

To: Shannon Meder
 HDR

From: Jim Fisher, PE
 Stantec Consulting Services Inc.

File: 171001938
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Reference: SC 41 Improvement Project-Alternatives Review

The purpose of this memorandum is to review and document the existing and future projected traffic volumes along the SC 41 improvement study area, and to evaluate a range of improvement alternatives to accommodate them. South Carolina Department of Transportation (SCDOT) count locations and 2015 AADT volumes were utilized to determine historic trends. In addition, Stantec obtained separate counts from September 2017 for comparison. Both the SCDOT and the Stantec count data was compared to forecasts from the Charleston Area Transportation Study (CHATS) Travel Demand Model, maintained by the Berkeley Charleston Dorchester Council of Governments (BCDCOG). The 2015 CHATS Travel Demand Model was used to analyze the range of alternatives presented. This memorandum summarizes the findings of the CHATS analysis for each of the alternatives.

Project Description

Charleston County proposes to improve SC 41 from US 17 to the Wando River. The project purpose and need propose to alleviate congestion along SC 41, as well as implement improvements at the intersection of SC 41 and US 17.

For the purposes of reviewing the additional capacity required, Stantec utilized the 2015 version of the CHATS travel demand model. The version was modified by BCDCOG to include updates for large planned developments, including Cainhoy Plantation. Cainhoy Plantation is a 9,000-acre mixed-use development within the study area west of SC 41 along Clements Ferry Road, which will include residential, commercial, and institutional land uses. This development constitutes the majority of the future growth in travel demand in the SC 41 corridor. Stantec also modified the socioeconomic (SE) data within traffic analysis zones (TAZ) considered to directly influence future traffic on SC 41 and US 17 in Mount Pleasant. This SE data representing actual buildout through June of 2015, as well as forecasts for future development, were provided by the Town for 2040.

Study Corridors

Various segments along SC-41 and the major cross-streets (Bessemer Road, Dunes West Boulevard, and Park West Boulevard) were analyzed to compare the volumes among the three different sources (SCDOT, Stantec, CHATS). The segments are identified by a CHATS link identification. The CHATS links were compared to the nearest SCDOT count station and Stantec count location. Table 1 shows the corridor analysis segments.

Table 1: Corridor Analysis Segments

Facility	CHATS Link ID	SCDOT Station	Stantec Location	Segment Description
SC 41	4232	193	1	US 17 to Joe Rouse Road
	4620	198	2	Joe Rouse Road to Dunes West Boulevard
	4260	198	3	Dunes West Boulevard to Wando River
Bessemer Rd	2620	-	-	SC 41 to Park West Boulevard (E-W)
Park West Blvd	3477	-	-	Bessemer Road to Park West Boulevard (N-S)
Dunes West Boulevard	3503	-	-	Park West Boulevard to SC 41

Base Year Comparison

The base year within the CHATS model is 2015 with a horizon year of 2040. A comparison of the 2015 Average Annual Daily Traffic (AADT) from the model to 2015 SCDOT and 2015 Stantec count stations reveals some significant differences. The magnitude of these differences varies, as shown in Table 2.

Table 2: Comparison of 2015 AADT Data

Facility	Segment	CHATS 2015	SCDOT 2015	Difference from CHATS	Counts 2015	Difference from CHATS
SC 41	US 17 to Joe Rouse Rd	21,430	22,400	4.53%	26,752	24.83%
	Joe Rouse Rd to Dunes West Blvd	15,375	13,100	-17.80%	17,795	15.74%
	Dunes West Blvd to Wando River	13,066	13,100	0.26%	14,525	11.17%
Bessemer Rd	SC 41 to Park West Blvd (E-W)	4,221	-	-	-	-
Park West Blvd	Bessemer Rd to Park West Blvd (N-S)	4,149	-	-	-	-
Dunes West Blvd	Park West Blvd to SC 41	7,842	-	-	-	-

The magnitude of differences in base year AADTs indicates the need for certain assumptions to be made about the CHATS forecast for the horizon year. Stantec has made the following basic assumptions:

- SCDOT traffic counts are collected and processed in accordance with the “Traffic Monitoring Guide” published by the Federal Highway Administration (FHWA). The resulting AADT is accurate (to the relevant standard) in the vicinity of the count station.
- The CHATS model is very complex, and its calibration based on base year traffic volumes may result in inaccuracies for limited segments of certain roadways.
- Horizon year AADTs in the CHATS model are produced by adding new trips generated as a result of anticipated land use, capacity limitations and changes in the road network that influence travel demand in the project area.

