:15 PM	29	0	1	0	0	130	37	0	0	0	0	0	1	110	0	0	308
01:30 PM	33	0	1	0	0	120	58	0	0	0	0	0	0	102	0	0	314
01:45 PM	20	0	1	0	0	119	44	0	0	0	0	0	2	103	0	0	289
Total	105	0	3	0	0	467	179	0	0	0	0	0	4	419	0	0	1177
02:00 PM	23	0	0	0	0	127	32	0	0	0	0	0	2	94	0	0	278
02:15 PM	20	0	1	0	0	152	50	0	0	0	0	0	1	90	0	0	314
02:30 PM	24	0	2	0	0	159	52	0	0	0	0	0	0	123	0	0	360
02:45 PM	24	0	4	0	0	154	38	0	0	0	0	0	6	169	0	0	395
Total	91	0	7	0	0	592	172	0	0	0	0	0	9	476	0	0	1347
03:00 PM	37	0	0	0	0	184	46	0	0	0	0	0	4	176	0	0	427
03:15 PM	47	0	1	0	0	164	37	0	0	0	0	0	2	197	0	0	448
03:30 PM	42	0	3	0	0	166	59	0	0	0	0	0	0	143	0	0	413
03:45 PM	42	0	2	0	0	143	50	0	0	0	0	0	3	194	0	0	434
Total	168	0	6	0	0	637	192	0	0	0	0	0	9	710	0	0	1722
04:00 PM	58	0	0	0	0	161	65	0	0	0	0	0	1	150	0	0	435
04:15 PM	44	0	0	0	0	151	66	0	0	0	0	0	0	128	0	0	389
04:30 PM	54	0	1	0	0	171	67	0	0	0	0	0	1	127	0	0	421
04:45 PM	40	0	3	0	0	154	62	0	0	0	0	0	1	140	0	0	400
Total	196	0	4	0	0	637	260	0	0	0	0	0	3	545	0	0	1645
05:00 PM	63	0	2	0	0	169	85	0	0	0	0	0	0	121	0	0	440
05:15 PM	70	0	2	0	0	221	85	0	0	0	0	0	3	114	0	0	495
05:30 PM	57	0	0	0	0	211	102	0	0	0	0	0	0	124	0	0	494
05:45 PM	47	0	0	0	0	207	101	0	0	0	0	0	2	120	0	0	477
Total	237	0	4	0	0	808	373	0	0	0	0	0	5	479	0	0	1906
Grand Total	1401	0	51	0	0	4578	1561	0	0	0	0	0	46	4726	0	0	12563
Apprch %	96.5	0.0	3.5	0.0	0.0	74.6	25.4	0.0	0.0	0.0	0.0	0.0	1.0	99.0	0.0	0.0	
Total %	11.3	0.0	0.4	0.0	0.0	37.0	12.6	0.0	0.0	0.0	0.0	0.0	0.4	38.2	0.0	0.0	

APPENDIX E: ACCIDENT DIAGRAM

LOCATION: SR 104 @ Halali Farm Road  
 ACCIDENT PERIOD: From June 2001 through May 2003 (24 Months)



S.R. 104 (WASHINGTON RD)  
 (Street Name)

Summary

PDO 11  
 INJ + 9  
 TOTAL 20

SYMBOLS	TYPES OF COLLISIONS	SHOW FOR EACH ACCIDENT
<ul style="list-style-type: none"> <li>→ Moving Vehicle</li> <li>↔ Backing Vehicle</li> <li>--- Non-Involved Vehicle</li> <li>X Pedestrian</li> <li>▭ Parked Vehicle</li> <li>□ Fixed Object</li> <li>○ Fatal Accident</li> <li>○ Injury Accident</li> </ul>	<ul style="list-style-type: none"> <li>← Rear End</li> <li>→ Head On</li> <li>↔ Side Swipe</li> <li>↔ Out of Control</li> <li>↔ Left Turn</li> <li>↔ Right Angle</li> </ul>	<ol style="list-style-type: none"> <li>Day of week</li> <li>Date and Time</li> <li>Weather (rain, clear, snow)</li> <li>Road Surface (wet, dry, snow, ice)</li> <li>Light Condition (day, night)</li> </ol>

## SCORING RESULTS AS PER TOPPS 2440-2

<b>Project Number:</b>		<b>County:</b>		<b>PI No.:</b>	
<b>Report Date:</b>		<b>Concept By:</b>			
		DOT Office:			
<input type="checkbox"/> CONCEPT		Consultant:			
<b>Project Type:</b> Choose One From Each Column		<input type="checkbox"/> Major	<input type="checkbox"/> Urban	<input type="checkbox"/> ATMS	
		<input type="checkbox"/> Minor	<input type="checkbox"/> Rural	<input type="checkbox"/> Bridge	
				<input type="checkbox"/> Building	
				<input type="checkbox"/> Interchange	
				<input type="checkbox"/> Intersection	
				<input type="checkbox"/> Interstate	
				<input type="checkbox"/> New Location	
				<input type="checkbox"/> Widening & Reconstruction	
				<input type="checkbox"/> Miscellaneous	
<b>FOCUS AREAS</b>	<b>SCORE</b>	<b>RESULTS</b>			
<b>Presentation</b>					
<b>Judgement</b>					
<b>Environmental</b>					
<b>Right of Way</b>					
<b>Utility</b>					
<b>Constructability</b>					
<b>Schedule</b>					