FDOT
District Seven

US 301 (Gall Blvd.) Project Development & Environment Study

from S. of Proposed SR 56 to S. of SR 39 (Buchman Highway)

Pasco County, Florida

Work Program Item Segment Number: 416564-1

Final Noise Study Report

June 2017

Addendum to the Project File

US 301 (Gall Boulevard) from South of Proposed SR 56 to South of SR 39 (Buchman Highway)

The limits of the original Environmental Assessment with a Finding of No Significant Impact (EA/FONSI), approved 1/25/1993, included SR 54 (currently SR 56) from Cypress Creek Road to US 301 and extended northward along US 301 (Gall Boulevard) to Zephyrhills East By-pass/Chancey Road. During the Re-evaluation of this segment of the EA/FONSI (from SR 56 to Chancey Road), including the Chancey Road/US 301 (Gall Boulevard) intersection, the limit was extended to the north from Chancey Road to SR 39 (Buchman Highway), a total distance of 0.4 mile. Project documents refer to this 0.4 mile extension as the second segment associated with a new Type 2 Categorical Exclusion (CE).

During a meeting held on September 26, 2017, District 7 in coordination with the Office of Environmental Management, agreed to include the evaluation of the 0.4 mile extension with the Re-evaluation of the EA/FONSI. This reduces confusion to the public and sets logical project termini. All supporting environmental and engineering documents have evaluated the limits of the segment being advanced as part of the EA/FONSI Re-evaluation, as well as the 0.4 mile extension. It should be noted that the inclusion of the 0.4 mile extension does not change the outcome of the analysis conducted.

FINAL

NOISE STUDY REPORT (NSR)
PROJECT DEVELOPMENT AND ENVIRONMENT (PD&E) STUDY
US 301 (GALL BOULEVARD) FROM S. OF PROPOSED SR 56 TO S. OF SR 39 (PAUL BUCHMAN HIGHWAY)
PASCO COUNTY, FLORIDA

Work Program Item Segment Number: 416564-1

Prepared for:

Florida Department of Transportation
District Seven
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The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. §327 and a Memorandum of Understanding dated December 14, 2016 and executed by the Federal Highway Administration and FDOT.

June 2017

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ACRONYMS AND ABBREVIATIONS

AADT	Annual Average Daily Traffic
CCC	Chairs Coordinating Committee
CE	Categorical Exclusion
CFR	Code of Federal Regulations
dB(A)	A-weighted decibels
EA/FONSI	Environmental Assessment/Finding of No Significant Impact
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FY	Fiscal Year
HCM	Highway Capacity Manual
Leq(h)	Hourly Equivalent Noise Levels
LOS	Level of Service
MP	Mile Post
mph	Miles Per Hour
MPO	Metropolitan Planning Organization
NAC	Noise Abatement Criteria
NSR	Noise Study Report
PCPT	Pasco County Public Transportation
PD&E	Project Development & Environment
PPSR	Preliminary Pond Siting Report
ROW	Right-of-Way
SE	Socioeconomic
SLM	Sound Level Meter
SR	State Road
TAZ	Traffic Analysis Zones
TBRPM-ML	Tampa Bay Regional Planning Model for Managed Lanes
TNM	Traffic Noise Model
TSP	Transit Signal Priority
vpd	Vehicles Per Day

EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT) has proposed improvements to approximately 2 miles of US 301 (Gall Boulevard) in Pasco County to accommodate present and future traffic demands. These improvements include widening the existing two-lane road to four lanes with a median. The overall project limits begin south of the proposed connection of State Road (SR) 56 on the south (approximately mile post 1.395) to south of the proposed future realigned SR 39 (Buchman Highway) on the north (mile post 3.505).

This Final Noise Study Report (NSR) was prepared as part of the PD&E Study for the project as required by the FDOT's PD&E Manual, Part 2, Chapter 17 (May 4, 2011) and in accordance with the Title 23, Part 772 of the Code of Federal Regulations (23 CFR 772)- Procedures for Abatement of Highway Traffic Noise and Construction Noise (July 13, 2010).

One hundred twenty-one noise sensitive receptors (i.e., discrete representative locations on a property that has noise sensitive land uses) were evaluated within eight noise sensitive areas. One hundred eighteen receptors were evaluated on residential properties, two at residential community pools and one at a residential community shuffleboard court.

Of the 121 evaluated receptors, 41 are predicted to be impacted by traffic noise with existing conditions and in the future without the proposed improvements. With the proposed improvements, 70 of the 121 receptors are predicted to be impacted by traffic noise. Of the 70 receptors predicted to be impacted with the proposed improvements, 69 were evaluated on residential properties and one was evaluated at the shuffleboard court.

Traffic management measures, modifications to the roadway alignment, buffer zones and noise barriers were considered as abatement measures. With the exception of the proposed noise barriers for the impacted properties within the following areas, the noise abatement measures were not determined to be both feasible and reasonable.

- Barrier 1: Residences at the Palm View Gardens RV Park (Receptors 4-59, 64, 66, 72, 73, and 77)

- Barrier 3: Residences at the Shady Oaks Mobile Home Park (Receptors 86-93)

The estimated costs to construct the noise barriers ranges from $212,100 to $917,400 depending on barrier length and height.

The FDOT is committed to the construction of noise barriers at the two locations above, contingent upon the following:

- Detailed noise analysis during the final design process supports the need for, and the feasibility and reasonableness of providing the barriers as abatement

- The detailed analysis demonstrates that the cost of the noise barrier will not exceed the cost effective limit

- The residents/property owners benefitted by the noise barrier desire that a noise barrier be constructed

- All safety and engineering conflicts or issues related to construction of a noise barrier are resolved

Section 1.0
PROJECT DESCRIPTION

The Florida Department of Transportation (FDOT) has proposed improvements to approximately 2 miles of US 301 (Gall Boulevard) in Pasco County to accommodate present and future traffic demands. These improvements include widening the existing two-lane road to four lanes with a median. The overall project limits begin south of the proposed connection of State Road (SR) 56 on the south (approximately mile post 1.395) to south of the proposed future realigned SR 39 (Buchman Highway) on the north (mile post 3.505).

The project consists of two segments. The first segment begins south of the planned US 301/SR 56 intersection and ends at Chancey Road; an approximate length of this segment is 1.7 miles. This segment is part of a PD&E Design Change Reevaluation of the original SR 54 Environmental Assessment/Finding of No Significant Impact (EA/FONSI). The second segment begins at Chancey Road and ends south of SR 39 (Buchman Highway) and includes the US 301/Chancey Road intersection; an approximate length of this segment is 0.4 miles. It terminates south of where the proposed SR 39 realignment will tie into existing US 301 (Gall Boulevard), south of the existing SR 39/US 301 (Gall Boulevard intersection. The second segment of the project is associated with a new Type 2 Categorical Exclusion (CE). The project location map is included as **Figure 1-1**.

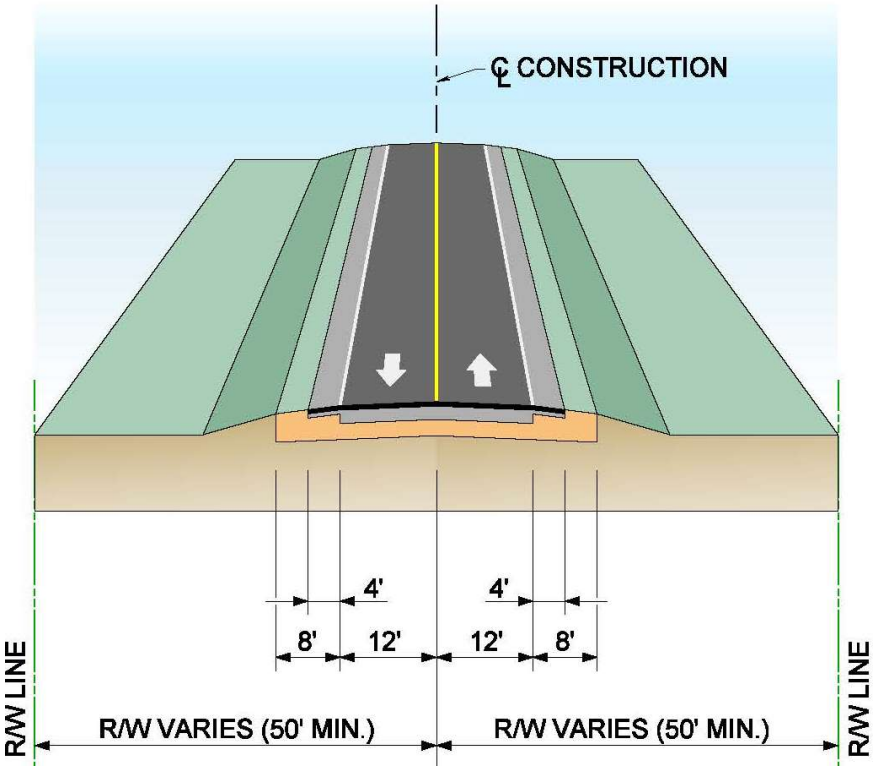
1.1 EXISTING CONDITIONS

US 301 (Gall Boulevard) is functionally classified as a *Rural Principal Arterial - Other* from MP 1.395 (project southern termini) to MP 2.452 (just north of Shamrock Place), for a distance of 1.057 mile. From MP 2.452 (just north of Shamrock Place) to MP 3.505 (project northern termini), the corridor is functionally classified as an *Urban Principal Arterial – Other*, for a distance of 1.053 mile. US 301 (Gall Boulevard) is designated as Access Class 3 within the study limits.

The existing US 301 (Gall Boulevard) corridor within the study area is currently a two-lane undivided facility with 12-foot travel lanes and 8-foot outside shoulders (four feet paved). From the south, the existing posted speed limit is 60 miles per hour (mph) up to MP 2.240, 55 mph from MP 2.240 to MP 3.067 (Chancey Road), and 45 mph north of MP 3.067 (Chancey Road). The existing right-of-way (ROW) width is approximately 100 feet. **Figure 1-2** depicts the existing roadway typical section.

FIGURE 1-1
PROJECT LOCATION MAP

FIGURE 1-2
EXISTING TYPICAL SECTION



Source: URS, 2015.

1.2 RECOMMENDED IMPROVEMENTS

The Recommended Build Alternative is comprised of two typical sections. The first typical section, a suburban section, begins south of the future SR 56 intersection and ends at Chancey Road. The second typical section, an urban section, begins at Chancey Road and ends just south of the proposed realigned SR 39 (Buchman Highway) and US 301 (Gall Boulevard) intersection.

