

NOISE STUDY REPORT

DRAFT

Florida Department of Transportation

District One

SR 45 (US 41) at Bonita Beach Road

Lee County, Florida

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ETDM Number: 6291

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The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 USC § 327 and a Memorandum of Understanding dated May 26, 2022, and executed by the Federal Highway Administration and FDOT.

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## 1.0 Introduction

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study for proposed operational improvements for US 41 at CR 865/Bonita Beach Road. The project location and study area are shown in **Figure 1-1** and **Figure 1-2**, respectively.

### 1.1 Project Description

The PD&E Study is evaluating capacity, safety, and multi-modal improvements at the US 41 and Bonita Beach Road intersection in the City of Bonita Springs, Florida. The study area limits extend along US 41 from Foley Road to just south of the Imperial River bridge, a distance of approximately 0.9 miles. Additionally, the study area extends along Bonita Beach Road from Windsor Road to Spanish Wells Boulevard, a distance of approximately 0.8 miles.

US 41 is a north-south principal arterial roadway running parallel to Interstate 75 (I-75) and facilitates the movement of regional and local traffic (including truck traffic) along Florida's west coast. Bonita Beach Road is an east-west minor arterial roadway providing a connection to I-75 and is one of two east-west connections between the Lee County mainland and coastal communities and barrier island tourist destinations and beaches to the west. US 41 is a state roadway maintained by the FDOT District 1, while Bonita Beach Road is maintained by Lee County. Both US 41 and Bonita Beach Road are designated as emergency evacuation routes.

US 41 within the project limits is a six-lane divided roadway with 5-foot on-street bicycle lanes and 5-foot sidewalks on both sides of the roadway. Bonita Beach Road is a four-lane divided roadway with 5-foot sidewalks on both sides but no on-street bicycle facilities.

The US 41 at Bonita Beach Road intersection is currently a signalized intersection with two exclusive left turn lanes and an exclusive right turn lane in each approach. Aside from the main intersection, there is currently one other signalized intersection along US 41 at the Center of Bonita Springs (Tuffy Auto/Advanced Auto Parts). There are three additional signalized intersections along Bonita Beach Road at the Center of Bonita Springs, Arroyal Road, and Spanish Wells Boulevard.

