SR 400 (I-4) Project Development and Environment (PD&E) Study

FM No.: 432100-1-22-01

Noise Study Report

Segment 2: State Road 400 (SR 400) / Interstate 4 (I-4) from West of SR 528 (Beachline Expressway) to West of SR 435 (Kirkman Road)

Orange County (75280), Florida

July 2016

4 EXPRESS

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1.0 Summary of Project

The Florida Department of Transportation (FDOT) is conducting an update/reevaluation of the Project Development and Environment (PD&E) studies for the extension of proposed express lanes for State Road 400 (SR 400)/Interstate 4 (I-4). The project limits in the original PD&E studies were:

- West of Memorial Boulevard (SR 546) to the Polk/Osceola County Line, (29.5 miles)
- CR 532 (Polk/Osceola County Line) to West of SR 528 Beachline Expressway (13.7 miles), and
- West of SR 528 Beachline Expressway to SR 472 (43 miles).

The corresponding environmental documents associated with these PD&E studies include: Environmental Assessment/Finding of No Significant Impact (EA/FONSI) for SR 400 (I-4) from West of Memorial Boulevard (SR 546) to the Polk/Osceola County Line [Financial Project Number (FPN) 201210 (December 1998)] and from CR 532 (Polk/Osceola County Line) to West of SR 528 (Beachline Expressway) [FPN 242526 and 242483 (December 1999)] and Final Environmental Impact Statement (FEIS) for I-4 from SR 528 (Beachline Expressway) to SR 472 [FPN 242486, 242592 and 242703 (August 2002, Record of Decision Pending)].

The project limits of the current SR 400 (I-4) PD&E reevaluation, herein referred to as I-4 Beyond the Ultimate (BtU) PD&E Reevaluation Study, include a total of approximately 43 miles of roadway sections east and west of the 21-mile, I-4 Ultimate project. The I-4 Ultimate project, which began construction in early 2015, is reconstruction to include new express lanes of the section of I-4 that extends from west of SR 435 (Kirkman Road) to east of SR 434. The current I-4 BtU PD&E study has been divided into the following five segments:

- Segment 1: SR 400 (I-4) from West of CR 532 (Polk/Osceola County Line) to West of SR 528 (Beachline Expressway) - Osceola County (92130) and Orange County (75280)
- Segment 2: SR 400 (I-4) from West of SR 528 (Beachline Expressway) to West of SR 435 (Kirkman Road) - Orange County (75280)
- Segment 3: SR 400 (I-4) from 1 Mile East of SR 434 to East of SR 15-600/US 17-92 (Seminole/Volusia County Line) - Seminole County (77160)
- Segment 4: SR 400 (I-4) from East of SR 15-600/US 17-92 (Seminole/Volusia County Line) to ½ Mile East of SR 472 - Volusia County (79110)
- Segment 5: SR 400 (I-4) from West of SR 25/US 27 to West of CR 532 (Polk/Osceola County Line) Polk County (16320)

Since no record of Decision has been issued by the Federal Highway Administration (FHWA) for Segments 2, 3 and 4, the current PD&E BtU study for these three segments will update the original PD&E study. This Noise Study Report was prepared for Segment 2 of the SR 400 (I-4) BtU PD&E Reevaluation Study and contains detailed information that fulfills the purpose and need for the SR 400 (I-4), from West of 528 (Beachline Expressway) to West of SR 435 (Kirkman Road), PD&E study.

The purpose of this noise study is to determine if noise levels will be likely to increase, if noise-sensitive receptors are (or will be) within the project area, and if noise-related impacts will occur, in support of the PD&E update for the I-4 BtU Segment 2 portion of the FEIS for I-4 from SR 528 (Beachline Expressway) to SR 472 (FPN 242486-1, 242592-1, 242703-1, August 2002, Record of Decision pending). This update includes environmental analysis of the original design concept, which showed six general use lanes (GULs) and two high occupancy vehicles (HOV) lanes (6+2), to the current proposed

design, which includes six GULs and four express lanes (EL) operating under a variable price toll plan (6+4). Other changes being reanalyzed include stormwater management, access plan and interchange configurations.

1.1 Description of Proposed Action

FDOT is proposing to reconstruct and widen I-4 as part of the I-4 BtU concept. This involves the build-out of I-4 to its ultimate condition through Central Florida, including segments in Polk, Osceola, Orange, Seminole and Volusia Counties. The concept design proposes the addition of two new express lanes in each direction, resulting in a total of ten dedicated lanes. The project limits for the segment analyzed in this report are within a 3.9-mile segment of I-4 which extends from west of SR 528 (MP 5.650) to west of SR 435 (Kirkman Road) [MP 9.528] in Orange County (herein referred to as I-4, Segment 2), as shown in Error! Reference source not found.**.** Although, the interstate is a designated east-west corridor, the alignment follows a north-south orientation through the majority of Segment 2. The study area in this section from west of SR 528 to west of SR 435 (Kirkman Road) includes the interchanges at SR 528, Sand Lake Road, and Universal Boulevard.

Two mainline typical sections are proposed for I-4 Segment 2. The typical section from the begin project limits east of Central Florida Parkway to SR 528 includes a 44-foot rail envelope in the median within a minimum 300 foot right of way (6+4 with rail envelope). The typical section from SR 528 to west of SR 435 does not include the rail corridor and also has a proposed minimum 300 foot right of way (6+4 without rail envelope). Both typical sections have a design speed of 70 miles per hour (mph) and will include three 12-foot general use lanes with a 10-foot inside shoulder and a 12-foot outside shoulder (10-foot paved) and two 12-foot express lanes with a 4-foot inside shoulder and a 10-foot outside shoulder, in each direction. A barrier wall between adjacent shoulders will separate the express lanes from the general use lanes. Additionally, up to three auxiliary lanes in either direction of travel will be provided in some areas. **Figure 1.2 and Figure 1.3** illustrate the proposed mainline typical sections for I-4 Segment 2.

While the overall typical section remains consistent throughout Segment 2, there are some areas along the I-4 BtU corridor that will have special sections. Special cross sections were developed to meet the needs of the project due to right of way constraints, existing utility easements or other design considerations along the corridor. These special sections may include C-D roads, braided ramp systems, elevated express lanes or elevated general use lanes. Additionally, the median width may vary in certain locations to accommodate changes in the horizontal alignment due to crossroad support structures or other design features. The special sections within the Segment 2 corridor include a C-D system between Central Florida Parkway and SR 528; the eastbound C-D Road is at grade and the westbound C-D Road is elevated. The eastbound C-D road extends approximately 1.9 miles between SR 528 in Segment 2 and the Daryl Carter Parkway interchange located within Segment 1 of the I-4 BtU corridor. The westbound C-D Road extends approximately 5.9 miles between SR 528 in Segment 2 and the Osceola Parkway interchange located within Segment 1 of the I-4 BtU corridor.

1.2 Purpose and Need

The proposed improvements to I-4 include widening the existing six lane divided urban interstate to a ten lane divided highway in order to improve traffic operations, enhance connectivity and improve mobility by providing travel choices to the motoring public. I-4 is an east-west limited access freeway which links the west and east coasts of Florida, from I-275 in Tampa to I-95 in Daytona Beach. I-4 spans across six counties in Central Florida, traversing through many cities including Lakeland, Celebration, Orlando, Altamonte Springs, Sanford and DeLand. I-4 is a critical component of Florida's Strategic Intermodal System (SIS) which links seaports, rail, airports and other intermodal facilities. This aspect of I-4's significance is evidenced through connectivity provided by major junctions with I-275, I-75, SR 429 (Daniel Webster Western Beltway), SR

417 (Southern Connector/Central Florida Greenway/Seminole Expressway), SR 528 (Martin Andersen Beachline Expressway), SR 91 (Florida's Turnpike), SR 408 (Spessard Lindsay Holland East-West Expressway) and I-95 on the east coast.

I-4 serves as the primary corridor in the movement of people and freight between major population, employment and activity centers in the Central Florida region. When the entire Interstate was fully opened in the early 1960's, it was designed to serve intrastate and interstate travel by providing a critical link between the east and west coasts of Central Florida. Although this role continues to be a crucial transportation function of I-4, the highway also serves large volumes of local and commuter traffic with shorter trip distances. Today, the highway serves as the primary link between hotel/resort complexes and tourist attractions such as Walt Disney World, Universal Studios, Sea World, the International Drive Resort Area and downtown Orlando. Since I-4 is the only north-south limited access facility that is centrally located between the predominant employment centers and the major suburbs to the north, it has become the primary commuting corridor in the Central Florida metropolitan area.

Growth in Central Florida over the past decades has made it difficult for the transportation system to accommodate travel demand. Additionally, traffic congestion and crash incidents have resulted in major delays on the Interstate as well as other arterials surrounding the corridor. Increased congestion levels are experienced outside of the typical morning and afternoon rush-hour periods, affecting mobility levels for more hours of the day and impacting other non-commuter/non-weekday travel. The congestion on I-4 is further evidenced by the less than desirable levels of service on the Interstate as well as the crossroads.

Projections of future population and employment in the region indicate that travel demand will continue to increase well into the future. The ability to accommodate the new travel patterns resulting from growth must be provided to sustain the region's economy. Without the improvements, extremely congested conditions are expected to occur for extended periods of time in both the morning and evening peak periods. Due to these congested conditions, user travel times will continue to increase, the movement of goods through the urban area will be slower, and the deliveries of goods within the urban area will be forced to other times throughout the day.

The need for improvements to I-4 is illustrated by the important transportation roles I-4 serves to the Central Florida region and the State of Florida. If no improvements are made to the Interstate, a loss in mobility for the area's residents, visitors, and commuters can be expected, resulting in a severe threat to the continued viability of the economy and the quality of life.

This PD&E update involves revising the original design concept showing 6 GULs + 2 HOV lanes, as recommended in the FEIS for I-4 from SR 528 to SR 472 (FPN No. 242486, 242592 & 242703, August 2002, Record of Decision Pending), to the current proposed design of 6 GUL + 4 EL. The express lanes are tolled lanes and will extend the full length of the project. The access to/from the tolled lanes will be evaluated as part of this effort to determine if changes are needed from the previously approved concept for access to/from the HOV Lanes.

The original I-4 PD&E Studies involved physical separation between the general use lanes and the HOV lanes on I-4, with demand management in the HOV lanes. The original demand management strategy was to control the use of the lanes by requiring a minimum number of occupants per vehicle to maintain an acceptable level of service (Level of Service D). This update also addresses revising the demand management tool to convert the HOV lanes to tolled express lanes. The express lanes will be separated from the general use travel lanes by two shoulders with a barrier wall between the

shoulders. A variable pricing tolling plan is proposed for the express lanes. The tolls will vary by time of day and day of week to maintain acceptable levels of service in the express lanes. The tolls will be collected electronically through existing E-Pass, SunPass and other systems currently in place in the Central Florida area. The conversion to express lanes will maintain the same right of way limits as documented previously and will not change the impacts to the social, natural or physical environment. An update to the Systems Access Modification Report (SAMR) prepared in January 2013 is being completed in conjunction with this effort.

The purpose of this traffic noise study is to determine if noise levels will be likely to increase, if noise-sensitive receptors are (or will be) within the project area, and if noise impacts will occur. If future design-year noise levels at noise sensitive receptors approach, meet, or exceed the Noise Abatement Criteria established by FHWA in 23 CFR 772 or increase 15 dB(A) over existing noise levels as a direct result of the transportation improvement project, noise abatement must be considered. The Federal Highway Administration's (FHWA) Traffic Noise Modeling (TNM) Version 2.5 computer program was used to determine if noise abatement was warranted, and, if so, considered reasonable and feasible for any noise-sensitive sites. The format and content of this report are based on the procedures established in Part 2, Chapter 17 "Noise", of the FDOT PD&E Manual.

The noise analysis guidance provided is based on the regulatory material found in 23 Code of Federal Regulations (CFR), Part 772, and entitled "Procedures for Abatement of Highway Traffic Noise and Construction Noise" for FDOT noise assessments, regardless of funding. This regulation, pursuant to Rule Chapter 335.17, Florida Statutes (F.S.), is available from the FHWA and FDOT.

Figure 1.1 - Project Location Map

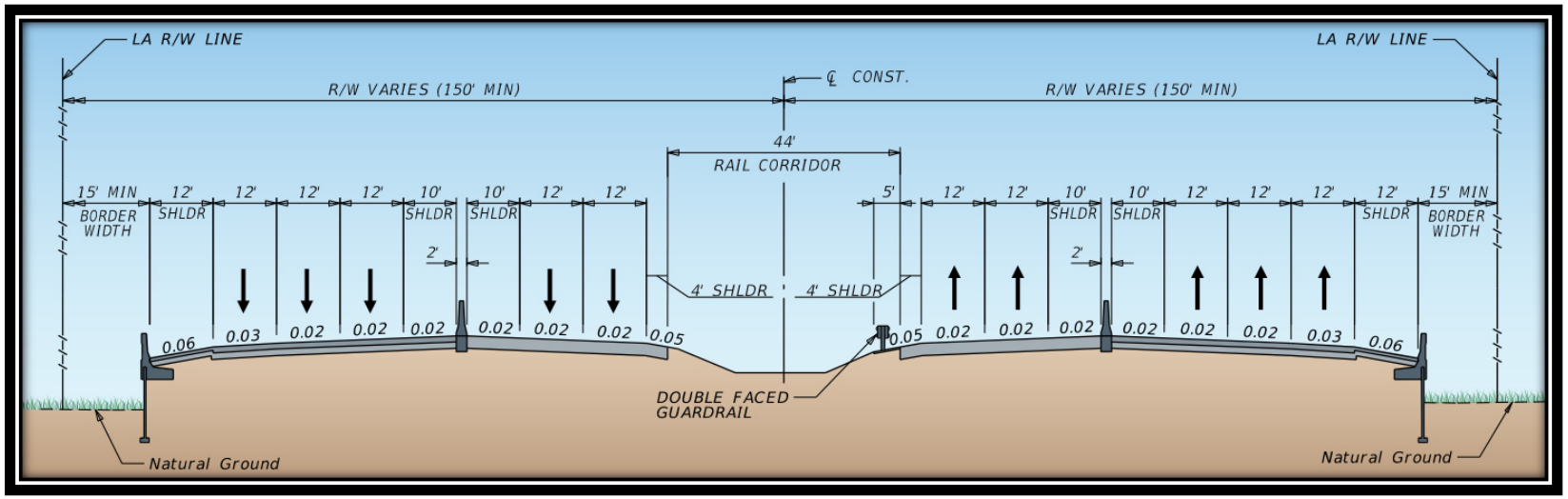


Figure 1.2: Proposed Typical Section (6+4 with rail envelope) – E. of Central Florida Parkway to SR 528

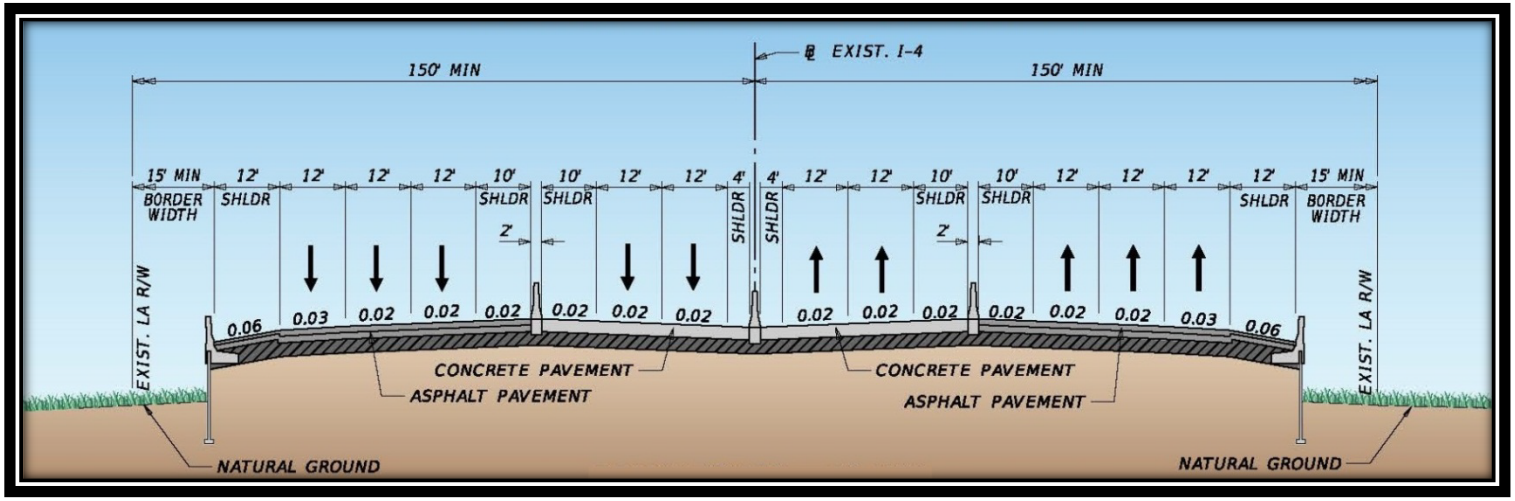


Figure 1.3: Proposed Typical Section (6+4 without rail envelope) – SR 528 to W. of SR 435

1.3 Existing Facility

The project corridor is located within an urban area of Orange County, at the northern end of the Orlando "Tourist Corridor" encompassing the primary access points to Universal Orlando, International Drive (I-Drive), and the Orange County Convention Center. Sea World is located to the east of the corridor, south of SR 528 off of Central Florida Parkway and I-Drive. A number of residential communities are located west of the corridor off of Sand Lake Road and Turkey Lake Road, with the remainder of the area being commercial and retail establishments such as hotels, shops, restaurants, and businesses. A hospital and US Post office are located off of Turkey Lake Road to the west of I-4. Categorization of land uses under the Florida Land Use Cover Forms and Classification System (FLUCFCS) include the following (See Figure A, Land Use and Habitat Maps in **Appendix I**):

Residential (1000-1300) – This range of land use codes consists of areas containing low, medium, and high density residential housing. These areas are found west of Turkey Lake Road, between SR 528 and Kirkman Road. The most densely populated areas are in the Toscana Development north of Sand Lake Road, and in the Sand Lake Town Homes and Sand Lake Residences near the Dr. P. Phillips Hospital.