Stantec obtained 2017 counts for comparison. Table 3 compares the 2015 and 2017 Stantec counts.

Table 3: Comparison of 2015 and 2017 Count Data

Facility	Segment	2015 Counts	2017 Counts	2-year Growth	
				Linear	Exponential
SC 41	US 17 to Joe Rouse Rd	26,752	26,701	-0.10%	-0.09%
	Joe Rouse Rd to Dunes West Blvd	17,795	18,764	2.72%	2.25%
	Dunes West Blvd to Wando River	14,525	15,713	4.09%	3.43%

To capture the traffic growth generated by future development, the new trips (difference between 2015 and 2040 AADT in the CHATS model) were added to the counts taken in 2015. This is referred to as the adjusted 2040 CHATS AADT (2040 AADT_{adj}), determined as follows:

$$2040 \text{ AADT}_{adj} = 2015 \text{ COUNT AADT} + (2040 \text{ CHATS AADT} - 2015 \text{ CHATS AADT})$$

The CHATS 2040 AADT_{adj} for each roadway segment is shown in Table 4.

Table 4: Adjusted CHATS 2040 AADT

Facility	Segment	CHATS		COUNTS	CHATS (adjusted)	
		2015	2040	2015	2040	Growth*
SC 41	US 17 to Joe Rouse Rd	21,430	34,941	26,752	40,263	2.02%
	Joe Rouse Rd to Dunes West Blvd	15,375	26,940	17,795	29,360	2.60%
	Dunes West Blvd to Wando River	13,066	29,431	14,525	30,890	4.51%
Bessemer Rd	SC 41 to Park West Blvd (E-W)	4,221	6,541	-	-	-
Park West Blvd	Bessemer Rd to Park West Blvd (N-S)	4,149	12,012	-	-	-
Dunes West Blvd	Park West Blvd to SC 41	7,842	17,787	-	-	-

* growth is average annual linear rate.

Alternatives

The initial development and screening of the range of alternatives was completed through further modifications to the CHATS model. The model distributes trips in part according to the capacity of the links (roads) within the network. By adding lanes (capacity) to a link, more traffic may be drawn to that link. Similarly, if a new link (roadway on new alignment) is placed in the model, connecting two existing links, some of the existing or forecasted traffic on those adjoining links may be drawn to the new connecting link (road). A wide variety of alternatives were modeled in this manner, by either adding capacity directly to SC 41, or by adding connecting or parallel roadways in an attempt to distribute the traffic demand, relieve congestion and reduce travel times.

Twelve different improvement alternatives and a no build alternative, were analyzed in the CHATS Travel Demand Model. Each of the alternatives is described below.

No Build: Assumes no change to SC 41 from the existing 2017 conditions.

Build Alternative 1:

- Widen SC 41 to four lanes, from US 17 to Wando River.

Build Alternative 2:

- Widen SC 41 from US 17 to Joe Rouse Road to four lanes.
- Widen SC 41 to three lanes (2 general purpose lanes + 1 two-way left turn lane) from Joe Rouse Road to Dunes West Boulevard.
- Widen SC 41 to four lanes north of Dunes West Boulevard to the Wando River bridge.

Build Alternative 2A:

- Widen SC 41 from US 17 to Joe Rouse Road to four lanes.
- Widen SC 41 to three lanes (2 general purpose lanes + 1 two-way left turn lane) from Joe Rouse Road to Dunes West Boulevard.
- Widen Joe Rouse Road, Bessemer Road, and Dunes West Boulevard to three lanes (2 general purpose lanes + 1 two-way left turn lane).
- Widen SC 41 to four lanes north of Dunes West Boulevard to the Wando River bridge.

Build Alternative 3:

- Widen SC 41 from US 17 to Joe Rouse Road to four lanes.
- Convert Joe Rouse Road, Bessemer Road, and Dunes West Boulevard to two lanes one-way northbound from the intersection of SC 41 and Joe Rouse Road to the intersection of SC 41 and Dunes West Boulevard.
- Convert SC 41 to two lanes one-way southbound from Joe Rouse Road to Dunes West Boulevard.
- Widen SC 41 to four lanes north of Dunes West Boulevard to the Wando River bridge.

