U.S. 701 Bridge Replacement

Traffic Noise Analysis Report

U.S. 701 Bridge Replacement

Over the Great Pee Dee River

Georgetown/Horry County, South Carolina

SCDOT
South Carolina
Department of Transportation

Prepared by:

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An ICA Company

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TRAFFIC NOISE ANALYSIS REPORT
U.S. Route 701
(U.S. Route 701 Bridge Replacement Over The Great Pee Dee River)
Georgetown/Horry County, South Carolina

EXECUTIVE SUMMARY

The Code of Federal Regulations (CFR) Section 23, Part 772 contains the Federal Highway Administration (FHWA) traffic noise standards. The South Carolina Department of Transportation (SCDOT) has implemented these standards in its Traffic Noise Abatement Policy. A traffic noise analysis is required for proposed Federal-aid highway projects that will construct a highway on new location or physically alter an existing highway, which will significantly change either the horizontal or vertical alignment of the road or increase the number of through-traffic lanes. Traffic noise impacts are predicted for this project. Noise abatement measures have been considered for reducing or eliminating the traffic noise impacts in accordance SCDOT's Traffic Noise Abatement Policy.

An original noise analysis was completed for this project in May of 2009. The new noise analysis was prepared to comply with the revised SCDOT Traffic Noise Abatement Policy implemented in July of 2011 and to evaluate another proposed alternate, Alternative 2, as well as a No-Build Alternative.

An analysis was performed on U.S. 701 from Trinity Road in Georgetown County to Lucas Bay Road in Horry County to determine the effect of the project on traffic noise levels in the immediate area (Figure 1). This investigation includes an inventory of existing noise sensitive land uses, and a field survey of background (existing) noise levels in the project study area. It also includes a comparison of the predicted noise levels and the background noise levels to determine if traffic noise impacts can be expected resulting from the proposed project. Traffic noise impacts are predicted for this project.

TNM version 2.5, A Federal Highway Administration (FHWA) traffic noise prediction model was used in the analysis to compare existing and future Leq(h) noise levels. Leq(h) is the average energy of a sound level over a one hour period. A-weighted decibels (dBa) are the units of measurement used in the study.

Existing noise measurements were taken in the vicinity of the project to quantify the existing acoustic environment and to provide a base for assessing the impact of noise level increases. Model inputs included existing and proposed roadway characteristics, estimated traffic volumes, and receiver locations. Table 1 lists the traffic data used to estimate Leq(h) noise levels expected to occur in the project area by the year 2032.

Table 1 - Traffic Data for Noise Analysis

Roadway Section	Speed (mph)	Two Way Design Hourly Traffic	One Way Hourly Traffic	Hourly Volume Cars (vph)	Hourly Volume Medium Trucks (vph)	Hourly Heavy Trucks (vph)
2012 Traffic Computations						
U.S. 701	55	880	440	378	18	44
2032 Traffic Computations						
U.S. 701	55	1230	615	529	25	62

Table 2 shows the comparison of field measurements versus modeled noise levels. The calculated noise levels for the measurement sites range from 48.0 to 65.4 dBA. The difference between calculated and field measured noise levels at all five locations is 3 dBA or less, validating the results of the TNM model.

Table 2 - Existing TNM Calculated Noise Levels vs. Field Measurements

Site	Location	Field Measurement Noise Level (dBA)	TNM Calculated Noise Level (dBA)	Difference (dBA)
1	U.S. 701/Trinity Road/Ellis Landing Road	66.9	65.4	1.5
2	U.S. 701/Yauhannan Lake Drive	61.6	59.2	2.4
3	9265 N. Fraser Street (U.S. 701)	62.0	59.0	3.0
4	Public Boat Ramp at Great Pee Dee River	58.1	60.2	-2.1
5	Walking Trail at Oxbow	49.8	48.0	1.8

Difference = Measured Leq minus Modeled Leq

The Federal Highway Administration (FHWA) has developed Noise Abatement Criteria (NAC) and procedures to be used in the planning and design of highways to determine whether highway noise levels are or are not compatible with various land uses (Table 3). The abatement criteria and procedures are set forth in the aforementioned Federal reference (Title 23 CFR Part 772).

Table 3 – FHWA Noise Abatement Criteria

Activity Category	Activity Criteria\2\		Evaluation Location	Activity Description
	Leq(h)	L10(h)		
A	57	60	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 purpose.
B\3\	67	70	Exterior	Residential
C\3\	67	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries,

				day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E\3\	72	75	Exterior	Motels, hotels, offices, restaurant/bars, and other developed lands, properties or activities not included in A-D or F
F	--	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	--	--	--	Undeveloped lands that are not permitted

\1\ Either Leq(h) or L10(h) (but not both) may be used on a project

\2\ The Leq(h) and L10(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures

\3\ Includes undeveloped lands permitted for this activity category

Activity Category A consists of tracts of land that are locally significant for their serenity and quiet surroundings. Activity Category B consists of residential properties. Activity Category C consists of exterior locations of public outdoor areas, places of worship, cemeteries, recreational areas, etc. Activity Category D consists primarily of the same activities as Activity Category C but is for interior locations. Activity Category E consists of hotel/motels, offices, restaurants, and other developed land with activities not included in Activity Categories A-D. Activity F consists of agricultural lands, airports, and commercial/industrial facilities. Activity G is for undeveloped lands not presently permitted. Activity Categories adjacent to the project are mostly residential (B).

Traffic noise impacts occur when the predicted traffic noise levels either: (a) approach or exceed the FHWA noise abatement criteria ("approach" meaning within 1 dBA of the value listed in Table 3), or (b) substantially exceed the existing noise levels. According to the SCDOT Traffic Noise Abatement Policy, a 15 dBA increase is deemed to be a "substantial increase." Consideration for noise abatement measures must be given to receivers that fall in either category.

The results of the noise analysis indicate that traffic related noise impacts would occur to eight (8) receivers under the 2032 Build Alternative 2 and 6 (six) receivers under the 2032 Build Alternative 3. However, eight (8) receivers would be impacted under the 2032 No-Build Alternative. No receivers in the project area would substantially exceed the FHWA noise abatement criteria. The original noise analysis completed in May of 2009, for Alternative 3, resulted in 11 receivers being impacted in future build conditions. No receivers were found to substantially exceed the FHWA noise abatement criteria.

Predicted build-condition traffic noise level contours are not a definitive means by which to assess traffic noise level impacts; however, they can aid in future land use planning efforts in undeveloped areas. Table 4 summarizes the predicted distances to the 72, 67, and 66 dBA noise level contours and the noise impact analysis results.

Table 4: Activity Category Critical Distances and Noise Impact Analysis

STUDY AREA	Leq(h) NOISE LEVELS[1]			ACTIVITY CATEGORY DISTANCES[2] (ft)		
	25 ft	50 ft	100 ft	72 dBA	67 dBA	66dBA
U.S. 701	77.3	73.8	68.7	76	135	151

ROADWAY LOCATION	TOTAL NO. OF RECEIVERS	APPROXIMATE # OF IMPACTED RECEIVERS ACCORDING TO TITLE 23 CFR PART 772 / SCDOT POLICY				
		A	B	C	D	E
2032 Year No-Build Alternative						
U.S. 701 – No-Build	26	---	**8**	---	---	---
2032 Year Build Alternatives						
U.S. 701 – Alternative 2	26	---	**8**	---	---	---
U.S. 701 – Alternative 3	26	---	**6**	---	---	---

1. 50ft, 100 ft & 200 ft distances are measured from the outside edge of pavement
2. 72 dBA, 67 dBA and 66 dBA activity category distances are measured from the proposed centerline of the roadway

If traffic noise impacts are predicted, noise abatement measures for reducing or eliminating the noise impacts must be considered. Noise abatement measures were evaluated for this project but were found not to be acoustically feasible since it would not provide at least a 5 dBA noise reduction to impacted receivers due to the number of access breaks.

The major construction elements of this project are expected to be earth removal, hauling, grading, paving, and pile driving. General construction noise impacts, such as temporary speech interference for passers-by and those individuals living or working near the project, can be

expected particularly from pile driving, paving operations, and earth moving equipment during construction. However, considering the relatively short-term nature of construction noise and the likely limitation of construction to daytime hours, these impacts are not expected to be substantial. The contractor would be required to comply with applicable local noise ordinances and OSHA regulations concerning noise attenuation devices on construction equipment.

This evaluation completes the highway traffic noise requirements of Title 23 CFR Part 772.

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U.S. ROUTE 701 NOISE ANALYSIS
(U.S. ROUTE 701 BRIDGE REPLACEMENT OVER THE GREAT PEE DEE RIVER)
GEORGETOWN/HORRY COUNTY, SOUTH CAROLINA

I. HIGHWAY TRAFFIC NOISE ANALYSIS

A. Introduction

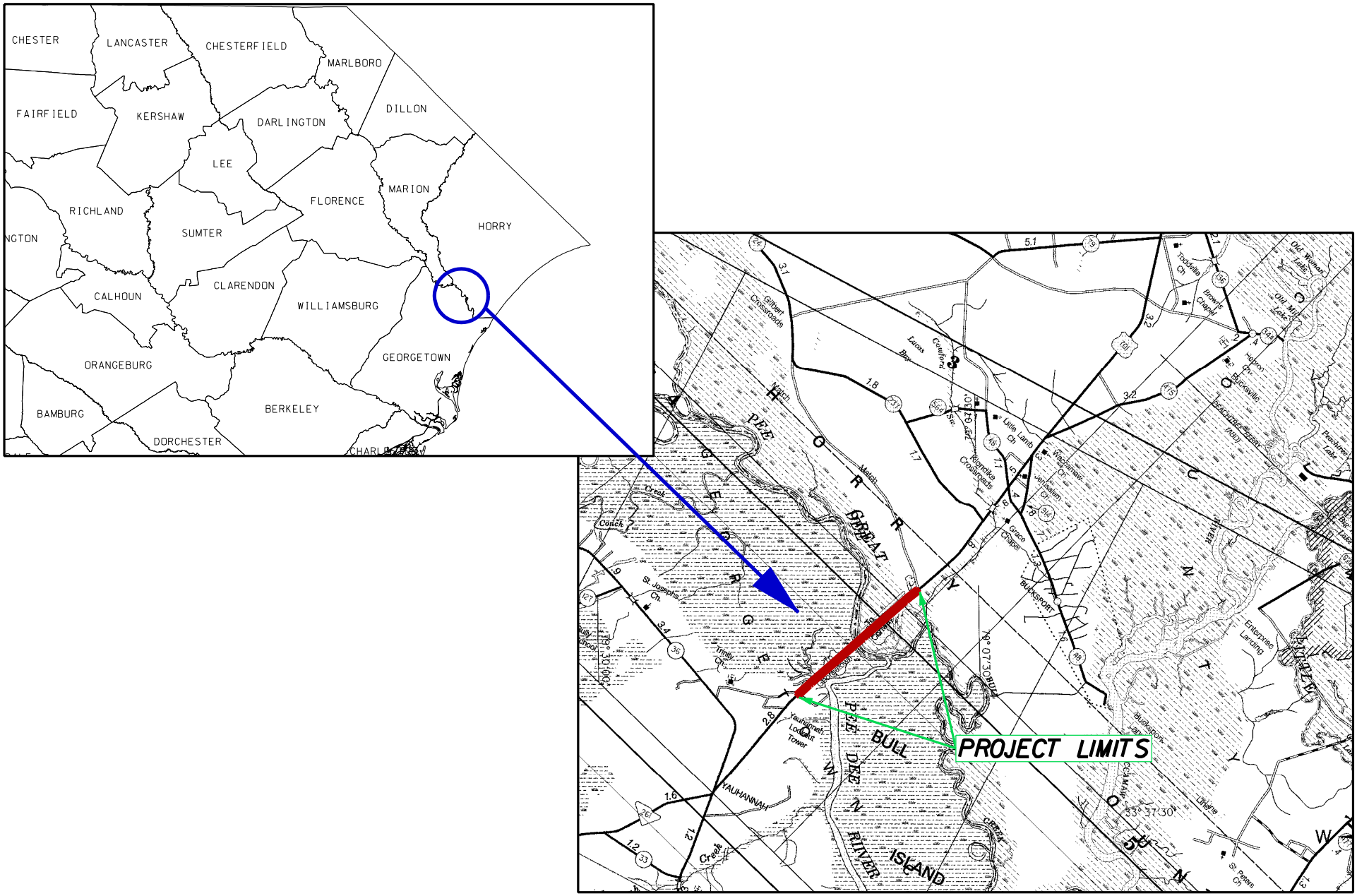
The Code of Federal Regulations (CFR) Section 23, Part 772 contains the Federal Highway Administration (FHWA) traffic noise standards. The South Carolina Department of Transportation (SCDOT) has implemented these standards in its Traffic Noise Abatement Policy approved on July 1, 2011. A traffic noise analysis is required for proposed Federal-aid highway projects that will construct a highway on new location or physically alter an existing highway, which will significantly change either the horizontal or vertical alignment of the road or increase the number of through-traffic lanes. Traffic noise impacts are predicted for this project. Noise abatement measures have been considered for reducing or eliminating the traffic noise impacts in accordance SCDOT's Traffic Noise Abatement Policy.

An analysis was performed on U.S. 701 from Trinity Road in Georgetown County to Lucas Bay Road in Horry County to determine the effect of the project on traffic noise levels in the immediate area (Figure 1). This investigation includes an inventory of existing noise sensitive land uses, and a field survey of background (existing) noise levels in the project study area. It also includes a comparison of the predicted noise levels and the background noise levels to determine if traffic noise impacts can be expected resulting from the proposed project. Traffic noise impacts are predicted for this project.

An original noise analysis was completed for this project in May of 2009. The new noise analysis was prepared to comply with the revised SCDOT Traffic Noise Abatement Policy implemented in July of 2011 and to evaluate another proposed alternate, Alternative 2, as well as a No-Build Alternative.

B. Project Description

The U.S. 701 Bridge Replacement project consists of the replacement and realignment of an approximately two mile long section of U.S. 701 located in Georgetown and Horry Counties. The project involves the replacement of three bridges on U.S. 701 through rural, undeveloped, light residential and light commercial portions of Horry and Georgetown Counties. The project involves replacing the three existing U.S. 701 bridges over Yauhannah Lake, the Great Pee Dee River, and the Great Pee Dee River Overflow, as well as the construction of a new roadway approach alignment. The project corridor crosses the referenced water bodies, as well as extensive floodplain forested wetlands. The Waccamaw National Wildlife Refuge occupies much of the project corridor study area. The purpose of the project is to replace the structurally deteriorated and functionally obsolete existing U.S. 701 bridges and maintain the principal direct rural connection between the larger towns of Conway and Georgetown, as well as the smaller communities such as Bucksport and Yauhannah. Two proposed alternatives were considered for evaluation as part of this study; Alternative 2 that moved the existing alignment 55 feet



U.S. 701 Bridge Replacement
Noise Analysis
Georgetown/Horry County, S.C.

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NOT TO SCALE

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FIGURE 1:
PROJECT LOCATION MAP

northwest and Alternative 3 that moved the existing alignment 55 feet southeast. A future no-build alternative was also considered.

C. Characteristics of Noise

Noise is basically defined as unwanted sound. It is emitted from many sources including airplanes, factories, railroads, commercial businesses, and highway vehicles. Highway traffic noise is usually a composite of noises from engine exhaust, drive train, and tire-roadway interaction. Of these sources, tire noise is typically the most offensive at unimpeded travel speeds.