The suburban typical section, beginning south of the future SR 56 intersection and ending at Chancey Road will have four 12-foot lanes, a 54-foot median, two 7-foot bike lanes/paved shoulders, and Type E curb and gutter; as well as a 5-foot sidewalk along the eastern ROW line and a 10-foot shared use path along the western ROW line, as shown in **Figure 1-3**. This typical section is expandable to six lanes by adding two lanes to the inside reducing the overall median width to 30 feet. The design speed is 50 mph.

The urban typical section, beginning at Chancey Road and ending just south of the proposed realigned SR 39 (Buchman Highway) and US 301 (Gall Boulevard) intersection, is shown in **Figure 1-4**. The typical section consists of four 11-foot lanes, a variable width median, 7-

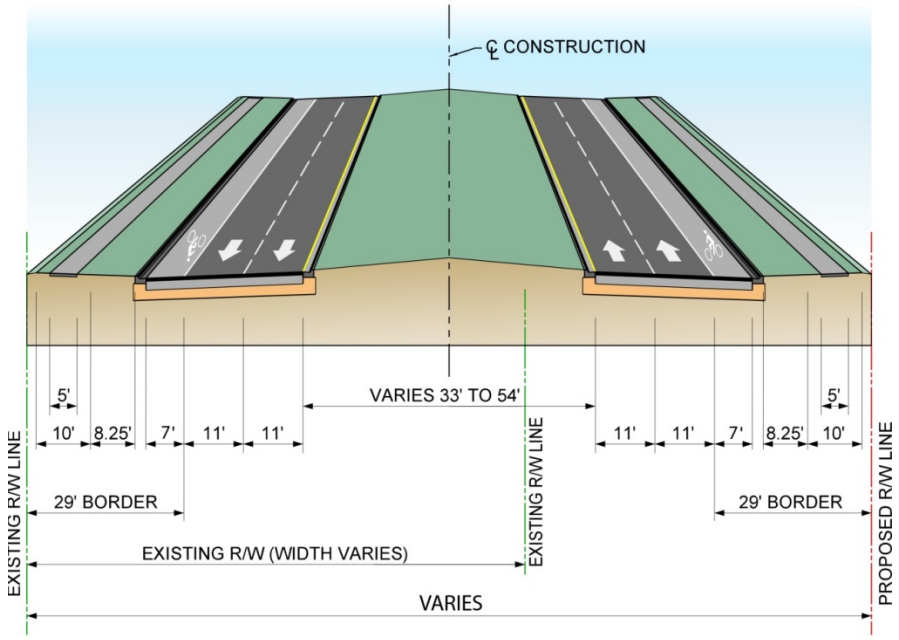
foot bike lanes/paved shoulders, and Type E curb and gutter; as well as 5-foot sidewalks. The design speed is 45 mph.

Both typical sections will hold the existing western ROW line and expand the project corridor to the east. In addition to widening US 301 (Gall Boulevard) to four lanes, the Recommended Build Alternative includes intersection improvements at the following intersections:

- US 301 (Gall Boulevard) and proposed SR 56
- US 301 (Gall Boulevard) and Chancey Road

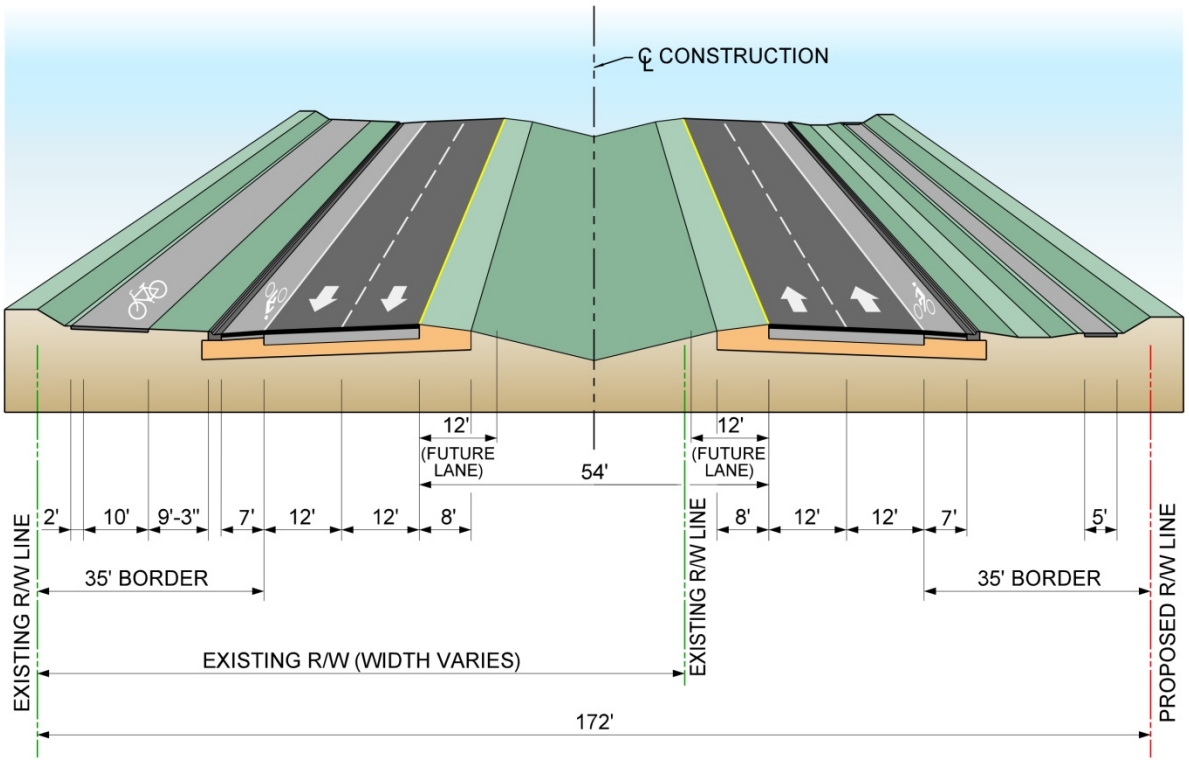
The Recommended Build Alternative also includes stormwater management facilities and floodplain compensation sites.

FIGURE 1-3
RECOMMENDED BUILD ALTERNATIVE SUBURBAN TYPICAL SECTION
S. OF PROPOSED SR 56 TO CHANCEY ROAD



Source: URS, 2015.

FIGURE 1-4
RECOMMENDED BUILD ALTERNATIVE URBAN TYPICAL SECTION
CHANCEY ROAD TO S. OF SR 39 (BUCHMAN HIGHWAY)



Source: URS, 2015.

Section 2.0
PROJECT PURPOSE AND NEED

2.1 REGIONAL CONNECTIVITY

US 301 (Gall Boulevard) is a major north-south arterial located in East Pasco County. It is a regional truck route and provides north-south access to distribution centers. US 301 (Gall Boulevard) is an important connection to the regional and statewide transportation network that links the Tampa Bay region to the remainder of the state and the nation. US 301 (Gall Boulevard) was identified as a regional roadway by the West Central Florida Metropolitan Planning Organization (MPO) Chairs Coordinating Committee (CCC) and is included in the Regional Roadway Network. As shown in Section 2.5, the Design Year (2040) expected Annual Average Daily Traffic (AADT) is 39,500 vehicles per day (vpd). The measured percentage of daily truck traffic is 15.10 percent. Therefore, the projected truck traffic on US 301 (Gall Boulevard) is approximately 6,000 trucks per day in the Design Year (2040).

2.2 PLAN CONSISTENCY

The widening of US 301 (Gall Boulevard) from proposed SR 56 to the proposed realignment of SR 39 (Buchman Highway) is identified as a 'Cost-Affordable Capital Improvement' (construction 2031 – 2040) in the *Pasco County MPO Mobility 2040*. The project has also been identified on the latest *Pasco County Transportation Capital Improvement Projects (2014-2028)* map. It should additionally be noted that $2.5 million is programmed for the design phase in FY 2018 within the FDOT Five Year Work Program. Further, the project is reflected on *Map 7-22: Future Number of Lanes (2035)* in the Transportation Element of the adopted *Pasco County Comprehensive Plan*.

2.3 EMERGENCY EVACUATION

US 301 (Gall Boulevard) is designated as a parallel evacuation route to I-75 for the length of Pasco County.

2.4 FUTURE POPULATION AND EMPLOYMENT GROWTH

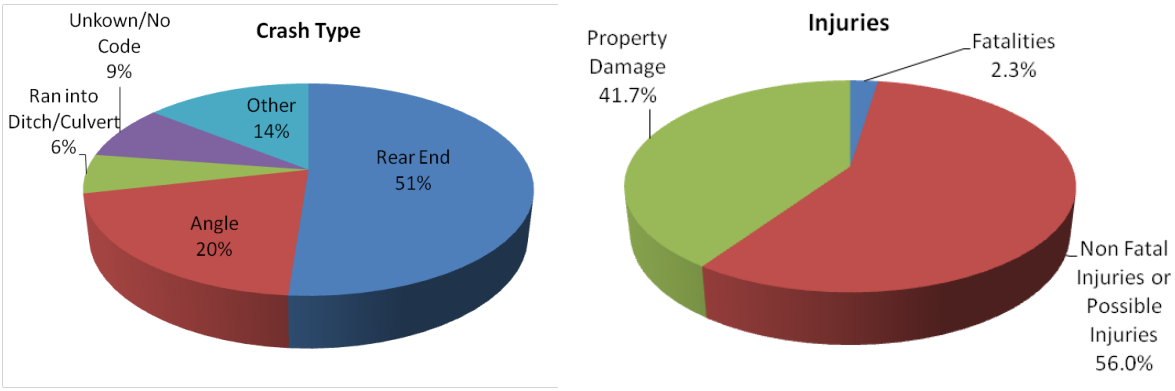
Socioeconomic (SE) data from the Tampa Bay Regional Planning Model for Managed Lanes (TBRPM-ML) "Starter Projects" Traffic Analysis Zones (TAZs) located within one quarter-mile of the US 301 (Gall Boulevard) project corridor indicates that the study area's population is projected to grow from 4,973 in year 2006 to 13,638 in year 2035 (an increase of 8,665). Employment is also expected to increase during the same period from 1,337 to 5,392 (an increase of 4,055).

2.5 FUTURE TRAFFIC

In 2013, US 301 (Gall Boulevard) from Chancey Road to SR 39 (Buchman Highway) carried 12,500 vpd. By the Design Year (2040), segments within this section of US 301 (Gall Boulevard) are expected to reach a volume of 39,500 vpd. The roadway segment was analyzed using the FDOT's HIGHPLAN software which incorporates methodologies contained within the 2010 Highway Capacity Manual (HCM) 2010. Based on this analysis, the existing level of service (LOS) is C. Without the recommended improvement, the operating conditions will continue to deteriorate to a failing LOS of F. With the recommended improvement to widen this roadway to four lanes and other recommended improvements, the LOS for the Design Year (2040) is projected to be C, with one exception in the northbound PM peak hour where the LOS will be D.