Commercial and Services (1400) – This land use was observed throughout the project corridor along Turkey Lake Road, International Drive, Sand Lake Road, and Kirkman Road. It includes numerous types of businesses in strip malls and as stand-alone establishments throughout the corridor.

Retail Sales and Services (1410) – This land use was observed throughout the project corridor which consisted of office complexes, shopping centers, and other service/retail oriented businesses along the adjacent roadways. Big-box stores like Wal-Mart and Whole Foods are located on Turkey Lake Road, and numerous other stores and restaurants can be found along the corridor.

Professional Services (1430) – Medical offices, dental offices, banks, and other professional offices are located along Turkey Lake Road and Sand Lake Road in the project area.

Tourist Services (1450) – There are a number of hotels and resorts located along the corridor, especially along International Drive to the east of I-4. The Westgate Lakes Resort is located on Turkey Lake Road near the SR 528 interchange, and there are three resort hotels associated with Universal Studios Orlando on Kirkman Road.

Institutional (1700) – This land use consisted of the Orange County Convention Center located at the SR 528/I-4 Interchange in the northeast quadrant. The convention center is a large sprawling complex, with numerous parking lots and limited natural habitat.

Medical and Health Care (1740) – The Dr. P. Phillips Hospital is located on the western side of Turkey Lake Road north of the SR 528 interchange. The hospital is set back off the road, but is composed of a number of buildings with multiple parking lots.

Community Recreational Facilities (1860) – The YMCA Aquatic and Family Center is located on the western side of International Drive south of Sand Lake Road and abuts I-4. The complex is enclosed by a roof and has several pools, though sections of the roof are open or removed.

Other Recreational (1890) – The Air Florida Helicopter facility is a tourist attraction offering helicopter rides over the local area and is located on the western side of International Drive adjacent to I-4 south of Sand Lake Road. Helicopters are taking off and landing several times per hour every day of the week, contributing to background noise.

Inactive land (1920) – This land use consists of undeveloped open land. There are several hundred acres of inactive land on the Universal Studios property between Turkey Lake Road and I-4.

Herbaceous- Dry Prairie (3100) – This land use consists of open, dry treeless areas containing grasses, forbs, sedges, rushes and other herbaceous vegetation. This habitat was observed within the central median between Kirkman Road and Sand Lake Road, and at the SR 528 interchange.

Pine Flatwoods (4110) – This land use consists of natural pine flatwoods, and is located at the SR 528 interchange on the southeast side of I-4. Dominant vegetation in this community consists of slash pine and saw palmetto. This land use has a high likelihood for wildlife occurrence.

Sand Pine (4130) – This pine community grows on deep, infertile deposits of marine sands and clays. It consists of densely-stocked, pure, even-aged stands of sand pine, with no other canopy species. The sand pine found within the project corridor occurs at the interchange of I-4 eastbound with SR 528, in the southeastern corner and within the median.

Upland Hardwood Forests (4200) – Vegetation within this land use consisted of oaks, pine, and other shrubs. This habitat was mostly observed on the west side of Turkey Lake Road south of Sand Lake Road.

Live Oak (4270) – The dominant vegetation within this land use consisted of live oaks and was observed along the western side of Turkey Lake Road near the residential and hospital areas.

Ditches (5130) – These man-made water retention and distribution areas were observed along the ROW throughout most of the project area.

Reservoirs (5300) – This land use designates all retention ponds and other artificial impoundments used for irrigation and flood control along the project corridor and within residential developments.

Willow and Elderberry (6180) – This community has willow as the pure or predominant species and was observed between Turkey Lake Road and the on-ramp to SR 528 from westbound I-4.

Exotic Wetland Hardwoods (6190) – The category is a wetland with a dominant exotic species present. In the areas surrounding the Kirkman Road interchange, Brazilian Pepper wetlands were observed dominating the wetlands within the median and right of way.

Cypress (6210) – Dominate vegetation consisted of cypress and was observed at the northwest corner of the Orange County Convention Center, and rimming Big Sand Lake on the western side of Turkey Lake Road.

Roads and Highways (8140) – This land use designates all major and minor roads throughout the project corridor.

2.0 Methods

2.1 Noise Metrics

The noise levels documented in this report are based upon the hourly equivalent sound level [Leq(h)]. The Leq(h) represents the steady-state sound level, which contains the same amount of acoustic energy as the actual time-varying sound level over a one hour period. Sound measurements are recorded in decibels (dB), which is a unit of measure used to determine sound intensities. Leq(h) is measured on an A-weighted decibel scale (dBA), which is the frequency of sound that is heard by the human ear.

2.2 Traffic Noise Modeling

The Federal Highway Administration's (FHWA) Traffic Noise Modeling (TNM) Version 2.5 computer program was used to determine if noise abatement was warranted, and, if so, considered reasonable and feasible for any noise-sensitive sites. This model is the latest version of TNM and was used as required by 23 CFR 772. The model estimates the acoustic intensity at noise receptor sites based upon the roadway design and is influenced by vehicle speed and type. TNM 2.5 predicted noise levels are reported in dB(A) Leq(h). To validate TNM, potential noise receptor sites were identified throughout the project corridor. Information that was loaded into the noise model to predict existing and projected noise levels includes: roadway geometry; vehicle types, volumes, and speeds; existing barrier and buffer information, propagation path; and, climatic conditions. The results of the validation are shown in Section 4.1.

2.3 Existing Noise Levels

In order to collect data on existing noise levels throughout the project area, field monitoring was conducted by four noise monitoring specialists in accordance with the FHWA's guidance document "Measurement of Highway-Related Noise." on May 28, 2013. Quest™ Model M-28 Noise Logging Dosimeters were used to collect sound levels at the location. Sound levels are measured and calculated in decibels (dB), which is a unit of measure used to determine sound intensities. The decibel levels were measured on an A-weighted scale (dBA), which is the frequency of sound that is heard by a human ear. The average sound level over a one-hour period is considered the Level Equivalent (Leq), and is used in the noise modeling process. The dosimeter was calibrated on site just prior to the onset of sampling to ensure accuracy and mounted on a tripod at a height of approximately 5 feet which is standard and equivalent to the average height of the human ear. Noise readings were taken 3 separate times at 15-minute intervals during both the morning (10:00 – 11:30) and afternoon (1:00 – 3:00), periods of non-peak traffic activity along the project corridor.

The location was on the west side of Turkey Lake Road within the right of way at an abandoned development driveway approximately 28 feet from the outside of the southbound travel lane. The location provided clear site lines to observe traffic on both I-4 and Turkey Lake Road. The right-of-way adjacent to I-4 is mown grass, separated from Turkey Lake Road via a 6-foot chain link fence. Vegetation along the fence and Turkey Lake Road was grass or low weedy vegetation, with no trees or any natural or man-made obstructions to affect the noise readings.

In order to gauge traffic volumes during the monitoring periods, traffic counts of the number and type of vehicles traveling in each direction at the monitoring station were recorded. Traffic counts were taken simultaneously during each of the 3 noise recording events. Vehicles were categorized as either 1) passenger cars or light trucks, 2) medium trucks (box or panel trucks with one double-axle) or 3) heavy trucks (two or more double-axles) and motorcycles. Field notes were collected to record general weather and environmental conditions, and all unusual or otherwise noteworthy sound events. Traffic speeds for passing vehicles were determined by the use of a daily calibrated radar gun and recording the resulting speeds during timed monitoring runs.

The speeds used in the TNM modeling program for the model validation were based on the average observed speeds of 60 mph for cars, and 55 mph for trucks during the data collection. Level of Service C volumes at speeds of 65 mph was utilized to model the worst case scenario for future noise projections (See **Table 4**).

Design files supplied by HNTB were used to establish the input parameters for modeling the roadway, including vertical and horizontal geometry and ground elevations.

2.4 Noise Abatement Criteria

The FHWA established Noise Abatement Criteria (NAC) for seven land use categories. If predicted noise levels approach or exceed the NAC levels, or a substantial noise increase is predicted, noise abatement must be considered. A substantial noise increase occurs when the existing noise level is predicted to be exceeded by 15 dB(A) or more by the project. FDOT defines 'approach' as within 1.0 dB(A) of the FHWA criteria.

Noise sensitive receptor sites include areas where frequent exterior human use occurs and where a reduced noise level would be beneficial. Included are lands which require quiet (Activity Category A), residential areas (Activity Category B), a variety of non-residential land uses such as parks, schools, places of worship, and medical facilities (Activity Category C), and commercial properties with areas of exterior use such as restaurants, hotels, and other places of business (Activity Category E). Activity Category D includes noise sensitive sites that have interior uses but no exterior activities such as hospitals, libraries, recording studios, television studios, and public meeting rooms. Activity Categories F (industrial and retail facilities) and G (undeveloped lands) have no exterior uses and are not considered noise sensitive and thus do not have any noise abatement criteria (see Table 1 - Noise Abatement Criteria [NAC]). The land uses occurring within the project study area were described previously in Section 1.3.

TABLE 1 – NOISE ABATEMENT CRITERIA

NOISE ABATEMENT CRITERIA [Hourly A-Weighted Sound Level-decibels (dB(A))]				
Activity Category	Activity Leq(h)[1]		Evaluation location	Description of activity category
	FHWA	FDOT		
A	57	56	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67	66	Exterior	Residential
C[2]	67	66	Exterior	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.
D	52	51	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[2]	72	71	Exterior	Hotels, motels, offices, restaurants/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.

Part 2, Chapter 17 of PD&E Manual (5/24/2011) (Based on Table 1 of 23 CFR Part 772)

[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: FDOT defines that a substantial noise increase occurs when the existing noise level is predicted to be exceeded by 15 decibels or more as a result of the transportation improvement project. When this occurs, the requirement for abatement consideration will be followed.

For reference, the relationship between typical noise levels and common indoor/outdoor activities is provided in **Table 2**.

Table 2 – Typical Noise Levels

COMMON OUTDOOR ACTIVITIES	NOISE LEVEL dB(A)	COMMON INDOOR ACTIVITIES
	---110---	Rock Band
Jet Fly-over at 1000 ft		
	---100---	
Gas Lawn Mower at 3 ft		
	---90---	
Diesel Truck at 50 ft, at 50 mph		Food Blender at 1 m (3 ft)
	---80---	Garbage Disposal at 1 m (3 ft)
Noise Urban Area (Daytime)		
Gas Lawn Mower at 100 ft	---70---	Vacuum Cleaner at 10 ft
Commercial Area		Normal Speech at 3 ft
Heavy Traffic at 300 ft	---60---	
		Large Business Office
Quiet Urban Daytime	---50---	Dishwasher Next Room
Quiet Urban Nighttime	---40---	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime		Library
	---30---	Bedroom at Night, Concert Hall (Background)
Quiet Rural Nighttime		
	---20---	
	---10---	
Lowest Threshold of Human Hearing	---0---	Lowest Threshold of Human Hearing

Source: California Dept. of Transportation Technical Noise Supplement, Oct. 1998, Page 18.

3.0 Noise-Sensitive Sites

A noise-sensitive receptor is defined as "any property (owner occupied, rented, or leased) where frequent exterior human use occurs." The project was broken up into geographic noise sensitive areas to facilitate the analysis of traffic related noise impacts. Eight (8) noise sensitive areas that have the potential to be impacted by the project were identified (see Figure B, Noise Sensitive Area Maps). The potentially impacted noise-sensitive sites identified for this segment consist of hotels, resorts, multi-family residences within the Sand Lake Private Residences, Sand Lake Village, McKinley at Monterey Lakes, and Sea Isle, and single-family residences at Toscana. One single family residence that appears abandoned is located directly on Turkey Lake Road, several hundred feet south of the Walmart. The Orange County Building Department was contacted for all approved building permits within the developments along the project corridor. The properties identified during this search were all modeled as existing receptors in the TNM runs. The noise sensitive areas within the study area present several different types of sites to model within TNM: multi-family buildings with external balconies were modeled using several points to represent similar receptors at different locations in the building, while single family residences were modeled using a point to represent each site. Hotels with no external balconies were represented only by areas of common outdoor usage (pools, outdoor recreation areas). Multi-story buildings were modeled using representative points on the ground floor, first floor, and second floor where appropriate. First floor receptor sites were modeled 5 feet above ground level, while second and third story receptors were modeled at 15 and 25 feet above ground level. There are no additional noise-sensitive sites such as golf courses, libraries, or other areas that require quiet conditions within the study area.

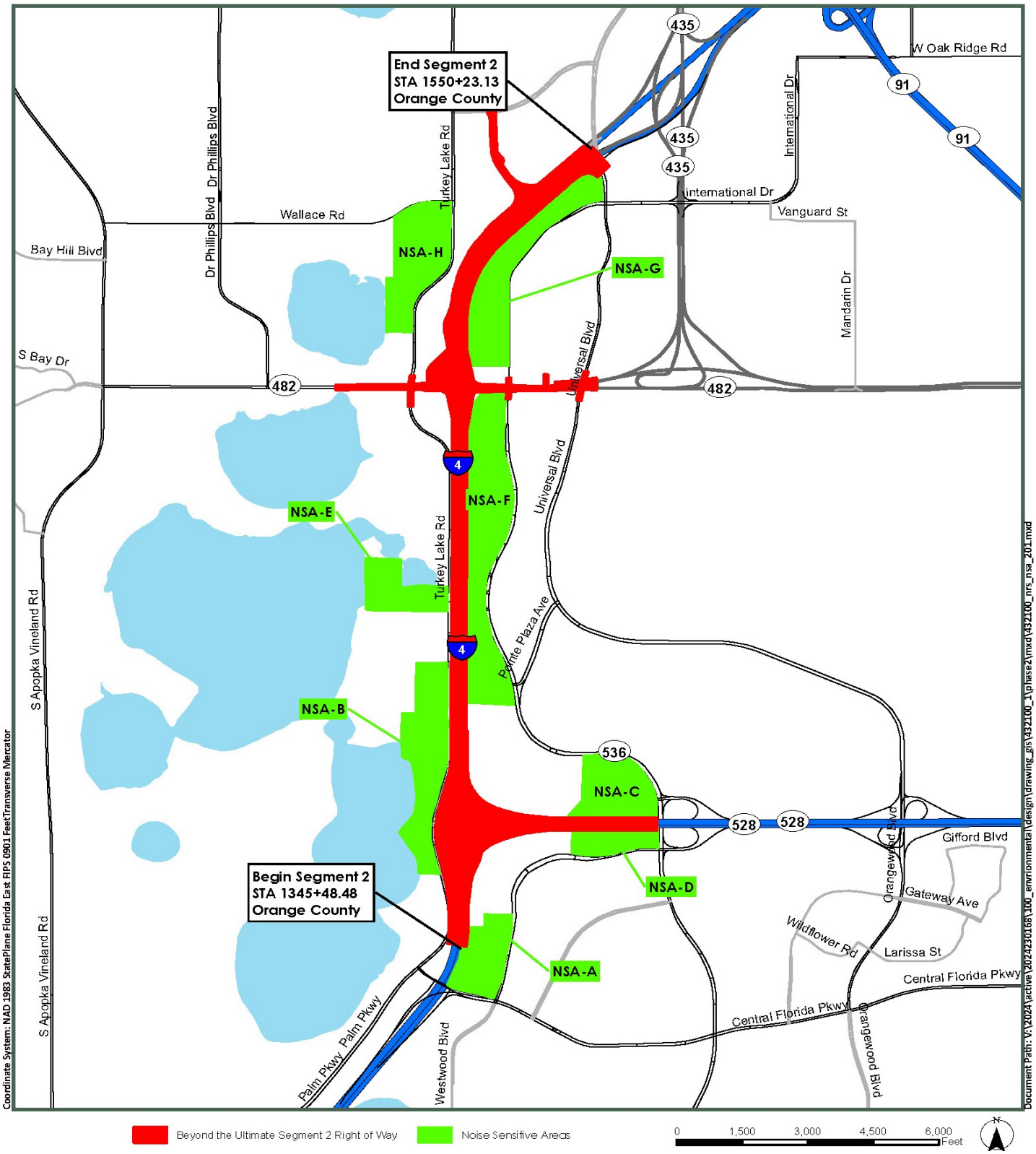


Figure 3.1 – Noise Sensitive Areas Map

Following is a description of each Noise Sensitive Area:

Noise Sensitive Area A

This area is located east of I-4 and north of Central Florida Parkway, and includes the noise sensitive sites at the McKinley Lake Apartments and those sites at the now under construction Sea Isle. Additional points for common areas of outdoor use were included to represent the pools and recreation facilities.