Figure 1-1 | Project Location

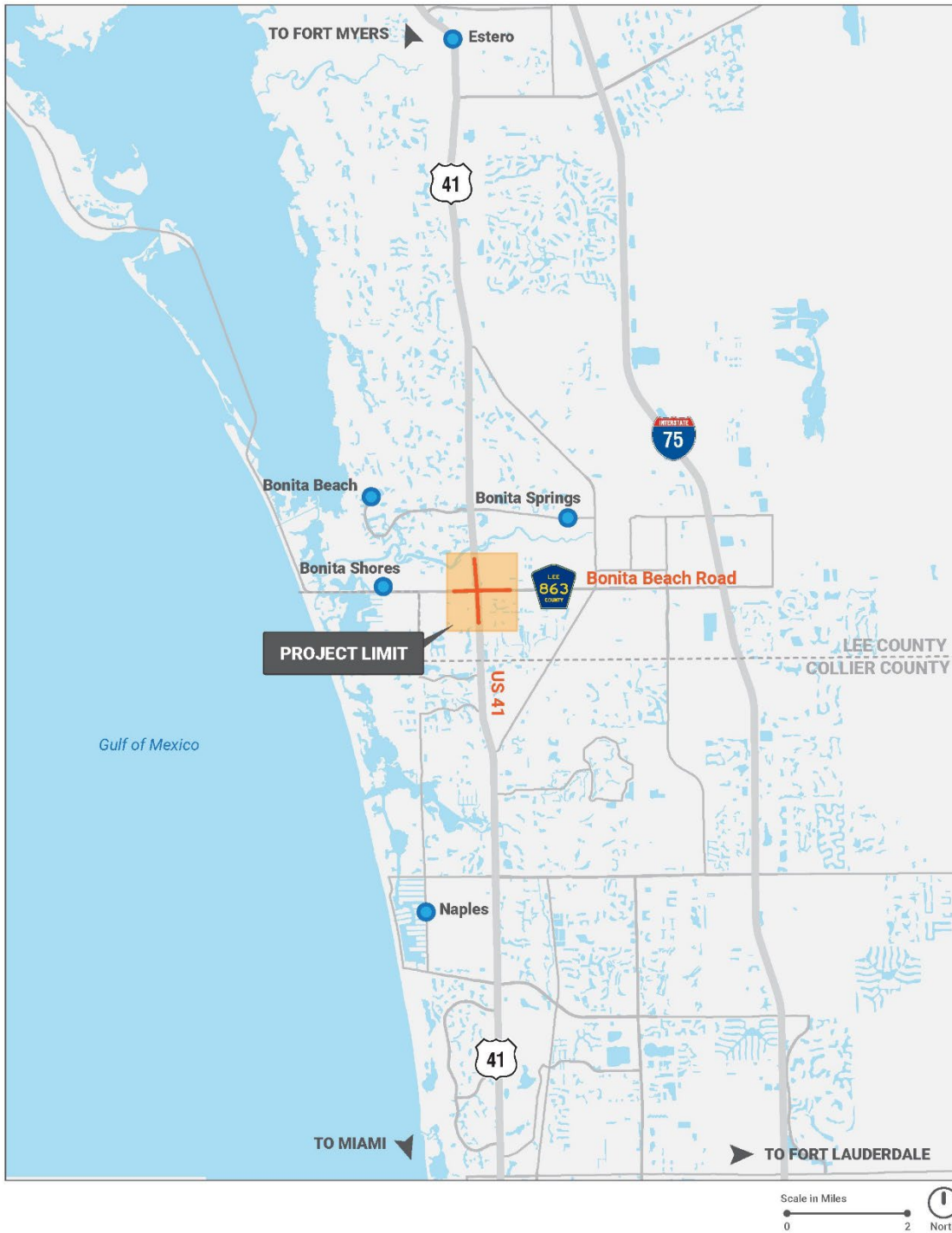
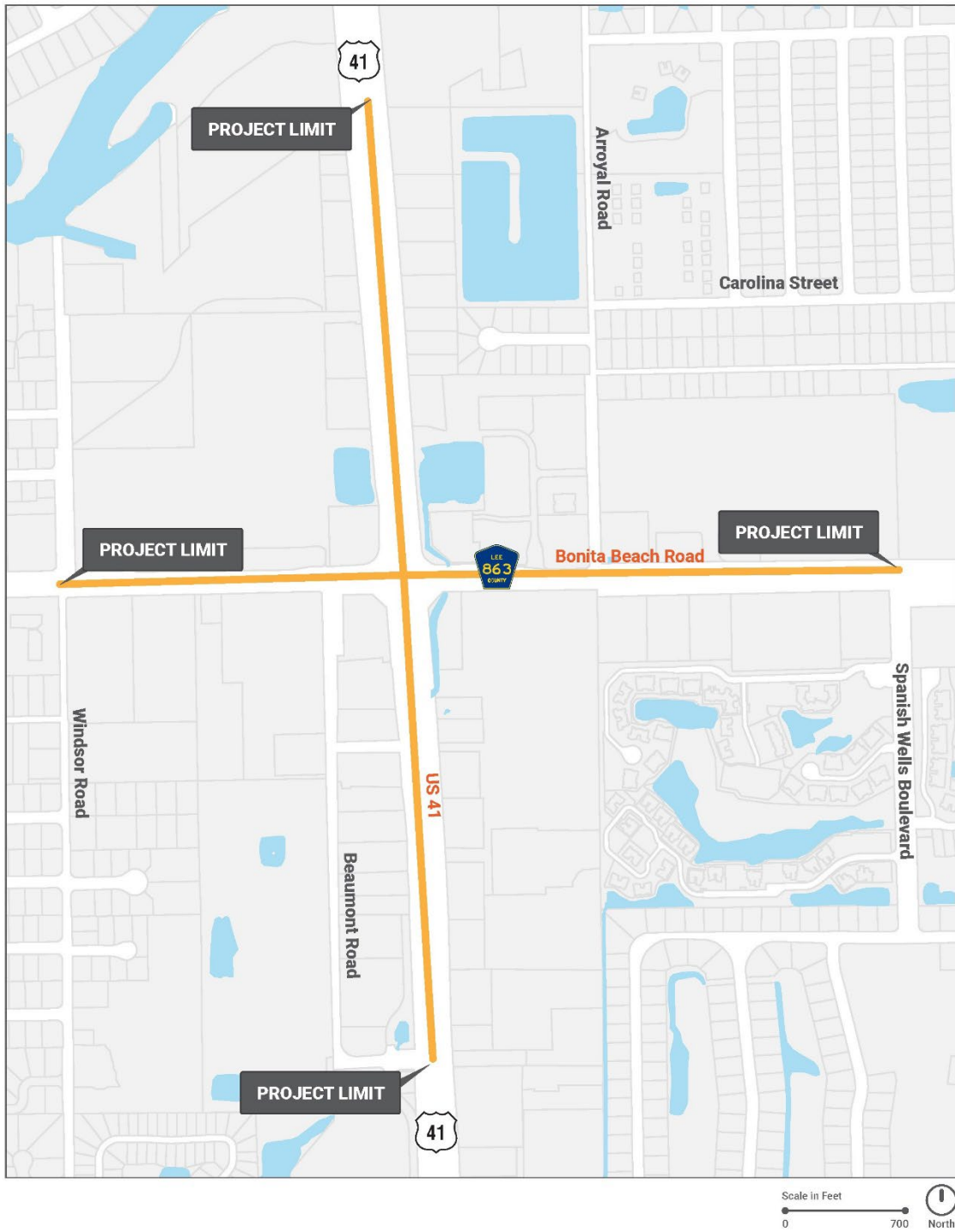