Build Alternative 4:

- Maintain two lanes on SC 41.
- New two-lane (two-way) roadway on new parallel alignment extending diagonally from the intersection of US 17 and Winnowing Way, where it begins to parallel to SC 41, tying back into Dunes West Boulevard.
- Widen SC 41 from Dunes West Boulevard to the Wando River bridge.

Build Alternative 5:

- Maintain two lanes on SC 41.
- New two-lane (two-way) roadway on new parallel alignment extending diagonally from the intersection of US 17 and Winnowing Way, where it begins to parallel to SC 41, tying back into Dunes West Boulevard.
- New two-lane (two-way) extending from Dunes West Boulevard until connecting to Harpers Ferry Way (SC 41 Parallel).
- Widen SC 41 from Harpers Ferry Way to the Wando River bridge.

Build Alternative 5A:

- Maintain two lanes on SC 41.
- New four-lane (two-way) roadway on new parallel alignment extending diagonally from the intersection of US 17 and Winnowing Way, where it begins to parallel to SC 41, tying back into Dunes West Boulevard.
- New two-lane (two-way) extending from Dunes West Boulevard until connecting to Harpers Ferry Way (SC 41 Parallel).
- Widen SC 41 from Harpers Ferry Way to the Wando River bridge.

Build Alternative 6:

- Maintain two lanes on SC 41.
- New four-lane roadway on new parallel alignment extending diagonally from the intersection of US 17 and Winnowing Way, then it begins to parallel to SC 41 tying back into Dunes West Boulevard (SC 41 Parallel).
- Widen SC 41 from Dunes West Boulevard to the Wando River bridge.

Build Alternative 7:

- Widen SC 41 to four lanes from US 17 to Joe Rouse Road.
- Widen Joe Rouse Road, Bessemer Road, Park West Boulevard and Dunes West Boulevard to four lanes from SC 41 to SC 41.
- Widen SC 41 to four lanes from Dunes West Boulevard to the Wando River bridge.
- Widen SC 41 to three lanes (2 general purpose lanes/1 two-way left turn lane) from Joe Rouse Road to Dunes West Boulevard.

Build Alternative 8:

- Widen SC 41 to six lanes from US 17 to Joe Rouse Road.
- Widen Joe Rouse Road, Bessemer Road, Park West Boulevard and Dunes West Boulevard to six lanes from SC 41 to SC 41.
- Widen SC 41 to six lanes from Dunes West Boulevard to the Wando River bridge.
- Widen SC 41 to three lanes (2 general purpose/1 two-way left turn lane) from Joe Rouse Road to Dunes West Boulevard.

Build Alternative 9:

- Widen SC 41 to six lanes from US 17 to Joe Rouse Road.
- Widen Joe Rouse Road, Bessemer, Park West Boulevard and Dunes West Boulevard to four lanes from SC 41 to SC 41.
- Widen SC 41 to four lanes from Dunes West Boulevard to the Wando River bridge.
- Widen SC 41 to three lanes (2 general purpose/1 two-way left turn lane) from Joe Rouse Road to Dunes West Boulevard.

Build Alternative 10:

- Widen SC 41 to six lanes from US 17 to Wando River.

Build Alternative 11:

- Widen SC 41 from US 17 to Joe Rouse to six lanes.
- Widen SC 41 to four lanes from Joe Rouse Road to the Wando River bridge.

Build Alternative 12:

- Widen SC 41 from US 17 to Dunes West Boulevard to six lanes.
- Widen SC 41 to four lanes from Dunes West Boulevard to the Wando River bridge.

Planning Level Capacity Methodology

Florida Department of Transportation (FDOT)'s Generalized Annual Average Daily Volumes for Florida's Urbanized Areas table obtained from the Florida Department of Transportation's 2013 Quality/Level of Service Handbook was utilized to assign a planning Level of Service (LOS) to each of the projected alternative volumes. Although SCDOT has published a planning LOS table for use in travel demand modeling, the FDOT publication is much more comprehensive, as it provides separate values for high speed and low speed facilities, and adjustment factors for certain roadway characteristics such as exclusive turn lanes at intersections.