Noise Sensitive Area B

This area is located west of I-4 and SR 528 along the western side of Turkey Lake Road. This noise sensitive area represents the noise sensitive sites at the Westgate Lakes Resort and the noise sensitive sites in the Sand Lake Villas.

Noise Sensitive Area C

This area is located west of International Drive and south of SR 528, to the east of I-4. This noise sensitive area consists of the noise sensitive sites at hotels and a commercial area of restaurants and shops.

Noise Sensitive Area D

This area is located west of International Drive and north of SR 528, to the east of I-4. This noise sensitive area consists of the noise sensitive sites at four hotels, a commercial area of restaurants and shops, and the Orange County Convention Center.

Noise Sensitive Area E

This area is located west of I-4 on the west side of Turkey Lake road north of SR 528. This noise sensitive area consists of the noise sensitive sites at the Quality Suites by Choice Hotels, the Sand Lake Private Residences, a commercial area of restaurants and shops, and the Dr. P. Phillips Hospital.

Noise Sensitive Area F

This area is located east of I-4 and west of International Drive, south of Sand Lake Road. This noise sensitive area consists of noise sensitive sites at a number of hotels, numerous commercial areas of restaurants and shops, and YMCA Aquatic Center.

Noise Sensitive Area G

This area is located east of I-4, west of International Drive, north of Sand Lake Road. This noise sensitive area consists of noise sensitive sites at a number of hotels, numerous commercial areas of restaurants and shops, and outdoor recreation areas such as the Volcano Island Mini-Golf and the Coco Cay Waterpark.

Noise Sensitive Area H

This area is located west of I-4, west of Turkey Lake Road, north of Sand Lake Road. This noise sensitive area consists of the noise sensitive sites in Toscana, the Drury Inn, and a commercial area with restaurants and shops.

4.0 Predicted Noise Levels

4.1 Model Validation and Background Noise Levels

The TNM model was validated at the field sampling location along Turkey Lake Road. Field recorded noise levels varied slightly from TNM predictions. Contributing noise levels from sources other than roadway-generated noise along I-4 and Turkey Lake Road were not input into the TNM. As seen in **Table 3**, TNM Version 2.5 predictions were within 3 decibels (dBA) of the field recorded noise levels. Therefore, the model was validated.

Table 3. TNM Validation Results (dBA)

Field Recording Station	Field Recorded	TNM Predicted	Δ	Threshold	Validate
Location 1 AM	**71.4**	**72.3**	**0.9**	**3**	**YES**
Location 1 PM	**66.3**	**68.6**	**2.2**	**3**	**YES**

4.2 Future Noise Impact Analysis

Future noise was modeled for the proposed project at potential noise receptor areas for the future build conditions in the design year 2040 (TNM results are included in **Appendix II**). Traffic data utilized was based upon Level of Service C as obtained from the generalized tables of FDOT's Level of Service Handbook (December 2012) and shown in Table 4 below. Based upon the design traffic models for the design year, I-4 is expected to operate at a low level of service (D or E), which precipitated the use of LOS C for the TNM model.

Note: trucks will not be permitted in the Express Lanes, and for the purpose of the TNM model, trucks were only spread into the middle and outside General Use lanes.

Table 4.
Traffic Data for TNM Modeling

Roadway Segment	Level of Service "C" Volume	Cars	Medium Trucks	Heavy Trucks	Speed
General Use Outside	**4,580**	**1429**	**49**	**98**	**65**
General Use Middle		**1429**	**49**	**97**	**65**
General Use Inside		**1429**	**0**	**0**	**65**
Express Inside	**3,320**	**1660**	**0**	**0**	**65**
Express Outside		**1660**	**0**	**0**	**65**

Noise Sensitive Area A

This area represents activity Category B and has **60** sites predicted to be impacted.

Noise Sensitive Area B

This area represents activity Category B and has **5** sites predicted to be impacted.

Noise Sensitive Area C

This area represents activity Category E and has **no** sites predicted to be impacted.

Noise Sensitive Area D

This area represents activity Category E and has **no** sites predicted to be impacted.

Noise Sensitive Area E

This area represents activity Category B, C, and E and has **4** sites predicted to be impacted.

Noise Sensitive Area F

This area represents activity Category C and E and has **5** sites predicted to be impacted.

Noise Sensitive Area G

This area represents activity Category C and E and has **3** sites predicted to be impacted.

Noise Sensitive Area H

This area represents activity Category C and E and has n**o** sites predicted to be impacted.

Table 5 shows the results of the TNM analysis of noise sensitive sites in locations most likely to be impacted and those predicted to exceed the 66 dBA threshold in the future build scenarios. The complete set of results for all TNM runs for potential noise sensitive sites can be found in **Appendix II**.

Table 5
Noise Sensitive Areas

Noise Sensitive Area	Activity Category	Number of Impacted Sites
A	**B**	**60**
B	**B**	**5**
C	**E**	**0**
D	**E**	**0**
E	**B, C. E**	**4**
F	**C, E**	**5**
G	**C, E**	**3**
H	**C, E**	**0**

5.0 Noise Abatement

The FHWA requires that various noise abatement measures be considered for a proposed project when the predicted noise levels exceed noise abatement criteria, or, will increase substantially over existing levels. If none of the potential receptors exceed the abatement criteria or show a substantial increase over existing levels, noise abatement will not be required for the project. The most common and effective noise abatement measure is the construction of a noise barrier. As noted in 23 CFR 772.13(c)(1), the FHWA requires that, at a minimum, FDOT shall consider noise abatement in the form of a noise barrier. FHWA also considers the following activities as acceptable noise abatement measures.

5.1 Alignment Selection

Alignment selection involves the orientation of the project location in such a way as to minimize impacts and costs. For noise abatement, alignment selection is primarily a matter of (a) positioning the roadway at a sufficient distance from the noise-sensitive sites, and, (b) positioning the roadway at a location where other noise abatement techniques such as a noise abatement wall could be implemented. The project is constrained as a widening of an existing roadway and cannot truly alter the existing alignment without substantial changes to the surrounding land uses.

5.2 Property Acquisition

Property acquisition for buffer zones alone is considered to be costly. Buffer zones can provide relief from noise impacts by creating added distance between the noise generator and the noise receptor. Methods of applying land use controls to maintain and establish buffered areas through zoning may be established by local jurisdiction. No acquisition for noise abatement is proposed for this project.

5.3 Land Use Controls

One of the most effective noise abatement measures is the proper implementation of land use controls to minimize future noise impacts. Local jurisdictions with zoning control can implement policies to limit the growth on noise-sensitive land uses adjacent to the roadway. Development planned for the study area includes additional residential and commercial areas in this heavily developed urban area. No potential land use controls are available to assist in noise abatement in this corridor.

5.4 Traffic Management

Traffic management measures that limit vehicle type, speed, volume, and time of operations can be effective noise abatement measures. Such measures may be considered in the future if noise levels resulting from the proposed project approach or exceed the abatement criteria. No traffic management measures will be utilized as I-4 is a heavily traveled interstate highway and the only direct north-south Interstate through the greater Orlando area.

5.5 Noise Barriers

Noise barriers reduce noise levels by blocking the sound path between a roadway and noise-sensitive sites. To be effective, barriers have to be continuous, sufficiently long and tall, shield a reasonably sized impacted area or a number of people, and provide appreciable noise level reduction. Noise barriers are to be modeled at locations where noise increases exceeded abatement criteria during the design year, and evaluated for feasibility and reasonableness. A wide range of factors are used to evaluate noise abatement measures as reasonable and feasible. Feasibility deals with engineering considerations such as the ability to construct a barrier using standard construction techniques and methods to provide a reduction of at least 5 dBA to an impacted receptor site. Additionally, in order for a noise barrier to be considered acoustically feasible, at least two impacted receptor sites must achieve a 5 dBA reduction or greater.

When a noise abatement measure such as a sound barrier is determined to be feasible, the reasonableness is then evaluated. Three reasonableness factors must be collectively achieved in order for the noise abatement measure to be deemed reasonable: the achievement of the noise reduction design goal (7 dBA for at least one receptor per FDOT criteria), the cost effectiveness of the noise abatement measure, and the consideration of the viewpoints of the benefited property owners and residents. When examining the cost reasonableness of a modeled noise barrier design for a residential area, the upper limit of $42,000 per benefited receptor has been set by FDOT using the standard construction cost of $30.00 per square foot where approximately 1,400 square feet of noise barrier is provided per benefited receptor.

A benefited receptor is defined as a noise sensitive site that will obtain a minimum of 5 dBA of noise reduction as a result of a specific noise abatement measure whether or not they are predicted as having a noise impact. Only benefited receptor sites can be included in the calculation of a barrier being cost reasonable.

One Noise Barrier was deemed reasonable and feasible during the original PD&E study completed for this segment. Additional noise barriers were modeled for Noise Sensitive Areas with multiple impacted sites along the corridor during this analysis as described below. For each area, barriers were modeled as either ground-mounted at the edge of the right-of-way, and/or as barrier-mounted along the edge of the roadway shoulder. For the ground-mounted barriers, barrier heights were analyzed from 16 feet to 22 feet tall, while the heights of the shoulder mounted barriers were limited to 14 feet. The optimal barrier design for each analysis (See Figure B, Noise Barrier Analysis Maps in **Appendix I)** is described below and detailed in **Table 6**.

Noise Sensitive Area A

Noise barriers were modeled at two locations for Noise Sensitive Area A; at the Sea Isle Luxury Apartments and at the McKinley at Monterey Lakes Apartments. A noise barrier designed at 800 feet long with an average height of 19 feet was deemed reasonable and feasible during the original PD&E study for the McKinley Apartments at Monterey Lakes. Barriers were modeled along the right-of-way and at edge of shoulder for the McKinley at Monterey Lakes, but due to the location of the Sea Isle Apartments and the configuration of the road being on structure over Central Florida Parkway; only a shoulder mounted barrier was modeled. At this location, a 931 foot-long, 14 foot-tall shoulder mounted barrier provided an insertion loss of greater than 5 dBA to 30 receptors at a total cost of $391,061, for an average cost of $13,035 per benefited receptor. The best case scenario for the McKinley at Monterey Lakes apartments was a 440 foot-long, 22 foot-tall, ground mounted barrier that provided an insertion loss of greater than 5 dBA to 16 receptors at a total cost of $290,308, for an average cost of $18,144 per benefited receptor. Both of these barriers are less than the $42,000 per benefited receptor threshold and are therefore cost reasonable.

Noise Sensitive Area B

Barriers were modeled at two locations for this Noise Sensitive Area B. As the only noise sensitive sites are located within the Sand Lake Villas which are located adjacent to the westbound side of Turkey Lake Road, the barriers were modeled as close as possible to the source traffic (on the outside shoulder) or nearest the receptor (at the edge of Turkey Lake Road) within the I-4 right-of-way. None of the barriers modeled provided an insertion loss of 5 dBA or greater and fail to meet the design goal, so are therefore not reasonable and feasible.

Noise Sensitive Area C

No noise barriers were modeled for this area as no receptors were predicted to be impacted by the project.

Noise Sensitive Area D

No noise barriers were modeled for this area as no receptors were predicted to be impacted by the project.

Noise Sensitive Area E

A barrier was modeled along the edge of the right-of-way nearest the residential subdivision along southbound Turkey Lake Road named Sand Lake Private Residences. The ground mounted barrier was modeled along the I-4 westbound right-of-way nearest Turkey Lake Road and the impacted receptors. The barrier modeled was approximately 411 feet long and 22 feet tall, but did not result in any receptors receiving an insertion loss of 5 dBA or greater and failed to meet the design goal and is therefore not reasonable and feasible.

Noise Sensitive Area F

This noise sensitive area has two different places where two or more impacted receptors are grouped together: near the Rosen Inn at Pointe Orlando and near the YMCA Aquatic Center. Noise barriers were modeled for both areas with both ground-mounted and barrier-mounted walls being analyzed. The barriers modeled near the Rosen Inn resulted in only two benefited receptors for both the ground mounted and barrier mounted designs. The best case scenario was for a 14-foot tall 1,176 foot long barrier-mounted wall with a total cost of $493,920 resulting in an average cost of $246,960 per benefited receptor. The barriers modeled nearest the YMCA Aquatic Center achieved a 5 d(B) reduction at four receptors, with the best case scenario being the 16-foot tall, 1,760 foot long ground mounted wall with a total cost of $844,863, resulting in an average cost of $211,216 per benefited receptor. Both of these scenarios are well above the $42,000 threshold and therefore not cost reasonable.

Noise Sensitive Area G

Noise barriers were analyzed for the impacted sites within this area. Both ground mounted and barrier mounted walls were analyzed for this area, where impacts are predicted at the Coco Key waterpark and the hotel pool at the Hampton Inn I-Drive. The best case scenario results from a 14-foot tall, 731 foot long barrier mounted wall at a total cost of $307,127. This barrier results in only one receptor achieving an insertion loss of 5 dBA, and is therefore not acoustically feasible.

Noise Sensitive Area H

No noise barriers were modeled for this area as no receptors were predicted to be impacted by the project.

