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Memorandum

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Date: February 10, 2009
Subject: Capital Circle Southwest PD&E Study
Preliminary Noise Assessment

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Kimley-Horn and Associates, Inc. (KHA) has conducted a preliminary assessment of noise levels in the Capital Circle Southwest (CCSW) Project Development and Environment (PD&E) study area. The purpose of this assessment is to provide information to decision-makers for use in determining the preferred alignment. The following details the methodology and findings.

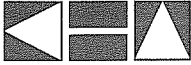
Project Description

The proposed project involves improvements to the portion of CCSW from US 319 (Crawfordville Road) to SR 20 (Blountstown Highway), a distance of approximately 6.7 miles. Within the study area, the existing CCSW is a 2-lane, undivided, rural, principal arterial with posted speed limits of 45 and 55 miles per hour (mph) within a varying 80-foot to 132-foot right-of-way. Proposed corridor improvements consist of a 6-lane, divided, urban roadway with bike lanes, curb and gutter, and 5-foot-wide and 10-foot-wide sidewalks / multi-use pathways within a 230-foot right-of-way. Improvements along the existing roadway corridor, as well as the realignment of portions of the existing corridor, are being considered. Right-of-way acquisition will be necessary to provide for the improved transportation corridor and the improved stormwater management facilities.

In addition, concepts were developed for widening Springhill Road to a 4-lane divided section between Orange Avenue and CCSW in order to be in a position to take advantage of future funding opportunities. Springhill Road is currently a 2-lane, undivided, minor arterial with a posted speed limit of 45 mph.



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Vehicular traffic on CCSW, Orange Avenue, and Springhill Road would change as a result of the project, as detailed in the Capital Circle Southwest Traffic Volumes Memorandum (KHA 2007).

The two build concepts are: widening the existing alignment to six lanes; or six-lane corridor realignment. The realignment concept includes widening the existing alignment between Springhill Road and Crawfordville Road and a realignment concept for Springhill Road between CCSW and Windy Pine Way.

Segment 4 of the project lies between existing CCSW and Lake Bradford Road, and consists of 5 alternatives. Segments 4a, 4b, 4a1, and 4b1 would consist of a new alignment. Segment 4c would replace Orange Avenue between existing CCSW and Lake Bradford Road. Refer to the Proposed Alternatives exhibit for further details.

Traffic Noise Definition and Terms

Noise is defined as excessive or undesired sound. Human sensitivity to sound depends on its intensity, frequency composition, and duration. Noise intensity is measured on a scale with units termed as decibels (dB). This scale is logarithmic in order to represent the wide range of sounds audible to the human ear. With this scale, an increase of 10 dB is perceived as a doubling of the apparent loudness. For example, a 70 dB noise level sounds twice as loud as a 60 dB noise level. The minimum change in the sound level of individual events that an average human ear can detect is about 3 dB.

Because of the logarithmic scale used to measure noise intensity, a doubling of the strength of a noise source, such as doubling the traffic on a road, produces a 3 dB increase in average roadway noise. Such a modest increase would not be perceived as a doubling in noise loudness, which requires a 10 dB increase. Sound levels caused by line sources, which are relatively long, variable or moving sound sources such as traffic, decrease at a rate of 3 to 4.5 dB when the distance from the road is doubled, depending on the surface hardness between the source and the receiver. Sounds from discrete events or stationary point sources, such as an idling bus, decrease by 6 dB when the distance from the source is doubled. Similarly, halving the distance to a source increases sound levels by 3 dB for roadway sources and 6 dB for point sources.

When addressing how noise affects people, it is necessary to consider the sound frequency response of the human ear. The increased sensitivity of the human ear to certain frequencies is approximated by skewing or weighing the decibel (dB) scale



towards those frequencies. The weighted decibel scale which best approximates the response of the human ear is known as the A-weighted scale (dBA) and all sound levels in this evaluation are reported in dBA.

A noise descriptor, known as the equivalent sound level (Leq), characterizes average sound levels. The equivalent sound level is the decibel level of a constant sound with the same energy as the actual fluctuating sound levels, which are measured over a given period of time. As such, the Leq can be considered an energy-average sound level. When referring to sound levels, it is important to identify the time period considered, with Leq(24h), for example, being the equivalent sound level for a 24-hour period. In addition, the weighting network associated with the sound level can be denoted as part of the descriptor, with LAeq, for example, being the A-weighted sound level. The noise descriptor used in this report is the one-hour average A-weighted sound level (LAeq1h). Use of LAeq1h is consistent with the noise descriptor established by the Federal Highway Administration (FHWA) in 23 CFR 772.