The magnitude of noise is usually described by its sound pressure. Since the range of sound pressure varies greatly, a logarithmic scale is used to relate sound pressures to some common reference level, usually the decibel (dB). Sound pressures described in decibels are called sound pressure levels and are often defined in terms of frequency weighted scales (A, B, C, or D).
The weighted-A decibel scale is used almost exclusively in vehicle noise measurements because it places the most emphasis on the frequency range to which the human ear is most sensitive (1,000-6,000 Hertz). Sound levels measured using a weighted-A decibel scale are often expressed as dBA. Throughout this report, all noise levels will be expressed in dBA-(s).

Most individuals are exposed to fairly high noise levels from many sources as they go about their daily activities (Table 1).

Table 1 – Daily Sounds

DECIBELS		
	140	Shotgun blast, jet 100' away at takeoff — PAIN
		Motor test chamber — HUMAN EAR THRESHOLD
	130	----------
		Firecrackers
	120	Severe thunder, pneumatic jackhammer
		Hockey crowd
		Amplified rock music — UNCOMFORTABLY LOUD
	110	----------
		Textile loom
	100	Subway train, elevated train, farm tractor
		Power lawn mower, newspaper press
		Heavy city traffic, noisy factory — LOUD
	90	----------
D		Diesel truck 40 mph at 50' away
E	80	Crowded restaurant, garbage disposal
C		Average factory, vacuum cleaner
I		Passenger car 50 mph at 50' away — MODERATELY LOUD
B	70	----------
E		Quiet typewriter
L	60	Singing birds, window air-conditioner
S		Quiet automobile
		Normal conversation, average office — QUIET
	50	----------
		Household refrigerator
		Quiet office — VERY QUIET
	40	----------
		Average home
	30	Dripping faucet
		Whisper at 5' away
	20	Light rainfall, rustle of leaves
		AVERAGE PERSON'S THRESHOLD OF HEARING
		Whisper — JUST AUDIBLE
	10	----------
	0	THRESHOLD FOR ACUTE HEARING

Sources: World Book, Rand McNally Atlas of the Human Body, Encyclopedia America, "Industrial Noise and Hearing Conversation" by J. B. Olishifski and E. R. Harford (Researched by N. Jane Hunt and published in the Chicago Tribune in an illustrated graphic by Tom Heinz.)

The degree of disturbance or annoyance of unwanted sound depends essentially on three things:

1. The amount and nature of the intruding noise.
2. The relationship between the background noise and the intruding noise.
3. The type of activity occurring when the noise is heard.

In considering the first of these factors, it is important to note that individuals have different sensitivity to noise. Loud noises disturb some individuals more than others and some individuals become upset if an unwanted noise persists. The time patterns of noise also enter into an individual's judgment of whether or not a noise is offensive. For example, noises that occur during sleeping hours are usually considered to be more offensive than the same noises in the daytime.

With regard to the second factor, individuals tend to judge the annoyance of an unwanted noise in terms of its relationship to noise from other sources (background noise). The blowing of a car horn at night when background noise levels are approximately 45 dBA would generally be more objectionable than the blowing in the afternoon when background noises might be 55 dBA.

The third factor is related to the interference of noise with activities of individuals. In a 60 dBA environment, normal conversation would be possible while sleep might be difficult. Work activities requiring high levels of concentration may be interrupted by loud noises while activities requiring manual effort may not be interrupted to the same degree.

Over time, particularly if the noises occur at predicted intervals and are expected, individuals tend to accept the noises that intrude into their lives. Attempts have been made to regulate many of these types of noises including airplane noise, factory noise, railroad noise, and highway noise. In relation to highway traffic noise, methods of analysis and control have developed rapidly over the past few years.

D. Noise Abatement Criteria

The Federal Highway Administration (FHWA) has developed Noise Abatement Criteria (NAC) and procedures to be used in the planning and design of highways to determine whether highway noise levels are or are not compatible with various land uses. The abatement criteria and procedures are set forth in the aforementioned Federal reference (Title 23 CFR Part 772). A summary of the noise abatement criteria for various land uses is presented in Table 2.

Table 2 – FHWA Noise Abatement Criteria

Activity Category	Activity Criteria\2\		Evaluation Location	Activity Description
	Leq(h)	L10(h)		
A	57	60	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 purpose.
B\3\	67	70	Exterior	Residential
C\3\	67	70	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings
D	52	55	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios
E\3\	72	75	Exterior	Motels, hotels, offices, restaurant/bars, and other developed lands, properties or activities not included in A-D or F
F	--	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing
G	--	--	--	Undeveloped lands that are not permitted

\1\ Either Leq(h) or L10(h) (but not both) may be used on a project

\2\ The Leq(h) and L10(h) Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures

\3\ Includes undeveloped lands permitted for this activity category

Activity Category A consists of tracts of land that are locally significant for their serenity and quiet surroundings. Activity Category B consists of residential properties. Activity Category C consists of exterior locations of public outdoor areas, places of worship, cemeteries, recreational areas, etc. Activity Category D consists primarily of the same activities as Activity Category C but is for interior locations. Activity Category E consists of hotel/motels, offices, restaurants, and other developed land with activities not included in Activity Categories A-D. Activity F consists of agricultural lands, airports, and commercial/industrial facilities. Activity G is for undeveloped

lands not presently permitted. Activity Categories adjacent to the project are mostly residential (B).

Sound pressure levels in this report are referred to as Leq(h). The hourly Leq, or equivalent sound level, is the level of constant sound in a one-hour time period that would have the same energy as a time-varying sound. In other words, the fluctuating sound levels of traffic noise are represented in terms of a steady noise level with the same energy content.

E. Existing Noise Levels

Existing noise measurements were taken in the vicinity of the project to quantify the existing acoustic environment and to provide a base for assessing the impact of noise level increases. There are five traffic noise measurement sites. The following are the traffic noise measurement sites and their locations:

- **Site 1** – Site 1 is located at the intersection of U.S. 701 and Trinity Road and Ellis Landing Road. The measurement device was set at approximately 60 inches above the ground elevation at the corner of the restaurant (Terry's Fish House).
- **Site 2** – Site 2 is located at the intersection of U.S. 701 and Yauhannan Lake Drive. The measurement device was set at approximately 60 inches above the ground elevation at the corner of the residence.
- **Site 3** – Site 3 is located at 9265 N. Fraser Street (U.S. 701). The measurement device was set at approximately 60 inches above the ground elevation at the corner of the residence.
- **Site 4** – Site 4 is located at the public boat ramp on the Great Pee Dee River. The measurement device was set at approximately 60 inches above the ground elevation just before the beginning of the dock.
- **Site 5** – Site 5 is located on the public walking trail at the oxbow. The measurement device was set at approximately 60 inches above the ground elevation.

The existing Leq(h) traffic noise levels, as measured in the project area at Sites 1, 2, 3, 4, and 5 were 66.9, 61.6, 62.0, 58.1, and 49.8 respectively (Table 3).

Table 3 - Existing Noise Levels [Leq(h)]

Site	Location	Description	Noise Level (dBA)
1	U.S. 701/Trinity Road/Ellis Landing Road	Asphalt	66.9
2	U.S. 701/Yauhannan Lake Drive	Grass	61.6
3	9265 N. Fraser Street (U.S. 701)	Grass	62.0
4	Public Boat Ramp at Great Pee Dee River	Concrete	58.1
5	Walking Trail at Oxbow	Grass	49.8

The existing roadway and traffic conditions were used with the current traffic noise prediction model (TNM version 2.5, February 2004) to calculate existing noise levels for comparison with actual measured noise levels. Project-related traffic noise level increases are based upon the existing loudest-hour noise levels. See Table 4 for more information about the field measurements.

Table 4 - Field Noise Measurements

Site	Time Period	Hourly Traffic Based on Concurrent Traffic Counts										Measured Leq
		Northbound Lanes					*Southbound Lanes*					
		Autos	MT	HT	Bus	MC	Autos	MT	HT	Bus	MC	
1	9:11 AM – 9:31 AM	102	3	9	0	0	99	0	21	0	0	66.9
2	9:44 AM – 10:04 AM	108	3	15	0	0	111	0	15	0	0	61.6
3	10:13 AM – 10:33 AM	120	0	6	0	0	72	6	12	0	0	62.0
4	10:45 AM – 11:05 AM	72	3	15	3	0	96	0	9	0	0	58.1
5	11:34 AM – 11:54 AM	90	3	24	0	0	114	0	9	0	0	49.8

MT = Medium Trucks; HT = Heavy Trucks; MC = Motorcycles - Data was obtained on Thursday, October 4, 2012.

Notes (background noise sources):
Site 1 – traffic, crows, pile driver in distance, loud bass from car on Trinity at 9:19 AM
Site 2 – traffic, dogs barking, electric saw in distance, woman speaking at 9:48 AM
Site 3 – traffic, rooster next door
Site 4 – traffic
Site 5 – traffic

Table 5 shows the comparison of field measurements versus modeled noise levels. The calculated noise levels for the measurement sites range from 48.0 to 65.4 dBA. The difference between calculated and field measured noise levels at all five locations is 3 dBA or less, validating the results of the TNM model.

Table 5 - Existing TNM Calculated Noise Levels vs. Field Measurements

Site	Location	Field Measurement Noise Level (dBA)	TNM Calculated Noise Level (dBA)	Difference (dBA)
1	U.S. 701/Trinity Road/Ellis Landing Road	66.9	65.4	1.5
2	U.S. 701/Yauhannan Lake Drive	61.6	59.2	2.4
3	9265 N. Fraser Street (U.S. 701)	62.0	59.0	3.0
4	Public Boat Ramp at Great Pee Dee River	58.1	60.2	-2.1
5	Walking Trail at Oxbow	49.8	48.0	1.8

Difference = Measured Leq minus Modeled Leq

F. Procedure For Predicting Future Noise Levels

Based on the SCDOT Traffic Noise Abatement Policy, a preliminary noise analysis is required for all build alternatives determined to be reasonable and under consideration in a project's NEPA document. The preliminary analysis models the most conservative noise environment to determine if there will be noise impacts, and if there are, the feasibility and reasonableness of noise abatement to mitigate the impacts. The elevations of receiver locations and roadway characteristics *are not* taken into account in a preliminary noise analysis (i.e. everything is considered to be flat and at the same elevation).

A total of four build alternatives were considered for this project, including the two alternatives previously discussed. Two of these alternatives were deemed not reasonable due to property impacts and environmental impacts. Therefore, these alternatives were not modeled as part of this study.

Once a preferred alternative has been identified, a detailed noise analysis is required for any noise abatement that was recommended for that alternative in the preliminary analysis. Elevations of the receivers and roadway *are* taken into account in a detailed analysis.

Traffic noise is not constant; it varies in time depending upon the number, speed, type, and frequency of vehicles that pass by a given receiver. Furthermore, since traffic noise emissions are different for various types of vehicles, the TNM model distinguishes between the source emissions from the following vehicle types: automobiles, medium trucks, heavy trucks, buses, and motorcycles. The TNM traffic noise prediction model uses the number and type of vehicles on the planned roadway, their speeds, the physical characteristics of the road (curves, hills, depressed, elevated, etc.), receiver location and height, and, if applicable, barrier type, barrier ground elevation, and barrier top elevation.

Preliminary designs, aerial photography, and contour mapping were used to model the proposed roadway and receiver elevations and represent the topographical conditions. The noise predictions made in this report are highway-related noise predictions for the traffic conditions during the year 2032. They do not include other noises related to the excessive background noises (trains, airplanes and construction, etc.) that were measured during the existing conditions.

According to FHWA guidance, the predictions documented in this report are based upon each proposed roadway alignment design and the traffic conditions for the year 2032 that result in the loudest predicted hourly-equivalent traffic noise levels for each receiver. Traffic noise level and location spreadsheets are included in the Appendix and contain a list of all receivers in close proximity to the project along with aerials showing the receiver locations, and summarize the loudest hour equivalent noise levels for the Existing, No-Build, Build Alternative 2, and Build Alternative 3 conditions in the year 2032 under traffic conditions within

the project site. The land uses of receivers were determined by field observations and reviewing available GIS parcel data.

Table 6 lists the traffic data used in this noise analysis. This data is based on field observations and data from the 2009 Highway Capacity Analysis Report for this project.

Table 6 - Traffic Data for Noise Analysis

Roadway Section	Speed (mph)	Two Way Design Hourly Traffic	One Way Hourly Traffic	Hourly Volume Cars (vph)	Hourly Volume Medium Trucks (vph)	Hourly Heavy Trucks (vph)
2012 Traffic Computations						
U.S. 701	55	880	440	378	18	44
2032 Traffic Computations						
U.S. 701	55	1230	615	529	25	62

- mph = miles per hour
- vph = vehicles per hour
- Design hourly traffic volumes were obtained using 10% of average daily traffic provided by SCDOT.
- Design hourly traffic volumes on U.S. 701 are assumed to result in worst case noise conditions.
- The assumed truck split was a Medium Truck Percentage of 4 percent and a Heavy Truck Percentage of 10 percent, based on previous noise analysis report.

G. Traffic Noise Impacts And Noise Thresholds

Traffic noise impacts occur when the predicted traffic noise levels either: (a) approach or exceed the FHWA noise abatement criteria ("approach" meaning within 1 dBA of the value listed in Table 2), or (b) substantially exceed the existing noise levels. According to the SCDOT Traffic Noise Abatement Policy, a 15 dBA increase is deemed to be a "substantial increase." Consideration for noise abatement measures must be given to receivers that fall in either category. The results of the noise analysis indicate that traffic related noise impacts would occur to eight (8) receivers under the 2032 Build Alternative 2 and 6 (six) receivers under the 2032 Build Alternative 3. However, eight (8) receivers would be impacted under the 2032 No-Build Alternative. No receivers in the project area would substantially exceed the FHWA noise abatement criteria. Predicted build-condition traffic noise level contours are not a definitive means by which to assess traffic noise level impacts; however, they can aid in future land use planning efforts in undeveloped areas. Table 7 summarizes the predicted distances to the 72, 67, and 66 dBA noise level contours and the noise impact analysis results.

Table 7: Activity Category Critical Distances and Noise Impact Analysis

STUDY AREA	Leq(h) NOISE LEVELS[1]			ACTIVITY CATEGORY DISTANCES[2] (ft)		
	25 ft	50 ft	100 ft	72 dBA	67 dBA	66dBA
U.S. 701	77.3	73.8	68.7	76	135	151

ROADWAY LOCATION	TOTAL NO. OF RECEIVERS	APPROXIMATE # OF IMPACTED RECEIVERS ACCORDING TO TITLE 23 CFR PART 772 / SCDOT POLICY				
		A	B	C	D	E
2032 Year No-Build Alternative						
U.S. 701 – No-Build	26	---	**8**	---	---	---
2032 Year Build Alternatives						
U.S. 701 – Alternative 2	26	---	**8**	---	---	---
U.S. 701 – Alternative 3	26	---	**6**	---	---	---

1. 50ft, 100 ft & 200 ft distances are measured from the outside edge of pavement
2. 72 dBA, 67 dBA and 66 dBA activity category distances are measured from the proposed centerline of the roadway

II. TRAFFIC NOISE ABATEMENT MEASURES

If traffic noise impacts are predicted, noise abatement measures for reducing or eliminating the noise impacts must be considered. Consideration for noise abatement measures have been given to impacted receivers along each alternative. The following discussion addresses the applicability of these measures to the proposed project.