2.6 SAFETY

For the five-year period (2009-2013), there were 84 crashes reported along the corridor with an average of 16.8 crashes per year. Rear-end collisions were the most common crash type recorded for the corridor with 43 or 51.2 percent of total crashes, followed by 17 angle collisions (including two left-turn collisions) or 20.2 percent of the total crashes. Out of the 84 total crashes, 47 or 56.0 percent were crashes with injuries and 35 or 41.7 percent were crashes with property damage only.



Source: FDOT Unified Base Map Repository, 2014.

There were two fatal crashes recorded along the US 301 (Gall Boulevard) corridor (2.3 percent). Further, four out of 84 total crashes (4.8 percent) were related to medium or heavy trucks. Among the truck-related incidents, three crashes involved injuries.

Safety within the US 301 (Gall Boulevard) corridor will be enhanced due to the additional capacity that will be provided. Roadway congestion will be reduced, thereby decreasing potential conflicts with other vehicles.

2.7 TRANSIT

The existing Pasco County Public Transportation (PCPT) bus Route 30 terminates at Tucker Road just north of the study area, and serves activity centers to the north including downtown Zephyrhills and Dade City from 4:45 am to 7:45 pm. In addition, this segment of US 301 (Gall Boulevard) to downtown Zephyrhills is part of the proposed SR 54 Cross County Express Route that is included in the *Pasco County MPO Mobility 2040 Cost Affordable Transit Plan* for implementation in 2031. Also planned is a Major Transit Station/Stop and Transit Signal Priority (TSP) along the corridor.

2.8 ACCESS TO INTERMODAL FACILITIES AND FREIGHT ACTIVITY CENTERS

Access to intermodal facilities and movement of goods and freight are important considerations in the development of the Pasco County transportation system. US 301 (Gall Boulevard) is a regional truck route. The Zephyrhills Airport Industrial Area, a designated freight activity center, is located just northeast of the northern terminus of the study area. This industrial area has five major manufacturing facilities with approximately 700,000 square feet of industrial space. These companies generate approximately 200 trucks per day. Improvements to US 301 (Gall Boulevard) will enhance access to activity centers in the area and the movement of goods and freight in eastern Pasco County.

2.9 RELIEF TO PARALLEL FACILITIES

The planned widening of US 301 (Gall Boulevard) between Chancey Road and the proposed realigned SR 39 (Buchman Highway) intersection is part of an overall plan to improve access and relieve traffic congestion on such parallel facilities as I-75, the Suncoast Parkway, and US 41. Safety, emergency access, and truck access will all be enhanced by this improvement.

2.10 BIKEWAYS AND SIDEWALKS

Integration of bicycle facilities and sidewalks are considered on all Pasco County and State road projects including new roads, widening of existing roads, and the resurfacing of State roads. The project segment from south of proposed SR 56 to Chancey Road includes 7-foot-wide paved shoulders/bike lanes to allow for bicycle safety, a 10-foot shared use path on the west side of US 301 (Gall Boulevard), and a 5-foot sidewalk on the east side of US 301 (Gall Boulevard). The project segment north of Chancey Road includes 7-foot-wide paved shoulders/bike lanes; 5-foot sidewalks are proposed on both sides of the project segment in lieu of the shared use path.

Section 3.0
ALTERNATIVES CONSIDERED

The US 301 (Gall Boulevard) PD&E study considered two alternatives, as described further below.

3.1 NO BUILD ALTERNATIVE

The No-Build Alternative assumes that traffic volumes will continue to increase with no changes to US 301 within the study area. The No-Build Alternative requires no additional expenditure of funds and has no environmental impacts. Although the No-Build Alternative does not meet the purpose and need and offers no future operational improvements, it will remain a viable alternative throughout the study process and serve as the basis of comparison for the build alternatives.

3.2 BUILD ALTERNATIVE

The Build Alternative consists of widening the existing two-lane road to four lanes with a median and is comprised of two typical sections. The first typical section, a suburban section, begins south of the future SR 56 intersection and ends at Chancey Road. The second typical section, an urban section, begins at Chancey Road and ends just south of the proposed realigned SR 39 (Buchman Highway) and US 301 (Gall Boulevard) intersection.

The suburban typical section, beginning south of the future SR 56 intersection and ending at Chancey Road will have four 12-foot lanes, a 54-foot median, two 7-foot bike lanes/paved shoulders, and Type E curb and gutter; as well as a 5-foot sidewalk along the eastern ROW line and a 10-foot shared use path along the western ROW line, as shown in Figure 1-3. This typical section is expandable to six lanes by adding two lanes to the inside reducing the overall median width to 30 feet. The design speed is 50 mph.

The urban typical section, beginning at Chancey Road and ending just south of the proposed realigned SR 39 (Buchman Highway) and US 301 (Gall Boulevard) intersection, is shown in Figure 1-4. The typical section consists of four 11-foot lanes, a variable width median, 7-foot bike lanes/paved shoulders, and Type E curb and gutter; as well as 5-foot sidewalks. This typical section will serve as a transition between the ultimate 6-lane section of US 301 (Gall Boulevard) and the ultimate 4-lane section of US 301 (Gall Boulevard). The design speed is 45 mph.

Both typical sections will hold the existing western ROW line and expand the project corridor to the east. In addition to widening US 301 (Gall Boulevard) to four lanes, the Build Alternative includes intersection improvements at the following intersections:

- US 301 (Gall Boulevard) and proposed SR 56
- US 301 (Gall Boulevard) and Chancey Road

The Build Alternative also includes stormwater management facilities and floodplain compensation sites.

Section 4.0
METHODOLOGY

This traffic noise analysis has been prepared in accordance with all applicable guidelines as stated within both 23 CFR 772 and Part 2, Chapter 17 of the FDOT PD&E Manual. As such, the analysis was performed using the Federal Highway Administration (FHWA)'s Traffic Noise Model (TNM, Version 2.5). Use of the TNM is required when evaluating the potential for traffic noise impacts during the design year of roadway improvement projects for which the regulations, policies and guidelines with 23 CFR 772 and Part 2, Chapter 17 of the PD&E Manual are applicable.

For properties with uses other than residential, the methodologies described in the FDOT's *A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations* was also used. Special land uses include community pools and recreational areas.

4.1 NOISE METRICS

The predicted traffic noise levels presented in this report are expressed in decibels on the "A"-weighted scale (dB(A)). This scale most closely approximates the response characteristics of the human ear to traffic noise. All traffic noise levels are reported as equivalent levels (Leq(h)). Levels reported as Leq(h) are equivalent steady-state sound levels that contain the same acoustic energy as time-varying sound levels over a period of one hour.

4.2 TRAFFIC DATA

Noise levels are low when traffic volumes are low and operating conditions are good (LOS A or B) and when traffic is so congested that movement is slow (LOS D, E, or F). Generally, the maximum hourly noise level occurs between these two conditions (i.e., LOS C).

The traffic volumes used in the analysis were either the roadway design LOS C volume or the forecast demand volume, whichever was less, so that the predicted traffic noise levels with the improvements to US 301 (Gall Boulevard) represent the maximum hourly noise level during the project's design year. The Existing (year 2013), Future No-Build (year 2040) and Future Build (year 2040) traffic data used in the analysis are provided in **Appendix A** of this Final Noise Study Report (NSR).

4.3 NOISE ABATEMENT CRITERIA

For the purpose of evaluating traffic noise, the FHWA established Noise Abatement Criteria (NAC). As shown in Table 4-1, these criteria vary according to a properties' activity

category (i.e., land use). For comparative purposes, typical noise levels for common indoor and outdoor activities are provided in Table 4-2.

When predicted traffic noise levels "approach" or exceed the NAC, or when predicted future noise levels increase substantially from existing levels, the FHWA requires that noise abatement measures be considered. FDOT defines the word "approach" to mean within 1 dB(A) of the NAC. The FDOT's NAC are also shown in Table 4-1.

FHWA regulations also state that a traffic noise impact is predicted to occur when predicted traffic noise levels with a proposed improvement are considered substantial when compared to existing levels. The FDOT considers a substantial increase to be when traffic noise levels are predicted to increase 15 dB(A) or more above existing conditions as a direct result of a transportation improvement project.

4.4 NOISE ABATEMENT MEASURES

When traffic noise impacts are predicted, noise abatement measures are considered for the impacted properties and the feasibility and reasonableness of providing an abatement measure are considered. Feasibility factors are related to the acoustical and engineering properties of an abatement measure while reasonableness factors relate to the social, economic and environmental properties of a measure.

The following subsections of this NSR present and discuss four methods of abating traffic noise impacts.

TABLE 4-1
FHWA/FDOT NOISE ABATEMENT CRITERIA

ACTIVITY CATEGORY	DESCRIPTION OF ACTIVITY CATEGORY	ACTIVITY Leq(h)1	
		FHWA	FDOT
A	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.	57 (Exterior)	56 (Exterior)
B[2]	Residential	67 (Exterior)	66 (Exterior)
C[2]	Active sports 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, recreational areas, Section 4(f) sites, schools, television studios, trails and trail crossings.	67 (Exterior)	66 (Exterior)
D	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.	52 (Interior)	51 (Interior)

TABLE 4-1 (continued)
FHWA/FDOT NOISE ABATEMENT CRITERIA

ACTIVITY CATEGORY	DESCRIPTION OF ACTIVITY CATEGORY	ACTIVITY Leq(h)1	
		FHWA	FDOT
E[2]	Hotels, motels, offices, restaurants/bars and other developed lands, properties or activities not included in A-D or F.	72 (Exterior)	71 (Exterior)
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.	--	--

Sources: Table 1 of 23 CFR Part 772 and Table 17.1 of Chapter 17 of the FDOT's PD&E Manual (dated 5-24-11).
[1] The Leq(h) activity criteria values are for impact determination only, and are not design standards for noise abatement measures.
[2] Includes undeveloped lands permitted for this activity category.
Note: Noise abatement considerations are also warranted when a substantial noise increase is predicted to occur (i.e., when the predicted future traffic noise level with an improvement project is equal to or greater than 15 dB(A) when compared to the existing traffic noise level.