Table 6 – Barrier Analysis													
Noise Sensitive Locations	**Barrier Type**	**Barrier Name**	**Barrier Location**	**Height (feet)**	**Length (feet)**	**# of Impacted Receptors**	**# of Impacted Benefited Receptors**	**# of Non-Impacted Benefited Receptors**	**Total # of Benefited Receptors**	**Avg. Noise Reduction (dBA)**	**Cost ($30.00 per square foot)**	**Average Cost per Benefited Receptor**	**Comment**
NSA A / Sea Isle	barrier-mounted	BW-A1	I-4 EB Shoulder	14	931	34	12	18	30	6.0	$391,061	$13,035	Costs Reasonable
NSA A / McKinley at Monterey Lakes	ground	BW-A2	I-4 EB ROW	22	440	26	16	0	16	8.5	$290,308	$18,144	Cost Reasonable
	ground		I-4 EB ROW	20	440	26	12	0	12	9.2	$263,916	$21,993	Cost Reasonable
	ground		I-4 EB ROW	18	440	26	12	0	12	8.4	$237,525	$19,794	Cost Reasonable
	ground		I-4 EB ROW	16	440	26	12	0	12	7.4	$211,133	$17,594	Cost Reasonable
	ground		I-4 EB ROW	14	440	26	6	0	6	8.3	$184,741	$30,790	Cost Reasonable
	barrier-mounted		I-4 EB Shoulder	14	517	26	6	0	6	7.7	$216,954	$36,159	Cost Reasonable
NSA B	ground	BW-B2	I-4 WB ROW	22	1,751	5	0	0	0	0	$1,157,458		Does not meet Design Goal
	barrier-mounted	BW-B1	I-4 WB Shoulder	14	2,000	5	0	0	0	0	$839,876		Does not meet Design Goal
NSA E	ground	BW-E	I-4 WB ROW	22	411	2	0	0	0	0	$271,425		Does not meet Design Goal
NSA F / Rosen Inn	ground		I-4 EB ROW	22	1,176	2	2	0	2	9.3	$776,160	$388,080	Not Cost Reasonable
	ground		I-4 EB ROW	20	1,176	2	2	0	2	9.0	$705,600	$352,800	Not Cost Reasonable
	ground		I-4 EB ROW	18	1,176	2	2	0	2	8.7	$635,040	$317,520	Not Cost Reasonable
	ground		I-4 EB ROW	16	1,176	2	2	0	2	8.4	$564,480	$282,240	Not Cost Reasonable
	barrier-mounted	BW-F1	I-4 EB Shoulder	14	1,176	2	2	0	2	7.9	$493,920	$246,960	Not Cost Reasonable
NSA F / YMCA	ground		I-4 EB ROW	22	1,760	4	3	1	4	7.7	$1,161,686	$290,422	Not Cost Reasonable
	ground		I-4 EB ROW	20	1,760	4	3	1	4	7.4	$1,056,079	$264,020	Not Cost Reasonable
	ground		I-4 EB ROW	18	1,760	4	3	1	4	7.0	$950,471	$237,618	Not Cost Reasonable
	ground		I-4 EB ROW	16	1,760	4	3	1	4	6.6	$844,863	$211,216	Not Cost Reasonable
	barrier-mounted	BW-F2	I-4 EB Shoulder	14	1,760	4	3	1	4	6.1	$739,255	$184,814	Not Cost Reasonable / does not meet design goal
NSA G	ground		I-4 EB ROW	18	731	2	1	0	1	8.3	$394,877	$394,877	Not Cost Reasonable
	ground		I-4 EB ROW	16	731	2	1	0	1	8.0	$351,002	$351,002	Not Cost Reasonable
	barrier-mounted	BW-G	I-4 EB Shoulder	14	731	2	1	0	1	7.7	$307,127	$307,127	Not Cost Reasonable

6.0 Conclusions

Based upon the analysis conducted, two noise barriers are recommended for further consideration and public input for this segment of the project: For the McKinley at Monterey Lakes Apartments within Noise Sensitive Area A, a 22-foot tall, 440-foot long ground mounted barrier provides the best noise abatement and meets the requirements as reasonable and feasible. For the Sea Isle Luxury Apartments within Noise Sensitive Area A, a 14-foot tall, 931-foot long shoulder-mounted barrier provides the best noise abatement and meets the requirements as reasonable and feasible.

7.0 Commitments

FDOT is committed to the construction of feasible and reasonable noise abatement measures at the noise impacted location described in the conclusion above and shown in Table 6 and in the Noise Study Maps Figure B contingent upon the following conditions:

- Cost analysis indicates that the cost of the noise barriers will not exceed the cost-reasonable criterion.
- Community input supporting types, heights, and locations of noise barriers is provided to the District Office.
- Safety and engineering aspects as related to the roadway user and the adjacent property owner have been reviewed and any conflicts or issues resolved.

8.0 Construction Noise and Vibration

Construction activities for any of the proposed improvements will have temporary noise impacts for those residents and travelers within the immediate vicinity of the project. Noise and vibration impacts will be caused by heavy equipment movement and construction activities such as pile driving and vibratory compaction. Noise control measures should be implemented according to the FDOT's Standard Specifications for Road and Bridge Construction to minimize or eliminate some potential construction noise and vibration impacts. Section 335, F.S., exempts FDOT from compliance with local ordinances. FDOT policy is to follow the requirement of local ordinances to the extent that is reasonable. However, should unanticipated noise or vibration issues arise during the construction process, the Project Engineer, in coordination with the District Noise Specialist will investigate additional methods of controlling these impacts.

9.0 Public Involvement

As this project will have significant public involvement, the Final NSR will be made available in multiple forms (Public Meetings, Website, circulated to the appropriate local planning/zoning officials) in order to eliminate or minimize noise impacts at future development sites that are incompatible with traffic noise. The public will have opportunities for input during the public meetings and via the web site while the planning and design of the project are ongoing.

10.0 References

FDOT's PD&E Manual - Part 2, Chapter 17 "Noise" (dated 05/24/2011))
FHWA's guidance document "Measurement of Highway-Related Noise."
FDOT's Standard Specifications for Road and Bridge Construction

APPENDIX I

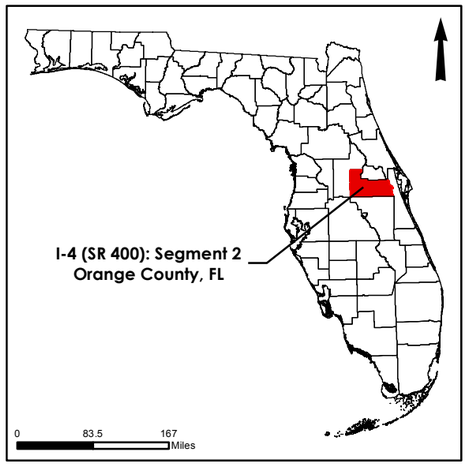
I-4 (SR 400) PROJECT DEVELOPMENT AND ENVIRONMENT (PD&E) STUDY
BEYOND THE ULTIMATE

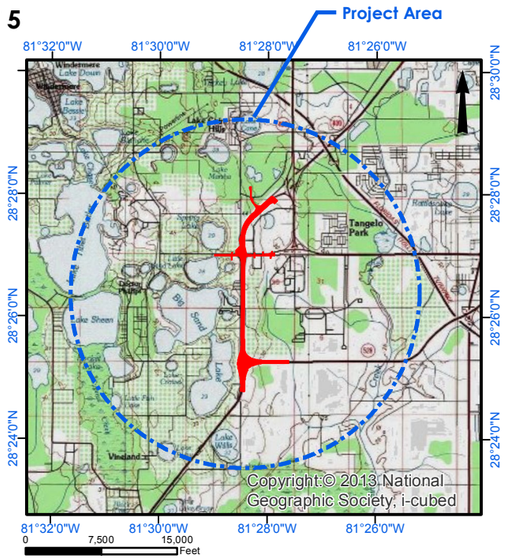
SEGMENT 2

FDOT FM NO. 432100-1-22-01

NOISE STUDY REPORT (NSR)

ORANGE COUNTY
FLORIDA DEPARTMENT OF TRANSPORTATION
DISTRICT 5





MAP SHEET INDEX

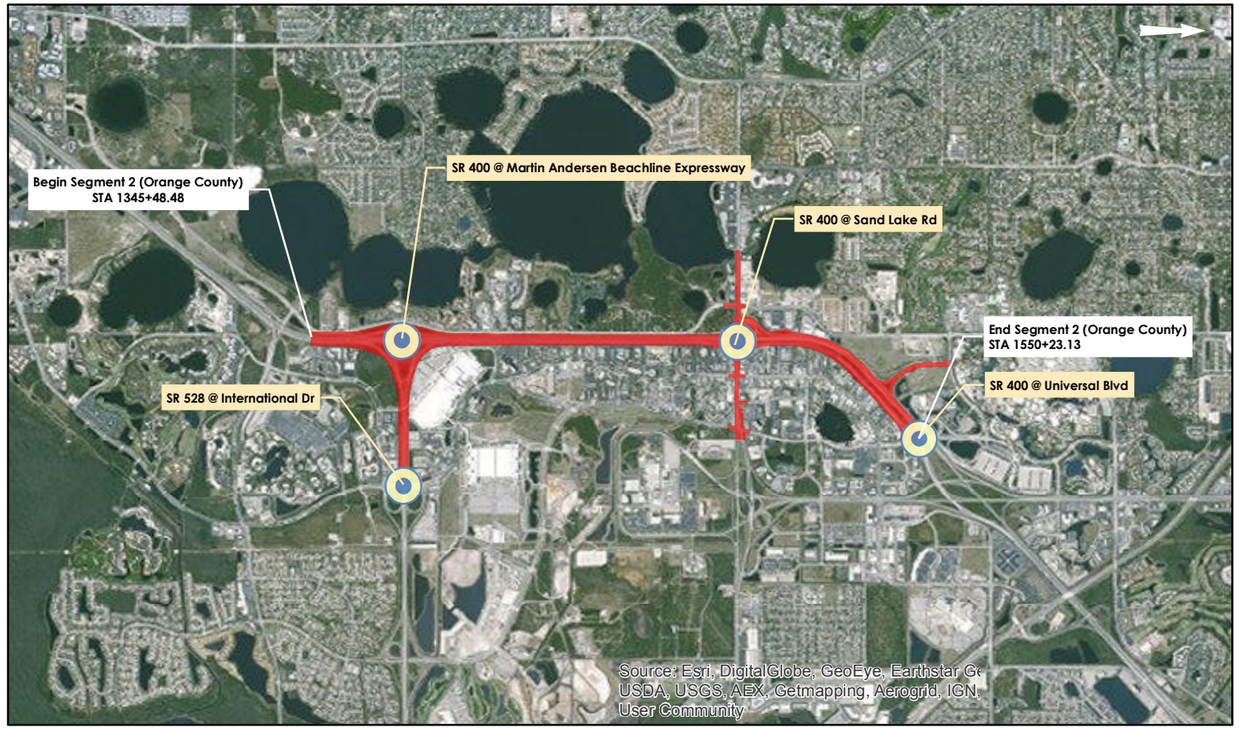
FIGURE NO.	SHEET NO.	TITLE
Figure A	Single Sheet	Land Use and Habitat Map
Figure B	Sheets 1-6	Noise Barrier Analysis Map

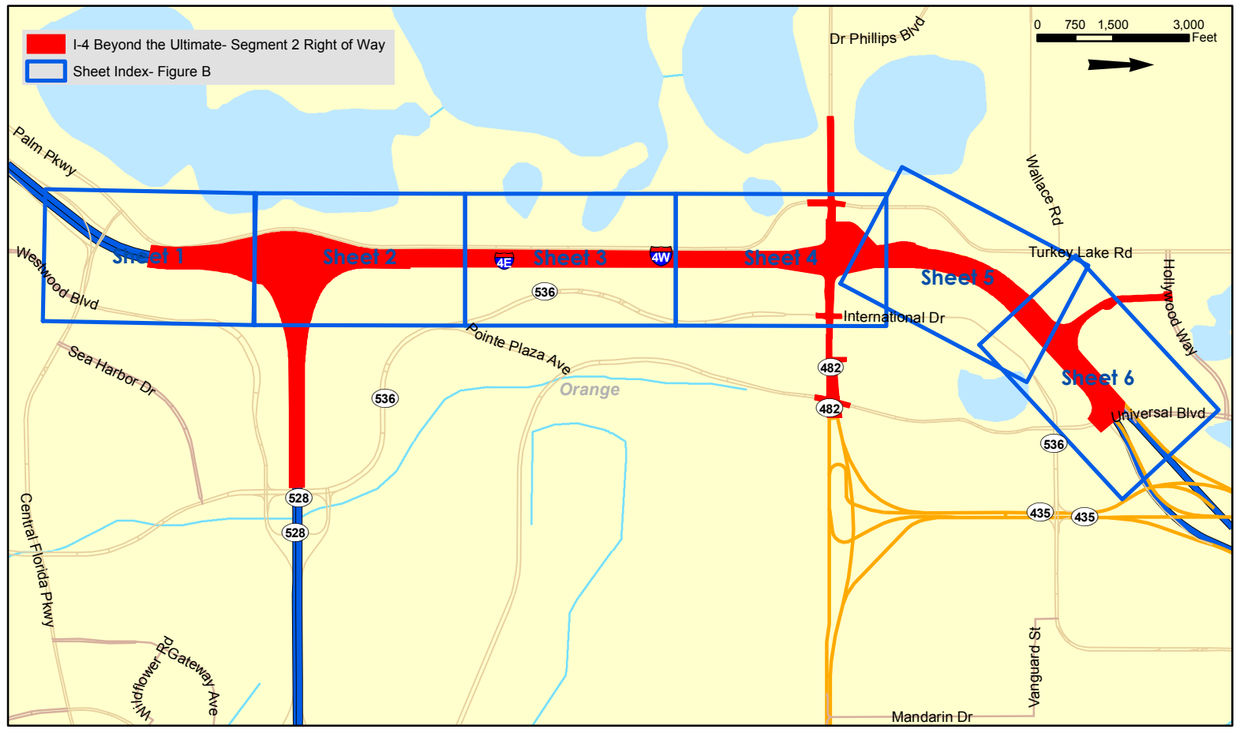
PROJECT DETAILS

NOISE STUDY REPORT: Segment 2 - Report Maps

SR 400 (I-4) from West of SR 528 Beachline Expressway to West of SR 435 Kirkman Road - Orange County (75280)

75280 Orange County
STA 1345+48.48 (Begin) - MP 5.65
STA 1550+23.13 (End) - MP 9.562





STN No. 2024230168

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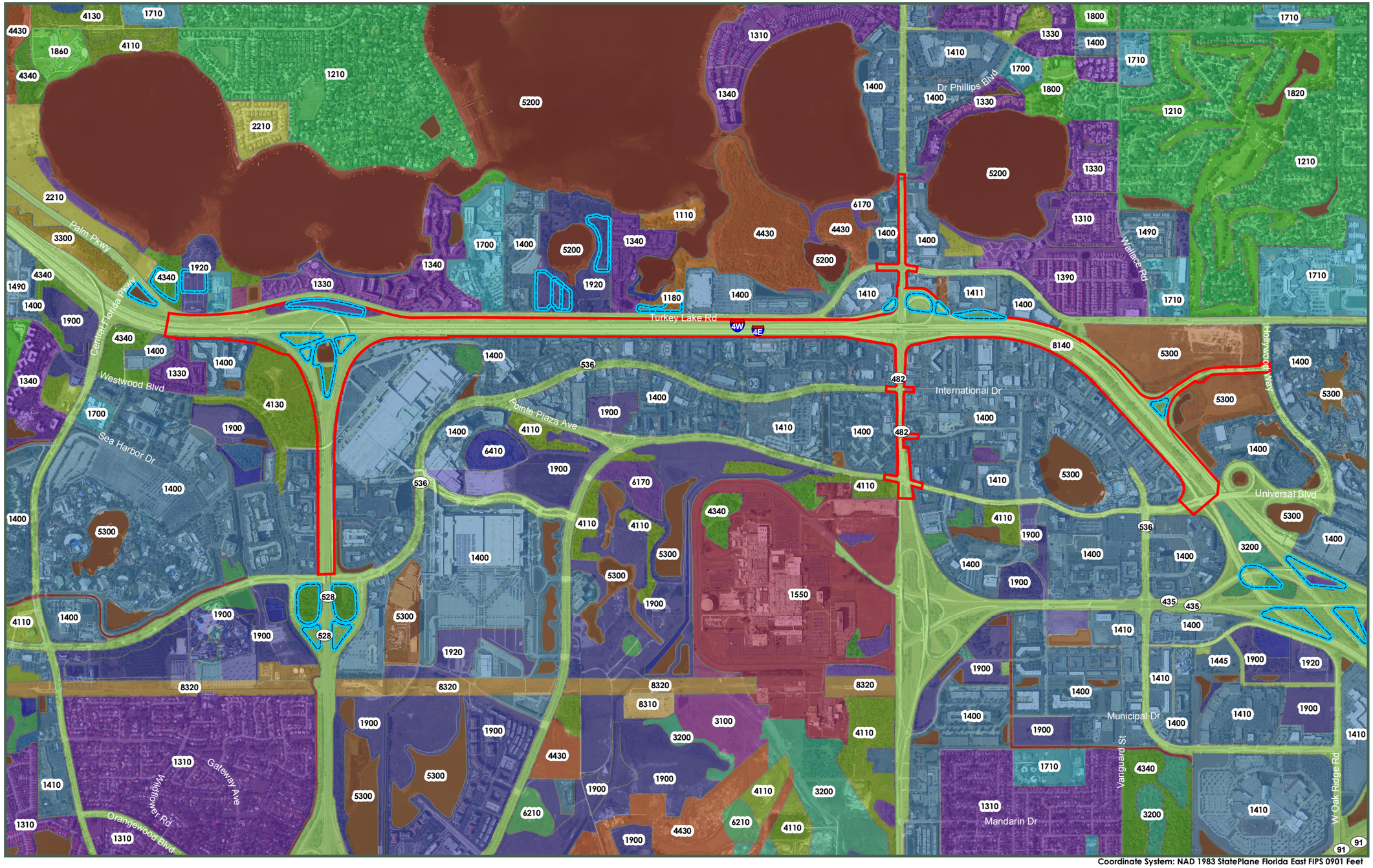
NOISE STUDY REPORT: Segment 2 - Land Use and Habitat Map