Figure 1-2 | Project Study Area



The existing US 41 and Bonita Beach Road intersection has two high volume left turn movements, those being eastbound to northbound and southbound to eastbound. To partially address these heavy movements, the City of Bonita Springs conducted the "Network Enhancement Alignment Study – Quadrant Plan" in May 2017. From this, the City will be designing and building a two-lane quadrant roadway connecting Bonita Beach Road at Windsor Road to US 41 at the Center of Bonita Springs. This Northwest Quadrant Roadway is currently in design by the City and anticipated to be built ahead of the US 41 and Bonita Beach Road intersection improvements.

The proposed improvements will modify the signalized configuration of the US 41 and Bonita Beach Road intersection to be a partial displaced left turn (PDLT), with the northbound and southbound left turn movements to crossover and be located outside of the opposing traffic flow. This configuration will allow the northbound and southbound left turning movements to operate in the same signal phase or simultaneously as the northbound and southbound through movements. To accommodate the partial displaced left turn configuration and facilitate the relocation of northbound and southbound turning vehicles, two new signalized "crossover" intersections will be added along US 41 approximately 675 feet south and 460 feet north of Bonita Beach Road. The southbound and eastbound left turn movements are proposed to have three lanes each, and the eastbound and westbound right turn movements are proposed to have two lanes each.

As noted above, a Northwest Quadrant Roadway is being constructed by the City of Bonita Springs. As part of the PD&E study's proposed improvements, the US 41 and the Center of Bonita Springs intersection is proposed to be changed from a standard signalized intersection to a "thru-cut" intersection. A thru-cut intersection restricts through movements from the minor street typically due to operational and/or geometric conditions. In this case, the west leg is being widened from two lanes to five lanes (four eastbound approach lanes and one westbound receiving lane) and the east leg is being widened from two lanes to four lanes (two westbound approach lanes and two eastbound receiving lanes). This creates skew issues for any east/west through movements and creates operational constraints that are alleviated by the thru-cut intersection configuration. Tying into the new east leg is a Northeast Quadrant Roadway proposed between US 41 and Arroyal Road, northeast of the US 41 and Bonita Beach Road intersection. This will be a new three-lane roadway with two lanes eastbound and one lane westbound.

Along US 41 in the northbound direction, a 6-foot sidewalk is proposed from Foley Road to Springs Plaza and a 12-foot shared-use path is proposed from Springs Plaza to just north of the Imperial River Boat Ramp. In the southbound direction, a 12-foot shared-use path is proposed

from just north of the Imperial River Boat Ramp to Bonita Funeral Home and a 6-foot sidewalk is proposed from Bonita Funeral Home to Foley Road. Along both sides of Bonita Beach Road, the sidewalks will be widened to 12-foot shared-use paths from the Center of Bonita Springs to Arroyal Road. Signalized marked crosswalks will be maintained on every leg of the PDLT, including the channelized right turn lanes. Signalized marked crosswalks will also be provided on every leg of each signalized intersection along US 41 and Bonita Beach Road within the study area.

## **1.2 Project Purpose and Need**

The purpose of this project is to address the deficient operational capacity of the US 41 and Bonita Beach Road intersection to relieve existing congestion and accommodate projected future traffic demand. The project's secondary goals are to 1) Enhance regional and local mobility; 2) Enhance safety conditions; and 3) Improve multi-modal access. The need for these improvements is described in this section.

### **1.2.1 Transportation Demand/Capacity**

The US 41 at Bonita Beach Road intersection experiences chronic congestion. As population and employment growth are expected to continue within this area of Lee County, the intersection's congestion is anticipated to increase. Based on 2019 traffic counts taken, the existing Annual Average Daily Traffic (AADT) ranges from 39,000 to 53,000 along US 41 and was 30,000 along Bonita Beach Road. Based on future growth projections to a 2050 design year, the AADTs are forecast to range from 60,000 to 78,000 along US 41. The future 2050 AADT forecast along Bonita Beach Road is 39,000.