TABLE 4-2
TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	NOISE LEVEL dB(A)	COMMON INDOOR ACTIVITIES
	110	Rock band
Jet flyover at 1,000 feet		
	100	
Gas lawnmower at 3 feet		
	90	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80	Garbage disposal at 3 feet
Noisy urban area daytime		
Gas lawnmower at 100 feet	**70**	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	**60**	
		Large business office
Quiet urban daytime	**50**	Dishwasher in next room
Quiet urban nighttime	**40**	Theater, large conference room (background)
Quiet suburban nighttime		
	30	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20	
		Broadcast/recording studio
	10	
	0	

Source: KBE, 2015.

4.4.1 Traffic Management

Some types of traffic management reduce noise levels. For example, trucks can be prohibited from certain streets and roads, or be permitted to only use certain streets and roads during daylight hours. The timing of traffic lights can also be changed to smooth out the flow of traffic and eliminate the need for frequent stops and starts. Speed limits can also be reduced.

4.4.2 Alignment Modifications

Modifying the horizontal and/or vertical alignment of a roadway can also be an effective traffic noise mitigation measure. When the horizontal alignment is shifted (i.e., moved) away from a noise sensitive property or when the vertical alignment is shifted below (i.e., placing the roadway below the elevation of a noise sensitive land use) or above a noise sensitive property.

4.4.3 Buffer Zones

Providing a buffer between a roadway and noise-sensitive land uses is an abatement measure that can minimize/eliminate noise impacts. To abate traffic noise at an existing noise sensitive land use, the property will be acquired to create a buffer zone. Buffer zones can also be used to eliminate the potential for new noise sensitive land uses to be impacted by traffic noise. For this purpose, and to encourage use of this abatement measure through local land use planning, noise contours have been developed and are further discussed in Section 5.0 of this NSR.

4.4.4 Noise Barriers

The most common type of noise abatement measure is construction of a noise barrier. Noise barriers have the potential to reduce traffic noise levels by blocking the sound path between the motor vehicles on the roadway (the source) and the noise-sensitive land uses adjacent to the roadway.

In order to effectively reduce traffic noise, a noise barrier must be relatively long, continuous (without intermittent openings) and sufficiently tall. For a noise barrier to be considered a potential abatement measure the barrier must also provide the following noise reduction requirements:

- Minimum Noise Reduction Requirements - A barrier must provide at least a 5 dB(A) reduction in traffic noise for two or more impacted noise-sensitive receptors and also provide at least a 7 dB(A) reduction (i.e., the FDOT's noise reduction design goal) for at least one impacted receptor. Receptors are discrete representative locations on a property that has noise sensitive land uses (see Table 4-1).

The cost of a noise barrier must also be reasonable. For this purpose, the FDOT established the following cost effective limit:

- Cost Effective Limit – At a cost of $30 per square foot, a barrier should not cost more than $42,000 per benefited noise sensitive receptor (a benefited receptor is one that receives at least a 5 dB(A) reduction in noise from a mitigation measure). For special land uses (e.g., the outdoor eating area of a restaurant), the cost of a barrier is based on the number of people using the impacted and benefitted area.

If the results of the preliminary analysis indicate that a noise barrier will provide the required reduction in traffic noise at a cost at or below the cost effective limit, additional factors are then considered. These factors relate to barrier design and construction (i.e., given site-specific details, can a barrier actually be constructed), safety, access to and from adjacent properties, ROW requirements, maintenance and impacts on utilities and drainage amongst other factors. The viewpoint of the impacted property owners (and renters if applicable) who may, or may not, desire a noise barrier, is also a factor that is considered when evaluating noise barriers as an abatement measure.

Section 5.0
TRAFFIC NOISE ANALYSIS

5.1 NOISE SENSITIVE RECEPTORS

As previously stated, noise sensitive receptors are representative locations of a noise sensitive land use. The location of the receptors evaluated for the US 301 (Gall Boulevard) improvements are shown on aerials provided in **Appendix B**. One-hundred-twenty-one noise sensitive receptors (i.e., discrete representative locations on a property that has noise sensitive land uses) were evaluated within eight noise sensitive areas. One-hundred-eighteen receptors were evaluated on residential property, two were evaluated at community pools located at the Palm View Gardens RV Resort and Bramblewood Mobile Home Park and one receptor was evaluated at the shuffleboard court at the Palm View Gardens RV Resort.

Table 5-1 lists and describes each area and provides the number of evaluated noise sensitive receptors.

TABLE 5-1
NOISE SENSITIVE AREAS

NAME AND/OR LOCATION OF NOISE SENSITIVE PROPERTIES	SHEET NO. (SEE APPENDIX B)	ACTIVITY CATEGORY	NUMBER OF EVALUATED RECEPTORS
Tropical Acre Estates	3	B – Residential	2
Isolated Residence	3	B – Residential	1
Palm View Gardens RV Resort	4	B – Residential	77
		C – Recreational Area (Pool)	1
		C – Recreational Area (Shuffleboard Court)	1
Shady Oaks Mobile Home Park	8	B – Residential	27
Sunset RV Park	8	B - Residential	5
Ramblewood Mobile Home Park	8	B - Residential	6
		C –Recreational Area (Pool)	1
		Total	**121**

Source: KBE, 2015.

Following FHWA/FDOT guidance, the residences were evaluated as Activity Category "B" (i.e. abatement considered at a predicted traffic noise of 66 dB(A)). The areas of use at the pools and shuffleboard court were evaluated as Activity Category "C" (i.e., abatement considered at a predicted traffic noise level of 66 dB(A)).

5.2 MEASURED NOISE LEVELS

Both existing and future noise levels (with and without the proposed improvements) were modeled using the TNM. To verify the accuracy of the predictions, the computer model was validated using field measured noise levels adjacent to the project corridor. Traffic data including motor vehicle volumes, vehicle mix, vehicle speeds and meteorological conditions were recorded during each measurement period.

The field measurements were conducted in accordance with the FHWA's *Measurement of Highway-Related Noise*. The measurements were obtained using a Larson Davis Model 831, Type II integrating sound level meter (SLM). The SLM was calibrated before and after the measurement period with a Larson Davis CAL200 calibrator.

The recorded traffic data were used as input for the TNM to determine if, given the topography and site conditions of the area, the computer model could "re-create" the measured levels with the existing roadway. Following FDOT guidelines, a noise prediction model is considered within the accepted level of accuracy if the measured and predicted noise levels are within a tolerance standard of 3 dB(A).

Table 5-2 presents the field measurements and the validation results. As shown, the ability of the model to predict noise levels within the FDOT limits of plus or minus 3 dB(A) for the project was confirmed. Documentation in support of the validation is provided in **Appendix C** of this NSR.

TABLE 5-2
VALIDATION DATA

LOCATION	SITE	MEASUREMENT PERIOD	MODELED (dB(A))	MEASURED (dB(A))	DIFFERENCE
Northwest side of US 301 (Gall Boulevard) southwest of the Palm View Gardens RV Resort adjacent to the Moose Lodge	1	1	68.6	69.1	-0.5
		2	68.8	68.5	0.3
		3	69.4	69.4	0.0
	2	1	70.4	69.5	0.9
		2	69.1	71.7	-2.6
		3	69.5	71.4	-1.9

Source: KBE, 2015.

5.3 PREDICTED TRAFFIC NOISE LEVELS

Table 5-3 presents the results of the traffic noise analysis for the proposed improvements. As shown, of the 121 evaluated receptors, 41 are predicted to be impacted by traffic noise with existing conditions and in the future without the proposed improvements. With the proposed improvements, 70 of the 121 receptors are predicted to be impacted by traffic noise. Of the 70 receptors predicted to be impacted with the proposed improvements, 69 were evaluated for residential properties (Activity Category B) and one receptor was evaluated at the shuffleboard court in the Palm View Gardens RV Resort (Activity Category C).

TABLE 5-3
TRAFFIC NOISE ANALYSIS RESULTS

RECEPTOR ID	DESCRIPTION	ACTIVITY CATEGORY	FDOT NAC	EXISTING (2013)	NO-BUILD (2040)	BUILD (2040)	INCREASE OVER EXISTING	APPROACHES, MEETS OR EXCEEDS THE NAC ?
RESIDENCES IN THE TROPICAL ACRE ESTATES SUBDIVISION								
1	Residential	B	66	59.9	61.7	64.0	4.1	--
2	Residential	B	66	58.6	60.3	62.7	4.1	--
ISOLATED SINGLE FAMILY RESIDENCE								
3	Residential	B	66	57.5	58.8	65.0	7.5	--
RESIDENCES, SHUFFLEBOARD COURT AND POOL AT THE PALM VIEW GARDENS RV RESORT								
4	Residential	B	66	69.8	70.9	73.9	4.1	Yes
5	Residential	B	66	69.9	71.0	74.0	4.1	Yes
6	Residential	B	66	70.2	71.2	74.3	4.1	Yes
7	Residential	B	66	70.2	71.1	74.3	4.1	Yes
8	Residential	B	66	70.1	71.0	74.1	4.0	Yes
9	Residential	B	66	69.8	70.7	74.0	4.2	Yes
10	Residential	B	66	69.6	70.5	73.8	4.2	Yes
11	Residential	B	66	69.8	70.6	73.9	4.1	Yes
12	Residential	B	66	69.8	70.6	74.0	4.2	Yes
13	Residential	B	66	70.4	71.1	74.4	4.0	Yes
14	Residential	B	66	70.4	71.1	74.3	3.9	Yes
15	Residential	B	66	70.2	70.8	74.1	3.9	Yes
16	Residential	B	66	70.2	70.8	74.0	3.8	Yes
17	Residential	B	66	70.1	70.6	73.8	3.7	Yes
18	Residential	B	66	70.1	70.6	73.8	3.7	Yes
19	Residential	B	66	70.8	71.2	74.3	3.5	Yes
20	Residential	B	66	70.4	70.8	74.1	3.7	Yes
21	Residential	B	66	70.8	71.2	74.4	3.6	Yes
22	Residential	B	66	70.2	71.0	74.0	3.8	Yes
23	Residential	B	66	70.2	71.1	73.9	3.7	Yes