SR 400 (I-4) from West of SR 528 Beachline Expressway to West of SR 435 Kirkman Road- Orange County (75280)



Map Key

SR 400 (I-4) PD&E Limits

- I-4 Beyond the Ultimate- Segment 2 Right of Way
- Pond Sites (02/02/15)

Land Use and Habitats

- 1100;RESIDENTIAL, LOW DENSITY
- 1200;RESIDENTIAL, MEDIUM DENSITY
- 1300;RESIDENTIAL, HIGH DENSITY
- 1400;COMMERCIAL AND SERVICES
- 1500;INDUSTRIAL
- 1700;INSTITUTIONAL
- 1800;RECREATIONAL
- 1900;OPEN LAND
- 2120;UNIMPROVED PASTURES
- 2200;TREE CROPS
- 3100;HERBACEOUS (DRY PRAIRIE)
- 3200;SHRUB AND BRUSHLAND
- 3300;MIXED RANGELAND
- 4100;UPLAND CONIFEROUS FORESTS
- 4200;UPLAND HARDWOOD FORESTS
- 4300;UPLAND HARDWOOD FORESTS
- 4400;TREE PLANTATIONS
- 5100;STREAMS AND WATERWAYS
- 5200;LAKES
- 5300;RESERVOIRS
- 6100;WETLAND HARDWOOD FORESTS
- 6200;WETLAND CONIFEROUS FORESTS
- 6300;WETLAND FORESTED MIXED
- 6400;NON-FORESTED WETLANDS
- 8100;TRANSPORTATION
- 8200;COMMUNITCATIONS
- 8300;UTILITIES

Title:

NOISE STUDY REPORT- Segment 2 Land Use and Habitat Map

Client/Project:
Florida Department of Transportation- D5
SR 400 Project Development & Environment Study
Segment 2: SR 400 West of SR 528 Beachline Expressway to West of SR 435 Kirkman Road

Project Location:
Orange (75280)
STA 1345+48.48 (Begin) - MP 5.65
STA 1550+23.13 (End) - MP 9.562

Prepared by: mLeonard 2/26/2015
Technical Review by: mDrauer 2/26/2015
Independent Review by: jMoore 2/26/2015

Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901 Feet

0 1,800 3,600 7,200 Feet

Figure A: Land Use and Location

1 " = 1,800 '

SR 400 (I-4) Project Development and Environment (PD&E) Study | FM No. 432100-1-22-01

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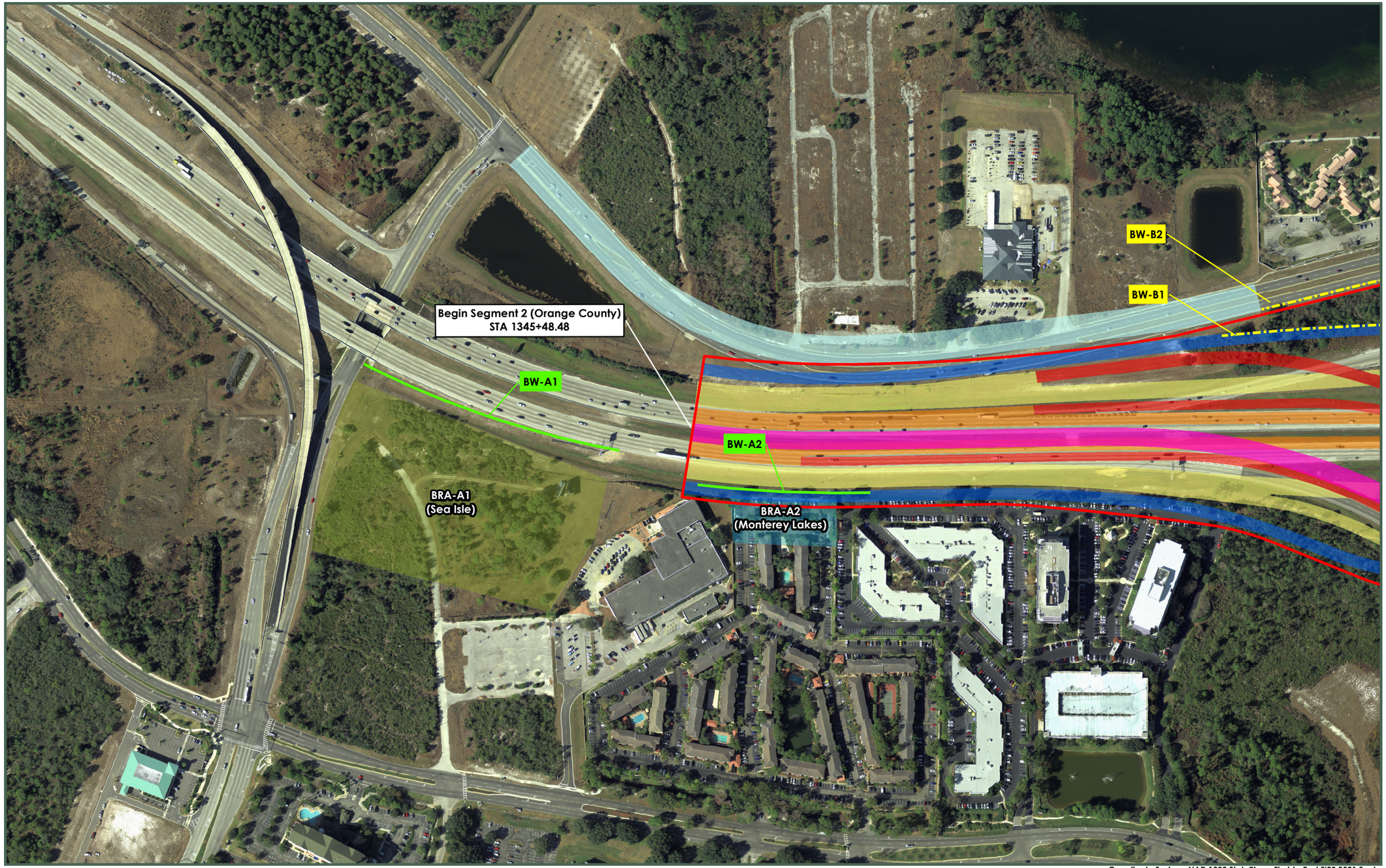

Map Key

SR 400 (I-4) PD&E Limits

- I-4 Beyond the Ultimate- Segment 2 Right of Way

Barrier Walls

- Barrier Wall (Cost Reasonable)
- Barrier Wall (Not Cost Reasonable)

Benefited Receiver Areas (BRA)

- BRA-A1 (Sea Isle)
- BRA-A2 (Monterey Lakes)
- BRA-F1 (Rosen Inn)
- BRA-F2 (YMCA)
- BRA-G,

Proposed SR 528 Interchange

- Joint Use Ramps
- Express Lanes
- Auxilary Roads
- General Use Lanes
- Turkey Lake Realignment
- Rail Corridor

Title:

NOISE STUDY REPORT- Segment 2 Noise Barrier Analysis Map

Client/Project:
Florida Department of Transportation- D5
SR 400 Project Development & Environment Study
Segment 2: SR 400 West of SR 528 Beachline Expressway to West of SR 435 Kirkman Road

Project Location:
Orange (75280)
STA 1345+48.48 (Begin) - MP 5.65
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Technical Review by: mDrauer 2/26/2015
Independent Review by: jMoore 2/26/2015

Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901 Feet

0 300 600 1,200
Feet

Figure B: Noise Barrier Analysis Map - Sheet 1 of 6

1 " = 300 '

SR 400 (I-4) Project Development and Environment (PD&E) Study | FM No. 432100-1-22-01

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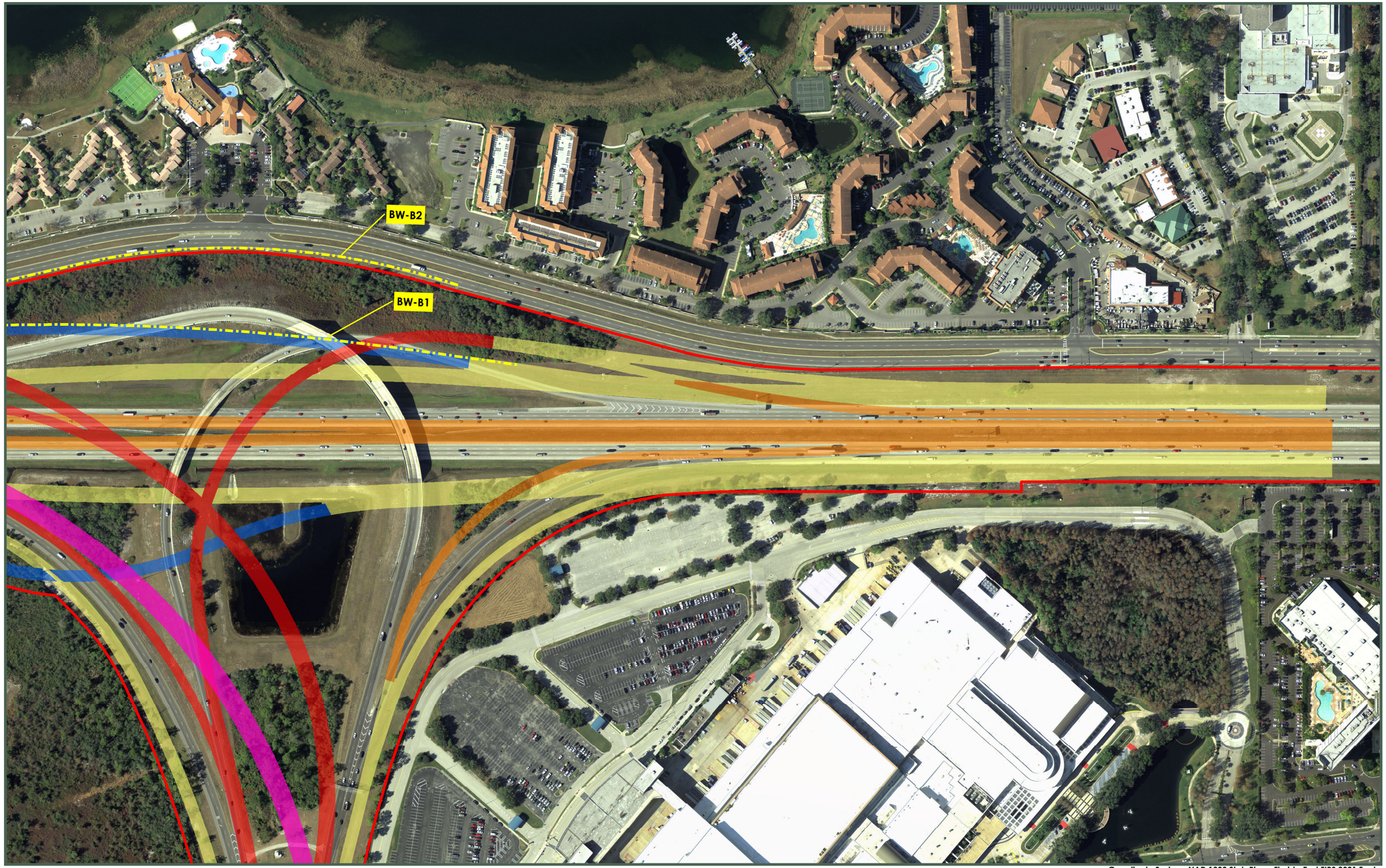

Map Key

SR 400 (I-4) PD&E Limits

- I-4 Beyond the Ultimate- Segment 2 Right of Way

Barrier Walls

- Barrier Wall (Cost Reasonable)
- Barrier Wall (Not Cost Reasonable)

Benefited Receiver Areas (BRA)

- BRA-A1 (Sea Isle)
- BRA-A2 (Monterey Lakes)
- BRA-F1 (Rosen Inn)
- BRA-F2 (YMCA)
- BRA-G,

Proposed SR 528 Interchange

- Joint Use Ramps
- Express Lanes
- Auxilary Roads
- General Use Lanes
- Turkey Lake Realignment
- Rail Corridor

Title:

NOISE STUDY REPORT- Segment 2 Noise Barrier Analysis Map

Client/Project:
Florida Department of Transportation- D5
SR 400 Project Development & Environment Study
Segment 2: SR 400 West of SR 528 Beachline Expressway to West of SR 435 Kirkman Road

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Prepared by: mLeonard 2/26/2015
Technical Review by: mDrauer 2/26/2015
Independent Review by: jMoore 2/26/2015

Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901 Feet

0 300 600 1,200 Feet

Figure B: Noise Barrier Analysis Map - Sheet 2 of 6

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Map Key

SR 400 (I-4) PD&E Limits

- I-4 Beyond the Ultimate- Segment 2 Right of Way

Barrier Walls

- Barrier Wall (Cost Reasonable)
- Barrier Wall (Not Cost Reasonable)

Benefited Receiver Areas (BRA)

- BRA-A1 (Sea Isle)
- BRA-A2 (Monterey Lakes)
- BRA-F1 (Rosen Inn)
- BRA-F2 (YMCA)
- BRA-G,

Proposed SR 528 Interchange

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NOISE STUDY REPORT- Segment 2 Noise Barrier Analysis Map

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0 300 600 1,200 Feet

Figure B: Noise Barrier Analysis Map - Sheet 3 of 6

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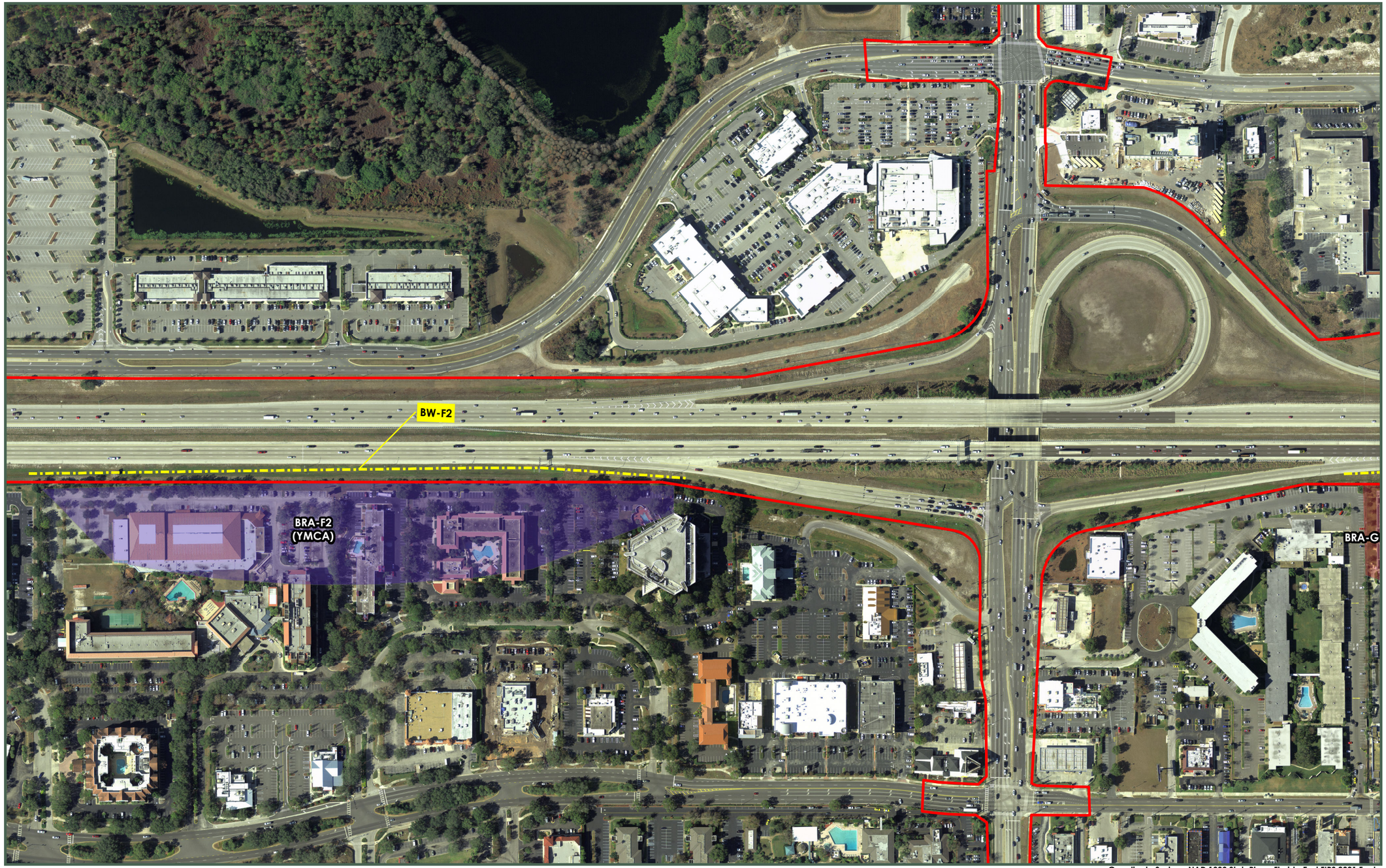