Based on the functional road classification and number of lanes, along with other actual (existing) or assumed (build alternates) roadway characteristics, the planning LOS for each road segment was determined. LOS A operations typically represent ideal, free-flow conditions where vehicles experience little to no delays, and LOS F operations typically represent poor, forced-flow (bumper-to-bumper) conditions with high vehicular delays, and are generally considered undesirable. Tables 5 and 6 summarize the FDOT volume thresholds associated with each planning LOS grade based on the functional road classification and number of lanes. Table 5 shows the FDOT's volume thresholds for each Level of Service (LOS) for Uninterrupted Flow Highways while Table 6 shows FDOT's volume thresholds for each Level of Service (LOS) for Interrupted Flow Arterials-State Signalized Arterials-Class 1 (40 mph or higher posted speed limit).

Table 5: Urbanized Area Uninterrupted Flow Highways

Uninterrupted Flow Highways				
# of Lanes	Level of Service			
	B	C	D	E
2	8,600	17,000	24,200	33,300
3 ^a	9,030	17,850	25,410	34,965
4 ^b	36,700	51,800	65,600	72,600
6 ^b	55,000	77,700	98,300	108,800

Table 6: Urbanized Area Interrupted Flow Arterials

State Signalized Arterials - Class I				
# of Lanes	Level of Service			
	B	C	D	E
2	*	16,800	17,700	**
3 ^c	*	17,640	18,585	**
4 ^d	*	37,900	39,800	**
6 ^d	*	58,400	59,900	**
One-Way Adjustments***				
# of Lanes	Level of Service			
	B	C	D	E
2	*	10,080	10,620	**

- a The 3 lane scenario was analyzed a 2 lane divided with exclusive left turn lanes. This adjustment was +5% of the undivided volumes.
 - b The 4 and 6 lane segments were assumed to have divided medians.
 - c The 3 lane scenario was analyzed a 2 lane divided with exclusive left turn lanes. This adjustment was +5% of the undivided volumes.
 - d The 4 and 6 lane scenarios were assumed to have divided medians.
- *Cannot be achieved using table input value defaults.
 **For the automobile mode, volumes greater than Level of Service D become F because intersection capacities have been reached.
 ***One-Way Facility Adjustment was calculated by multiplying the corresponding two-directional volumes by 0.6

Uninterrupted flow facilities are roadways that have no fixed causes of periodic delay or interruption to the traffic stream, such as signals or stop signs. Interrupted flow facilities are roadways that have fixed causes of periodic delay or interruption to the traffic stream, such as signals or stop signs, with average spacing less than or equal to 2.0 miles. LOS A is not considered a responsible target for planning purposes, so it is not shown in these tables. Anything exceeding LOS E volumes is considered LOS F (there is no upper limit for LOS F).

Table 7 lists the AADT for the respective network segments for the fourteen (14) alternatives as determined by the CHATS travel demand model. Table 8 provides the screening level capacity expressed as Level of Service (LOS) for the study segments as uninterrupted or interrupted facilities.

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Table 7: CHATS Alternatives AADT