A. Noise Barriers

Physical measures to abate anticipated traffic noise levels are often applied on fully controlled facilities using solid mass berms or walls strategically placed between the traffic sound source and the receivers to diffract, absorb, and reflect highway traffic noise emissions. To be effective, a noise barrier must be long enough and tall enough to shield the impacted receiver(s). Generally, the noise wall length must be eight times the distance from the barrier to the receiver. For example, if a receiver is 200 feet from the roadway, an effective barrier would be approximately 1,600 feet long – with the receiver in the horizontal center. Due to the requisite lengths for effectiveness, noise walls are typically not economical for isolated or most low-density areas, or for most uncontrolled access facilities. On facilities where access is allowed for driveways, openings will be needed in the walls. An access opening of 40 feet in a 400-foot wall will make the wall ineffective.

According to the SCDOT's Traffic Noise Abatement Policy, a noise wall must be considered both reasonable and feasible. The feasibility of a wall is determined by constructability of the wall given the topography, presence of other dominant noise sources, and at least a 5 dBA noise

reduction must be achieved for 75% of the impacted receivers. Construction of a noise wall is considered reasonable if the cost per benefited receiver is less than $30,000 and if other applicable criteria are met.

Residences and businesses will have direct access to U.S. 701 with the proposed alignments. Each impacted property has a nearby driveway that accesses U.S. 701 or an intersecting road. Most impacts in the project are within 100 feet of the proposed roadway. At this distance, an effective barrier would be approximately 800 feet long with no breaks in access. One or more access breaks would be required at any impacted receiver in the project area, making a barrier incapable of providing at least a 5 dBA noise reduction to be acoustically feasible. For these reasons, noise barriers are not feasible for reducing or eliminating noise impacts for this project.

B. Highway Alignment Selection

Highway alignment selection involves the horizontal or vertical orientation of the proposed improvements in such a way as to minimize impacts and costs. The selection of alternative alignments for noise abatement purposes must consider the balance between noise impacts and other engineering and environmental parameters. For noise abatement, horizontal alignment selection is primarily a matter of constructing the proposed roadway at a sufficient distance from noise sensitive areas. The two alternatives evaluated have been located to minimize impacts to human and natural resources. Raising or lowering of the roadway grade for either alternative is not feasible or practical as a change in grade would require additional new right-of-way and constitute a large cost versus small benefit in reduced noise levels. Alignment shifts are not practical due to safety considerations and potential displacements.

C. Traffic System Management Measures

Traffic system management (TSM) measures, which limit vehicle type, speed, volume and time of operations are often effective noise abatement measures. Past project experience has shown that a reduction in the speed limit of 10 mph would result in a noise level reduction of approximately 1 to 2 dBA. Further reducing the speed limit would not be appropriate for the functional classification for this project. Truck lane designation is not a viable alternative of noise abatement on this project, given the limited scope of the proposed improvements.

D. Other Mitigation Measures Considered

The acquisition of property in order to provide buffer zones to minimize noise impacts is not considered to be a feasible noise mitigation measure. The cost to acquire impacted receivers for buffer zones would exceed the abatement threshold of $30,000 per benefited receiver. The use of buffer zones to minimize impacts to future sensitive areas is not recommended because this could be accomplished through land use controls and the noise critical distances as predicted in Table 7. The use of vegetation for noise mitigation is not considered reasonable for projects such as this one due to the substantial amount of right-of-way necessary to make vegetative barriers

effective. FHWA research has shown that a vegetative barrier should be approximately 100 feet wide to provide a 3 dBA reduction in noise levels.

III. CONSTRUCTION NOISE

The major construction elements of this project are expected to be earth removal, hauling, grading, paving, and pile driving. General construction noise impacts, such as temporary speech interference for passers-by and those individuals living or working near the project, can be expected particularly from pile driving, paving operations, and earth moving equipment during construction. However, considering the relatively short-term nature of construction noise and the likely limitation of construction to daytime hours, these impacts are not expected to be substantial. The contractor would be required to comply with applicable local noise ordinances and OSHA regulations concerning noise attenuation devices on construction equipment.

IV. GEORGETOWN COUNTY & HORRY COUNTY PLANNING OFFICIALS

Boyd Johnson, Director
Georgetown County Department of Planning & Code Enforcement
129 Screven Street, Room 222
Georgetown, SC 29440

Janet Carter, Director
Horry County Planning & Zoning Department
1301 Second Ave
Conway, SC 29526

V. SUMMARY

An original noise analysis was completed in May of 2009 for the 2032 Build Alternative 3 that resulted in 11 receivers being impacted in future build conditions. No receivers would substantially exceed the FHWA noise abatement criteria.

The results of the new noise analysis indicate that traffic related noise impacts would occur to eight (8) receivers under the 2032 Build Alternative 2 and six (6) receivers under the 2032 Build Alternative 3. However, eight (8) receivers would be impacted under the 2032 No-Build Alternative. No receivers in the project area would substantially exceed the FHWA noise abatement criteria. Noise abatement measures were evaluated for this project but were found not to be acoustically feasible since it would not provide at least a 5 dBA noise reduction to impacted receivers due to the number of required access breaks.

This evaluation completes the highway traffic noise requirements of Title 23 CFR Part 772.

APPENDIX

Traffic Noise Impacts and Locations

Predicted Traffic Noise Levels - US 701 Bridge Replacement

RECEIVER INFORMATION				2012 EXISTING		2032 NO-BUILD ALTERNATIVE		2032 BUILD ALTERNATIVE 2		2032 BUILD ALTERNATIVE 3	
ID #	LAND USE	CATEGORY	EQUIVALENT NO. OF RECEIVERS	ESTIMATED Leq dBA	NOISE IMPACT (YES/NO)	ESTIMATED Leq dBA	NOISE IMPACT (YES/NO)	ESTIMATED Leq dBA	NOISE IMPACT (YES/NO)	ESTIMATED Leq dBA	NOISE IMPACT (YES/NO)
R 1	Commercial	E	1	67	No	68	No	67	No	68	No
R 2	Commercial	E	1	67	No	69	No	68	No	69	No
R 3	Residential	B	1	56	No	57	No	57	No	57	No
R 4	Residential	B	1	65	No	66	Yes	67	Yes	67	Yes
R 5	Residential	B	1	65	No	66	Yes	68	Yes	67	Yes
R 6	Residential	B	1	64	No	65	No	68	Yes	66	No
R 7	Residential	B	1	55	No	56	No	56	No	56	No
R 8	Residential	B	1	55	No	56	No	57	No	56	No
R 9	Residential	B	1	56	No	57	No	59	No	57	No
R 10	Residential	B	1	57	No	58	No	60	No	58	No
R 11	Residential	B	1	66	No	67	Yes	72	Yes	65	No
R 12	Residential	B	1	58	No	59	No	61	No	58	No
R 13	Residential	B	1	65	No	67	Yes	71	Yes	64	No
R 14	Residential	B	1	68	Yes	69	Yes	71	Yes	65	No
R 15	Residential	B	1	60	No	61	No	63	No	60	No
R 16	Commercial	E	1	64	No	65	No	64	No	65	No
R 17	Residential	B	1	63	No	64	No	63	No	64	No
R 18	Residential	B	1	65	No	66	No	65	No	67	Yes
R 19	Residential	B	1	62	No	63	No	62	No	63	No
R 20	Residential	B	1	67	Yes	67	Yes	68	Yes	68	Yes
R 21	Residential	B	1	61	No	61	No	63	No	63	No
R 22	Residential	B	1	63	No	64	No	62	No	64	No
R 23	Residential	B	1	66	Yes	67	Yes	65	No	72	Yes
R 24	Residential	B	1	66	No	67	Yes	66	Yes	69	Yes
R 25	Residential	B	1	64	No	65	No	64	No	66	No
R 26	National Park Walking Trail	C	1	53	No	54	No	54	No	56	No

U.S. 701 Bridge Replacement
Noise Analysis
Georgetown/Horry County, S.C.

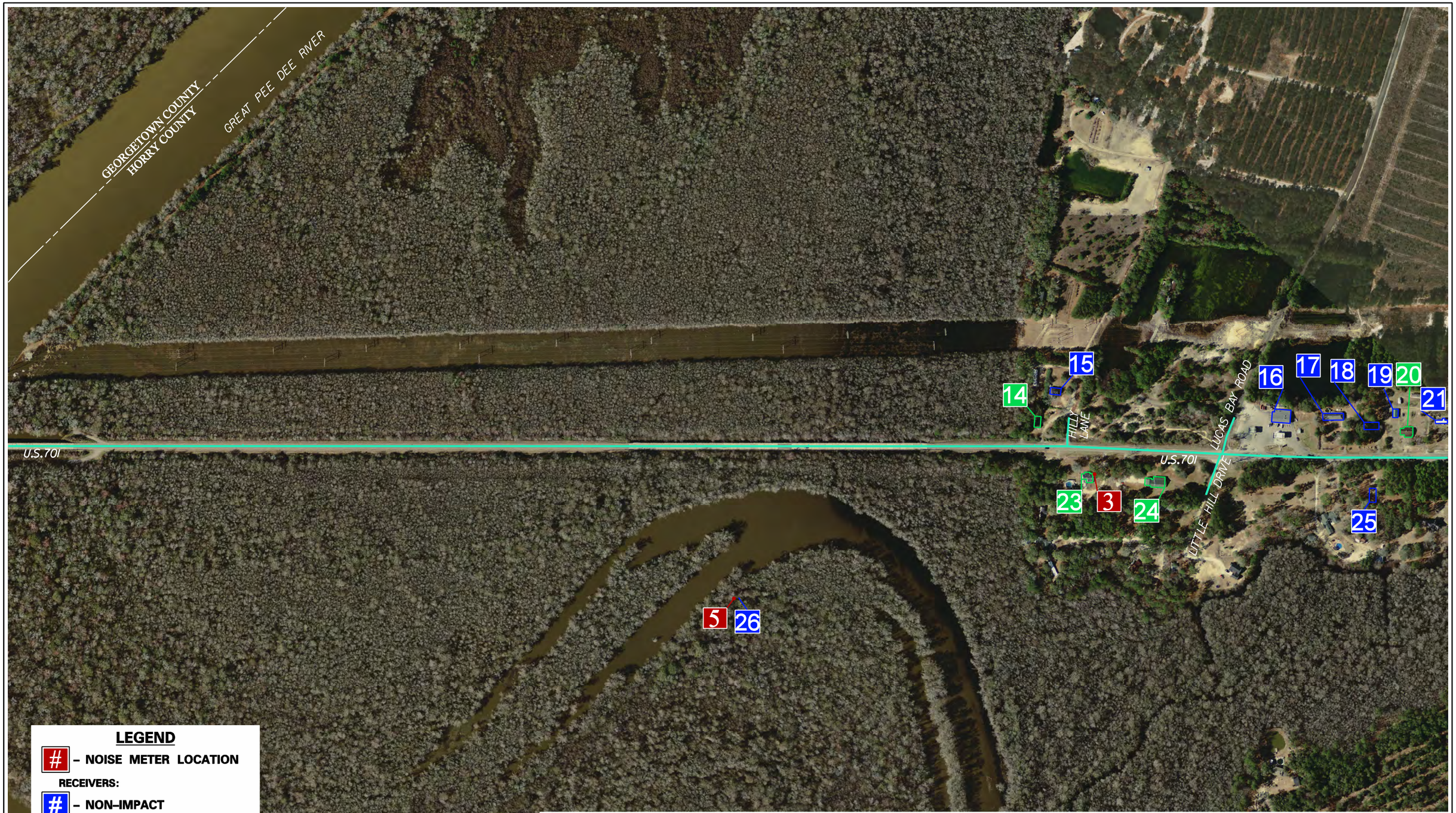
Noise Analysis
Receiver & Meter Locations

SCALE 0 200 400 FEET

Florence & Hutcheson
An ICA Company
501 Hoger Street, Columbia, SC 29201

NO BUILD NOISE IMPACTS

SHEET: 1 OF 2



U.S. 701 Bridge Replacement
Noise Analysis
Georgetown/Horry County, S.C.

Noise Analysis
Receiver & Meter Locations

SCALE 0 200 400 FEET

Florence & Hutcheson
An ICA Company
501 Hagar Street, Columbia, SC 29201

NO BUILD NOISE IMPACTS

SHEET: 2 OF 2

U.S. 701 Bridge Replacement
Noise Analysis
Georgetown/Horry County, S.C.

Noise Analysis
Receiver & Meter Locations

SCALE 0 200 400 FEET

Florence & Hutcheson
An ICA Company
501 Hager Street, Columbia, SC 29201

ALTERNATE 2 BUILD
NOISE IMPACTS

SHEET: 1 OF 2

GEORGETOWN COUNTY
HORRY COUNTY

GREAT PEE DEE RIVER

U.S.701 (RELOC.)

HILLY LANE

LUCAS BAY ROAD

U.S.701 (RELOC.)

LITTLE HILL DRIVE

14 15 16 17 18 19 20 21 23 3 24 25 5 26

LEGEND

- # – NOISE METER LOCATION

RECEIVERS:

- # – NON-IMPACT
- # – IMPACT
- PROPOSED CENTERLINE

U.S. 701 Bridge Replacement
Noise Analysis
Georgetown/Horry County, S.C.

Noise Analysis
Receiver & Meter Locations

SCALE 0 200 400 FEET

Florence & Hutcheson
An ICA Company
501 Hager Street, Columbia, SC 29201

ALTERNATE 2 BUILD
NOISE IMPACTS

SHEET: 2 OF 2

U.S. 701 Bridge Replacement
Noise Analysis
Georgetown/Horry County, S.C.

Noise Analysis
Receiver & Meter Locations

SCALE 0 200 400 FEET

Florence & Hutcheson
An ICA Company
501 Hagar Street, Columbia, SC 29201

ALTERNATE 3 BUILD
NOISE IMPACTS

SHEET: 1 OF 2

U.S. 701 Bridge Replacement
Noise Analysis
Georgetown/Horry County, S.C.