Map Key

SR 400 (I-4) PD&E Limits

- I-4 Beyond the Ultimate- Segment 2 Right of Way

Barrier Walls

- Barrier Wall (Cost Reasonable)
- Barrier Wall (Not Cost Reasonable)

Benefited Receiver Areas (BRA)

- BRA-A1 (Sea Isle)
- BRA-A2 (Monterey Lakes)
- BRA-F1 (Rosen Inn)
- BRA-F2 (YMCA)
- BRA-G,

Proposed SR 528 Interchange

- Joint Use Ramps
- Express Lanes
- Auxilary Roads
- General Use Lanes
- Turkey Lake Realignment
- Rail Corridor

Title:

NOISE STUDY REPORT- Segment 2 Noise Barrier Analysis Map

Client/Project:
Florida Department of Transportation- D5
SR 400 Project Development & Environment Study
Segment 2: SR 400 West of SR 528 Beachline Expressway to West of SR 435 Kirkman Road

Project Location:
Orange (75280)
STA 1345+48.48 (Begin) - MP 5.65
STA 1550+23.13 (End) - MP 9.562

Prepared by: mLeonard 2/26/2015
Technical Review by: mDrauer 2/26/2015
Independent Review by: jMoore 2/26/2015

Figure B: Noise Barrier Analysis Map - Sheet 4 of 6

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Map Key

SR 400 (I-4) PD&E Limits

- I-4 Beyond the Ultimate- Segment 2 Right of Way

Barrier Walls

- Barrier Wall (Cost Reasonable)
- Barrier Wall (Not Cost Reasonable)

Benefited Receiver Areas (BRA)

- BRA-A1 (Sea Isle)
- BRA-A2 (Monterey Lakes)
- BRA-F1 (Rosen Inn)
- BRA-F2 (YMCA)
- BRA-G,

Proposed SR 528 Interchange

- Joint Use Ramps
- Express Lanes
- Auxilary Roads
- General Use Lanes
- Turkey Lake Realignment
- Rail Corridor

Title:

NOISE STUDY REPORT- Segment 2 Noise Barrier Analysis Map

Client/Project:
Florida Department of Transportation- D5
SR 400 Project Development & Environment Study
Segment 2: SR 400 West of SR 528 Beachline Expressway to West of SR 435 Kirkman Road

Project Location:
Orange (75280)
STA 1345+48.48 (Begin) - MP 5.65
STA 1550+23.13 (End) - MP 9.562

Prepared by: mLeonard 2/26/2015
Technical Review by: mDrauer 2/26/2015
Independent Review by: jMoore 2/26/2015

Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901 Feet

0 300 600 1,200 Feet

Figure B: Noise Barrier Analysis Map - Sheet 5 of 6

Map Key

SR 400 (I-4) PD&E Limits

- I-4 Beyond the Ultimate- Segment 2 Right of Way

Barrier Walls

- Barrier Wall (Cost Reasonable)
- Barrier Wall (Not Cost Reasonable)

Benefited Receiver Areas (BRA)

- BRA-A1 (Sea Isle)
- BRA-A2 (Monterey Lakes)
- BRA-F1 (Rosen Inn)
- BRA-F2 (YMCA)
- BRA-G,

Proposed SR 528 Interchange

- Joint Use Ramps
- Express Lanes
- Auxilary Roads
- General Use Lanes
- Turkey Lake Realignment
- Rail Corridor

Title:

NOISE STUDY REPORT- Segment 2 Noise Barrier Analysis Map

Client/Project:
Florida Department of Transportation- D5
SR 400 Project Development & Environment Study
Segment 2: SR 400 West of SR 528 Beachline Expressway to West of SR 435 Kirkman Road

Project Location:
Orange (75280)
STA 1345+48.48 (Begin) - MP 5.65
STA 1550+23.13 (End) - MP 9.562

Prepared by: mLeonard 2/26/2015
Technical Review by: mDrauer 2/26/2015
Independent Review by: jMoore 2/26/2015

Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901 Feet

0 300 600 1,200 Feet

Figure B: Noise Barrier Analysis Map - Sheet 6 of 6

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APPENDIX II

TNM RESULTS

Stantec
M Drauer

17 November 2014
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 NSA A BMB
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	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ML 1	2	2	0.0	72.3	66	72.3	10	Snd Lvl	66.2	6.1	8	-1.9
ML 2	3	2	0.0	74.6	66	74.6	10	Snd Lvl	73.4	1.2	8	-6.8
ML 3	4	2	0.0	72.6	66	72.6	10	Snd Lvl	66.1	6.5	8	-1.5
ML 4	5	2	0.0	74.8	66	74.8	10	Snd Lvl	73.7	1.1	8	-6.9
ML 5	6	2	0.0	72.6	66	72.6	10	Snd Lvl	66.5	6.1	8	-1.9
ML 6	7	2	0.0	74.8	66	74.8	10	Snd Lvl	73.9	0.9	8	-7.1
ML 7	9	2	0.0	68.0	66	68.0	10	Snd Lvl	64.8	3.2	8	-4.8
ML 8	10	2	0.0	70.1	66	70.1	10	Snd Lvl	68.9	1.2	8	-6.8
ML 9	11	2	0.0	65.5	66	65.5	10	----	63.6	1.9	8	-6.1
ML 10	12	2	0.0	67.0	66	67.0	10	Snd Lvl	66.1	0.9	8	-7.1
ML 11	13	2	0.0	67.7	66	67.7	10	Snd Lvl	63.5	4.2	8	-3.8
ML 12	14	2	0.0	69.9	66	69.9	10	Snd Lvl	68.0	1.9	8	-6.1
ML 13	15	2	0.0	64.8	66	64.8	10	----	62.4	2.4	8	-5.6
ML 14	16	2	0.0	66.8	66	66.8	10	Snd Lvl	65.3	1.5	8	-6.5
ML 15	17	2	0.0	63.1	66	63.1	10	----	60.9	2.2	8	-5.8
ML 16	18	2	0.0	64.8	66	64.8	10	----	63.3	1.5	8	-6.5
ML 17	19	2	0.0	64.0	66	64.0	10	----	62.6	1.4	8	-6.6
ML 18	20	2	0.0	65.1	66	65.1	10	----	64.3	0.8	8	-7.2
ML Pool	21	1	0.0	62.0	66	62.0	10	----	60.1	1.9	8	-6.1
ML 19	23	2	0.0	61.2	66	61.2	10	----	59.6	1.6	8	-6.4
ML 20	24	2	0.0	65.6	66	65.6	10	----	64.3	1.3	8	-6.7
ML 21	25	2	0.0	61.0	66	61.0	10	----	59.1	1.9	8	-6.1
ML 22	26	2	0.0	66.2	66	66.2	10	Snd Lvl	64.6	1.6	8	-6.4

SI B 6	28	2	0.0	65.9	66	65.9	10	----	62.9	3.0	8	-5.0
SI B 6	29	2	0.0	67.0	66	67.0	10	Snd Lvl	65.4	1.6	8	-6.4
SI B 6	30	2	0.0	62.7	66	62.7	10	----	61.1	1.6	8	-6.4
SI B 6	31	2	0.0	64.8	66	64.8	10	----	62.8	2.0	8	-6.0
SI B 6	32	2	0.0	61.3	66	61.3	10	----	59.8	1.5	8	-6.5
SI B 6	33	2	0.0	62.7	66	62.7	10	----	60.8	1.9	8	-6.1
SI B 6	35	2	0.0	67.6	66	67.6	10	Snd Lvl	67.0	0.6	8	-7.4
SI B 6	36	2	0.0	68.6	66	68.6	10	Snd Lvl	67.7	0.9	8	-7.1
SI B 7	38	2	0.0	68.3	66	68.3	10	Snd Lvl	64.9	3.4	8	-4.6
SI B 7	39	2	0.0	67.6	66	67.6	10	Snd Lvl	65.5	2.1	8	-5.9
SI B 7	40	2	0.0	68.1	66	68.1	10	Snd Lvl	67.4	0.7	8	-7.3
SI B 7	41	2	0.0	63.0	66	63.0	10	----	60.3	2.7	8	-5.3
SI B 7	42	2	0.0	67.4	66	67.4	10	Snd Lvl	62.7	4.7	8	-3.3
SI B 7	43	2	0.0	65.8	66	65.8	10	----	62.8	3.0	8	-5.0
SI B 7	44	2	0.0	66.3	66	66.3	10	Snd Lvl	65.2	1.1	8	-6.9
SI B 7	45	2	0.0	62.1	66	62.1	10	----	57.1	5.0	8	-3.0
SI B 8	46	2	0.0	67.7	66	67.7	10	Snd Lvl	63.7	4.0	8	-4.0
SI B 8	47	2	0.0	65.8	66	65.8	10	----	62.9	2.9	8	-5.1
SI B 8	48	2	0.0	68.2	66	68.2	10	Snd Lvl	67.3	0.9	8	-7.1
SI B 8	49	2	0.0	61.8	66	61.8	10	----	57.6	4.2	8	-3.8
SI B 8	50	2	0.0	66.8	66	66.8	10	Snd Lvl	62.1	4.7	8	-3.3
SI B 8	51	2	0.0	63.9	66	63.9	10	----	60.6	3.3	8	-4.7
SI B 8	52	2	0.0	65.6	66	65.6	10	----	64.1	1.5	8	-6.5
SI B 8	53	2	0.0	60.8	66	60.8	10	----	55.6	5.2	8	-2.8
SI B 10	54	2	0.0	68.8	66	68.8	10	Snd Lvl	63.9	4.9	8	-3.1
SI B 10	55	2	0.0	68.3	66	68.3	10	Snd Lvl	64.9	3.4	8	-4.6
SI B 10	56	2	0.0	69.2	66	69.2	10	Snd Lvl	67.8	1.4	8	-6.6
SI B 10	57	2	0.0	66.4	66	66.4	10	Snd Lvl	62.3	4.1	8	-3.9
SI B 10	58	2	0.0	65.8	66	65.8	10	----	61.8	4.0	8	-4.0
SI B 10	59	2	0.0	63.7	66	63.7	10	----	60.7	3.0	8	-5.0
SI B 10	60	2	0.0	66.4	66	66.4	10	Snd Lvl	65.0	1.4	8	-6.6
SI B 10	61	2	0.0	62.1	66	62.1	10	----	56.5	5.6	8	-2.4
SI B 9	62	2	0.0	62.7	66	62.7	10	----	58.0	4.7	8	-3.3
SI B 9	63	2	0.0	61.7	66	61.7	10	----	59.2	2.5	8	-5.5
SI B 9	64	2	0.0	66.3	66	66.3	10	Snd Lvl	64.7	1.6	8	-6.4
SI B 9	65	2	0.0	61.5	66	61.5	10	----	57.0	4.5	8	-3.5
SI B 9	66	2	0.0	58.8	66	58.8	10	----	55.1	3.7	8	-4.3
SI B 9	67	2	0.0	59.1	66	59.1	10	----	56.4	2.7	8	-5.3
SI B 9	68	2	0.0	63.1	66	63.1	10	----	61.4	1.7	8	-6.3
SI B 9	69	2	0.0	56.7	66	56.7	10	----	52.5	4.2	8	-3.8

Dwelling Units	# DUs	Noise Reduction

		Min	Avg	Max
		dB	dB	dB
All Selected	125	0.6	2.7	6.5
All Impacted	60	0.6	2.6	6.5
All that meet NR Goal	0	0.0	0.0	0.0

Stantec
M Drauer

17 November 2014
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 NSA B
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					With Barrier			
				LAeq1h		Increase over existing		Type Impact	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
Sand Lake 26	1	1	0.0	64.5	66	64.5	10	----	62.6	1.9	8	-6.1
Sand Lake 27	2	1	0.0	63.9	66	63.9	10	----	62.0	1.9	8	-6.1
Sand Lake 28	3	1	0.0	62.5	66	62.5	10	----	60.9	1.6	8	-6.4
Sand lake 25	4	1	0.0	64.9	66	64.9	10	----	62.9	2.0	8	-6.0
Sand Lake 24	5	1	0.0	63.9	66	63.9	10	----	61.6	2.3	8	-5.7
Sand Lake 22	6	1	0.0	66.1	66	66.1	10	Snd Lvl	64.3	1.8	8	-6.2
Sand Lake 23	7	1	0.0	63.8	66	63.8	10	----	61.5	2.3	8	-5.7
Sand Lake 21	8	1	0.0	66.1	66	66.1	10	Snd Lvl	64.3	1.8	8	-6.2
Sand Lake 20	9	1	0.0	63.0	66	63.0	10	----	60.6	2.4	8	-5.6
Sand Lake 18	10	1	0.0	65.0	66	65.0	10	----	63.0	2.0	8	-6.0
Sand Lake 19	11	1	0.0	61.2	66	61.2	10	----	58.7	2.5	8	-5.5
Sand Lake 17	12	1	0.0	65.0	66	65.0	10	----	63.1	1.9	8	-6.1
Sand Lake 16	13	1	0.0	63.1	66	63.1	10	----	60.6	2.5	8	-5.5
Sand Lake 15	14	1	0.0	61.3	66	61.3	10	----	58.3	3.0	8	-5.0
Sand Lake 14	15	1	0.0	62.5	66	62.5	10	----	60.1	2.4	8	-5.6
Sand Lake 13	16	1	0.0	66.2	66	66.2	10	Snd Lvl	64.7	1.5	8	-6.5
Sand Lake 12	17	1	0.0	66.2	66	66.2	10	Snd Lvl	64.7	1.5	8	-6.5
Sand Lake 11	18	1	0.0	65.0	66	65.0	10	----	63.2	1.8	8	-6.2
Sand Lake 10	19	1	0.0	61.7	66	61.7	10	----	59.2	2.5	8	-5.5
Sand Lake 9	20	1	0.0	60.6	66	60.6	10	----	57.9	2.7	8	-5.3
Sand Lake 8	21	1	0.0	63.8	66	63.8	10	----	61.6	2.2	8	-5.8
Sand Lake 7	22	1	0.0	66.3	66	66.3	10	Snd Lvl	64.9	1.4	8	-6.6
Sand Lake 6	23	1	0.0	65.2	66	65.2	10	----	63.4	1.8	8	-6.2

Sand Lake 5	24	1	0.0	62.5	66	62.5	10	----	60.1	2.4	8	-5.6
Sand Lake 4	25	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 3	26	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 2	27	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 1	28	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 80 4	29	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 80 3	30	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 90 4	31	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 90 3	32	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 90 2	33	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 90 5	34	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 80 2	35	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 80 5	36	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 90 1	37	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 90 6	38	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 80 1	39	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 80 6	40	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 5	41	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 6	42	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 7	43	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 8	44	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 1	45	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 2	46	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 3	47	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 4	48	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 300 4	49	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 300 3	50	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 300 2	51	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 300 1	52	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 700 1	53	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 700 2	54	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 700 4	55	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 700 3	56	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 700 5	57	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 600 1	58	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 600 2	59	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 600 3	60	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 600 4	61	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
pool	63	1	0.0	61.3	66	61.3	10	----	59.3	2.0	8	-6.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max

		dB	dB	dB
All Selected	62	0.0	0.8	3.0
All Impacted	5	1.4	1.6	1.8
All that meet NR Goal	0	0.0	0.0	0.0

Stantec
M Drauer

17 November 2014
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 - NSA C & D
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	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Pool 1	1	1	0.0	59.2	66	59.2	10	----	59.2	0.0	8	-8.0
Pool 2	2	1	0.0	57.0	66	57.0	10	----	57.0	0.0	8	-8.0
Pool 3	3	1	0.0	59.6	66	59.6	10	----	59.6	0.0	8	-8.0
Pool 4	4	1	0.0	59.4	66	59.4	10	----	59.4	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	4	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

Stantec
M Drauer

17 November 2014
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 NSA E & F
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	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Sand Lake 26	1	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 27	2	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 28	3	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand lake 25	4	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 24	5	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 22	6	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 23	7	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 21	8	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 20	9	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 18	10	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 19	11	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 17	12	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 16	13	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 15	14	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 14	15	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 13	16	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 12	17	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 11	18	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 10	19	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 9	20	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 8	21	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 7	22	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 6	23	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0