Facility	Segment	2015 AADT	2040 AADT (# of Lanes)														
			No Build	Alt 1	Alt 2	Alt 2A	Alt 3	Alt 4	Alt 5	Alt 5A	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11	Alt 12
SC 41	US 17 to Joe Rouse Rd	21,430	32,336 (2)	49,393 (4)	42,616 (4)	42,849 (4)	39,881 (4)	27,056 (2)	26,209 (2)	22,366 (2)	24,138 (2)	43,817 (4)	45,556 (6)	44,932 (6)	51,302 (6)	50,433 (6)	51,000 (6)
	Joe Rouse Rd to Dunes West Blvd	15,375	26,777 (2)	42,746 (4)	35,032 (3)	35,491 (3)	29,512* (2SB)	26,960 (2)	26,321 (2)	22,352 (2)	23,806 (2)	29,951 (3)	29,880 (3)	30,270 (3)	45,403 (6)	43,638 (4)	45,151 (6)
	Dunes West Blvd to Wando River ¹	13,066	26,211 (2)	33,624 (4)	29,745 (4)	29,533 (4)	25,863 (4)	29,686 (4)	14,624 (2)	9,714 (2)	32,454 (4)	32,285 (4)	33,344 (6)	32,459 (4)	34,748 (6)	33,866 (4)	34,136 (4)
Bessemer Rd	SC 41 to Park West Blvd (E-W)	4,221	6,407 (2)	7,569 (2)	7,999 (2)	8,126 (3)	22,309* (2NB)	581 (2)	794 (2)	673 (2)	342 (2)	14,472 (4)	16,223 (6)	15,263 (4)	6,837 (2)	7,717 (2)	6,792 (2)
			16,482 (2)	5,927 (2)	7,190 (2)	6,642 (3)	8343 2	8961 (2)	9,077 (2)	4,624 (2)	4312 (2)	10,901 (2)	11,792 (2)	11,224 (2)	5,788 (2)	5,755 (2)	5,782 (2)
Park West Blvd	Bessemer Rd to Park West Blvd (N-S)	4,149	14,514 (2)	12,572 (2)	14,773 (2)	13,997 (3)	28,473* (2NB)	21,317 (2)	21,977 (2)	31,674 (4)	28,946 (4)	23,766 (4)	24,966 (6)	23,990 (4)	11,638 (2)	12,541 (2)	11,581 (2)
			14,514 (2)	12,572 (2)	14,773 (2)	13,997 (3)	28,473* (2NB)	21,317 (2)	21,977 (2)	31,674 (4)	28,946 (4)	23,766 (4)	24,966 (6)	23,990 (4)	11,638 (2)	12,541 (2)	11,581 (2)
Dunes West Blvd	Park West Blvd to SC 41	7,842	30,476 (2)					30,476 (2)	30,959 (2)	30,959 (4)	41,337 (4)						
SC 41 Parallel	North of US 17	-															
SC 41 Parallel	North of Dunes West Blvd	-							14,879 (2)	24,175 (4)							
SC 41	Harpers Ferry Way to Wando River	-								14,879 (2)	24,175 (4)						

* These are one-way volumes.

¹ This segment represents Dunes West Blvd to Harpers Ferry Way in Alternative 5.

*The volumes in this table do not correlate to an LOS. LOS can be found in Tables 8 and 9 on the following pages.