TABLE 5-3 (continued)
TRAFFIC NOISE ANALYSIS RESULTS

RECEPTOR ID	DESCRIPTION	ACTIVITY CATEGORY	FDOT NAC	EXISTING (2013)	NO-BUILD (2040)	BUILD (2040)	INCREASE OVER EXISTING	APPROACHES, MEETS OR EXCEEDS THE NAC ?
24	Residential	B	66	69.8	70.8	73.7	3.9	Yes
25	Residential	B	66	69.8	70.9	73.7	3.9	Yes
26	Residential	B	66	69.5	70.5	73.4	3.9	Yes
27	Residential	B	66	69.9	70.9	73.7	3.8	Yes
28	Residential	B	66	69.4	70.5	73.3	3.9	Yes
29	Residential	B	66	69.1	70.3	73.0	3.9	Yes
30	Residential	B	66	68.9	70.1	72.8	3.9	Yes
31	Residential	B	66	68.7	69.9	72.6	3.9	Yes
32	Residential	B	66	68.9	70.1	72.7	3.8	Yes
33	Residential	B	66	69.1	70.3	72.8	3.7	Yes
34	Residential	B	66	69.4	70.6	72.9	3.5	Yes
35	Residential	B	66	69.6	70.7	72.9	3.3	Yes
36	Residential	B	66	69	70.1	72.4	3.4	Yes
37	Residential	B	66	68.5	69.7	72.1	3.6	Yes
38	Residential	B	66	69.3	70.5	72.6	3.3	Yes
39	Residential	B	66	69.0	70.2	72.3	3.3	Yes
40	Residential	B	66	69.0	70.1	72.2	3.2	Yes
41	Residential	B	66	69.2	70.3	72.4	3.2	Yes
42	Residential	B	66	68.9	70.0	72.1	3.2	Yes
43	Residential	B	66	68.1	69.2	71.6	3.5	Yes
44	Residential	B	66	67.8	68.6	71.4	3.6	Yes
45	Residential	B	66	62.5	64.4	66.7	4.2	Yes
46	Residential	B	66	62.5	64.4	66.8	4.3	Yes
47	Residential	B	66	62.2	64.0	66.4	4.2	Yes
48	Residential	B	66	62.5	64.3	66.9	4.4	Yes
49	Residential	B	66	62.4	64.1	66.8	4.4	Yes
50	Residential	B	66	62.3	64.0	66.9	4.6	Yes
51	Residential	B	66	62.4	64.0	67.1	4.7	Yes
52	Residential	B	66	62.3	63.9	67.1	4.8	Yes

TABLE 5-3 (continued)
TRAFFIC NOISE ANALYSIS RESULTS

RECEPTOR ID	DESCRIPTION	ACTIVITY CATEGORY	FDOT NAC	EXISTING (2013)	NO-BUILD (2040)	BUILD (2040)	INCREASE OVER EXISTING	APPROACHES, MEETS OR EXCEEDS THE NAC ?
53	Residential	B	66	62.0	63.6	66.6	4.6	Yes
54	Residential	B	66	61.8	63.4	66.4	4.6	Yes
55	Residential	B	66	61.8	63.4	66.6	4.8	Yes
56	Residential	B	66	61.8	63.3	66.5	4.7	Yes
57	Residential	B	66	61.8	63.3	66.6	4.8	Yes
58	Residential	B	66	61.9	63.3	66.7	4.8	Yes
59	Residential	B	66	61.7	63.2	66.6	4.9	Yes
60	Shuffleboard Court	C	66	61.8	63.3	66.7	4.9	Yes
61	Community Pool	C	66	61.0	62.8	65.4	4.4	--
62	Residential	B	66	60.1	61.9	64.2	4.1	--
63	Residential	B	66	60.9	62.8	65.2	4.3	--
64	Residential	B	66	61.4	63.2	66.0	4.6	Yes
65	Residential	B	66	60.5	62.4	64.5	4.0	--
66	Residential	B	66	61.5	63.3	66.0	4.5	Yes
67	Residential	B	66	58.1	59.9	62.2	4.1	--
68	Residential	B	66	58.4	60.3	62.3	3.9	--
69	Residential	B	66	59.3	61.2	63.2	3.9	--
70	Residential	B	66	60.3	62.3	64.3	4.0	--
71	Residential	B	66	61.3	63.1	65.6	4.3	--
72	Residential	B	66	62.1	63.8	66.9	4.8	Yes
73	Residential	B	66	61.9	63.6	66.7	4.8	Yes
74	Residential	B	66	61.1	62.9	65.4	4.3	--
75	Residential	B	66	60.4	62.3	64.5	4.1	--
76	Residential	B	66	59.1	61.0	62.9	3.8	--
77	Residential	B	66	61.7	63.3	66.4	4.7	Yes
78	Residential	B	66	59.6	61.5	63.4	3.8	--
79	Residential	B	66	58.5	60.4	62.3	3.8	--
80	Residential	B	66	57.4	59.2	61.3	3.9	--
81	Residential	B	66	58.4	60.2	62.1	3.7	--

TABLE 5-3 (continued)
TRAFFIC NOISE ANALYSIS RESULTS

RECEPTOR ID	DESCRIPTION	ACTIVITY CATEGORY	FDOT NAC	EXISTING (2013)	NO-BUILD (2040)	BUILD (2040)	INCREASE OVER EXISTING	APPROACHES, MEETS OR EXCEEDS THE NAC ?
82	Residential	B	66	60.2	61.9	64.1	3.9	--
SHADY OAKS MOBILE HOME PARK								
83	Residential	B	66	54.4	56.7	61.7	7.3	--
84	Residential	B	66	55.4	57.7	63.0	7.6	--
85	Residential	B	66	56.9	59.2	65.1	8.2	--
86	Residential	B	66	58.9	61.2	67.6	8.7	Yes
87	Residential	B	66	59.6	61.9	68.2	8.6	Yes
88	Residential	B	66	59.5	61.8	68.1	8.6	Yes
89	Residential	B	66	59.3	61.6	67.8	8.5	Yes
90	Residential	B	66	59.0	61.3	67.4	8.4	Yes
91	Residential	B	66	58.9	61.2	67.3	8.4	Yes
92	Residential	B	66	58.7	61.0	67.0	8.3	Yes
93	Residential	B	66	58.5	60.8	66.5	8.0	Yes
94	Residential	B	66	58.1	60.5	65.9	7.8	--
95	Residential	B	66	58.2	60.5	65.7	7.5	--
96	Residential	B	66	58.0	60.3	65.2	7.2	--
97	Residential	B	66	57.6	59.9	64.6	7.0	--
98	Residential	B	66	57.3	59.6	63.8	6.5	--
99	Residential	B	66	56.6	58.9	63.0	6.4	--
100	Residential	B	66	56.3	58.6	62.5	6.2	--
101	Residential	B	66	56.2	58.5	62.2	6.0	--
102	Residential	B	66	55.7	58.0	61.5	5.8	--
103	Residential	B	66	55.3	57.6	60.9	5.6	--
104	Residential	B	66	54.0	56.3	59.6	5.6	--
105	Residential	B	66	52.7	55.0	58.2	5.5	--
106	Residential	B	66	51.5	53.8	57.4	5.9	--
107	Residential	B	66	53.3	55.6	59.9	6.6	--
108	Residential	B	66	53.4	55.7	60.1	6.7	--
109	Residential	B	66	53.5	55.8	59.6	6.1	--

TABLE 5-3 (continued)
TRAFFIC NOISE ANALYSIS RESULTS

RECEPTOR ID	DESCRIPTION	ACTIVITY CATEGORY	FDOT NAC	EXISTING (2013)	NO-BUILD (2040)	BUILD (2040)	INCREASE OVER EXISTING	APPROACHES, MEETS OR EXCEEDS THE NAC ?
SUNSET RV PARK								
110	Residential	B	66	58.7	61.7	64.0	5.3	--
111	Residential	B	66	58.4	61.3	63.7	5.3	--
112	Residential	B	66	58.0	60.9	63.4	5.4	--
113	Residential	B	66	57.4	60.3	62.8	5.4	--
114	Residential	B	66	57.0	59.9	62.4	5.4	--
RAMBLEWOOD MOBILE HOME PARK								
115	Residential	B	66	57.4	60.3	62.9	5.5	--
116	Residential	B	66	57.6	60.5	63.3	5.7	--
117	Residential	B	66	57.5	60.4	63.3	5.8	--
118	Residential	B	66	56.6	59.5	62.5	5.9	--
119	Residential	B	66	57.4	60.4	63.2	5.8	--
120	Community Pool	B	66	58.1	61.1	63.1	5.0	--
121	Residential	B	66	59.7	62.7	62.6	2.9	--

Source: KBE, 2015.

5.4 ABATEMENT CONSIDERATIONS

As previously stated, when traffic noise impacts are predicted, noise abatement measures are considered for the impacted properties. The following discusses the FDOT's consideration of each of the measures for which an overview was provided in Section 2.4 of this NSR.

5.4.1 Traffic Management

Reducing traffic speeds and/or the traffic volume or changing the motor vehicle fleet on US 301 (Gall Boulevard) is inconsistent with the goal of improving the ability of the roadway to handle the forecast traffic volume. Therefore, traffic management measures are not considered to be a reasonable noise abatement measure for the US 301 (Gall Boulevard) project.

5.4.2 Alignment Modifications

The proposed improvements to US 301 (Gall Boulevard) will be constructed within the existing ROW and following the existing horizontal alignment. Shifts in the horizontal alignment, for the purpose of minimizing potential noise impacts, will result in greater direct impacts to existing neighborhoods, wetlands and floodplains. Therefore, modifications to the horizontal alignment as a noise abatement measure, was considered to be unreasonable.

5.4.3 Buffer Zones

As previously stated, to abate predicted traffic noise at an existing noise sensitive land use, the property will have to be acquired. The same cost effective limit that applies to noise barriers (i.e., $42,000 per benefited noise sensitive receptor) will apply to the purchase price of any impacted noise sensitive property. A review of data from the Pasco Appraisers indicates that the cost to acquire the developed properties adjacent to US 301 (Gall Boulevard) exceed the cost effective limit. Therefore, creating a buffer zone by acquiring existing noise sensitive properties is not considered to be a reasonable noise abatement measure.

5.4.4 Noise Barriers

The TNM was used to evaluate the ability of noise barriers to reduce traffic noise levels for the impacted noise sensitive receptors adjacent to US 301. The barriers were evaluated five feet within the FDOT's ROW at heights from eight to 22 feet (in two-foot increments). The length of each barrier was optimized to determine if at least the minimum noise reduction requirements (i.e., a minimum reduction of 5 dB(A) for two impacted receptors and a minimum reduction of 7 dB(A) for one benefitted receptor) could be achieved.

The following provides the results of the noise barrier evaluation and discusses the potential amount of noise reduction and the cost effectiveness of providing barriers as an abatement

measure for the areas in which traffic noise has been predicted to impact noise sensitive properties.

Barrier 1 - Palm View Gardens RV Resort

A noise barrier was evaluated for the sixty-one impacted residences in the Palm View Gardens RV Resort (Receptors 4-60, 64, 66 and 72). The barrier was evaluated in two segments to accommodate access to/from the properties.