Noise Analysis
Receiver & Meter Locations

SCALE 0 200 400 FEET

Florence & Hutcheson
An ICA Company
501 Hager Street, Columbia, SC 29201

ALTERNATE 3 BUILD
NOISE IMPACTS

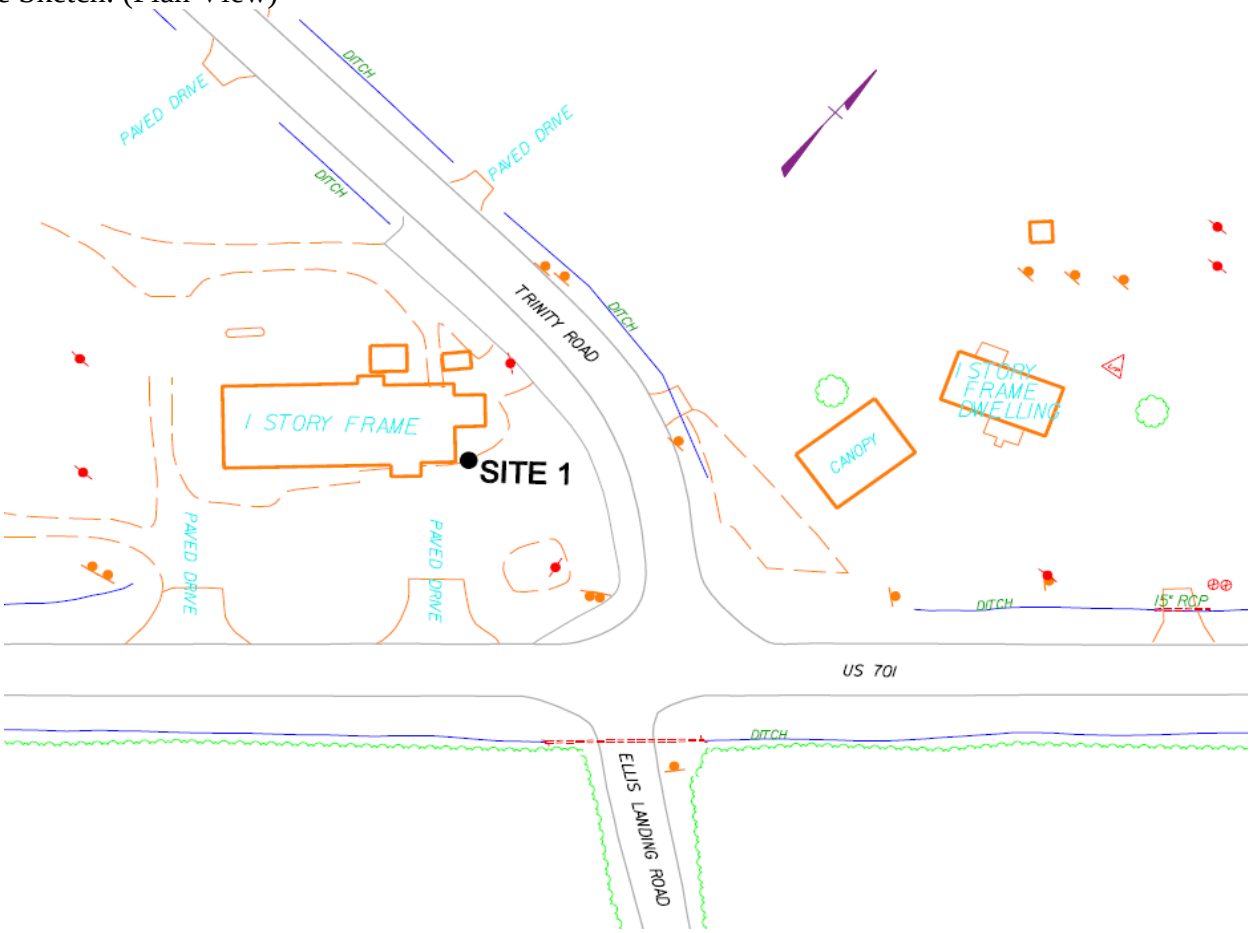
SHEET: 2 OF 2

Noise Measurement Data Sheets

TRAFFIC NOISE FIELD MEASUREMENT WORKSHEET

Project Name: **U.S. 701 Bridge Replacement, Georgetown/Horry County, SC**	Site #: 1	Date: December 14, 2012
Site Description: Commercial/Residential	Site Location: U.S. 701/Trinity Rd/Ellis Landing Rd	
Start Time: 9:11 am	Duration: 20 minutes	L_{eq}: 66.9

Site Sketch: (Plan View)



Notes: crows, pile driver in distance, loud bass from car on Trinity at 9:19

Traffic Counts	**U.S. 701**	**Trinity/Ellis Landing**
Autos:	North Bound – 34, South Bound - 33	East Bound – 13, West Bound - 4
Medium Trucks:	North Bound – 1, South Bound - 0	East Bound – 0, West Bound - 0
Heavy Trucks:	North Bound – 3, South Bound - 7	East Bound – 0, West Bound - 0
Buses:	North Bound – 0, South Bound - 0	East Bound – 0, West Bound - 0
Motorcycles:	North Bound – 0, South Bound - 0	East Bound – 0, West Bound - 0

Florence & Hutcheson, Inc. Field Personnel: Wayne Hall & Maddy Barbian

TRAFFIC NOISE FIELD MEASUREMENT WORKSHEET

Project Name: **U.S. 701 Bridge Replacement, Georgetown/Horry County, SC**	Site #: 1	Date: December 14, 2012
Site Description: Commercial/Residential	Site Location: U.S. 701/Trinity Rd/Ellis Landing Rd	
Start Time: 9:11 am	Duration: 20 minutes	L_{eq}:

Site Photographs:

Florence & Hutcheson, Inc.

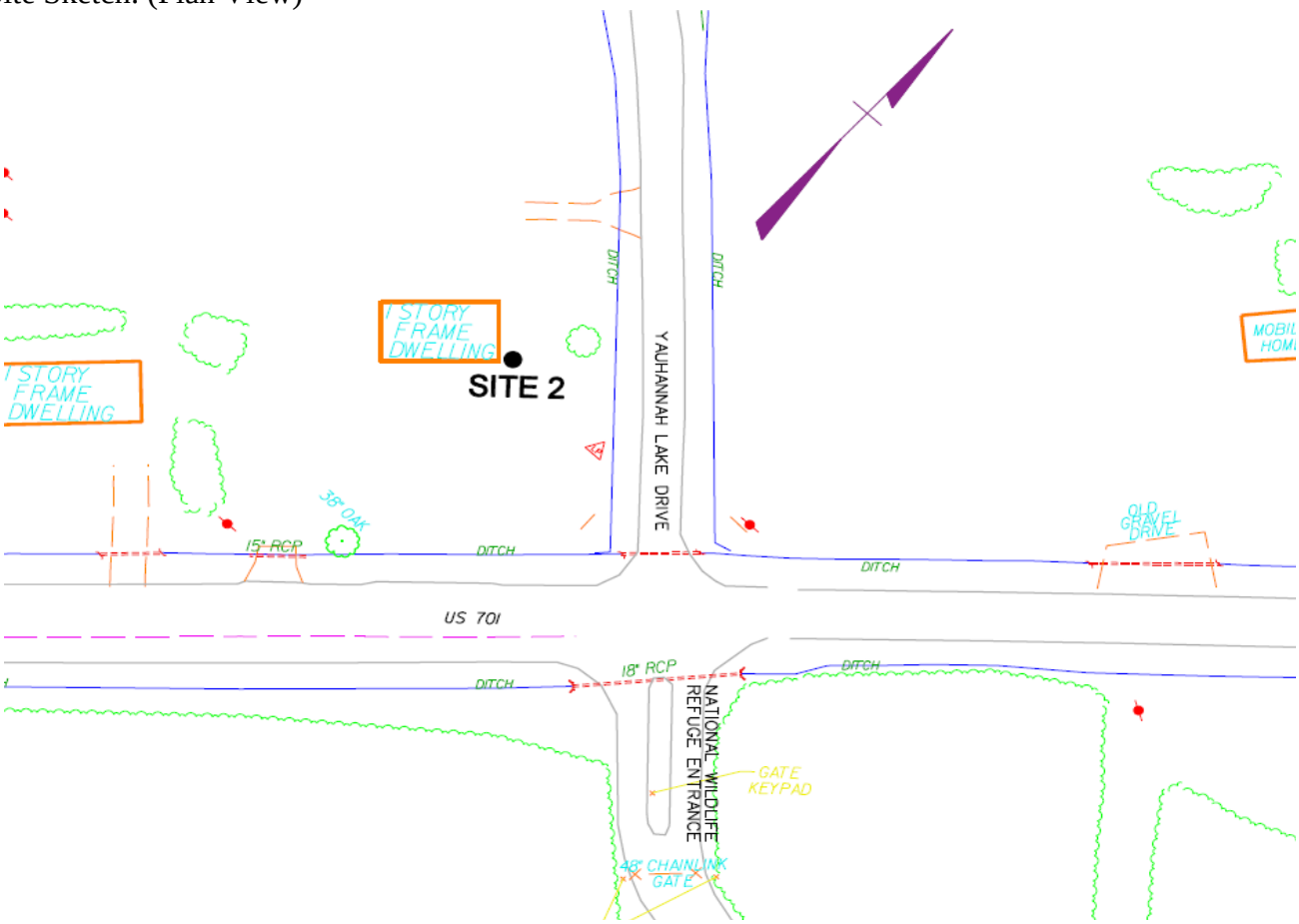
Field Personnel: Wayne Hall & Maddy Barbian

		Site 1					
		Intersection of US 701/Trinity Road/Ellis Landing Road					
Period:	Time: 10:10 - 10:29	**LAeq**	Despike?	SPL	LAF(max)	Lmax	LCpeak
	121214_0001.NBF	**66.9**			82.3	80.9	
0	(2012-12-14 10:10:04.000)	65.9		3890451.45	75.5	75.5	93.8
1	(2012-12-14 10:11:04.000)	69.5		8912509.38	80.9	80.9	95.8
2	(2012-12-14 10:12:04.000)	65.3		3388441.56	75.7	75.7	87.6
3	(2012-12-14 10:13:04.000)	67.8		6025595.86	79.3	79.3	97.7
4	(2012-12-14 10:14:04.000)	61.0		1258925.41	74.5	74.5	88.8
5	(2012-12-14 10:15:04.000)	59.3		851138.038	73.0	73.0	86.3
6	(2012-12-14 10:16:04.000)	68.8		7585775.75	78.1	78.1	96.6
7	(2012-12-14 10:17:04.000)	69.5		8912509.38	80.8	80.8	97.3
8	(2012-12-14 10:18:04.000)	66.5		4466835.92	75.3	75.3	93.5
9	(2012-12-14 10:19:04.000)	64.0		2511886.43	75.8	75.8	90.6
10	(2012-12-14 10:20:04.000)	63.2		2089296.13	76.1	76.1	89.8
11	(2012-12-14 10:21:04.000)	68.8		7585775.75	77.8	77.8	96.2
12	(2012-12-14 10:22:04.000)	68.1		6456542.29	77.5	77.5	89.8
13	(2012-12-14 10:23:04.000)	72.5	x		82.3		102.4
14	(2012-12-14 10:24:04.000)	65.3		3388441.56	75.6	75.6	90.2
15	(2012-12-14 10:25:04.000)	69.5		8912509.38	78.4	78.4	95.8
16	(2012-12-14 10:26:04.000)	64.4		2754228.7	74.6	74.6	87.1
17	(2012-12-14 10:27:04.000)	64.7		2951209.23	76.0	76.0	88.8
18	(2012-12-14 10:28:04.000)	42.3	x		51.1		74.3
19	(2012-12-14 10:29:04.000)	62.7		1862087.14	76.3	76.3	90.2

TRAFFIC NOISE FIELD MEASUREMENT WORKSHEET

Project Name: **U.S. 701 Bridge Replacement, Georgetown/Horry County, SC**	Site #: 2	Date: December 14, 2012
Site Description: Residential	Site Location: U.S. 701/Yauhannan Lake Drive	
Start Time: 9:44 am	Duration: 20 minutes	L_{eq}: 61.6

Site Sketch: (Plan View)



Notes: dogs barking, sawing in distance, woman speaking at 9:48

Traffic Counts	**U.S. 701**	**Yauhannan Lake Drive**
Autos:	North Bound – 36, South Bound - 37	East Bound – 0, West Bound - 2
Medium Trucks:	North Bound – 1, South Bound - 0	East Bound – 0, West Bound - 0
Heavy Trucks:	North Bound – 5, South Bound - 5	East Bound – 0, West Bound - 0
Buses:	North Bound – 0, South Bound - 0	East Bound – 0, West Bound - 0
Motorcycles:	North Bound – 0, South Bound - 0	East Bound – 0, West Bound - 0

Florence & Hutcheson, Inc. Field Personnel: Wayne Hall & Maddy Barbian

TRAFFIC NOISE FIELD MEASUREMENT WORKSHEET

Project Name: **U.S. 701 Bridge Replacement, Georgetown/Horry County, SC**	Site #: 2	Date: December 14, 2012
Site Description: Residential	Site Location: U.S. 701/Yauhannan Lake Drive	
Start Time: 9:44 am	Duration: 20 minutes	L_{eq}:

Site Photographs:

Florence & Hutcheson, Inc.

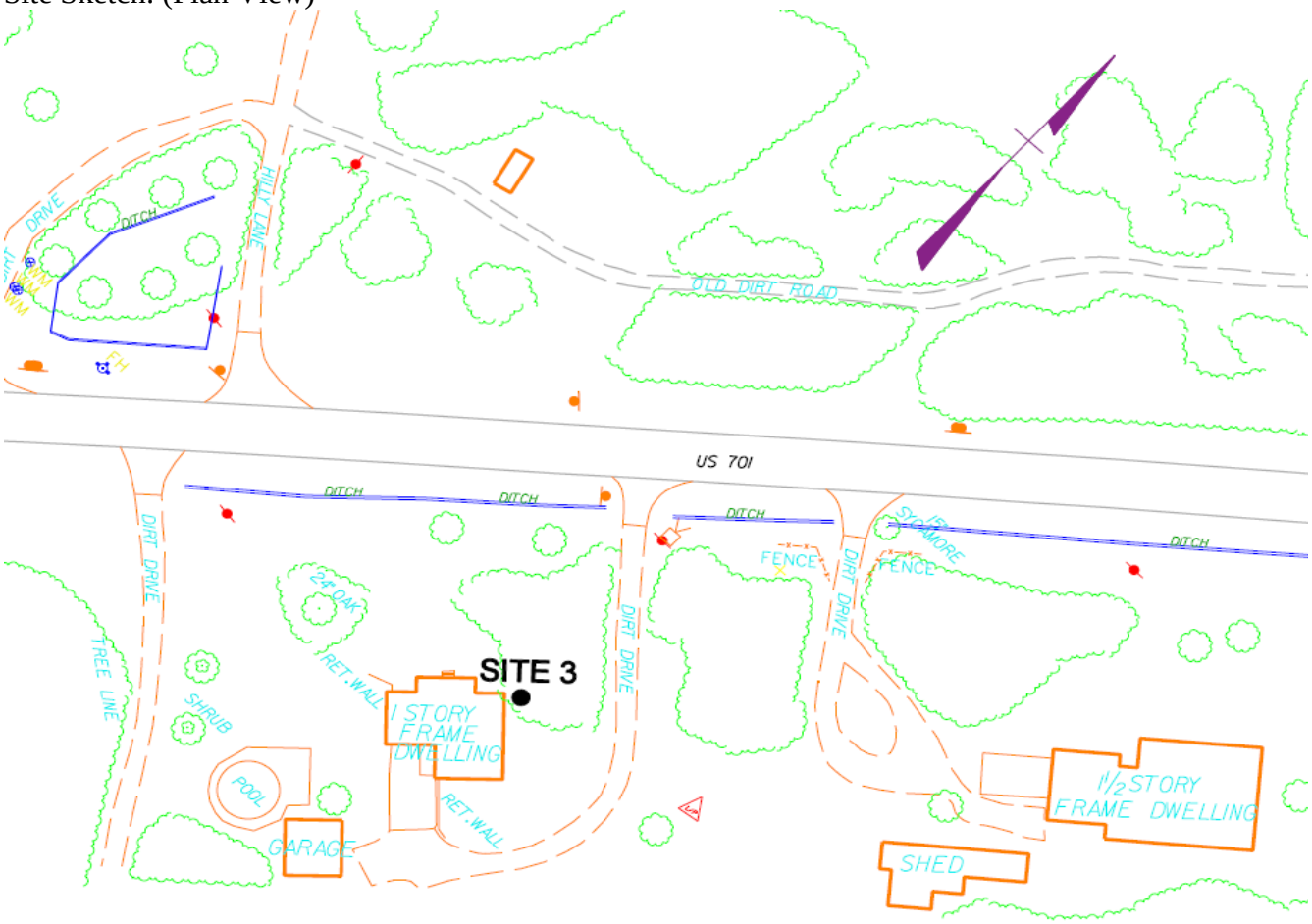
Field Personnel: Wayne Hall & Maddy Barbian