Noise Abatement Criteria

Federal Highway Administration

The FHWA has established criteria that apply to federally funded highway projects in 23 CFR 772: Procedures for Abatement of Highway Traffic Noise and Construction Noise. State Departments of Transportation (DOTs) are required to follow FHWA criteria for federally funded projects. The Noise Abatement Criteria (NAC) are shown in Table 1.

23 CFR 772 defines a Type I project as “A proposed Federal or Federal-aid highway project for the construction of a highway on new location or the physical alteration of an existing highway that significantly changes either the horizontal or vertical alignment or increases the number of through-traffic lanes.” The FHWA has clarified their interpretation by stating that a Type I project is any project that has the potential to increase noise levels at adjacent receivers. FDOT extends this definition to include state-funded highway projects that involve the physical alteration of an existing highway.

23 CFR 772 provides procedures for conducting highway project noise studies and implementing noise abatement measures to help protect public health and welfare, supplies the NAC, and establishes requirements for information to be given to local officials for use in planning and designing highways. Under this regulation, noise abatement must be considered for a Type I project if the project is predicted



to result in a traffic noise impact. A traffic noise impact is considered to occur when future predicted noise levels approach or exceed the NAC specified in the regulation or when future predicted noise levels substantially increase the existing noise levels. 23 CFR 772 does not specifically define the terms “substantial” or “approach,” leaving interpretation of these to the individual states.

Florida Department of Transportation

FDOT defines the approach criteria as “within 1 decibel (dBA) of the appropriate FHWA abatement criteria.” Therefore, the FDOT approach level for residential uses is 66 dBA. Table 1 summarizes the noise abatement criteria for each activity category.

Table 1. Noise Abatement Criteria (dB LAeq1h)

Activity Category	Abatement Criteria		Description of Activity Category
	FHWA	FDOT	
A	57	56 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need, and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67	66 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries and hospitals.
C	72	71 (Exterior)	Developed lands, properties, or activities not included in Category A or B above.
D	-	-	Undeveloped lands.
E	52	51 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: FDOT PD&E Manual, Part 2, Chapter 17

FDOT defines ‘noise sensitive receiver’ as “Any property (owner occupied, rented, or leased) where frequent exterior human use occurs and where a lowered noise level would be of benefit.

FDOT defines ‘impacted receiver’ as “a noise sensitive receiver that will be subjected to highway traffic noise that approaches or exceeds the noise abatement criterion or substantially exceeds existing noise levels due to a proposed transportation project.”



FDOT defines 'substantial increase' as "an increase of 15 or more decibels above the existing noise level as a direct result of the transportation improvement project in question."

FDOT defines 'substantial noise reduction' as "an effort to reduce traffic noise impacts at benefited receivers by 10 decibels or more, if possible, with a minimal acceptable level of reduction at no less than 5 decibels."

Preliminary Analysis

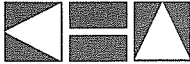
The Federal Highway Administration (FHWA) Traffic Noise Model (TNM) Version 2.5 was used to estimate existing noise levels and to predict the distance at which various traffic noise conditions would occur. The model considered estimated average vehicle speed, peak-hour traffic volume, and vehicle mix. The peak-hour traffic volume was obtained from the Capital Circle Southwest Traffic Volumes Memo (KHA 2007).

A simplified finite-length straight flat alignment was used in the analysis. The model used a default ground type of "lawn." The model did not consider the effects of intervening topography or structures. The results of this preliminary analysis are approximate; actual alignments, topography, and ground type used to model the selected alignments may cause variations in the noise level predictions. The vehicular traffic calculations are summarized in Appendix A.

In areas where the project roadway would be a realignment and would not widen an existing roadway, the existing noise level at noise sensitive receivers in the project area was determined through noise measurements at representative locations.

A series of short-term noise measurements were conducted in residential areas near realignment concepts, where roadway noise is a minor element in the existing noise environment. The measurements were performed using a Rion NA-28 American National Standards Institute (ANSI) Type 1 Integrating Sound Level Meter (SLM). The microphone was covered with a windscreen and placed 5 feet above ground level.

All measurements were conducted in accordance with FDOT guidance. The measurements were 10 minutes in duration, and 3 repetitions were conducted within one-hour periods during both morning and afternoon hours. The measured Leqs were arithmetically averaged; the results are shown in Table 2.