The results of the barrier analysis are provided in **Table 5-4**. As shown, at barrier heights between 8 and 22 feet, at least forty-one of the impacted residences will benefit from a reduction in traffic noise of 5 dB(A) or more, the noise reduction design goal of 7 dB(A) will be achieved and the cost of the barrier will be below the FDOT's cost reasonable limit. Because Barrier 1 is predicted to provide the minimum noise reduction requirements at a cost below the cost effective limit, the barrier was evaluated further. The results of the evaluation are provided in **Table 5-5.**

Barrier 2 - Palm View Gardens RV Resort Shuffleboard Court

Barrier 2 was considered for the shuffleboard court located in Palm View Gardens RV Resort. The area of the shuffleboard closest to US 301 (Gall Boulevard) is predicted to be impacted by traffic noise. The highest predicted traffic noise level in this area is 66.9 dB(A). The FDOT's "special land use" procedures were used to determine if a noise barrier could be considered a potential abatement measure for the impacted area. The cost of a barrier at a special land use should not exceed $995,935 per person-hour per square foot (dollars/person-hr/ft2).

A barrier was evaluated 5 feet inside the FDOT ROW in two segments to accommodate access to/from the properties. Due to limitations on the length of the barrier segments, the noise reduction design goal of 7 dB(A) could not be achieved at any of the evaluated barrier heights. Therefore, a barrier is not considered a reasonable noise abatement measure for the impacted area of the shuffleboard court.

Barrier 3 – Shady Oaks Mobile Home Park

A noise barrier was evaluated for the eight impacted residences in the Shady Oaks Mobile Home Park (Receptors 86-93). The barrier was evaluated 5 feet inside the proposed FDOT ROW.

TABLE 5-4
BARRIER 1: RESULTS FOR IMPACTED RESIDENCES IN THE PALM VIEW GARDENS RV RESORT

BARRIER HEIGHT (FEET)	BARRIER LENGTH (FEET)	NOISE REDUCTION AT IMPACTED RECEPTORS (dB(A))[1]			NUMBER OF BENEFITED RECEPTORS[2]			TOTAL ESTIMATED COST[3]	COST PER BENEFITED RECEPTOR[4]	COST REASON-ABLE YES/NO
		5-5.9	6–6.9	≥7	IMPACTED	NOT IMPACTED	TOTAL			
NUMBER OF IMPACTED RECEPTORS = 61										
8	1,480	3	1	37	41	0	41	$355,200	$8,663	Yes
10	1,440	11	7	38	56	0	56	$432,000	$7,714	Yes
12	1,410	7	9	44	60	10	70	$507,600	$7,251	Yes
14	1,410	7	9	44	60	10	70	$592,200	$8,460	Yes
16	1,400	4	8	48	60	12	72	$672,000	$9,333	Yes
18	1,390	4	6	50	60	13	73	$750,600	$10,282	Yes
20	1,390	5	5	51	61	14	75	$834,000	$11,120	Yes
22	1,390	5	5	51	61	14	75	$917,400	$12,232	Yes

Source: KBE, 2015.

[1] Receptors with a predicted noise level of 66 dB(A) or greater.

[2] Receptors with a predicted reduction of 5 dB(A) or more are considered benefited.

[3] Based on a unit cost of $30 per square foot.

[4] FDOT cost reasonable criterion is $42,000 per benefited receptor.

TABLE 5-5
BARRIER 1: ADDITIONAL BARRIER CONSIDERATIONS

TYPE OF FACTOR	EVALUATION CRITERIA	COMMENT
Feasibility	Design and Construction	A determination of whether a noise barrier can be constructed using standard construction methods and techniques will be made during the project's design phase. Notably, any additional costs to solely construct a noise barrier will be included in the final cost reasonableness evaluation of a noise barrier at this location.
	Safety	It does not appear that there will be any safety concerns (e.g., loss of sight distance).
	Accessibility	The barrier will be located within the FDOT's ROW for US 301 (Gall Boulevard) and will not block ingress or egress to any property.
	ROW	No acquisition of ROW or easements for construction/ maintenance appear to be necessary to construct a barrier within the FDOT's ROW.
	Maintenance	The FDOT should be able to maintain a barrier at this location using standard practices.
	Drainage	A determination as to whether the barrier can be designed so that water will be directed along, under, or away from the barrier will be made during the project's design phase.
	Utilities	A determination of utility conflicts will be made during the project's design phase. Notably, there are existing poles within the FDOT ROW that may cause a conflict with a noise barrier.
Reasonableness	Community desires	The desires of the property owners and renters (if applicable) will be solicited during the design phase of the project.

Source: KBE, 2015.

The results of the barrier analysis are provided in **Table 5-6**. As shown, at barrier heights between 10 and 20 feet, at least three of the impacted residences will benefit from a reduction in traffic noise of 5 dB(A) or more, the noise reduction design goal of 7 dB(A) will be achieved and the cost of the barrier will be below the FDOT's cost reasonable limit. Because Barrier 3 is predicted to provide the minimum noise reduction requirements at a cost below the cost effective limit, the barrier was evaluated further. The results of the evaluation are provided in **Table 5-7**.

TABLE 5-6
BARRIER 3: RESULTS FOR IMPACTED RESIDENCES IN THE SHADY OAKS MOBILE HOME PARK

BARRIER HEIGHT (FEET)	BARRIER LENGTH (FEET)	NOISE REDUCTION AT IMPACTED RECEPTORS (dB(A))[1]			NUMBER OF BENEFITED RECEPTORS[2]			TOTAL ESTIMATED COST[3]	COST PER BENEFITED RECEPTOR[4]	COST REASONABLE YES/NO
		5 -5.9	6 – 6.9	≥7	IMPACTED	NOT IMPACTED	TOTAL			
NUMBER OF IMPACTED RECEPTORS = 8										
8	NA[5]	NA[5]	NA[5]	NA[5]	NA[5]	NA[5]	NA[5]	NA[5]	NA[5]	NA[5]
10	707	3	4	1	8	0	8	$212,100	$26,513	Yes
12	577	2	4	2	8	0	8	$207,720	$25,965	Yes
14	557	2	2	4	8	0	8	$233,940	$29,243	Yes
16	547	2	1	5	8	0	8	$262,560	$32,820	Yes
18	547	2	1	5	8	0	8	$295,380	$36,923	Yes
20	537	2	1	5	8	0	8	$322,200	$40,275	Yes
22	537	2	1	5	8	0	8	$354,420	$44,303	No

Source: KBE, 2015.

[1] Receptors with a predicted noise level of 66 dB(A) or greater.

[2] Receptors with a predicted reduction of 5 dB(A) or more are considered benefited.

[3] Based on a unit cost of $30 per square foot.

[4] FDOT cost reasonable criterion is $42,000 per benefited receptor.

[5] 7 dB(A) reduction not achieved at any receptor.

TABLE 5-7
BARRIER 3: ADDITIONAL BARRIER CONSIDERATIONS

TYPE OF FACTOR	EVALUATION CRITERIA	COMMENT
Feasibility	Design and Construction	A determination of whether a noise barrier can be constructed using standard construction methods and techniques will be made during the project's design phase. Notably, any additional costs to solely construct a noise barrier will be included in the final cost reasonableness evaluation of a noise barrier at this location.
	Safety	It does not appear that there will be any safety concerns (e.g., loss of sight distance).
	Accessibility	The barrier will be located within the proposed FDOT's ROW for US 301 (Gall Boulevard) and will not block ingress or egress to any property.
	ROW	No acquisition of additional ROW or easements for construction/ maintenance appears to be necessary to construct a barrier within the FDOT's ROW.
	Maintenance	The FDOT should be able to maintain a barrier at this location using standard practices.
	Drainage	A determination as to whether the barrier can be designed so that water will be directed along, under, or away from the barrier will be made during the project's design phase.
	Utilities	A determination of utility conflicts will be made during the project's design phase. Notably, there are existing poles within the FDOT ROW that may cause a conflict with a noise barrier.
Reasonableness	Community desires	The desires of the property owners and renters (if applicable) will be solicited during the design phase of the project.

Source: KBE, 2015.

Section 6.0
CONCLUSIONS

As previously stated, future traffic noise levels with the proposed improvements are predicted to approach, meet, or exceed the NAC at 70 noise sensitive sites. These sites are predicted to experience future traffic noise levels with the proposed improvements to US 301 (Gall Boulevard) that will range from 66.0 to 74.4 dB(A).

The results of the evaluation indicate that construction of noise barriers is a potentially reasonable and feasible noise abatement method to reduce the predicted traffic noise levels for up to 69 of the 70 impacted sites at the following locations, as shown on maps in Appendix B:

- **Barrier 1:** Residences at the Palm View Gardens RV Park (Receptors 4-59, 64, 66, 72, 73, and 77)
- **Barrier 3:** Residences at the Shady Oaks Mobile Home Park (Receptors 86-93)

The estimated costs to construct the noise barriers ranges from $207,720 to $917,400 depending on barrier length and height.

6.1 STATEMENT OF LIKELIHOOD

The FDOT is committed to the construction of noise barriers at the locations above, contingent upon the following:

- Detailed noise analysis during the final design process supports the need for, and the feasibility and reasonableness of providing the barriers as abatement
- The detailed analysis demonstrates that the cost of the noise barriers will not exceed the cost effective limit
- The residents/property owners benefitted by the noise barriers desire that a noise barrier be constructed
- All safety and engineering conflicts or issues related to construction of the noise barriers are resolved

Section 7.0
NOISE CONTOURS

Land uses such as residences and recreational areas are considered incompatible with highway noise levels that approach or exceed the NAC. To reduce the possibility of additional traffic noise-related impacts, noise level contours were developed for the future improved roadway facility. These noise contours delineate the extent of the predicted traffic noise impact area from the improved roadway's edge-of-travel lane for each of the land use Activity Categories (Table 4-1). **Table 7-1** provides the distance from the edge-of-travel lane at which traffic noise levels are predicted to be 56 dB(A)—the NAC for land uses classified as Activity Category A, to 66 dB(A)—the NAC for land uses classified as Activity Category B and C, and to 71 dB(A)—the NAC for land uses classified as Activity Category E.

Local officials will be provided a copy of the Final NSR to promote compatibility between any future land developments in this area and the proposed project.

TABLE 7-1
NOISE CONTOUR LIMITS

US 301 (GALL BOULEVARD) ROADWAY SEGMENT	DISTANCE FROM IMPROVED ROADWAY'S EDGE-OF-PAVEMENT (FT)*		
	ACTIVITY CATEGORY A 56 dB(A)	ACTIVITY CATEGORY B/C 66 dB(A)	ACTIVITY CATEGORY E 71 dB(A)
S. of Proposed SR 56 to Chancey Road	480	130	95
Chancey Road to S. of SR 39	325	110	55

Source: KBE, 2015.