		Site 2					
		Intersection of US 701/Yauhannah Drive					
Period:	Time: 10:43-11:02	**LAeq**	Despike?	SPL	LAF(max)	Lmax	LCpeak
	121214_0002.NBF	**61.6**			76.6	76.6	
0	(2012-12-14 10:43:03.000)	57.0		501187.234	64.8	64.8	82.2
1	(2012-12-14 10:44:03.000)	55.4		346736.85	64.6	64.6	84.4
2	(2012-12-14 10:45:03.000)	64.1		2570395.78	76.6	76.6	89.7
3	(2012-12-14 10:46:03.000)	61.3		1348962.88	72.6	72.6	87.5
4	(2012-12-14 10:47:03.000)	64.2		2630267.99	73.5	73.5	89.1
5	(2012-12-14 10:48:03.000)	60.0		1000000	67.5	67.5	86.7
6	(2012-12-14 10:49:03.000)	64.1		2570395.78	73.6	73.6	93.8
7	(2012-12-14 10:50:03.000)	63.9		2454708.92	74.2	74.2	95.0
8	(2012-12-14 10:51:03.000)	60.7		1174897.55	67.1	67.1	87.4
9	(2012-12-14 10:52:03.000)	59.5		891250.938	68.2	68.2	84.7
10	(2012-12-14 10:53:03.000)	61.3		1348962.88	69.4	69.4	89.3
11	(2012-12-14 10:54:03.000)	63.6		2290867.65	74.8	74.8	93.5
12	(2012-12-14 10:55:03.000)	62.3		1698243.65	72.1	72.1	90.9
13	(2012-12-14 10:56:03.000)	51.2		131825.674	61.3	61.3	87.1
14	(2012-12-14 10:57:03.000)	58.2		660693.448	66.5	66.5	87.2
15	(2012-12-14 10:58:03.000)	63.4		2187761.62	74.1	74.1	91.4
16	(2012-12-14 10:59:03.000)	58.7		741310.241	71.5	71.5	90.8
17	(2012-12-14 11:00:03.000)	58.9		776247.117	65.6	65.6	85.3
18	(2012-12-14 11:01:03.000)	63.0		1995262.31	74.4	74.4	90.2
19	(2012-12-14 11:02:03.000)	59.7		933254.301	66.6	66.6	85.4

TRAFFIC NOISE FIELD MEASUREMENT WORKSHEET

Project Name: **U.S. 701 Bridge Replacement, Georgetown/Horry County, SC**	Site #: 3	Date: December 14, 2012
Site Description: Residential	Site Location: 9265 N. Fraser Street (U.S. 701)	
Start Time: 10:13 am	Duration: 20 minutes	L_{eq}: 62.0

Site Sketch: (Plan View)



Notes:

Traffic Counts	**U.S. 701**	
Autos:	North Bound – 40, South Bound - 24	
Medium Trucks:	North Bound – 0, South Bound - 2	
Heavy Trucks:	North Bound – 2, South Bound - 4	
Buses:	North Bound – 0, South Bound - 0	
Motorcycles:	North Bound – 0, South Bound - 0	

TRAFFIC NOISE FIELD MEASUREMENT WORKSHEET

Project Name: **U.S. 701 Bridge Replacement, Georgetown/Horry County, SC**	Site #: 3	Date: December 14, 2012
Site Description: Residential	Site Location: 9265 N. Fraser Street (U.S. 701)	
Start Time: 10:13 am	Duration: 20 minutes	L_{eq}:

Site Photographs:

Florence & Hutcheson, Inc.

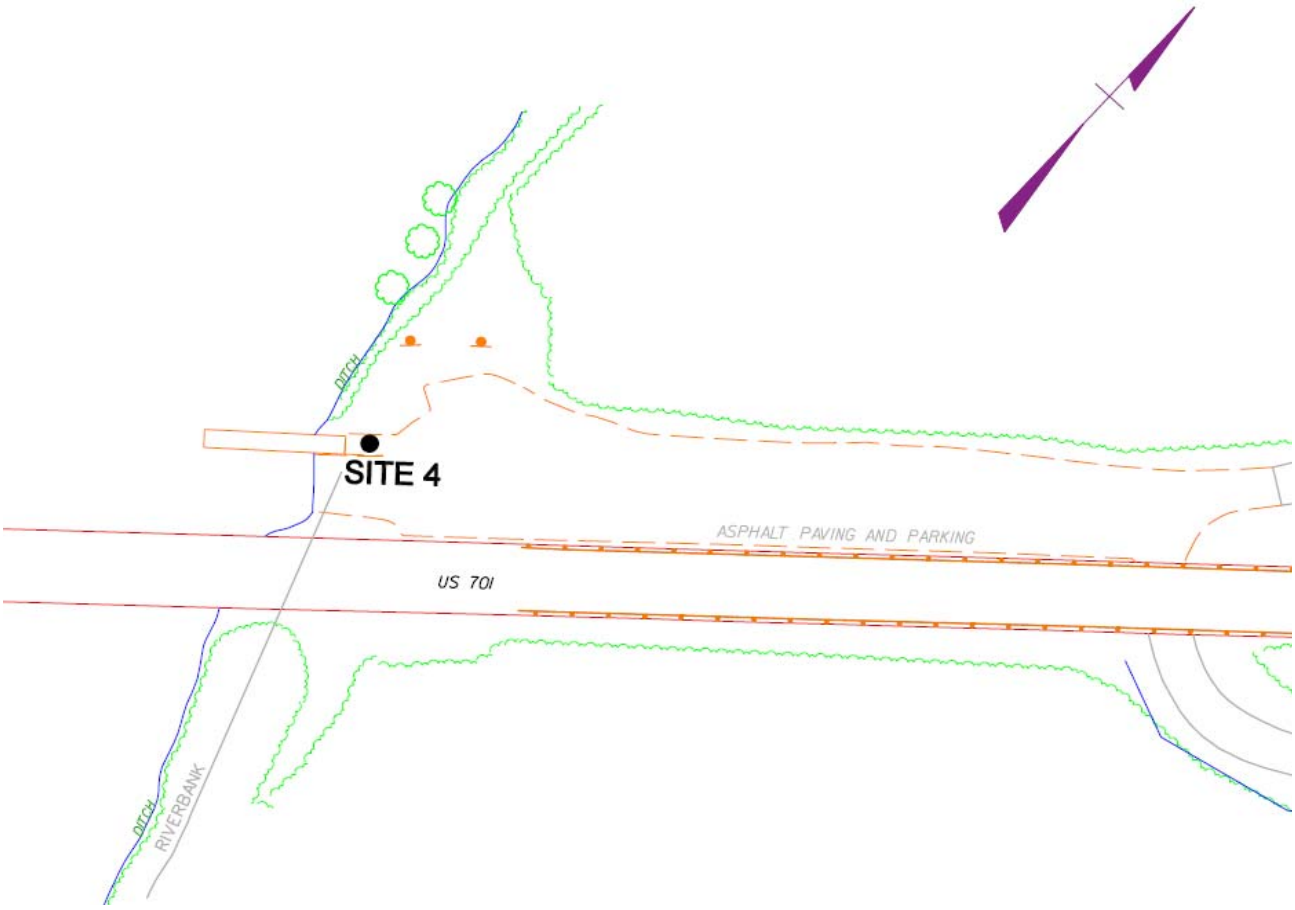
Field Personnel: Wayne Hall & Maddy Barbian

		Site 3					
		9265 U.S. 701					
Period:	Time: 11:12-11:31	**LAeq**	Despike?	SPL	LAF(max)	Lmax	LCpeak
	121214_0003.NBF	**62**			78.4	78.4	
0	(2012-12-14 11:12:30.000)	58.4		691830.971	69.2	69.2	87.5
1	(2012-12-14 11:13:30.000)	38.8	x		50.3		78.7
2	(2012-12-14 11:14:30.000)	61.9		1548816.62	75.9	75.9	90.8
3	(2012-12-14 11:15:30.000)	59.5		891250.938	71.2	71.2	86.0
4	(2012-12-14 11:16:30.000)	66.2		4168693.83	78.4	78.4	103.2
5	(2012-12-14 11:17:30.000)	61.2		1318256.74	70.6	70.6	87.0
6	(2012-12-14 11:18:30.000)	57.2		524807.46	68.6	68.6	87.1
7	(2012-12-14 11:19:30.000)	63.0		1995262.31	75.3	75.3	97.7
8	(2012-12-14 11:20:30.000)	60.3		1071519.31	69.9	69.9	85.9
9	(2012-12-14 11:21:30.000)	62.4		1737800.83	71.0	71.0	85.7
10	(2012-12-14 11:22:30.000)	59.7		933254.301	71.0	71.0	87.5
11	(2012-12-14 11:23:30.000)	59.1		812830.516	70.7	70.7	90.3
12	(2012-12-14 11:24:30.000)	59.3		851138.038	69.1	69.1	88.0
13	(2012-12-14 11:25:30.000)	58.0		630957.344	70.1	70.1	85.3
14	(2012-12-14 11:26:30.000)	53.9		245470.892	66.1	66.1	79.7
15	(2012-12-14 11:27:30.000)	66.0		3981071.71	75.9	75.9	96.6
16	(2012-12-14 11:28:30.000)	66.2		4168693.83	78.0	78.0	95.8
17	(2012-12-14 11:29:30.000)	62.5		1778279.41	74.1	74.1	92.2
18	(2012-12-14 11:30:30.000)	62.0		1584893.19	73.2	73.2	92.3
19	(2012-12-14 11:31:30.000)	65.4		3467368.5	74.8	74.8	90.9

TRAFFIC NOISE FIELD MEASUREMENT WORKSHEET

Project Name: **U.S. 701 Bridge Replacement, Georgetown/Horry County, SC**		Site #: 4	Date: December 14, 2012
Site Description: Rural		Site Location: Boat Ramp	
Start Time: 10:45 am		Duration: 20 minutes	L_{eq}:

Site Sketch: (Plan View)



Notes:

Traffic Counts	**U.S. 701**	
Autos:	North Bound – 24, South Bound - 32	
Medium Trucks:	North Bound – 1, South Bound - 0	
Heavy Trucks:	North Bound – 5, South Bound - 3	
Buses:	North Bound – 1, South Bound - 0	
Motorcycles:	North Bound – 0, South Bound - 0	

Florence & Hutcheson, Inc. Field Personnel: Wayne Hall & Maddy Barbian

TRAFFIC NOISE FIELD MEASUREMENT WORKSHEET

Project Name: **U.S. 701 Bridge Replacement, Georgetown/Horry County, SC**	Site #: 4	Date: December 14, 2012
Site Description: Rural	Site Location: Boat Ramp	
Start Time: 10:45 am	Duration: 20 minutes	L_{eq}:

Site Photographs:

Florence & Hutcheson, Inc.

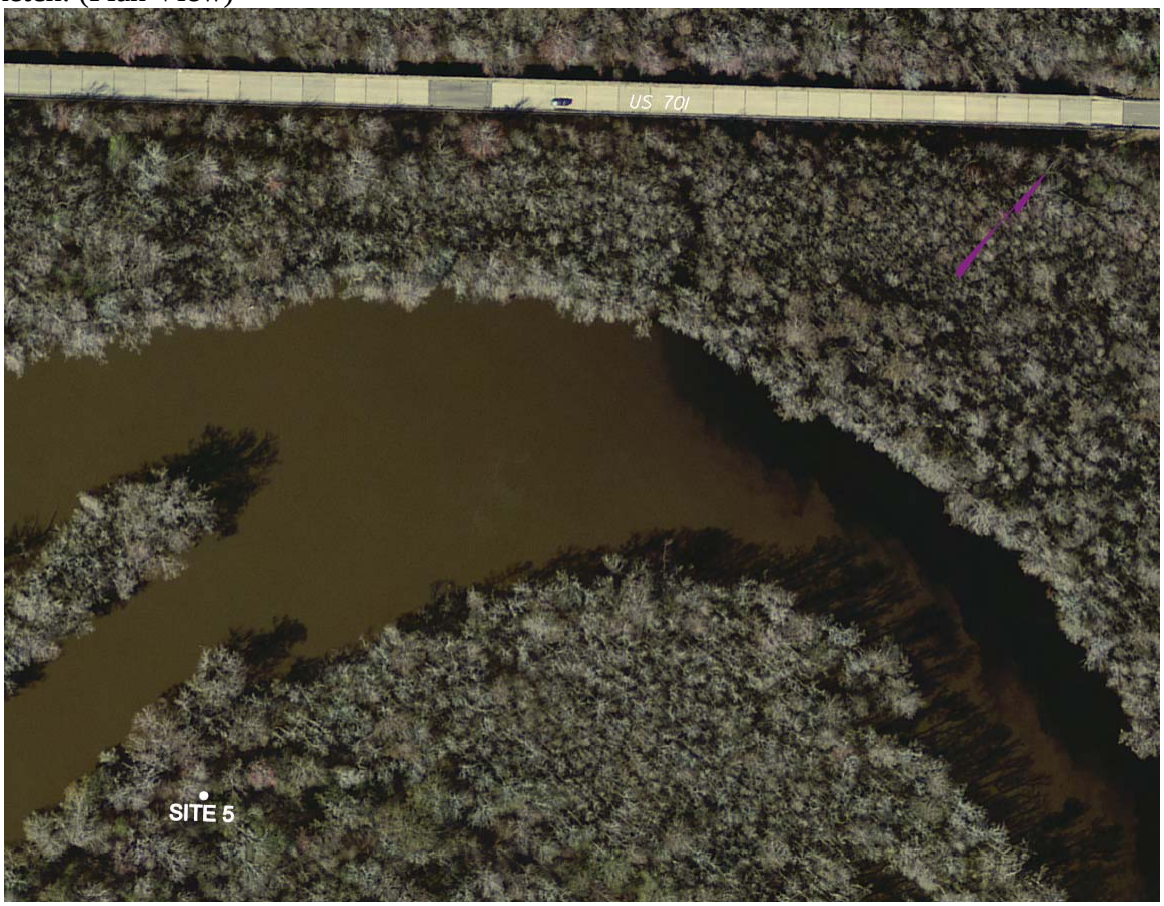
Field Personnel: Wayne Hall & Maddy Barbian