Sand Lake 5	24	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 4	25	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 3	26	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 2	27	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Sand Lake 1	28	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 80 4	29	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 80 3	30	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 90 4	31	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 90 3	32	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 90 2	33	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 90 5	34	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 80 2	35	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 80 5	36	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 90 1	37	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 90 6	38	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 80 1	39	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 80 6	40	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 5	41	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 6	42	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 7	43	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 8	44	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 1	45	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 2	46	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 3	47	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 100 4	48	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 300 4	49	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 300 3	50	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 300 2	51	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 300 1	52	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 700 1	53	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 700 2	54	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 700 4	55	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 700 3	56	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 700 5	57	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 600 1	58	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 600 2	59	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 600 3	60	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
WG 600 4	61	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
pool	63	1	0.0	0.0	66	0.0	10	inactive	0.0	0.0	8	0.0
Quality Suites Pool	65	1	0.0	66.8	66	66.8	10	Snd Lvl	66.8	0.0	8	-8.0
Sand Lake Private Residences Tennis	67	1	0.0	71.3	66	71.3	10	Snd Lvl	71.3	0.0	8	-8.0

Sand Lake Basketball	68	1	0.0	68.1	66	68.1	10	Snd Lvl	68.1	0.0	8	-8.0
Sand Lake private residence	69	1	0.0	65.4	66	65.4	10	----	65.4	0.0	8	-8.0
Sand Lake private residence	70	1	0.0	63.1	66	63.1	10	----	63.1	0.0	8	-8.0
Sand Lake private residence	71	1	0.0	62.0	66	62.0	10	----	62.0	0.0	8	-8.0
Old TL house	72	1	0.0	73.4	66	73.4	10	Snd Lvl	73.4	0.0	8	-8.0
Receiver74	74	1	0.0	62.9	66	62.9	10	----	62.6	0.3	8	-7.7
Rosen Inn Pool 3	76	1	0.0	75.7	66	75.7	10	Snd Lvl	65.8	9.9	8	1.9
Rosen Inn Pool 1	77	1	0.0	72.9	66	72.9	10	Snd Lvl	67.0	5.9	8	-2.1
Rosen Inn Pool 2	78	1	0.0	65.6	66	65.6	10	----	62.3	3.3	8	-4.7
Courtyard Pool	80	1	0.0	63.7	66	63.7	10	----	63.3	0.4	8	-7.6
Avanti Pool	81	1	0.0	63.9	66	63.9	10	----	63.8	0.1	8	-7.9
Embassy 1 Pool	82	1	0.0	65.7	66	65.7	10	----	65.6	0.1	8	-7.9
YMCA	83	1	0.0	72.0	66	72.0	10	Snd Lvl	65.8	6.2	8	-1.8
Radisson Pool	84	1	0.0	63.8	66	63.8	10	----	59.9	3.9	8	-4.1
Hotel Pool	85	1	0.0	68.1	66	68.1	10	Snd Lvl	61.7	6.4	8	-1.6
La Quinta Pool	86	1	0.0	63.9	66	63.9	10	----	58.2	5.7	8	-2.3
Embassy 2 Pool	87	1	0.0	70.8	66	70.8	10	Snd Lvl	64.6	6.2	8	-1.8
Comfort Inn Pool	88	1	0.0	66.3	66	66.3	10	Snd Lvl	65.5	0.8	8	-7.2

Dwelling Units	**# DUs**	**Noise Reduction**		
		Min	**Avg**	**Max**
		dB	**dB**	**dB**
All Selected	82	0.0	0.6	9.9
All Impacted	10	0.0	3.5	9.9
All that meet NR Goal	1	9.9	9.9	9.9

Stantec
M Drauer

17 November 2014
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 NSA G
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	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Rosen Inn Pool	1	1	0.0	60.6	66	60.6	10	----	60.1	0.5	8	-7.5
Hampton Inn Pool	3	1	0.0	67.0	66	67.0	10	Snd Lvl	63.8	3.2	8	-4.8
Mini Golf	5	1	0.0	65.0	66	65.0	10	----	62.1	2.9	8	-5.1
Coco Key	7	1	0.0	74.9	66	74.9	10	Snd Lvl	67.2	7.7	8	-0.3
Howard Johnson Pool	8	1	0.0	64.9	66	64.9	10	----	64.8	0.1	8	-7.9
Int'l Palms Pool	10	1	0.0	69.8	66	69.8	10	Snd Lvl	69.8	0.0	8	-8.0
pool	11	1	0.0	63.8	66	63.8	10	----	63.8	0.0	8	-8.0
pool	13	1	0.0	63.8	66	63.8	10	----	63.8	0.0	8	-8.0
Pool	15	1	0.0	63.8	66	63.8	10	----	63.8	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction Min	Avg	Max
		dB	dB	dB
All Selected	9	0.0	1.6	7.7
All Impacted	3	0.0	3.6	7.7
All that meet NR Goal	0	0.0	0.0	0.0

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17 November 2014
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 NSA H
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	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
Drury Inn Pool	1	1	0.0	58.9	66	58.9	10	----	58.9	0.0	8	-8.0
Toscana Pool	3	1	0.0	58.7	66	58.7	10	----	58.7	0.0	8	-8.0
Toscana	5	1	0.0	58.5	66	58.5	10	----	58.5	0.0	8	-8.0
Toscana	6	1	0.0	58.4	66	58.4	10	----	58.4	0.0	8	-8.0
Toscana	7	1	0.0	58.7	66	58.7	10	----	58.7	0.0	8	-8.0
Toscana	8	1	0.0	58.6	66	58.6	10	----	58.6	0.0	8	-8.0
Toscana	10	1	0.0	63.3	66	63.3	10	----	63.3	0.0	8	-8.0
Toscana	11	1	0.0	63.1	66	63.1	10	----	63.1	0.0	8	-8.0
Toscana	12	1	0.0	62.9	66	62.9	10	----	62.9	0.0	8	-8.0
Toscana	13	1	0.0	62.7	66	62.7	10	----	62.7	0.0	8	-8.0
Toscana	14	1	0.0	61.8	66	61.8	10	----	61.8	0.0	8	-8.0
Toscana	15	1	0.0	62.5	66	62.5	10	----	62.5	0.0	8	-8.0
Toscana	16	1	0.0	62.4	66	62.4	10	----	62.4	0.0	8	-8.0
Toscana	17	1	0.0	63.3	66	63.3	10	----	63.3	0.0	8	-8.0
Toscana	18	1	0.0	63.3	66	63.3	10	----	63.3	0.0	8	-8.0
Toscana	19	1	0.0	64.5	66	64.5	10	----	64.5	0.0	8	-8.0
Toscana	20	1	0.0	64.2	66	64.2	10	----	64.2	0.0	8	-8.0
Toscana	21	1	0.0	64.4	66	64.4	10	----	64.4	0.0	8	-8.0
Toscana	22	1	0.0	63.7	66	63.7	10	----	63.7	0.0	8	-8.0
Toscana	23	1	0.0	62.8	66	62.8	10	----	62.8	0.0	8	-8.0
Toscana	24	1	0.0	63.7	66	63.7	10	----	63.7	0.0	8	-8.0
Toscana	25	1	0.0	61.8	66	61.8	10	----	61.8	0.0	8	-8.0
Toscana	26	1	0.0	62.8	66	62.8	10	----	62.8	0.0	8	-8.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	23	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

BARRIER ANALYSIS

Stantec 17 November 2014
M Drauer TNM 2.5

RESULTS: BARRIER DESCRIPTIONS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 NSA A BMB
BARRIER DESIGN: SI BMB REV 14

Barriers

Name	Type	Heights along Barrier			Length	If Wall	If Berm			Cost
		Min	Avg	Max		Area	Volume	Top Width	Run:Rise	
		ft	ft	ft	ft	sq ft	cu yd	ft	ft:ft	$
Barrier8	W	14.00	14.00	14.00	931	13035				391061
									Total Cost:	391061

Stantec
M Drauer

17 November 2014
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 NSA A BMB
BARRIER DESIGN: SI BMB REV 14
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	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
SI B 6	28	2	0.0	65.9	66	65.9	10	----	62.1	3.8	8	-4.2
SI B 6	29	2	0.0	67.0	66	67.0	10	Snd Lvl	65.0	2.0	8	-6.0
SI B 6	30	2	0.0	62.7	66	62.7	10	----	61.4	1.3	8	-6.7
SI B 6	31	2	0.0	64.8	66	64.8	10	----	61.9	2.9	8	-5.1
SI B 6	32	2	0.0	61.3	66	61.3	10	----	60.2	1.1	8	-6.9
SI B 6	33	2	0.0	62.7	66	62.7	10	----	59.8	2.9	8	-5.1
SI B 6	35	2	0.0	67.6	66	67.6	10	Snd Lvl	66.7	0.9	8	-7.1
SI B 6	36	2	0.0	68.6	66	68.6	10	Snd Lvl	67.1	1.5	8	-6.5
SI B 7	38	2	0.0	68.3	66	68.3	10	Snd Lvl	63.8	4.5	8	-3.5
SI B 7	39	2	0.0	67.6	66	67.6	10	Snd Lvl	64.5	3.1	8	-4.9
SI B 7	40	2	0.0	68.1	66	68.1	10	Snd Lvl	66.7	1.4	8	-6.6
SI B 7	41	2	0.0	63.0	66	63.0	10	----	59.5	3.5	8	-4.5
SI B 7	42	2	0.0	67.4	66	67.4	10	Snd Lvl	60.5	6.9	8	-1.1
SI B 7	43	2	0.0	65.8	66	65.8	10	----	61.1	4.7	8	-3.3
SI B 7	44	2	0.0	66.3	66	66.3	10	Snd Lvl	64.2	2.1	8	-5.9
SI B 7	45	2	0.0	62.1	66	62.1	10	----	55.6	6.5	8	-1.5
SI B 8	46	2	0.0	67.7	66	67.7	10	Snd Lvl	62.3	5.4	8	-2.6
SI B 8	47	2	0.0	65.8	66	65.8	10	----	60.9	4.9	8	-3.1
SI B 8	48	2	0.0	68.2	66	68.2	10	Snd Lvl	66.3	1.9	8	-6.1
SI B 8	49	2	0.0	61.8	66	61.8	10	----	56.3	5.5	8	-2.5
SI B 8	50	2	0.0	66.8	66	66.8	10	Snd Lvl	59.8	7.0	8	-1.0
SI B 8	51	2	0.0	63.9	66	63.9	10	----	58.7	5.2	8	-2.8
SI B 8	52	2	0.0	65.6	66	65.6	10	----	62.6	3.0	8	-5.0

SI B 8	53	2	0.0	60.8	66	60.8	10	----	54.1	6.7	8	-1.3
SI B 10	54	2	0.0	68.8	66	68.8	10	Snd Lvl	62.1	6.7	8	-1.3
SI B 10	55	2	0.0	68.3	66	68.3	10	Snd Lvl	62.8	5.5	8	-2.5
SI B 10	56	2	0.0	69.2	66	69.2	10	Snd Lvl	66.3	2.9	8	-5.1
SI B 10	57	2	0.0	66.4	66	66.4	10	Snd Lvl	60.6	5.8	8	-2.2
SI B 10	58	2	0.0	65.8	66	65.8	10	----	60.7	5.1	8	-2.9
SI B 10	59	2	0.0	63.7	66	63.7	10	----	59.5	4.2	8	-3.8
SI B 10	60	2	0.0	66.4	66	66.4	10	Snd Lvl	64.0	2.4	8	-5.6
SI B 10	61	2	0.0	62.1	66	62.1	10	----	55.5	6.6	8	-1.4
SI B 9	62	2	0.0	62.7	66	62.7	10	----	56.3	6.4	8	-1.6
SI B 9	63	2	0.0	61.7	66	61.7	10	----	57.6	4.1	8	-3.9
SI B 9	64	2	0.0	66.3	66	66.3	10	Snd Lvl	63.1	3.2	8	-4.8
SI B 9	65	2	0.0	61.5	66	61.5	10	----	56.1	5.4	8	-2.6
SI B 9	66	2	0.0	58.8	66	58.8	10	----	54.0	4.8	8	-3.2
SI B 9	67	2	0.0	59.1	66	59.1	10	----	55.1	4.0	8	-4.0
SI B 9	68	2	0.0	63.1	66	63.1	10	----	60.3	2.8	8	-5.2
SI B 9	69	2	0.0	56.7	66	56.7	10	----	51.7	5.0	8	-3.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	80	0.9	4.1	7.0
All Impacted	34	0.9	3.7	7.0
All that meet NR Goal	0	0.0	0.0	0.0

Stantec 18 November 2014
M Drauer TNM 2.5

RESULTS: BARRIER DESCRIPTIONS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 - NSA A
BARRIER DESIGN: ML 22

Barriers

Name	Type	Heights along Barrier			Length	If Wall	If Berm			Cost
		Min	Avg	Max		Area	Volume	Top Width	Run:Rise	
		ft	ft	ft	ft	sq ft	cu yd	ft	ft:ft	$
Monteray Lakes	W	22.00	22.00	22.00	440	9677				290308
									Total Cost:	290308

Stantec
M Drauer

18 November 2014
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 - NSA A
BARRIER DESIGN: ML 22
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	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ML 1	2	2	0.0	72.2	66	72.2	10	Snd Lvl	63.2	9.0	8	1.0
ML 2	3	2	0.0	74.7	66	74.7	10	Snd Lvl	65.6	9.1	8	1.1
ML 3	4	2	0.0	72.5	66	72.5	10	Snd Lvl	61.4	11.1	8	3.1
ML 4	5	2	0.0	74.8	66	74.8	10	Snd Lvl	65.0	9.8	8	1.8
ML 5	6	2	0.0	72.5	66	72.5	10	Snd Lvl	62.4	10.1	8	2.1
ML 6	7	2	0.0	74.9	66	74.9	10	Snd Lvl	65.7	9.2	8	1.2
ML 7	9	2	0.0	68.0	66	68.0	10	Snd Lvl	63.0	5.0	8	-3.0
ML 8	10	2	0.0	70.2	66	70.2	10	Snd Lvl	65.2	5.0	8	-3.0
ML 9	11	2	0.0	65.2	66	65.2	10	----	62.2	3.0	8	-5.0
ML 10	12	2	0.0	67.2	66	67.2	10	Snd Lvl	63.7	3.5	8	-4.5
ML 11	13	2	0.0	67.4	66	67.4	10	Snd Lvl	63.2	4.2	8	-3.8
ML 12	14	2	0.0	69.9	66	69.9	10	Snd Lvl	65.3	4.6	8	-3.4
ML 13	15	2	0.0	64.4	66	64.4	10	----	62.0	2.4	8	-5.6
ML 14	16	2	0.0	66.8	66	66.8	10	Snd Lvl	63.8	3.0	8	-5.0
ML 15	17	2	0.0	62.5	66	62.5	10	----	60.7	1.8	8	-6.2
ML 16	18	2	0.0	64.8	66	64.8	10	----	62.5	2.3	8	-5.7
ML 17	19	2	0.0	63.8	66	63.8	10	----	61.6	2.2	8	-5.8
ML 18	20	2	0.0	65.3	66	65.3	10	----	62.8	2.5	8	-5.5
ML Pool	21	1	0.0	61.8	66	61.8	10	----	59.1	2.7	8	-5.3
ML 19	23	2	0.0	60.6	66	60.6	10	----	58.8	1.8	8	-6.2
ML 20	24	2	0.0	65.5	66	65.5	10	----	63.5	2.0	8	-6.0
ML 21	25	2	0.0	60.8	66	60.8	10	----	58.5	2.3	8	-5.7
ML 22	26	2	0.0	66.1	66	66.1	10	Snd Lvl	63.7	2.4	8	-5.6

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	45	1.8	4.7	11.1
All Impacted	26	2.4	6.6	11.1
All that meet NR Goal	12	9.0	9.7	11.1

Stantec 18 November 2014
M Drauer TNM 2.5

RESULTS: BARRIER DESCRIPTIONS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 - NSA A
BARRIER DESIGN: ML 20

Barriers

Name	Type	Heights along Barrier			Length	If Wall	If Berm			Cost
		Min	Avg	Max		Area	Volume	Top Width	Run:Rise	
		ft	ft	ft	ft	sq ft	cu yd	ft	ft:ft	$
Monteray Lakes	W	20.00	20.00	20.00	440	8797				263916
									Total Cost:	263916