* See Table 4-1 for a description of the activities that occur within each category. Distances do not reflect any reduction in noise levels that will occur from existing structures (shielding) and should be used for planning purposes only.

Section 8.0
CONSTRUCTION NOISE AND VIBRATION

Some land uses adjacent US 301 (Gall Boulevard) are identified on the FDOT listing of noise- and vibration-sensitive sites (e.g., residential use). Construction of the proposed roadway improvements is not expected to have a significant noise or vibration effect. Additionally, the application of the ***FDOT Standard Specifications for Road and Bridge Construction*** may minimize or eliminate potential issues. Should unanticipated noise or vibration issues arise during the construction process, the Project Engineer, in coordination with the District Noise Specialist and the Contractor, will investigate additional methods of controlling these impacts.

8.1 COMMUNITY COORDINATION

The PD&E Study's public hearing was held at the New Hope Baptist Church, 3514 Allen Road, Zephyrhills, FL. The Open House began at 5:00 p.m. on Tuesday, September 22, 2015, and the formal hearing presentation began at 6:00 p.m. Following the formal presentation, the Open House continued until 7:00 p.m. The public was given the opportunity to provide their comments in writing during the open house or by mail to be postmarked by October 2, 2015; verbally at the microphone following the formal presentation, or verbally to the court reporter during the open house portions of the hearing. FDOT representatives were available during the open house to speak one-on-one with attendees, take comments, and answer questions.

Thirty (30) members of the public signed in at the public hearing. Kirk Bogen, Environmental Management Engineer, and Stephanie Pierce, FDOT Project Manager, made the presentation during the formal session. The FDOT and consultant staff were available to answer questions and take comments following the presentation.

Attendees were provided with a project newsletter and a comment form (see attached). The hearing provided interested persons an opportunity to express their views concerning the location, conceptual design, and social, economic, and environmental effects of the proposed improvements to US 301.

One comment form was collected at the meeting, three additional comments were received by mail following the hearing, and one person spoke during the formal session. None of the comments received raised concerns regarding traffic-related noise along the corridor.

Section 9.0
REFERENCES

Federal Highway Administration. U.S. Department of Transportation. July 13, 2010. Title 23 CFR, Part 772. Procedures for Abatement of Highway Traffic Noise and Construction Noise.

Federal Highway Administration. February 2004. Traffic Noise Model, Version 2.5.

Federal Highway Administration. December 2011. Highway Traffic Noise: Analysis and Abatement Guidance.

Federal Highway Administration. May 1996. Measurement of Highway-Related Noise. FHWA-PD-96-046.

Florida Department of Transportation. May 24, 2011. Project Development and Environment Manual, Part 2, Chapter 17 – Noise.

Florida Department of Transportation. July 1, 2013. Plans Preparation Manual, Volume 1, Chapter 32 – Sound Barriers.

Florida Department of Transportation. 2014. Standard Specifications for Road and Bridge Construction.

California Department of Transportation. September 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol.

APPENDIX A

Traffic Data

This spreadsheet is designed to calculate the appropriate traffic data for use in the noise model - do not input values for items in "red".

DISTRICT 7 PD&E
TRAFFIC DATA FOR NOISE STUDIES

Project: US 301 (Gall Boulevard) PD&E Study

Date: 9/8/2014

State Project Number(s):

Prepared By: URS

Work Program Number(s): 416564-1

Federal Aid Number(s): 3112-024 P

Segment Description: US 301 (Gall Boulevard) from SR 56 (Proposed)/Project Southern Terminus to Chancey Road

(Data sheets are to be filled out for every segment having a change in traffic parameters such as volumes, posted speeds, typical section, etc.)

NOTE: Modeled ADT is the LOS(C) volume referenced in the FDOT LOS tables or demand, whichever is less.

Existing Facility			No-Build (Design Year)			Build (Design Year)		
Lanes:	2		Lanes:	2		Lanes:	4	
Year:	2013		Year:	2040		Year:	2040	
ADT:			ADT:			ADT:		
LOS (C)	16,800		LOS (C)	16,800		LOS (C)	37,900	
Demand	12,500		Demand	39,500		Demand	39,500	
Posted Spd:	55	mph	Posted Spd:	55	mph	Posted Spd:	55	mph
	89	kmh		89	kmh		89	kmh
K=	9.0	%	K=	9.0	%	K=	9.0	%
D=	60.0	%	D=	60.0	%	D=	60.0	%
T=	15.10	% for 24 hrs.	T=	15.10	% for 24 hrs.	T=	15.10	% for 24 hrs.
T=	7.55	% Design hr	T=	7.55	% Design hr	T=	7.55	% Design hr
4.15	% Medium Trucks DHV		4.15	% Medium Trucks DHV		4.15	% Medium Trucks DHV	
3.40	% Heavy Trucks DHV		3.40	% Heavy Trucks DHV		3.40	% Heavy Trucks DHV	
0.59	% Buses DHV		0.59	% Buses DHV		0.59	% Buses DHV	
3.21	% Motorcycles DHV		3.21	% Motorcycles DHV		3.21	% Motorcycles DHV	

STAMINA/TNM INPUT

The following are spreadsheet calculations based on the input above - do not enter data below this line

Existing Facility Model:		Demand	No-Build (Design Year) Model:		LOS (C)	Build (Design Year) Model:		LOS (C)
LOS (C)			LOS (C)			LOS (C)		
Peak:	Autos	804	Peak:	Autos	804	Peak:	Autos	1814
	Med Trucks	38		Med Trucks	38		Med Trucks	85
	Hvy Trucks	31		Hvy Trucks	31		Hvy Trucks	70
	Buses	5		Buses	5		Buses	12
	Motorcycles	29		Motorcycles	29		Motorcycles	66
Off Peak:	Autos	536	Off Peak:	Autos	536	Off Peak:	Autos	1210
	Med Trucks	25		Med Trucks	25		Med Trucks	57
	Hvy Trucks	21		Hvy Trucks	21		Hvy Trucks	46
	Buses	4		Buses	4		Buses	8
	Motorcycles	19		Motorcycles	19		Motorcycles	44
Demand			Demand			Demand		
Peak:	Autos	598	Peak:	Autos	1891	Peak:	Autos	1891
	Med Trucks	28		Med Trucks	89		Med Trucks	89
	Hvy Trucks	23		Hvy Trucks	73		Hvy Trucks	73
	Buses	4		Buses	13		Buses	13
	Motorcycles	22		Motorcycles	68		Motorcycles	68
Off Peak:	Autos	399	Off Peak:	Autos	1261	Off Peak:	Autos	1261
	Med Trucks	19		Med Trucks	59		Med Trucks	59
	Hvy Trucks	15		Hvy Trucks	48		Hvy Trucks	48
	Buses	3		Buses	8		Buses	8
	Motorcycles	14		Motorcycles	46		Motorcycles	46

This spreadsheet is designed to calculate the appropriate traffic data for use in the noise model - do not input values for items in "red".

DISTRICT 7 PD&E
TRAFFIC DATA FOR NOISE STUDIES

Project: US 301 (Gall Boulevard) PD&E Study
Date: 9/8/2014
State Project Number(s):
Prepared By: URS
Work Program Number(s): 416564-1
Federal Aid Number(s): 3112-024 P
Segment Description: US 301 (Gall Boulevard) from Chancey Road to SR 39

(Data sheets are to be filled out for every segment having a change in traffic parameters such as volumes, posted speeds, typical section, etc.)

NOTE: Modeled ADT is the LOS(C) volume referenced in the FDOT LOS tables or demand, whichever is less.

Existing Facility		No-Build (Design Year)		Build (Design Year)	
Lanes:	2	Lanes:	2	Lanes:	4
Year:	2013	Year:	2040	Year:	2040
ADT: LOS (C)	16,800	ADT: LOS (C)	16,800	ADT: LOS (C)	37,900
Demand	9,900	Demand	37,000	Demand	37,000
Posted Spd:	45 mph / 72 kmh	Posted Spd:	45 mph / 72 kmh	Posted Spd:	45 mph / 72 kmh
K=	9.0 %	K=	9.0 %	K=	9.0 %
D=	60.0 %	D=	60.0 %	D=	60.0 %
T=	8.67 % for 24 hrs.	T=	8.67 % for 24 hrs.	T=	8.67 % for 24 hrs.
T=	4.34 % Design hr	T=	4.34 % Design hr	T=	4.34 % Design hr
3.27	% Medium Trucks DHV	3.27	% Medium Trucks DHV	3.27	% Medium Trucks DHV
1.07	% Heavy Trucks DHV	1.07	% Heavy Trucks DHV	1.07	% Heavy Trucks DHV
0.65	% Buses DHV	0.65	% Buses DHV	0.65	% Buses DHV
1.77	% Motorcycles DHV	1.77	% Motorcycles DHV	1.77	% Motorcycles DHV

STAMINA/TNM INPUT

The following are spreadsheet calculations based on the input above - do not enter data below this line

Existing Facility Model:		Demand	No-Build (Design Year) Model:		LOS (C)	Build (Design Year) Model:		Demand
LOS (C)			LOS (C)			LOS (C)		
Peak:	Autos	846	Peak:	Autos	846	Peak:	Autos	1908
	Med Trucks	30		Med Trucks	30		Med Trucks	67
	Hvy Trucks	10		Hvy Trucks	10		Hvy Trucks	22
	Buses	6		Buses	6		Buses	13
	Motorcycles	16		Motorcycles	16		Motorcycles	36
Off Peak:	Autos	564	Off Peak:	Autos	564	Off Peak:	Autos	1272
	Med Trucks	20		Med Trucks	20		Med Trucks	45
	Hvy Trucks	6		Hvy Trucks	6		Hvy Trucks	15
	Buses	4		Buses	4		Buses	9
	Motorcycles	11		Motorcycles	11		Motorcycles	24
Demand			Demand			Demand		
Peak:	Autos	498	Peak:	Autos	1863	Peak:	Autos	1863
	Med Trucks	17		Med Trucks	65		Med Trucks	65
	Hvy Trucks	6		Hvy Trucks	21		Hvy Trucks	21
	Buses	3		Buses	13		Buses	13
	Motorcycles	9		Motorcycles	35		Motorcycles	35
Off Peak:	Autos	332	Off Peak:	Autos	1242	Off Peak:	Autos	1242
	Med Trucks	12		Med Trucks	44		Med Trucks	44
	Hvy Trucks	4		Hvy Trucks	14		Hvy Trucks	14
	Buses	2		Buses	9		Buses	9
	Motorcycles	6		Motorcycles	24		Motorcycles	24