		Site 4					
		Public Boat Ramp at Great Pee Dee River					
Period:	Time: 11:43-12:02	**LAeq**	Despike?	SPL	LAF(max)	Lmax	LCpeak
	121214_0004.NBF	**58.1**			79.3	79.3	
0	(2012-12-14 11:43:53.000)	55.9		389045.145	70.8	70.8	90.7
1	(2012-12-14 11:44:53.000)	56.8		478630.092	79.3	79.3	97.6
2	(2012-12-14 11:45:53.000)	52.3		169824.365	69.1	69.1	91.1
3	(2012-12-14 11:46:53.000)	62.8		1905460.72	72.8	72.8	99.6
4	(2012-12-14 11:47:53.000)	63.9		2454708.92	76.1	76.1	99.8
5	(2012-12-14 11:48:53.000)	58.0		630957.344	68.6	68.6	97.4
6	(2012-12-14 11:49:53.000)	57.0		501187.234	71.8	71.8	92.7
7	(2012-12-14 11:50:53.000)	57.4		549540.874	67.4	67.4	96.3
8	(2012-12-14 11:51:53.000)	57.4		549540.874	68.6	68.6	91.5
9	(2012-12-14 11:52:53.000)	58.1		645654.229	69.6	69.6	91.4
10	(2012-12-14 11:53:53.000)	59.6		912010.839	69.1	69.1	97.6
11	(2012-12-14 11:54:53.000)	55.0		316227.766	71.7	71.7	92.6
12	(2012-12-14 11:55:53.000)	54.8		301995.172	67.9	67.9	92.0
13	(2012-12-14 11:56:53.000)	57.4		549540.874	68.6	68.6	92.2
14	(2012-12-14 11:57:53.000)	54.7		295120.923	65.4	65.4	85.9
15	(2012-12-14 11:58:53.000)	52.4		173780.083	63.2	63.2	90.2
16	(2012-12-14 11:59:53.000)	50.2		104712.855	65.1	65.1	89.0
17	(2012-12-14 12:00:53.000)	59.1		812830.516	70.6	70.6	98.8
18	(2012-12-14 12:01:53.000)	57.9		616595.002	69.0	69.0	96.1
19	(2012-12-14 12:02:53.000)	56.2		416869.383	68.6	68.6	90.1

TRAFFIC NOISE FIELD MEASUREMENT WORKSHEET

Project Name: **U.S. 701 Bridge Replacement, Georgetown/Horry County, SC**	Site #: 5	Date: December 14, 2012
Site Description: Rural	Site Location: Oxbow, Walking Trail	
Start Time: 11:34 am	Duration: 20 minutes	L_{eq}:

Site Sketch: (Plan View)



Notes:

Traffic Counts	**U.S. 701**	
Autos:	North Bound – 30, South Bound - 38	
Medium Trucks:	North Bound – 1, South Bound - 0	
Heavy Trucks:	North Bound – 8, South Bound - 3	
Buses:	North Bound – 0, South Bound - 0	
Motorcycles:	North Bound – 0, South Bound - 0	

Florence & Hutcheson, Inc. Field Personnel: Wayne Hall & Maddy Barbian

TRAFFIC NOISE FIELD MEASUREMENT WORKSHEET

Project Name: **U.S. 701 Bridge Replacement, Georgetown/Horry County, SC**	Site #: 5	Date: December 14, 2012
Site Description: Rural	Site Location: Oxbow, Walking Trail	
Start Time: 11:34 am	Duration: 20 minutes	L_{eq}:

Site Photographs:

Florence & Hutcheson, Inc.

Field Personnel: Wayne Hall & Maddy Barbian

		Site 5					
		Public Walking Trail at Oxbow					
Period:	Time: 12:32 - 12:51	**LAeq**	Despike?	SPL	LAF(max)	Lmax	LCpeak
	121214_0005.NBF	**49.8**			61.2	61.2	
0	(2012-12-14 12:32:52.000)	49.8		95499.2586	56.6	56.6	79.3
1	(2012-12-14 12:33:52.000)	46.7		46773.5141	50.0	50.0	70.2
2	(2012-12-14 12:34:52.000)	46.6		45708.819	55.1	55.1	75.4
3	(2012-12-14 12:35:52.000)	52.3		169824.365	57.3	57.3	80.4
4	(2012-12-14 12:36:52.000)	52.0		158489.319	58.9	58.9	86.6
5	(2012-12-14 12:37:52.000)	46.0		39810.7171	51.0	51.0	70.9
6	(2012-12-14 12:38:52.000)	42.3		16982.4365	49.7	49.7	69.5
7	(2012-12-14 12:39:52.000)	52.8		190546.072	61.2	61.2	83.6
8	(2012-12-14 12:40:52.000)	49.9		97723.7221	57.5	57.5	80.5
9	(2012-12-14 12:41:52.000)	43.6		22908.6765	51.9	51.9	71.2
10	(2012-12-14 12:42:52.000)	43.8		23988.3292	53.4	53.4	70.9
11	(2012-12-14 12:43:52.000)	38.2		6606.93448	49.8	49.8	73.3
12	(2012-12-14 12:44:52.000)	45.6		36307.8055	58.1	58.1	80.8
13	(2012-12-14 12:45:52.000)	55.3		338844.156	60.9	60.9	85.5
14	(2012-12-14 12:46:52.000)	48.4		69183.0971	54.3	54.3	74.5
15	(2012-12-14 12:47:52.000)	51.0		125892.541	57.4	57.4	79.4
16	(2012-12-14 12:48:52.000)	50.8		120226.443	58.0	58.0	81.1
17	(2012-12-14 12:49:52.000)	51.2		131825.674	55.6	55.6	75.8
18	(2012-12-14 12:50:52.000)	49.9		97723.7221	55.3	55.3	74.6
19	(2012-12-14 12:51:52.000)	46.5		44668.3592	52.0	52.0	72.8

Traffic Data

Table 6. Highway Capacity Analysis Results

CAPACITY ANALYSIS RESULTS							
Case	**Analysis Year**	**AADT**	**Peak Hour Volume**	**Average Travel Speed**	**% Time Spent Following**	**LOS**	**v/c**
Case 1 No-Build w/ Historical Data	2012	8,800	880	51.0	65.2	D	0.32
	2022	10,500	1,050	49.8	70.0	D	0.38
	2032	12,300	1,230	48.4	74.4	D	0.44
Case 2 Build w/ Historical Data	2012	8,800	880	54.0	65.2	D	0.32
	2022	10,500	1,050	52.8	70.0	D	0.38
	2032	12,300	1,230	51.4	74.4	D	0.44
Case 3 No-Build w/ 3% Growth	2012	8,300	830	51.3	63.4	C	0.30
	2022	11,100	1,110	49.4	71.6	D	0.40
	2032	14,900	1,490	46.1	80.4	E	0.54
Case 4 Build w/ 3% Growth	2012	8,300	830	54.3	63.4	C	0.30
	2022	11,100	1,110	52.4	71.6	D	0.40
	2032	14,900	1,490	49.1	80.4	E	0.54

5.0 Conclusions

The purpose of the US 701 Bridge Replacement Project is to improve safety for the motoring public, as well as the safety of bicyclists, by replacing the three existing conditionally deficient and functionally obsolete bridges. The proposed project will improve safety by providing dedicated bike lanes and shoulder widths that are wider than the existing facility. Although the highway capacity analysis results indicates that there is not an improvement in the level of service between the "no-build" option and the "build" option, the results do demonstrate that the proposed bridge replacement will not negatively impact the level of service for US 701.

HCM Roadway Type	Rural Arterial
Free-Flow Speed	55.0
LOS C MSF (pcphpl)	1,190
LOS C Speed	55.0
LOS D MSF (pcphpl)	1,830
LOS D Speed	55.0

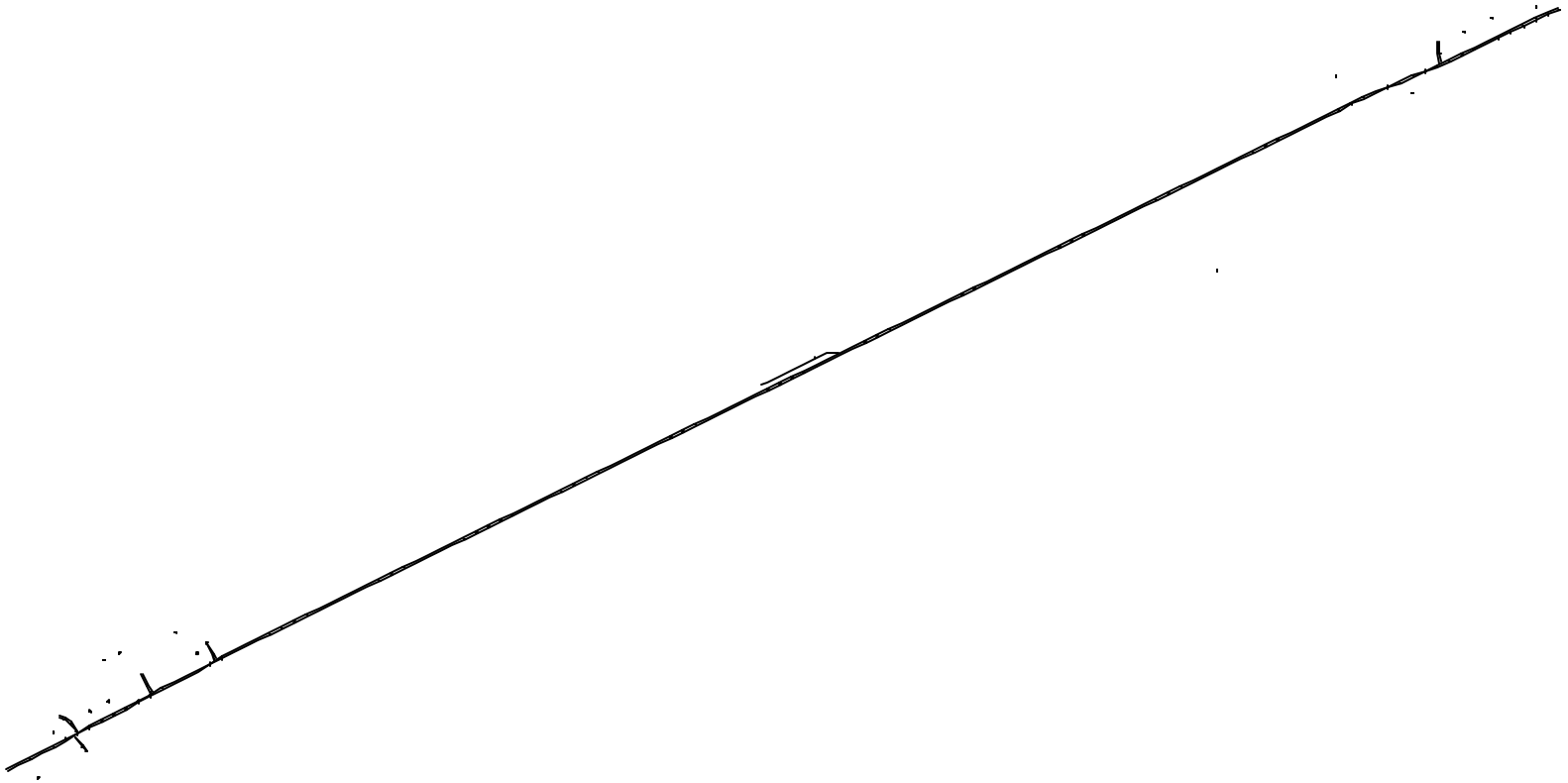
RUN	Roadway	Direction	Speed (mph)	Dir.Split	ADT	DHV %	DHV-dir	Duals (MT)	TT (HT)	Lanes	LOS	DHV-cap	Autos	MT	HT	Checksum
CASE 1: No Build w/ Hist. Data																
NO BUILD Year 2012 LOS D	U.S. 701	NB	55	50.0%	8,800	10.0%	440	4.0%	10.0%	1	D	440	378	18	44	0
	U.S. 701	SB	55	50.0%	8,800	10.0%	440	4.0%	10.0%	1	D	440	378	18	44	0
NO BUILD Year 2022 LOS D	U.S. 701	NB	55	50.0%	10,500	10.0%	525	4.0%	10.0%	1	D	525	452	21	53	1
	U.S. 701	SB	55	50.0%	10,500	10.0%	525	4.0%	10.0%	1	D	525	452	21	53	1
NO BUILD Year 2032 LOS D	U.S. 701	NB	55	50.0%	12,300	10.0%	615	4.0%	10.0%	1	D	615	529	25	62	1
	U.S. 701	SB	55	50.0%	12,300	10.0%	615	4.0%	10.0%	1	D	615	529	25	62	1
CASE 2: Build w/ Hist. Data																
BUILD Year 2012 LOS D	U.S. 701	NB	55	50.0%	8,800	10.0%	440	4.0%	10.0%	1	D	440	378	18	44	0
	U.S. 701	SB	55	50.0%	8,800	10.0%	440	4.0%	10.0%	1	D	440	378	18	44	0
BUILD Year 2022 LOS D	U.S. 701	NB	55	50.0%	10,500	10.0%	525	4.0%	10.0%	1	D	525	452	21	53	1
	U.S. 701	SB	55	50.0%	10,500	10.0%	525	4.0%	10.0%	1	D	525	452	21	53	1
BUILD Year 2032 LOS D	U.S. 701	NB	55	50.0%	12,300	10.0%	615	4.0%	10.0%	1	D	615	529	25	62	1
	U.S. 701	SB	55	50.0%	12,300	10.0%	615	4.0%	10.0%	1	D	615	529	25	62	1

PROJECT
US 701

0910801

Date	12/14/2012		12/14/2012		12/14/2012		12/14/2012		12/14/2012		12/14/2012		12/14/2012		12/14/2012		12/14/2012		12/14/2012	
Time	Time: 10:10 - 10:29		Time: 10:10 - 10:29		Time: 10:43-11:02		Time: 10:43-11:02		Time: 11:12-11:31		Time: 11:12-11:31		Time: 11:43-12:02		Time: 11:43-12:02		Time: 12:32 - 12:51		Time: 12:32 - 12:51	
Setup	***Site 1***		***Site 1***		***Site 2***		***Site 2***		***Site 3***		***Site 3***		***Site 4***		***Site 4***		***Site 5***		***Site 5***	
Location	Intersection of US 701/Trinity Rd/Ellis Landing Rd				Intersection of US 701/Yauhannah Drive				9265 U.S. 701				Public Boat Ramp at Great Pee Dee River				Public Walking Trail at Oxbow			
Count Duration (Mins)	20		20		20		20		20		20		20		20		20		20	
LANE(s)	US 701 NB		US 701 SB		US 701 NB		US 701 SB		US 701 NB		US 701 SB		US 701 NB		US 701 SB		US 701 NB		US 701 SB	
	COUNT	HOURLY	COUNT	HOURLY	COUNT	HOURLY	COUNT	HOURLY	COUNT	HOURLY	COUNT	HOURLY	COUNT	HOURLY	COUNT	HOURLY	COUNT	HOURLY	COUNT	HOURLY
AUTOS	34	102	33	99	36	108	37	111	40	120	24	72	24	72	32	96	30	90	38	114
DT / MED TRUCKS	1	3	0	0	1	3	0	0	0	0	2	6	1	3	0	0	1	3	0	0
TTST / HEAVY TRUCKS	3	9	7	21	5	15	5	15	2	6	4	12	5	15	3	9	8	24	3	9
BUSES	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0
MOTORCYCLES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SPEED	55		55		55		55		55		55		55		55		55		55	
DIR DT / MED TRUCKS %	2.6%		0.0%		2.4%		0.0%		0.0%		6.7%		3.3%		0.0%		2.6%		0.0%	
DIR TTST / HEAVY TRUCKS %	7.9%		17.5%		11.9%		11.9%		4.8%		13.3%		16.7%		8.6%		20.5%		7.3%	
TOTAL DIR TRUCKS %	10.5%		17.5%		14.3%		11.9%		4.8%		20.0%		20.0%		8.6%		23.1%		7.3%	
TOTAL RDY DT / MED TRUCKS %	1.3%				1.2%				2.8%				1.5%				1.3%			
TOTAL RDY TTST / HEAVY TRKS %	12.8%				11.9%				8.3%				12.3%				13.8%			
TOTAL RDY TRUCKS %	14.1%				13.1%				11.1%				13.8%				15.0%			