In areas near realignment concepts, as shown in Table 2, the existing noise level was compared with future noise levels to predict the distances from the centerline to the following traffic noise conditions:

- 65 dBA Leq (below the FDOT NAC approach level)
- Existing level + 15 dBA (FDOT substantial increase)
- Existing level + 10 dBA (common General Plan increase threshold)
- Existing level + 5 dBA (common General Plan increase threshold)
- Existing level (existing + project = 3 dBA increase)

Table 2. Distances from CCSW Centerline to Noise Thresholds for Segment 3 and Realignment Alternatives of Segment 4

Roadway Segment	Existing Noise Level	2035 Peak Hour / Direction Volume	65 dBA (Below FDOT NAC Approach Level)	Existing Level + 15 dBA (FDOT Substantial Increase)	Existing Level + 10 dBA	Existing Level + 5 dBA	Existing Level (3 dBA Increase)*
Segment 3							
S of Lake Bradford Road (N)	51 dBA	1,943 SB	175 ft	160 ft	265 ft	445 ft	590 ft
S of Lake Bradford Road (mid)	48 dBA	1,943 SB	175 ft	225 ft	350 ft	670 ft	805 ft
S of Lake Bradford Road (S)	44 dBA	1,943 SB	175 ft	310 ft	590 ft	1000 ft	1255 ft
Segment 4 (Alternatives 4a, 4b, 4a1, 4b1)							
E of Rankin Avenue	46 dBA	2,174 SB	185 ft	275 ft	465 ft	850 ft	1055 ft
E of Eisenhower Street	50 dBA	2,660 SB	205 ft	205 ft	320 ft	615 ft	775 ft

Notes:

Three distinct areas with noise sensitive receivers are located adjacent to the segment south of Lake Bradford Road.

Distances to noise thresholds for Capital Circle realignment segment 4 are valid only for realignment alternatives 4a, 4b, 4a1, and 4b1 only. Refer to Table 4 for noise levels for realignment alternative 4c.

* Modeling of receptors at distances over 500 feet from the Project roadway has inherent inaccuracies due to model limitations.



In areas where the project roadway would be an expansion of an existing roadway, FDOT policy is to determine the existing noise level by modeling existing traffic volumes. In these areas, the delta, or difference between existing and future levels, would be constant at all distances from the roadway. This delta was determined by comparing the existing and future peak-hour traffic volumes. Noise levels along the existing roadway considering the six-lane widening alternative are shown in Table 3; noise levels along the existing roadway network considering the realignment alternative are shown in Table 4; noise levels for the no-build alternative are shown in Table 5.

Table 3. Roadway Noise Levels for the Six-Lane Widening Concept along the Existing Roadway Network

Roadway Segment	Existing Peak-Hour Traffic Volume	2035 Peak-Hour Traffic Volume	Delta	Distance from Centerline to 65 dBA (Below FDOT NAC Approach Level)
Capital Circle				
S of Blountstown Highway	1,019	2,680	+4 dBA	205 ft
S of Orange Avenue	716	1,715	+4 dBA	170 ft
W of Tallahassee Regional Airport	716	1,685	+4 dBA	170 ft
E of Tallahassee Regional Airport	681	1,830	+4 dBA	180 ft
W of Springhill Road	674	2,000	+5 dBA	185 ft
E of Springhill Road	625	1,959	+5 dBA	175 ft
W of Crawfordville Road	734	1,980	+4 dBA	180 ft
Orange Avenue				
E of Rankin Avenue	409	792	+3 dBA	90 ft
Springhill Road				
N of Capital Circle	259	954	+6 dBA	110 ft
S of Capital Circle	236	303	+1 dBA	60 ft



Table 4. Roadway Noise Levels for Realignment Concept along the Existing Roadway Network

Roadway Segment	Existing Peak-Hour Traffic Volume	2035 Peak-Hour Traffic Volume	Delta	Distance from Centerline to 65 dBA (Below FDOT NAC Approach Level)
Capital Circle				
S of Blountstown Highway	1,019	2,765	+4 dBA	205 ft
S of Orange Avenue	716	420	-2 dBA	170 ft
W of Tallahassee Regional Airport	716	391	-3 dBA	170 ft
E of Tallahassee Regional Airport	681	551	-1 dBA	180 ft
W of Springhill Road	674	610	+0 dBA	185 ft
E of Springhill Road	625	238	-4 dBA	175 ft
W of Crawfordville Road	734	2,520	+5 dBA	180 ft
Realignment (4c)				
E of CCSW	409	2,298	+8 dBA	190 ft
E of Rankin Avenue	409	2,174	+7 dBA	185 ft
E of Eisenhower Street	409	2,660	+8 dBA	205 ft
Orange Avenue (4a,b)				
E of Rankin Avenue	409	65	-8 dBA	<35 ft
E of Eisenhower Street	409	84	-7 dBA	<35 ft
Springhill Road				
N of Realignment	259	1,032	+6 dBA	115 ft
N of Capital Circle	259	648	+4 dBA	90 ft
S of Capital Circle	236	305	+1 dBA	60 ft