APPENDIX B

Noise Sensitive Receptors

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

URS Corporation Southern
7650 West Courtney
Campbell Causeway
Tampa, FL 33607-1462
C.A. No. 00000002
Christopher N. Lovell, P.E. No. 63020

US 301 (GALL BOULEVARD)
PD&E STUDY
FROM SR 56 (PROPOSED) TO SR 39 (BUCHMAN HIGHWAY)
PASCO COUNTY, FLORIDA

ALTERNATIVE 1
PLAN SHEET (1)

SHEET NO.
1

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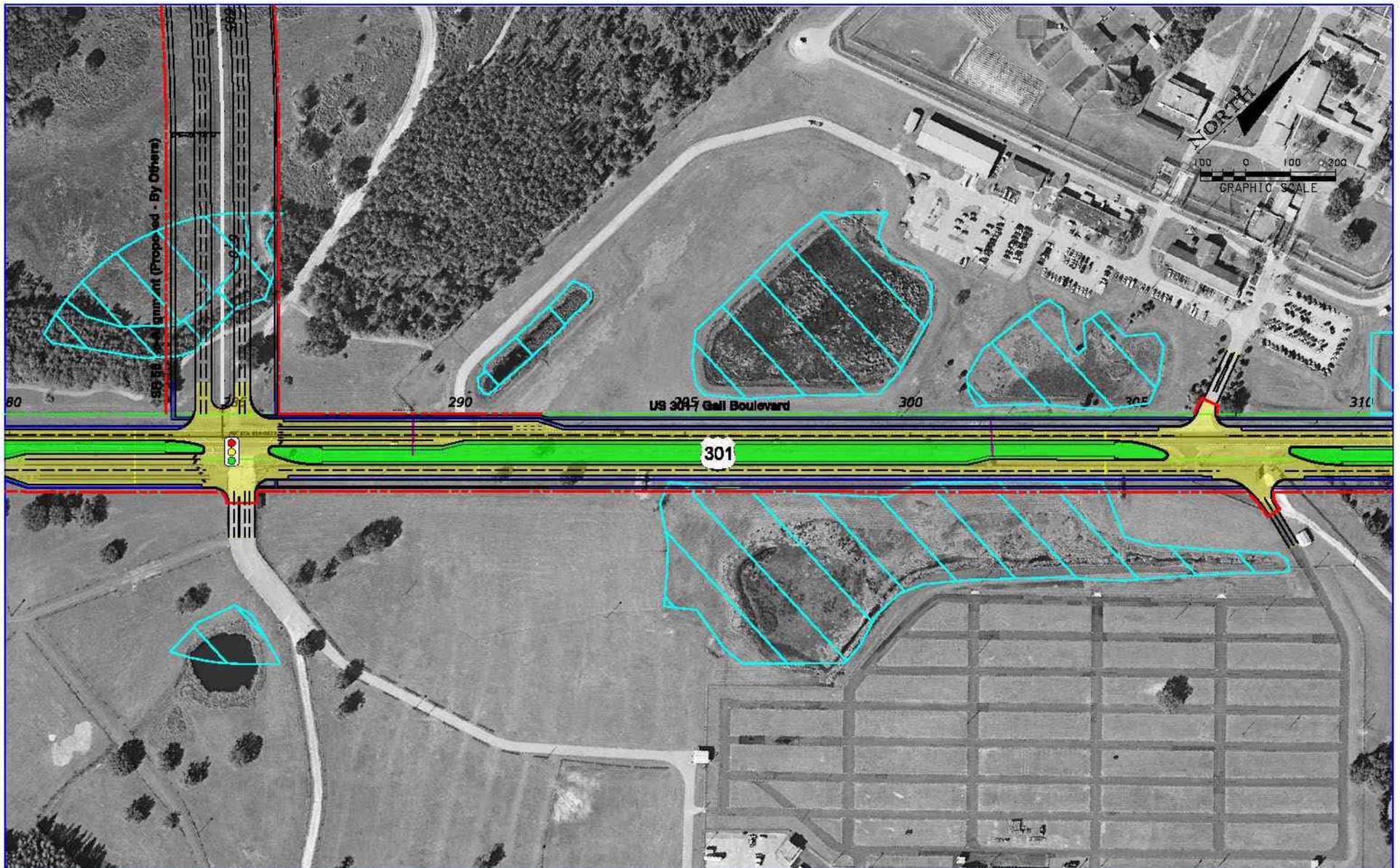

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

URS Corporation Southern
7650 West Courtney
Campbell Causeway
Tampa, FL 33607-1462
C.A. No. 00000002
Christopher N. Lovell, P.E. No. 63020

US 301 (GALL BOULEVARD)
PD&E STUDY
FROM SR 56 (PROPOSED) TO SR 39 (BUCHMAN HIGHWAY)
PASCO COUNTY, FLORIDA

ALTERNATIVE 1
PLAN SHEET (2)

SHEET NO. 2

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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

URS Corporation Southern
7650 West Courtney
Campbell Causeway
Tampa, FL 33607-1462
C.A. No. 00000002
Christopher N. Lovell, P.E. No. 63020

US 501 (GALL BOULEVARD)
PD&E STUDY
FROM SR 56 (PROPOSED) TO SR 39 (CRUMLEY HIGHWAY)
PASCO COUNTY, FLORIDA

ALTERNATIVE 1
PLAN SHEET (3)

SHEET NO. 3

paul_floyd 3/5/2015 8:23:57 AM S:\Projects_NAM\Proj\Fdot\Proj\FDOT\US\US-41656412201\roadway\Sheets\Alternative 1\A

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

URS Corporation Southern
7650 West Courtney
Campbell Causeway
Tampa, FL 33607-1462
C.A. No. 00000002
Christopher N. Lovell, P.E. No. 63020

US 301 (GALL BOULEVARD)
PD&E STUDY
FROM SR 56 (PROPOSED) TO SR 39 (BOCKMAN HIGHWAY)
PASCO COUNTY, FLORIDA

ALTERNATIVE 1
PLAN SHEET (4)

SHEET NO. 4

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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

URS Corporation Southern
7650 West Courtney
Campbell Causeway
Tampa, FL 33607-1462
C.A. No. 00000002
Christopher N. Lovell, P.E. No. 63020

US 301 (GALL BOULEVARD)
PD&E STUDY
FROM SR 56 (PROPOSED) TO SR 39 (BUCKHAM HIGHWAY)
PASCO COUNTY, FLORIDA

ALTERNATIVE 1
PLAN SHEET (5)

SHEET NO. 5

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APPENDIX C

Validation Documentation

NOISE MEASUREMENT DATA SHEET

Measurements Taken By: L. Baumaister, C. Schoonard, N. Rhoads Date: 3/3/2015
Time Study Started: 11:25 Time Study Ended: 12:06
Project Identification:
Financial Project ID: 416564-1
Project Location: US 301 (Gall Blvd.) from (Proposed) SR 56 to SR 39

Site Identification: Site 1 – US 301 at the Moose Lodge

Weather Conditions:
Sky: Clear ___ Partly Cloudy __X__ Cloudy ___ Other _____
Temperature 78.2°F Wind Speed 2.8 Wind Direction from East Humidity 70%
Equipment:
Sound Level Meter:
Type: Larson Davis 831 Serial Number(s): 1285
Did you check the battery? Yes X No ____
Calibration Readings: Start 114.14 End 114.0
Response Settings: Fast ____ Slow X
Weighting: A X Other ____
Calibrator:
Type: Larson Davis CAL 200 Serial Number: 5592
Did you check the battery? Yes X No ____

TRAFFIC DATA

Roadway Identification	US 301 Northbound		US 301 Southbound	
	Run 1-Run 2-Run 3		Run 1-Run 2-Run 3	
Vehicle Type	Volume	Speed (mph)	Volume	Speed (mph)
Autos	63-46-54	49-48-52	65-68-65	49-47-49
Medium Trucks	0-1-1	47-56-N/A	0-1-1	46-51-N/A
Heavy Trucks	7-2-2	39-51-46	3-5-6	45-44-45
Buses	0-0-0	0-0-0	0-0-0	0-0-0
Motorcycles	3-1-0	49-44-51	1-4-4	51-N/A-47
Duration	10 minutes per run		10 minutes per run	

*Speeds were not documented for all vehicle types.

RESULTS [dB(A)]

L_{EQ} 69.1-68.5-69.4 Lmax 95.5-96.5-85.7

Background Noise: _____
Major Sources: US 301
Unusual Events: cars turning into lodge

KB Environmental Sciences

NOISE MEASUREMENT DATA SHEET

Measurements Taken By: L. Baumaister, C. Schoonard, N. Rhoads Date: 3/3/2015
Time Study Started: 12:12 Time Study Ended: 12:50
Project Identification:
Financial Project ID: 416564-1
Project Location: US 301 (Gall Blvd.) from (Proposed) SR 56 to SR 39

Site Identification: Site 2 – US 301 at the Moose Lodge

Weather Conditions:
Sky: Clear ___ Partly Cloudy __X__ Cloudy ___ Other ___
Temperature 82.7°F Wind Speed 1.5 Wind Direction ESE Humidity 57%
Equipment:
Sound Level Meter:
Type: Larson Davis 831 Serial Number(s): 1285
Did you check the battery? Yes X No ___
Calibration Readings: Start 113.9 End 113.98
Response Settings: Fast ___ Slow X
Weighting: A X Other ___
Calibrator:
Type: Larson Davis CAL 200 Serial Number: 5592
Did you check the battery? Yes X No ___

TRAFFIC DATA

Roadway Identification	US 301 Northbound		US 301 Southbound	
	Run 1-Run 2-Run 3		Run 1-Run 2-Run 3	
Vehicle Type	Volume	Speed (mph)	Volume	Speed (mph)
Autos	33-42-40	49-48-51	78-78-62	49-47-49
Medium Trucks	1-2-2	47-47-52	2-2-1	46-51-N/A
Heavy Trucks	6-2-4	45-51-49	10-6-7	45-44-45
Buses	0-0-0	0-0-0	0-0-0	N/A-0-0
Motorcycles	2-0-1	40-N/A-N/A	2-2-2	51-N/A-47
Duration	10 minutes per run		10 minutes per run	

*Speeds were not documented for all vehicle types.

RESULTS [dB(A)]

L_{EQ} 69.5-71.7-71.4 Lmax 93.4-109.3-107.4

Background Noise: dogs barking.
Major Sources: US 301
Unusual Events: cars turning into lodge. Run 1: horn; Run 3: dog barking/owner shouting, truck horn

KB Environmental Sciences