2012 Existing Noise Levels



2012 Existing Conditions		Sheet 1 of 1	10 Jan 2013
		F&H	
Plan View (rotated)		Project/Contract No. US 701 Bridge Replacement	
Run name: Existing Condition		TNM Version 2.5, Feb 2004	
Scale:	1000 feet	Analysis By: JWH	
Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	

F&H 10 January 2013
JWH TNM 2.5
Calculated with TNM 2.5
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: US 701 Bridge Replacement
RUN: 2012 Existing Conditions
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

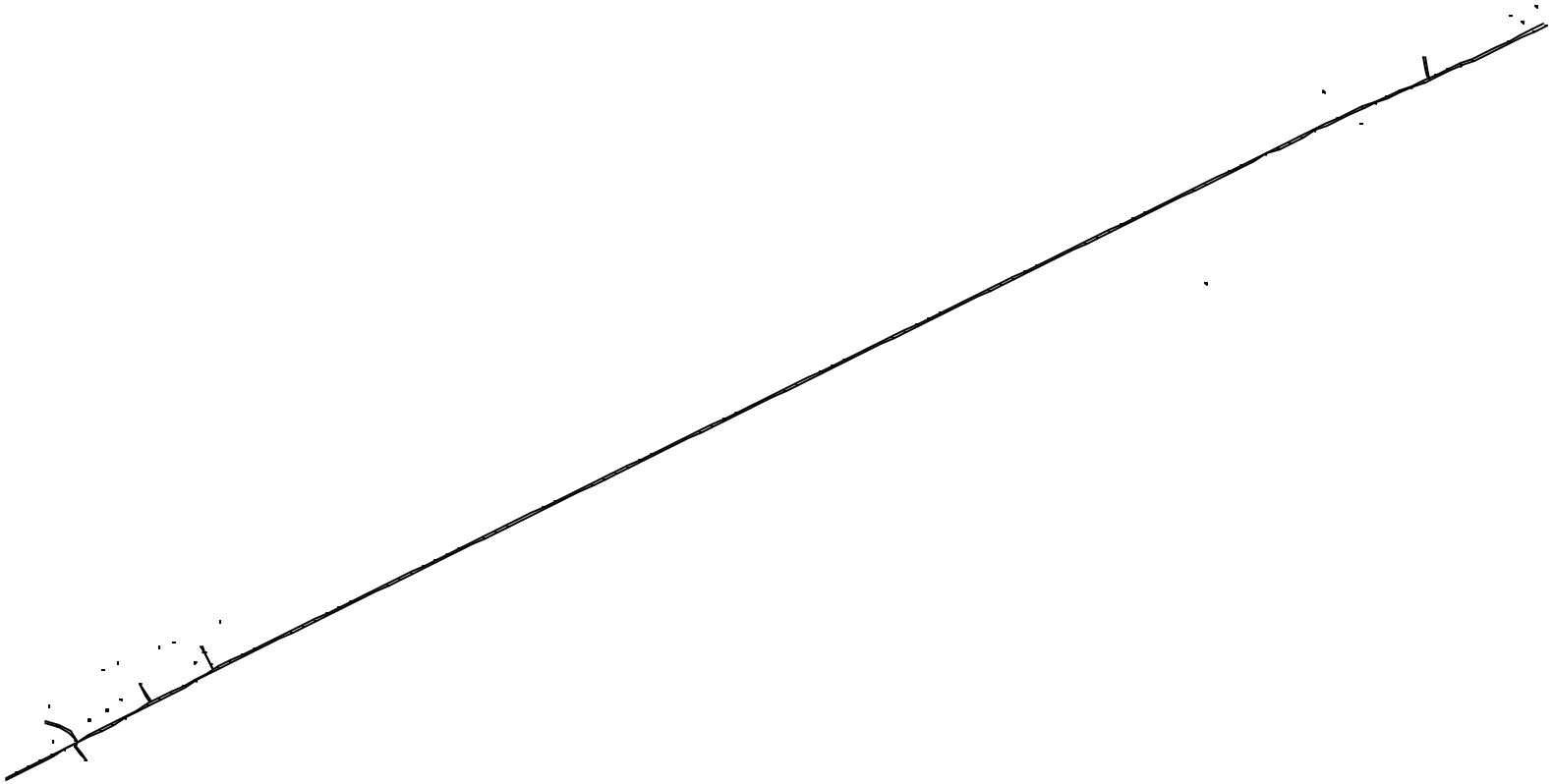
Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	With Barrier Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R1	49	1	0.0	66.5	72	66.5	15	----	66.5	0.0	8	-8.0
R2	50	1	0.0	67.0	72	67.0	15	----	67.0	0.0	8	-8.0
R3	51	1	0.0	55.8	66	55.8	15	----	55.8	0.0	8	-8.0
R4	52	1	0.0	65.4	66	65.4	15	----	65.4	0.0	8	-8.0
R5	53	1	0.0	65.1	66	65.1	15	----	65.1	0.0	8	-8.0
R6	54	1	0.0	63.8	66	63.8	15	----	63.8	0.0	8	-8.0
R7	55	1	0.0	54.8	66	54.8	15	----	54.8	0.0	8	-8.0
R8	56	1	0.0	55.1	66	55.1	15	----	55.1	0.0	8	-8.0
R9	57	1	0.0	56.3	66	56.3	15	----	56.3	0.0	8	-8.0
R10	58	1	0.0	56.6	66	56.6	15	----	56.6	0.0	8	-8.0
R11	59	1	0.0	65.7	66	65.7	15	----	65.7	0.0	8	-8.0
R12	60	1	0.0	57.6	66	57.6	15	----	57.6	0.0	8	-8.0
R13	61	1	0.0	64.8	66	64.8	15	----	64.8	0.0	8	-8.0
R14	62	1	0.0	67.7	66	67.7	15	Snd Lvl	67.7	0.0	8	-8.0
R15	63	1	0.0	59.5	66	59.5	15	----	59.5	0.0	8	-8.0
R16	64	1	0.0	63.7	72	63.7	15	----	63.7	0.0	8	-8.0
R17	65	1	0.0	63.2	66	63.2	15	----	63.2	0.0	8	-8.0
R18	66	1	0.0	65.1	66	65.1	15	----	65.1	0.0	8	-8.0
R19	67	1	0.0	61.9	66	61.9	15	----	61.9	0.0	8	-8.0
R20	68	1	0.0	66.7	66	66.7	15	Snd Lvl	66.7	0.0	8	-8.0
R21	69	1	0.0	60.9	66	60.9	15	----	60.9	0.0	8	-8.0
R22	70	1	0.0	62.6	66	62.6	15	----	62.6	0.0	8	-8.0
R23	71	1	0.0	66.1	66	66.1	15	Snd Lvl	66.1	0.0	8	-8.0
R24	72	1	0.0	65.9	66	65.9	15	----	65.9	0.0	8	-8.0

R25	73	1	0.0	63.5	66	63.5	15	----	63.5	0.0	8	-8.0
R26	74	1	0.0	53.0	66	53.0	15	----	53.0	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	26	0.0	0.0	0.0
All Impacted	3	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

2032 No-Build Noise Levels



2032 Future No Build		Sheet 1 of 1	10 Jan 2013
		F&H	
Plan View (rotated)		Project/Contract No. US 701 Bridge Replacement	
Run name: Future No-Build		TNM Version 2.5, Feb 2004	
Scale:	1000 feet	Analysis By: JWH	
Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	

F&H 10 January 2013
JWH TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: US 701 Bridge Replacement
RUN: 2032 Future No Build
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

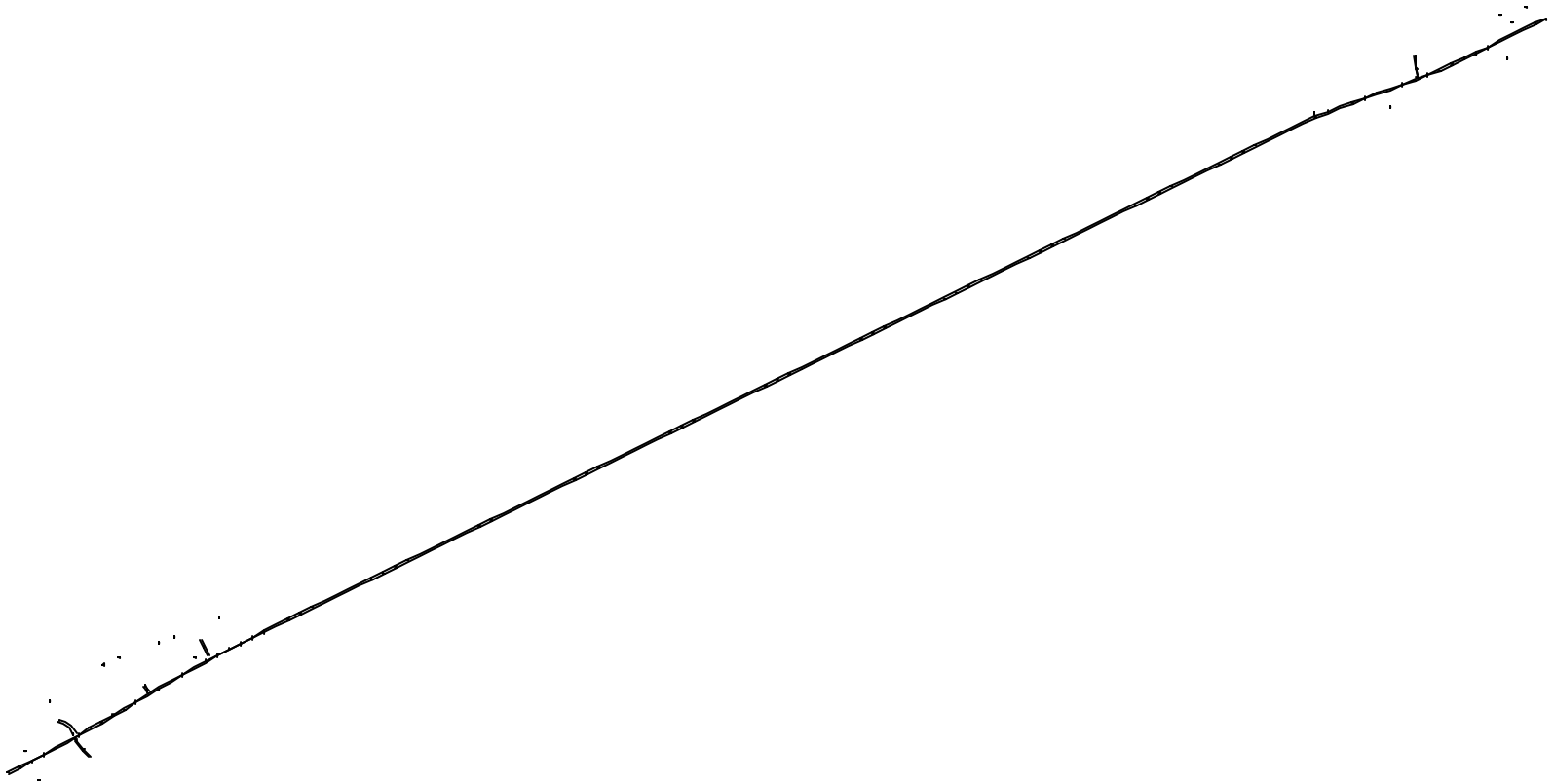
Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	With Barrier Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	68.0	72	68.0	15	----	68.0	0.0	8	-8.0
Receiver2	2	1	0.0	68.5	72	68.5	15	----	68.5	0.0	8	-8.0
Receiver3	3	1	0.0	56.7	66	56.7	15	----	56.7	0.0	8	-8.0
Receiver4	4	1	0.0	66.4	66	66.4	15	Snd Lvl	66.4	0.0	8	-8.0
Receiver5	5	1	0.0	66.2	66	66.2	15	Snd Lvl	66.2	0.0	8	-8.0
Receiver6	6	1	0.0	64.7	66	64.7	15	----	64.7	0.0	8	-8.0
Receiver7	7	1	0.0	55.7	66	55.7	15	----	55.7	0.0	8	-8.0
Receiver8	8	1	0.0	56.0	66	56.0	15	----	56.0	0.0	8	-8.0
Receiver9	9	1	0.0	57.3	66	57.3	15	----	57.3	0.0	8	-8.0
Receiver10	10	1	0.0	57.7	66	57.7	15	----	57.7	0.0	8	-8.0
Receiver11	11	1	0.0	66.9	66	66.9	15	Snd Lvl	66.9	0.0	8	-8.0
Receiver12	12	1	0.0	58.9	66	58.9	15	----	58.9	0.0	8	-8.0
Receiver13	13	1	0.0	66.7	66	66.7	15	Snd Lvl	66.7	0.0	8	-8.0
Receiver14	14	1	0.0	69.1	66	69.1	15	Snd Lvl	69.1	0.0	8	-8.0
Receiver15	15	1	0.0	61.1	66	61.1	15	----	61.1	0.0	8	-8.0
Receiver16	16	1	0.0	64.9	72	64.9	15	----	64.9	0.0	8	-8.0
Receiver17	17	1	0.0	63.7	66	63.7	15	----	63.7	0.0	8	-8.0
Receiver18	18	1	0.0	65.5	66	65.5	15	----	65.5	0.0	8	-8.0
Receiver19	19	1	0.0	62.6	66	62.6	15	----	62.6	0.0	8	-8.0
Receiver20	20	1	0.0	67.4	66	67.4	15	Snd Lvl	67.4	0.0	8	-8.0
Receiver21	21	1	0.0	61.2	66	61.2	15	----	61.2	0.0	8	-8.0
Receiver22	22	1	0.0	64.1	66	64.1	15	----	64.1	0.0	8	-8.0
Receiver23	23	1	0.0	67.4	66	67.4	15	Snd Lvl	67.4	0.0	8	-8.0
Receiver24	24	1	0.0	66.8	66	66.8	15	Snd Lvl	66.8	0.0	8	-8.0

Receiver25	25	1	0.0	64.5	66	64.5	15	----	64.5	0.0	8	-8.0
Receiver26	26	1	0.0	54.4	66	54.4	15	----	54.4	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	26	0.0	0.0	0.0
All Impacted	8	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

2032 Build Noise Levels



2032 Future Build Alternative 2		Sheet 1 of 1	10 Jan 2013
		F&H	
Plan View (rotated)		Project/Contract No. US 701 Bridge Replacement	
Run name: Alternative 2		TNM Version 2.5, Feb 2004	
Scale:	1000 feet	Analysis By: JWH	
Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	