Table 8: FDOT Planning LOS - Multi-lane Divided Highways

Facility	Segment	2015 AADT		2040 AADT Level of Service																
				No Build	Alt 1	Alt 2	Alt 2A	Alt 3	Alt 4	Alt 5	Alt 5A	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11	Alt 12		
SC 41	US 17 to Joe Rouse Rd	21,430	LOS _U	E	C	C	C	C	E	E	D	D	C	C	C	C	C	C		
			LOS _I	F	F	F	F	F	F	F	F	F	F	F	C	C	C	C	C	
			% Over	183%	124%	107%	108%	100%	153%	148%	126%	136%	110%							
			AADT	32,336	49,393	42,616	42,849	39,881	27,056	26,209	22,366	24,138	43,817	45,556	44,932	51,302	50,433	51,000		
	Lanes	(2)	(4)	(4)	(4)	(4)	(2)	(2)	(2)	(2)	(4)	(6)	(6)	(6)	(6)	(6)				
	Joe Rouse Road to Dunes West Boulevard	15,375	LOS _U	E	C	F	F	E	E	D	D	E	E	E	B	C	C	B	B	
			LOS _I	F	F	F	F	F	F	F	F	F	F	F	F	C	C	F	C	C
			% Over	151%	107%	188%	191%	167%	152%	149%	126%	134%	161%	161%	163%			110%		
			AADT	26,777	42,746	35,032	35,491	29,512*	26,960	26,321	22,352	23,806	29,951	29,880	30,270	45,403	43,638	45,151		
	Lanes	(2)	(4)	(3)	(3)	(25B)	(2)	(2)	(2)	(2)	(3)	(3)	(3)	(6)	(4)	(6)				
	Dunes West Blvd to Wando River	13,066	LOS _U	E	B	B	B	B	B	C	C	B	B	B	B	B	B	B	B	
			LOS _I	F	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
% Over			148%																	
AADT			26,211	33,624	29,745	29,533	25,863	29,686	14,624	9,714	32,454	32,285	33,344	32,459	34,748	33,866	34,136			
Lanes	(2)	(4)	(4)	(4)	(4)	(4)	(2)	(2)	(4)	(4)	(6)	(4)	(6)	(4)	(4)					
Bessemer Road	SC 41 to Park West Blvd (E-W)	4,221	LOS _U	B	B	B	B	D	B	B	B	B	B	B	B	B	B	B	B	
			LOS _I	C	C	C	C	F	C	C	C	C	C	C	C	C	C	C	C	
			% Over					126%												
			AADT	6,407	7,569	7,999	8,126	22,309*	581	794	673	342	14,472	16,223	15,263	6,837	7,717	6,792		
Lanes	(2)	(2)	(2)	(3)	(2)	(2)	(2)	(2)	(2)	(2)	(6)	(2)	(2)	(2)	(2)					
Park West Blvd	Bessemer Rd to Park West Blvd (N-S)	4,149	LOS _U	C	B	B	B	B	C	C	B	B	C	C	C	B	B	B	B	
			LOS _I	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
			% Over																	
			AADT	16,482	5,927	7,190	6,642	8343	8961	9,077	4,624	4312	10,901	11,792	11,224	5,788	5,755	5,782		
Lanes	(2)	(2)	(2)	(3)	2	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)					
Dunes West Blvd	Park West Blvd to SC 41	7,842	LOS _U	C	C	C	C	E	D	D	B	B	B	B	C	C	C	C	C	
			LOS _I	C	C	C	C	F	F	F	C	C	C	C	C	C	C	C	C	C
			% Over					161%	120%	124%										
			AADT	14,514	12,572	14,773	13,997	28,473*	21,317	21,977	31,674	28,946	23,766	24,966	23,990	11,638	12,541	11,581		
Lanes	(2)	(2)	(2)	(3)	(2NB)	(2)	(2)	(4)	(4)	(4)	(6)	(4)	(2)	(2)	(2)					
SC 41 Parallel	North of US 17	-	LOS _U						E	E	B	C								
			LOS _I						F	F	C	F								
			% Over						172%	175%	104%									
			AADT	-	-	-	-	-	30,476	30,959	30,959	41,337	-	-	-	-	-	-		
Lanes						(2)	(2)	(4)	(4)											
SC 41 Parallel	South of Bessemer Rd	-	LOS _U						C	C	B	B								
			LOS _I						C	C	C	C								
			% Over																	
			AADT						13,478	13,997	13,997	24994								
Lanes						(2)	(2)	(4)	(4)											
SC 41 Parallel	North of Dunes West Blvd	-	LOS _U						C	B										
			LOS _I						C	C										
			% Over																	
			AADT	-	-	-	-	-	-	14,879	24,175	-	-	-	-	-	-	-		
Lanes							(2)	(4)												
SC 41	Harpers Ferry Way to Wando River	-	LOS _U						B	B										
			LOS _I						C	C										
			% Over																	
			AADT	-	-	-	-	-	-	29,504	33,892	-	-	-	-	-	-	-		
Lanes							(4)	(4)												

LOS

- C
- D
- E
- F

LOS_U = Level of Service for Uninterrupted Flow Conditions
 LOS_I = Level of Service for Interrupted Flow Conditions

C* = LOS indicated a C or better
 Volumes greater than LOS D become F because intersection capacities have been reached.

Initial Screening of Alternatives

Stantec presented the results of the traffic distribution and planning level capacity analysis to the SC 41 project team at a meeting on January 26, 2018. Subsequently, Stantec added Alternatives 2A and 5A to the traffic screening process. These results demonstrated that some of the alternatives did not relieve congestion issues on SC 41, and consequently do not meet the purpose and need of the project. Table 9 summarizes the eliminated alternatives and the corresponding deficiency:

Table 9: Alternatives Eliminated by Initial Screening Process

Build Alternative	Elimination Justification
2A	The new alignment did not attract enough traffic volume to reduce congestion levels on SC 41 to acceptable levels.
3	Conversion of Joe Rouse Road, Bessemer Road and Dunes West Boulevard to one-way did not relieve congestion to acceptable levels.
4	The new alignments did not attract enough traffic volume to reduce congestion levels on SC 41 to acceptable levels.
5	
5A	
6	
8	Alternatives that included six lanes on SC 41 from US 17 to Joe Rouse Road provide excess capacity in this segment and do not reduce congestion levels in other segments of SC 41 to acceptable levels. The exception to this is Alternative 9, which was retained for further analysis because
9	
10	
11	
12	

HCS Analysis of Selected Alternatives

Following the initial planning level screening analysis, the alternatives were refined and Alternatives 1, 2, and 7 detailed analysis was performed. The refinement included an update of growth forecasts in the project area to correspond to changes in development plans for Cainhoj Plantation. The developer recently committed to preserve approximately fifty percent (50%) of the previously master planned area. This forecast was applied to the remaining alternatives prior to conducting more detailed LOS analyses.