Notes:

Noise levels along realignment valid only for realignment alternative 4c.
Refer to Table 2 for realignment alternatives 4a and 4b.

Noise levels along Orange Avenue valid only for realignment alternatives 4a and 4b.
Refer to Table 2 for realignment alternative 4c.

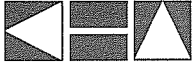


Table 5. No-Build Scenario Noise Levels

Roadway Segment	Existing Peak-Hour Traffic Volume	2035 Peak-Hour Traffic Volume	Delta
Capital Circle			
S of Blountstown Highway	1,019	2,120	+3 dBA
S of Orange Avenue	716	2049	+5 dBA
W of Tallahassee Regional Airport	716	1,110	+2 dBA
E of Tallahassee Regional Airport	681	1,210	+3 dBA
W of Springhill Road	674	1,290	+3 dBA
E of Springhill Road	625	1,293	+3 dBA
W of Crawfordville Road	734	1,297	+2 dBA
Orange Avenue			
E of Rankin Avenue	409	863	+3 dBA
Springhill Road			
N of Capital Circle	259	843	+5 dBA
S of Capital Circle	236	340	+2 dBA

Potential Noise Impacts

A review of the potential noise impacts along each alternative were reviewed as part of this preliminary noise analysis. The impacts were quantified by determining the number of receptors that may potentially experience significant noise levels or increases as a result of the development of each alternative. A noise receptor for this analysis is defined as a residential dwelling unit or a place of worship. The following table shows the number of receptors that may experience noise levels greater than 65 decibels or an increase of 15 decibels. These are standard FDOT thresholds used for this type of analysis. Receptors anticipated to experience an increase of 15 decibels and that have an existing noise level of or greater than 50 decibels, are referenced in the >65 decibel column. Each impacted receptor is only accounted for one time for each alternative segment reviewed. No mitigation was assumed as part of this analysis;



however some of the impacts may be lessened or eliminated through mitigation.

Table 6. Estimated Noise Sensitive Receiver Impacts

Alternative	>65 dBA	+15 dBA
Segment 1 Left	14	0
Segment 1 Right	13	0
Segment 1 Center	15	0
Segment 2 Left	2	0
Segment 2 Right	2	0
Segment 2 Center	2	0
Segment 3 East	2	3
Segment 3 West	2	3
Segment 3 Center	2	3
Segment 3c East	2	3
Segment 3c West	2	3
Segment 3c Center	2	3
Segment 4a South	2	3
Segment 4a North	2	2
Segment 4a Center	3	2
Segment 4b South	3	2
Segment 4b North	2	1
Segment 4b Center	3	1
Segment 4a1 South	6	5
Segment 4a1 North	6	4
Segment 4a1 Center	8	4
Segment 4b1 South	7	4
Segment 4b1 North	6	3
Segment 4b1 Center	8	2
Segment 4c	21	0



Conclusions

The project would generate noise levels considered by FDOT to constitute an impact. Abatement would be considered at noise sensitive areas exceeding 65 dBA. FDOT's normal design goal of abatement is to achieve an insertion loss of 10 dBA or more; the minimum insertion loss is 5 dBA. Barrier heights are typically from 6 to 22 feet above local ground level.

Possible areas where abatement in the form of a solid noise barrier may be reasonable include, but are not limited to, the following. Note that effectiveness, access requirements, and other engineering constraints are factors in abatement recommendations. Exclusion from this list does not imply that abatement will not be analyzed or found feasible and/or reasonable at a particular location. Inclusion to this list does not imply that abatement will be provided at a particular location.

- Segment 1, in the vicinity of Southern Street, Isabelle Drive, and Balkin Road.
- Segment 3, in the vicinity of Windy Pine Way / Pinenoll Drive and Lake Bradford Estates.
- Segment 4c, between Rankin Road and Lake Bradford Road.

If you have any questions, please let us know.