F&H 10 January 2013
JWH TNM 2.5
Calculated with TNM 2.5

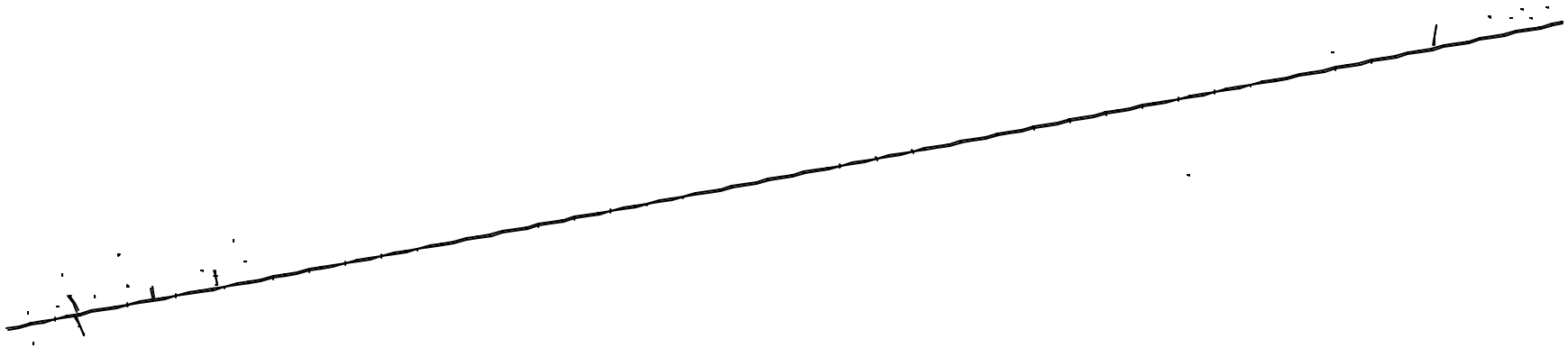
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: US 701 Bridge Replacement
RUN: 2032 Future Build Alternative 2
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	With Barrier Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Receiver1	1	1	0.0	66.9	72	66.9	15	----	66.9	0.0	8	-8.0
Receiver2	2	1	0.0	67.7	72	67.7	15	----	67.7	0.0	8	-8.0
Receiver3	3	1	0.0	56.6	66	56.6	15	----	56.6	0.0	8	-8.0
Receiver4	4	1	0.0	67.2	66	67.2	15	Snd Lvl	67.2	0.0	8	-8.0
Receiver5	5	1	0.0	68.0	66	68.0	15	Snd Lvl	68.0	0.0	8	-8.0
Receiver6	6	1	0.0	67.5	66	67.5	15	Snd Lvl	67.5	0.0	8	-8.0
Receiver7	7	1	0.0	56.4	66	56.4	15	----	56.4	0.0	8	-8.0
Receiver8	8	1	0.0	57.0	66	57.0	15	----	57.0	0.0	8	-8.0
Receiver9	9	1	0.0	58.9	66	58.9	15	----	58.9	0.0	8	-8.0
Receiver10	10	1	0.0	59.5	66	59.5	15	----	59.5	0.0	8	-8.0
Receiver11	11	1	0.0	71.5	66	71.5	15	Snd Lvl	71.5	0.0	8	-8.0
Receiver12	12	1	0.0	60.5	66	60.5	15	----	60.5	0.0	8	-8.0
Receiver13	13	1	0.0	70.7	66	70.7	15	Snd Lvl	70.7	0.0	8	-8.0
Receiver14	14	1	0.0	71.2	66	71.2	15	Snd Lvl	71.2	0.0	8	-8.0
Receiver15	15	1	0.0	62.7	66	62.7	15	----	62.7	0.0	8	-8.0
Receiver16	16	1	0.0	64.2	72	64.2	15	----	64.2	0.0	8	-8.0
Receiver17	17	1	0.0	62.7	66	62.7	15	----	62.7	0.0	8	-8.0
Receiver18	18	1	0.0	65.3	66	65.3	15	----	65.3	0.0	8	-8.0
Receiver19	19	1	0.0	62.2	66	62.2	15	----	62.2	0.0	8	-8.0
Receiver20	20	1	0.0	67.9	66	67.9	15	Snd Lvl	67.9	0.0	8	-8.0
Receiver21	21	1	0.0	63.4	66	63.4	15	----	63.4	0.0	8	-8.0
Receiver22	22	1	0.0	62.2	66	62.2	15	----	62.2	0.0	8	-8.0
Receiver23	23	1	0.0	65.1	66	65.1	15	----	65.1	0.0	8	-8.0
Receiver24	24	1	0.0	66.4	66	66.4	15	Snd Lvl	66.4	0.0	8	-8.0

Receiver25	25	1	0.0	64.4	66	64.4	15	----	64.4	0.0	8	-8.0
Receiver26	26	1	0.0	53.8	66	53.8	15	----	53.8	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	26	0.0	0.0	0.0
All Impacted	8	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0



2032 Future Build Alternative 3		Sheet 1 of 1	10 Jan 2013
		F&H	
Plan View (rotated)		Project/Contract No. US 701 Bridge Replacement	
Run name: Alternative 3		TNM Version 2.5, Feb 2004	
Scale:		Analysis By: JWH	
Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	

F&H 10 January 2013
JWH TNM 2.5
Calculated with TNM 2.5
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: US 701 Bridge Replacement
RUN: 2032 Future Build Alternative 3
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

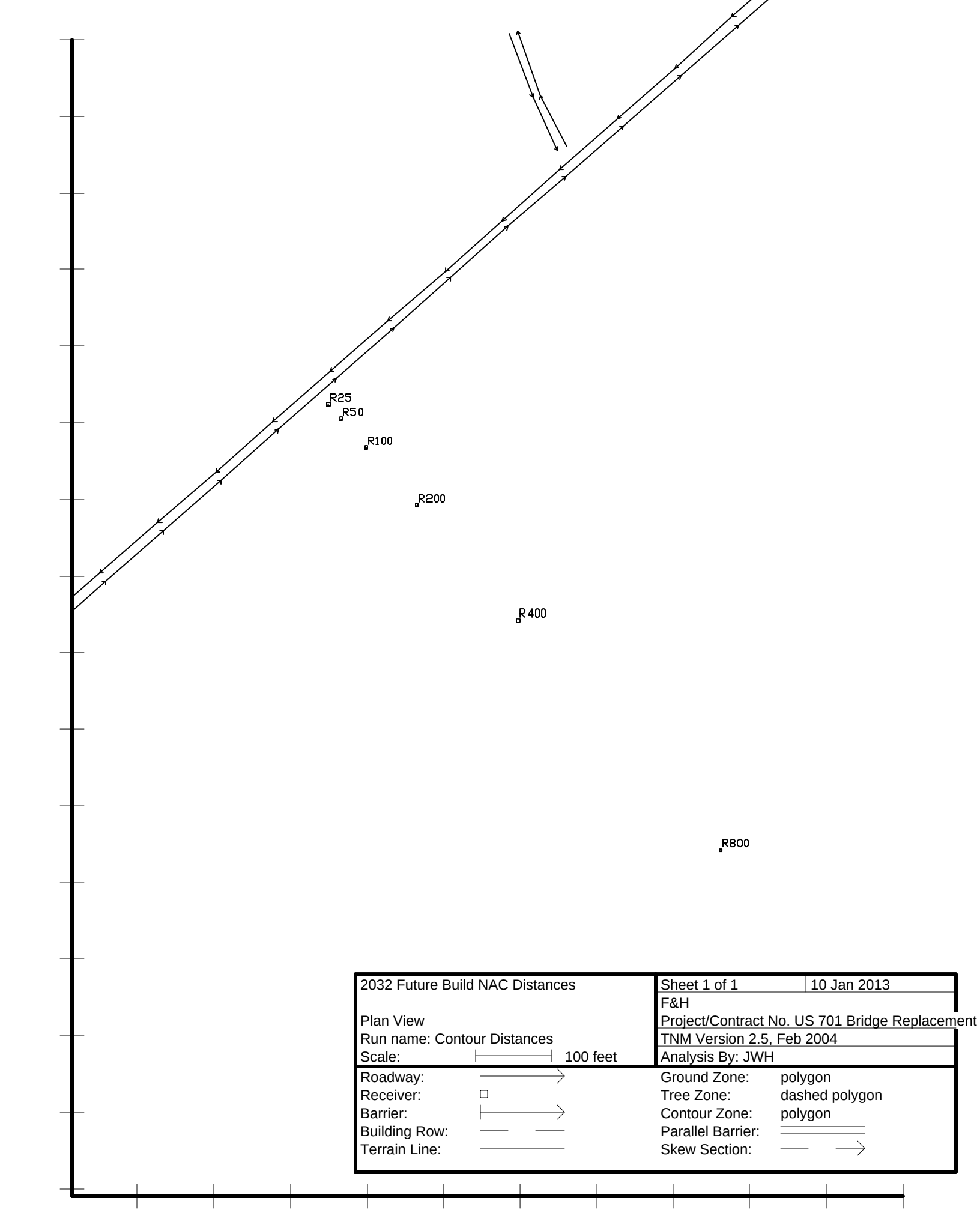
Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	With Barrier Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R1	1	1	0.0	68.3	72	68.3	15	----	68.3	0.0	8	-8.0
R2	2	1	0.0	68.5	72	68.5	15	----	68.5	0.0	8	-8.0
R3	3	1	0.0	57.1	66	57.1	15	----	57.1	0.0	8	-8.0
R4	4	1	0.0	67.0	66	67.0	15	Snd Lvl	67.0	0.0	8	-8.0
R5	5	1	0.0	66.7	66	66.7	15	Snd Lvl	66.7	0.0	8	-8.0
R6	6	1	0.0	65.5	66	65.5	15	----	65.5	0.0	8	-8.0
R7	7	1	0.0	55.8	66	55.8	15	----	55.8	0.0	8	-8.0
R8	8	1	0.0	56.0	66	56.0	15	----	56.0	0.0	8	-8.0
R9	9	1	0.0	57.0	66	57.0	15	----	57.0	0.0	8	-8.0
R10	10	1	0.0	57.5	66	57.5	15	----	57.5	0.0	8	-8.0
R11	11	1	0.0	65.2	66	65.2	15	----	65.2	0.0	8	-8.0
R12	12	1	0.0	57.9	66	57.9	15	----	57.9	0.0	8	-8.0
R13	13	1	0.0	64.2	66	64.2	15	----	64.2	0.0	8	-8.0
R14	14	1	0.0	65.0	66	65.0	15	----	65.0	0.0	8	-8.0
R15	15	1	0.0	59.6	66	59.6	15	----	59.6	0.0	8	-8.0
R16	16	1	0.0	64.9	72	64.9	15	----	64.9	0.0	8	-8.0
R17	17	1	0.0	64.2	66	64.2	15	----	64.2	0.0	8	-8.0
R18	18	1	0.0	66.6	66	66.6	15	Snd Lvl	66.6	0.0	8	-8.0
R19	19	1	0.0	62.9	66	62.9	15	----	62.9	0.0	8	-8.0
R20	20	1	0.0	68.3	66	68.3	15	Snd Lvl	68.3	0.0	8	-8.0
R21	21	1	0.0	63.2	66	63.2	15	----	63.2	0.0	8	-8.0
R22	22	1	0.0	64.4	66	64.4	15	----	64.4	0.0	8	-8.0
R23	23	1	0.0	71.6	66	71.6	15	Snd Lvl	71.6	0.0	8	-8.0
R24	24	1	0.0	69.0	66	69.0	15	Snd Lvl	69.0	0.0	8	-8.0

R25	25	1	0.0	65.6	66	65.6	15	----	65.6	0.0	8	-8.0
R26	26	1	0.0	55.5	66	55.5	15	----	55.5	0.0	8	-8.0

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	26	0.0	0.0	0.0
All Impacted	6	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Contours



2032 Future Build NAC Distances	Sheet 1 of 1 | 10 Jan 2013
	F&H
Plan View	Project/Contract No. US 701 Bridge Replacement
Run name: Contour Distances	TNM Version 2.5, Feb 2004
Scale: 100 feet	Analysis By: JWH

Roadway:		Ground Zone:	polygon
Receiver:		Tree Zone:	dashed polygon
Barrier:		Contour Zone:	polygon
Building Row:		Parallel Barrier:	
Terrain Line:		Skew Section:	

INPUTS FOR FUTURE NOISE LEVELS 2032 Build			NOISE	DISTANCE
US 701 Bridge Replacement Georgetown/Horry Counties			CONTOURS	TO CL (Ft)
Distance From Proposed US 701 EOP	PRD # 1	PRD # 2	72	76
25	77.3	0.0		-
50	73.8	0.0	67	135
100	68.7	0.0	66	151
200	63	0.0		
400	56.7	0.0	71	85
800	50.4	0.0	DESIRED	
1600	0	0.0	60	290
R0	12.0	0.0	dBA ^	

R0= Distance from Centerline to Edge of Pavement

F&H 10 January 2013
JWH TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: US 701 Bridge Replacement
RUN: 2032 Future Build Alternative 3
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
R25	29	1	0.0	77.3	66	77.3	10	Snd Lvl	77.3	0.0	8	-8.0
R50	30	1	0.0	73.8	66	73.8	10	Snd Lvl	73.8	0.0	8	-8.0
R100	31	1	0.0	68.7	66	68.7	10	Snd Lvl	68.7	0.0	8	-8.0
R200	32	1	0.0	63.0	66	63.0	10	----	63.0	0.0	8	-8.0
R400	33	1	0.0	56.7	66	56.7	10	----	56.7	0.0	8	-8.0
R800	34	1	0.0	50.4	66	50.4	10	----	50.4	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	6	0.0	0.0	0.0
All Impacted	3	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

TNM Validations

Florence & Hutcheson
JWH
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: US 701 Bridge Replacement
RUN: Validation Site 1
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

10 January 2013
TNM 2.5
Calculated with TNM 2.5

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	With Barrier Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Site 1	1	1	66.9	65.4	66	-1.5	15	----	65.4	0.0	8	-8.0
Site 2	2	1	61.6	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 3	3	1	62.0	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 4	4	1	58.1	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 5	5	1	49.8	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	5	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Florence & Hutcheson
JWH
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: US 701 Bridge Replacement
RUN: Validation Site 2
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

10 January 2013
TNM 2.5
Calculated with TNM 2.5

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h		Increase over existing		With Barrier Type Impact	With Barrier Calculated LAeq1h	Noise Reduction		
				Calculated	Crit'n	Calculated	Crit'n Sub'l Inc			Calculated	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Site 1	1	1	66.9	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 2	2	1	61.6	59.2	66	-2.4	15	----	59.2	0.0	8	-8.0
Site 3	3	1	62.0	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 4	4	1	58.1	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 5	5	1	49.8	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	5	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Florence & Hutcheson
JWH
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: US 701 Bridge Replacement
RUN: Validation Site 3
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

10 January 2013
TNM 2.5
Calculated with TNM 2.5

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Site 1	1	1	66.9	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 2	2	1	61.6	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 3	3	1	62.0	59.0	66	-3.0	15	----	59.0	0.0	8	-8.0
Site 4	4	1	58.1	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 5	5	1	49.8	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	5	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Florence & Hutcheson
JWH
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: US 701 Bridge Replacement
RUN: Validation Site 4
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

10 January 2013
TNM 2.5
Calculated with TNM 2.5

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	With Barrier Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Site 1	1	1	66.9	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 2	2	1	61.6	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 3	3	1	62.0	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 4	4	1	58.1	60.2	66	2.1	15	----	60.2	0.0	8	-8.0
Site 5	5	1	49.8	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	5	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0

Florence & Hutcheson
JWH
RESULTS: SOUND LEVELS
PROJECT/CONTRACT: US 701 Bridge Replacement
RUN: Validation Site 5
BARRIER DESIGN: INPUT HEIGHTS
ATMOSPHERICS: 68 deg F, 50% RH

10 January 2013
TNM 2.5
Calculated with TNM 2.5

Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.

Receiver Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Increase over existing Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Noise Reduction Goal	Noise Reduction Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Site 1	1	1	66.9	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 2	2	1	61.6	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 3	3	1	62.0	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 4	4	1	58.1	0.0	66	0.0	15	inactive	0.0	0.0	8	0.0
Site 5	5	1	49.8	48.0	66	-1.8	15	----	48.0	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Noise Reduction Avg	Noise Reduction Max
		dB	dB	dB
All Selected	5	0.0	0.0	0.0
All Impacted	0	0.0	0.0	0.0
All that meet NR Goal	0	0.0	0.0	0.0