Corridor LOS analysis was conducted for these selected alternatives using the Transportation Research Board's Highway Capacity Manual 2010 (HCM 2010) methodologies of the HCS 7 and HCS 2010 software. LOS grades range from A to F, which correspond to the traffic density in passenger cars per mile per lane (pc/mi/ln) for multilane highways, and the percentage of free-flow speed (PFFS%) or the percent-time-spent following (PTSF%) for two-lane highways. depending on classification. Traffic flow conditions corresponding to LOS A to F by HCM methods are the same as previously described for the planning level screening. Tables 10 and 11 summarize the HCM 2010 thresholds associated with each LOS grade for two-lane and multilane highways.

Table 10: HCM 2010 Automobile LOS for Two-Lane Highways (Exhibit 15-3 HCM 2010)

LOS	Class I Highways PTSF (%)	Class III Highways PFFS (%)
A	≤ 35	> 91.7
B	> 35-50	> 83.3-91.7
C	> 50-65	> 75.0-83.3
D	> 65-80	> 66.7-75.0
E	> 80	≤ 66.7

Table 11: HCM 2010 Automobile LOS for Multilane Highway Segments (Exhibit 14-4 HCM 2010)

Multilane Highways	
LOS	Density (pc/mi/ln)
A	> 0-11
B	> 11-18
C	> 18-26
D	> 26-35
E	> 35-45
F	> 45

The results of the HCM analysis for Alternatives 1, 2, and 7 are shown in Table 12. For each alternative, the results are presented with the same level of development (growth in travel demand) as the planning level screening analysis.

Table 12: SC 41 HCS Peak Hour Corridor Analysis Results

Roadway	Segment	Levels of Service/Density (pc/mi/ln) or PTSF (%) or PFFS (%)*								
		No Build		Alt 1		Alt 2		Alt 7		
		NB	SB	NB	SB	NB	SB	NB	SB	
SC 41	US 17 to Joe Rouse	LOS	F	F	D 31.5	D 31.5	C 25.8	C 25.8	C 22.9	C 22.9
		Lanes	2		4		4		4	
	Joe Rouse to Dunes West ***	LOS	E 93.0%	E 93.0%	D 26.5	D 27.6	F	F	E 92.3%	E 92.3%
		Lanes	2		4		3		3	
	Dunes West to Wando River	LOS	E 94.3%	E 94.3%	C 22.5	C 22.5	C 18.1	C 18.1	C 19.6	C 19.6
		Lanes	2		4		4		4	
		EB	WB	EB	WB	EB	WB	EB	WB	
Bessemer ***	SC 41 to Park West (E-W)	LOS	B 85.3%	B 85.5%	C 83.3%	B 83.5%	C 82.8%	C 82.9%	A 8.8	A 8.8
		Lanes	2		2		2		4	
Dunes West ***	Park West to SC 41 (E-W)	LOS	E 65.8%	E 65.8%	D 74.8%	D 74.8%	D 71.6%	D 71.6%	B 14.2	B 14.1
		Lanes	2		2		2		4	

*Level of Service based on HCS 7 for Multi-Lane Highways and HCS 2010 for Two-Lane Highways. Volumes were determined by assuming 10% of the AADT and a 50/50 directional split.
 ** This segment of SC 41 was analyzed as a Class I Highway. The 2 and 3 lane roadway LOS is determined based off the percent time spent following (PTSF %). However, if the volume exceeds capacity for this segment then that metric ultimately determines the LOS.
 ***The Class III 2 lane roadway LOS is determined based off the percent free-flow speed (PFFS %). These segments were analyzed as Class III Highways.



The results of this preliminary analysis indicate that Alternatives 1 and 7 merit further analysis. This will include a more detailed evaluation of junctions (intersections or interchanges) within these alternatives. Stantec expects that these alternatives will be further defined by other factors in the environmental process, such as the impacts each has on the natural environment and the surrounding community.

STANTEC CONSULTING SERVICES INC.

James R. Fisher, PE
 Senior Associate, Transportation Engineer

Phone: (843) 740-6325
 Fax: (843)-740-7707
 Jim.Fisher@stantec.com