Stantec
M Drauer

18 November 2014
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 - NSA A
BARRIER DESIGN: ML 20
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	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ML 1	2	2	0.0	72.2	66	72.2	10	Snd Lvl	63.5	8.7	8	0.7
ML 2	3	2	0.0	74.7	66	74.7	10	Snd Lvl	66.3	8.4	8	0.4
ML 3	4	2	0.0	72.5	66	72.5	10	Snd Lvl	61.8	10.7	8	2.7
ML 4	5	2	0.0	74.8	66	74.8	10	Snd Lvl	65.8	9.0	8	1.0
ML 5	6	2	0.0	72.5	66	72.5	10	Snd Lvl	62.7	9.8	8	1.8
ML 6	7	2	0.0	74.9	66	74.9	10	Snd Lvl	66.5	8.4	8	0.4
ML 7	9	2	0.0	68.0	66	68.0	10	Snd Lvl	63.1	4.9	8	-3.1
ML 8	10	2	0.0	70.2	66	70.2	10	Snd Lvl	65.4	4.8	8	-3.2
ML 9	11	2	0.0	65.2	66	65.2	10	----	62.3	2.9	8	-5.1
ML 10	12	2	0.0	67.2	66	67.2	10	Snd Lvl	63.9	3.3	8	-4.7
ML 11	13	2	0.0	67.4	66	67.4	10	Snd Lvl	63.3	4.1	8	-3.9
ML 12	14	2	0.0	69.9	66	69.9	10	Snd Lvl	65.5	4.4	8	-3.6
ML 13	15	2	0.0	64.4	66	64.4	10	----	62.0	2.4	8	-5.6
ML 14	16	2	0.0	66.8	66	66.8	10	Snd Lvl	63.9	2.9	8	-5.1
ML 15	17	2	0.0	62.5	66	62.5	10	----	60.8	1.7	8	-6.3
ML 16	18	2	0.0	64.8	66	64.8	10	----	62.6	2.2	8	-5.8
ML 17	19	2	0.0	63.8	66	63.8	10	----	61.7	2.1	8	-5.9
ML 18	20	2	0.0	65.3	66	65.3	10	----	62.9	2.4	8	-5.6
ML Pool	21	1	0.0	61.8	66	61.8	10	----	59.2	2.6	8	-5.4
ML 19	23	2	0.0	60.6	66	60.6	10	----	58.9	1.7	8	-6.3
ML 20	24	2	0.0	65.5	66	65.5	10	----	63.6	1.9	8	-6.1
ML 21	25	2	0.0	60.8	66	60.8	10	----	58.6	2.2	8	-5.8
ML 22	26	2	0.0	66.1	66	66.1	10	Snd Lvl	63.8	2.3	8	-5.7

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	45	1.7	4.5	10.7
All Impacted	26	2.3	6.3	10.7
All that meet NR Goal	12	8.4	9.2	10.7

Stantec 18 November 2014
M Drauer TNM 2.5

RESULTS: BARRIER DESCRIPTIONS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 - NSA A
BARRIER DESIGN: ML 18

Barriers

Name	Type	Heights along Barrier			Length	If Wall	If Berm			Cost
		Min	Avg	Max		Area	Volume	Top Width	Run:Rise	
		ft	ft	ft	ft	sq ft	cu yd	ft	ft:ft	$
Monteray Lakes	W	18.00	18.00	18.00	440	7917				237525
									Total Cost:	237525

Stantec
M Drauer

18 November 2014
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 - NSA A
BARRIER DESIGN: ML 18
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	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ML 1	2	2	0.0	72.2	66	72.2	10	Snd Lvl	63.8	8.4	8	0.4
ML 2	3	2	0.0	74.7	66	74.7	10	Snd Lvl	67.3	7.4	8	-0.6
ML 3	4	2	0.0	72.5	66	72.5	10	Snd Lvl	62.3	10.2	8	2.2
ML 4	5	2	0.0	74.8	66	74.8	10	Snd Lvl	67.1	7.7	8	-0.3
ML 5	6	2	0.0	72.5	66	72.5	10	Snd Lvl	63.0	9.5	8	1.5
ML 6	7	2	0.0	74.9	66	74.9	10	Snd Lvl	67.5	7.4	8	-0.6
ML 7	9	2	0.0	68.0	66	68.0	10	Snd Lvl	63.2	4.8	8	-3.2
ML 8	10	2	0.0	70.2	66	70.2	10	Snd Lvl	65.7	4.5	8	-3.5
ML 9	11	2	0.0	65.2	66	65.2	10	----	62.4	2.8	8	-5.2
ML 10	12	2	0.0	67.2	66	67.2	10	Snd Lvl	64.1	3.1	8	-4.9
ML 11	13	2	0.0	67.4	66	67.4	10	Snd Lvl	63.4	4.0	8	-4.0
ML 12	14	2	0.0	69.9	66	69.9	10	Snd Lvl	65.6	4.3	8	-3.7
ML 13	15	2	0.0	64.4	66	64.4	10	----	62.1	2.3	8	-5.7
ML 14	16	2	0.0	66.8	66	66.8	10	Snd Lvl	64.0	2.8	8	-5.2
ML 15	17	2	0.0	62.5	66	62.5	10	----	60.8	1.7	8	-6.3
ML 16	18	2	0.0	64.8	66	64.8	10	----	62.7	2.1	8	-5.9
ML 17	19	2	0.0	63.8	66	63.8	10	----	61.7	2.1	8	-5.9
ML 18	20	2	0.0	65.3	66	65.3	10	----	63.0	2.3	8	-5.7
ML Pool	21	1	0.0	61.8	66	61.8	10	----	59.1	2.7	8	-5.3
ML 19	23	2	0.0	60.6	66	60.6	10	----	59.0	1.6	8	-6.4
ML 20	24	2	0.0	65.5	66	65.5	10	----	63.7	1.8	8	-6.2
ML 21	25	2	0.0	60.8	66	60.8	10	----	58.9	1.9	8	-6.1
ML 22	26	2	0.0	66.1	66	66.1	10	Snd Lvl	64.0	2.1	8	-5.9

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	45	1.6	4.2	10.2
All Impacted	26	2.1	5.9	10.2
All that meet NR Goal	6	8.4	9.4	10.2

Stantec 18 November 2014
M Drauer TNM 2.5

RESULTS: BARRIER DESCRIPTIONS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 - NSA A
BARRIER DESIGN: ML 16

Barriers

Name	Type	Heights along Barrier			Length	If Wall	If Berm			Cost
		Min	Avg	Max		Area	Volume	Top Width	Run:Rise	
		ft	ft	ft	ft	sq ft	cu yd	ft	ft:ft	$
Monteray Lakes	W	16.00	16.00	16.00	440	7038				211133
									Total Cost:	211133

Stantec
M Drauer

18 November 2014
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 - NSA A
BARRIER DESIGN: ML 16
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	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ML 1	2	2	0.0	72.2	66	72.2	10	Snd Lvl	64.2	8.0	8	0.0
ML 2	3	2	0.0	74.7	66	74.7	10	Snd Lvl	68.8	5.9	8	-2.1
ML 3	4	2	0.0	72.5	66	72.5	10	Snd Lvl	62.9	9.6	8	1.6
ML 4	5	2	0.0	74.8	66	74.8	10	Snd Lvl	68.8	6.0	8	-2.0
ML 5	6	2	0.0	72.5	66	72.5	10	Snd Lvl	63.5	9.0	8	1.0
ML 6	7	2	0.0	74.9	66	74.9	10	Snd Lvl	69.2	5.7	8	-2.3
ML 7	9	2	0.0	68.0	66	68.0	10	Snd Lvl	63.4	4.6	8	-3.4
ML 8	10	2	0.0	70.2	66	70.2	10	Snd Lvl	66.1	4.1	8	-3.9
ML 9	11	2	0.0	65.2	66	65.2	10	----	62.5	2.7	8	-5.3
ML 10	12	2	0.0	67.2	66	67.2	10	Snd Lvl	64.3	2.9	8	-5.1
ML 11	13	2	0.0	67.4	66	67.4	10	Snd Lvl	63.5	3.9	8	-4.1
ML 12	14	2	0.0	69.9	66	69.9	10	Snd Lvl	65.9	4.0	8	-4.0
ML 13	15	2	0.0	64.4	66	64.4	10	----	62.2	2.2	8	-5.8
ML 14	16	2	0.0	66.8	66	66.8	10	Snd Lvl	64.2	2.6	8	-5.4
ML 15	17	2	0.0	62.5	66	62.5	10	----	60.9	1.6	8	-6.4
ML 16	18	2	0.0	64.8	66	64.8	10	----	62.8	2.0	8	-6.0
ML 17	19	2	0.0	63.8	66	63.8	10	----	61.9	1.9	8	-6.1
ML 18	20	2	0.0	65.3	66	65.3	10	----	63.2	2.1	8	-5.9
ML Pool	21	1	0.0	61.8	66	61.8	10	----	59.3	2.5	8	-5.5
ML 19	23	2	0.0	60.6	66	60.6	10	----	59.0	1.6	8	-6.4
ML 20	24	2	0.0	65.5	66	65.5	10	----	63.9	1.6	8	-6.4
ML 21	25	2	0.0	60.8	66	60.8	10	----	58.6	2.2	8	-5.8
ML 22	26	2	0.0	66.1	66	66.1	10	Snd Lvl	64.1	2.0	8	-6.0

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	45	1.6	3.9	9.6
All Impacted	26	2.0	5.3	9.6
All that meet NR Goal	6	8.0	8.9	9.6

Stantec 18 November 2014
M Drauer TNM 2.5

RESULTS: BARRIER DESCRIPTIONS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 - NSA A
BARRIER DESIGN: ML 14

Barriers

Name	Type	Heights along Barrier			Length	If Wall	If Berm			Cost
		Min	Avg	Max		Area	Volume	Top Width	Run:Rise	
		ft	ft	ft	ft	sq ft	cu yd	ft	ft:ft	$
Monteray Lakes	W	14.00	14.00	14.00	440	6158				184741
									Total Cost:	184741

Stantec
M Drauer

18 November 2014
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 - NSA A
BARRIER DESIGN: ML 14
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	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ML 1	2	2	0.0	72.2	66	72.2	10	Snd Lvl	64.7	7.5	8	-0.5
ML 2	3	2	0.0	74.7	66	74.7	10	Snd Lvl	71.5	3.2	8	-4.8
ML 3	4	2	0.0	72.5	66	72.5	10	Snd Lvl	63.6	8.9	8	0.9
ML 4	5	2	0.0	74.8	66	74.8	10	Snd Lvl	72.0	2.8	8	-5.2
ML 5	6	2	0.0	72.5	66	72.5	10	Snd Lvl	64.1	8.4	8	0.4
ML 6	7	2	0.0	74.9	66	74.9	10	Snd Lvl	72.4	2.5	8	-5.5
ML 7	9	2	0.0	68.0	66	68.0	10	Snd Lvl	63.6	4.4	8	-3.6
ML 8	10	2	0.0	70.2	66	70.2	10	Snd Lvl	67.4	2.8	8	-5.2
ML 9	11	2	0.0	65.2	66	65.2	10	----	62.7	2.5	8	-5.5
ML 10	12	2	0.0	67.2	66	67.2	10	Snd Lvl	64.8	2.4	8	-5.6
ML 11	13	2	0.0	67.4	66	67.4	10	Snd Lvl	63.7	3.7	8	-4.3
ML 12	14	2	0.0	69.9	66	69.9	10	Snd Lvl	66.8	3.1	8	-4.9
ML 13	15	2	0.0	64.4	66	64.4	10	----	62.4	2.0	8	-6.0
ML 14	16	2	0.0	66.8	66	66.8	10	Snd Lvl	64.6	2.2	8	-5.8
ML 15	17	2	0.0	62.5	66	62.5	10	----	61.0	1.5	8	-6.5
ML 16	18	2	0.0	64.8	66	64.8	10	----	63.2	1.6	8	-6.4
ML 17	19	2	0.0	63.8	66	63.8	10	----	62.0	1.8	8	-6.2
ML 18	20	2	0.0	65.3	66	65.3	10	----	63.6	1.7	8	-6.3
ML Pool	21	1	0.0	61.8	66	61.8	10	----	59.4	2.4	8	-5.6
ML 19	23	2	0.0	60.6	66	60.6	10	----	59.0	1.6	8	-6.4
ML 20	24	2	0.0	65.5	66	65.5	10	----	64.2	1.3	8	-6.7
ML 21	25	2	0.0	60.8	66	60.8	10	----	58.7	2.1	8	-5.9
ML 22	26	2	0.0	66.1	66	66.1	10	Snd Lvl	64.5	1.6	8	-6.4

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	45	1.3	3.1	8.9
All Impacted	26	1.6	4.1	8.9
All that meet NR Goal	4	8.4	8.7	8.9

Stantec 19 November 2014
M Drauer TNM 2.5

RESULTS: BARRIER DESCRIPTIONS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 NSA A
BARRIER DESIGN: ML shoulder 14

Barriers

Name	Type	Heights along Barrier			Length	If Wall	If Berm			Cost
		Min	Avg	Max		Area	Volume	Top Width	Run:Rise	
		ft	ft	ft	ft	sq ft	cu yd	ft	ft:ft	$
ML	W	14.00	14.00	14.00	517	7232				216954
									Total Cost:	216954

Stantec
M Drauer

19 November 2014
TNM 2.5
Calculated with TNM 2.5

RESULTS: SOUND LEVELS
PROJECT/CONTRACT: I-4 PD&E
RUN: Segment 2 NSA A
BARRIER DESIGN: ML shoulder 14

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	Goal	Calculated minus Goal
			dBA	dBA	dBA	dB	dB		dBA	dB	dB	dB
ML 1	2	2	0.0	72.2	66	72.2	10	Snd Lvl	64.5	7.7	8	-0.3
ML 2	3	2	0.0	74.6	66	74.6	10	Snd Lvl	70.4	4.2	8	-3.8
ML 3	4	2	0.0	72.5	66	72.5	10	Snd Lvl	64.4	8.1	8	0.1
ML 4	5	2	0.0	74.7	66	74.7	10	Snd Lvl	70.7	4.0	8	-4.0
ML 5	6	2	0.0	72.4	66	72.4	10	Snd Lvl	65.1	7.3	8	-0.7
ML 6	7	2	0.0	74.8	66	74.8	10	Snd Lvl	71.1	3.7	8	-4.3
ML 7	9	2	0.0	68.1	66	68.1	10	Snd Lvl	64.1	4.0	8	-4.0
ML 8	10	2	0.0	70.2	66	70.2	10	Snd Lvl	66.9	3.3	8	-4.7
ML 9	11	2	0.0	65.5	66	65.5	10	----	62.8	2.7	8	-5.3
ML 10	12	2	0.0	66.9	66	66.9	10	Snd Lvl	64.8	2.1	8	-5.9
ML 11	13	2	0.0	67.4	66	67.4	10	Snd Lvl	62.7	4.7	8	-3.3
ML 12	14	2	0.0	69.9	66	69.9	10	Snd Lvl	65.9	4.0	8	-4.0
ML 13	15	2	0.0	64.4	66	64.4	10	----	61.7	2.7	8	-5.3
ML 14	16	2	0.0	66.7	66	66.7	10	Snd Lvl	64.1	2.6	8	-5.4
ML 15	17	2	0.0	62.5	66	62.5	10	----	60.4	2.1	8	-5.9
ML 16	18	2	0.0	64.7	66	64.7	10	----	62.7	2.0	8	-6.0
ML 17	19	2	0.0	63.9	66	63.9	10	----	62.0	1.9	8	-6.1
ML 18	20	2	0.0	65.1	66	65.1	10	----	63.5	1.6	8	-6.4
ML Pool	21	1	0.0	61.8	66	61.8	10	----	59.3	2.5	8	-5.5
ML 19	23	2	0.0	60.7	66	60.7	10	----	58.9	1.8	8	-6.2
ML 20	24	2	0.0	65.5	66	65.5	10	----	64.0	1.5	8	-6.5
ML 21	25	2	0.0	60.8	66	60.8	10	----	58.6	2.2	8	-5.8
ML 22	26	2	0.0	66.1	66	66.1	10	Snd Lvl	64.0	2.1	8	-5.9

Dwelling Units	# DUs	Noise Reduction		
		Min	Avg	Max
		dB	dB	dB
All Selected	45	1.5	3.4	8.1
All Impacted	26	2.1	4.4	8.1
All that meet NR Goal	2	8.1	8.1	8.1