The existing (2019) mid-day traffic analysis for the US 41 at Bonita Beach Road intersection shows that six of the 12 movements operate at Level of Service (LOS) of F, with one of those being overcapacity (volume-to-capacity > 1.0). The existing (2019) PM traffic analysis for the intersection shows that seven of the 12 movements operate at Level of Service (LOS) of F, with two of those being overcapacity.

### **1.2.2 Safety**

Crash records were obtained for both US 41 and Bonita Beach Road within the study area, as described below:

- US 41 from Woods Edge Parkway (MP 0.130) to the Imperial River bridge (MP 1.482); and
- Bonita Beach Road from 300 feet west of Meadowlark Lane to 450 feet east of Spanish Wells Boulevard.

Crash data was obtained for the most recent five-year period on record (2014 through 2018). There was a total of 948 reported crashes during this period, 215 (23 percent) resulted in at least one injury, and there was one reported fatal crash in 2018 (rear end related). The study area experiences approximately 190 crashes per year on average.

Forty percent of the total study area crashes were located within the US 41 and Bonita Beach Road intersection's influence area. There was a total of 387 reported crashes during this period, 81 (21 percent) resulted in at least one injury, and there was one reported fatal crash in 2018 (rear end related). The highest crash type observed was rear end, comprising 55 percent of the total crashes. Sideswipe was the second highest crash type, accounting for 13 percent of the intersection crashes.

US 41 and Bonita Beach Road are designated emergency evacuation routes for both the Florida Division of Emergency Management and Lee County. Providing parallel service to I-75, US 41 plays an important role in facilitating north-south traffic during incidences and emergency evacuation periods (particularly within southwest Florida). Bonita Beach Road also serves a critical role during emergency evacuation periods as it connects US 41 and I-75 (facilities of the state evacuation route network) and provides one of two connections for residents and tourists between the barrier islands/tourist destinations to the west and mainland of Lee County.

### 1.2.3 Modal Interrelationships

While sidewalks are present on both sides of US 41 and Bonita Beach Road, the only bicycle facilities present in the study area are 5' marked bicycle lanes along both sides of US 41. Two LeeTran bus routes (Routes 150 and 600) operate along US 41 and Bonita Beach Road. In addition to the two bus routes, LeeTran has partnered with Uber to provide ULTRA On-Demand Transit service in the Bonita Springs area. With LeeTran's ULTRA On-Demand Transit service is a deluxe mini-bus available seven days a week from 7:00 AM to 6:00 PM. ULTRA On-Demand Transit allows riders to request a ride as needed, with curb to curb service.

Due to the presence of these facilities/services and the surrounding urban environment, heavy pedestrian and bicycle traffic exists in the area (as observed during field reviews conducted for the project).

The Office of Greenways and Trails (OGT) and the Lee County Metropolitan Planning Organization (MPO) have identified trail opportunities in the vicinity of the US 41 and Bonita Beach Road study intersection. The Coastal Loop Trail is a spur loop from the Southwest Coastal Regional Trail, which is part of the larger Shared-Use Nonmotorized (SUN) Trail Program. This is a planned loop trail that begins at the Southwest Coastal Regional Trail in Bonita Springs, travels along Bonita Beach Road to the barrier islands, then travels through Fort Myers Beach and

southern Fort Myers before connecting back to the Southwest Coastal Regional Trail east of US 41 in Fort Myers. Through discussions with Lee County MPO, no future funding has been dedicated for Coastal Loop Trail improvements in the vicinity of the US 41 and Bonita Beach Road intersection as per the date of this report.

#### **1.2.4 System Linkage**

US 41 serves as a critical arterial in facilitating the north-south movement of regional and local traffic (including truck traffic) as it runs parallel to I-75 along Florida's west coast. Similarly, Bonita Beach Road serves as a major east-west local roadway within Lee County, linking US 41 and I-75 and providing access (as one of two connections) between the mainland of Lee County and coastal communities/tourist destinations to the west (i.e., barrier islands and beaches).

The City of Bonita Springs performed the Network Enhancement Alignment Study, also known as the "Quadrant Plan", in May 2017. The purpose of the Quadrant Plan is to develop an expanded roadway network between Bonita Beach Road with US 41 that improves the area's mobility, maintains a high-quality environment for the community, and minimizes impacts to the natural environment. The City is moving forward with design and construction for a northwest quadrant roadway.

### **1.3 Alternatives**

#### **1.3.1 No-Build Alternative**

The No-Build Alternative is the scenario in which the proposed activity would not occur. The existing 6-lane (US 41) and 4-lane (Bonita Beach Road) facilities and intersection configurations are considered the No-Build Alternative. The No-Build Alternative does not address the purpose and need of this project; however, it serves as the baseline against which the build alternative is evaluated.



### 1.3.2 Alternatives Analysis Summary

Two intersection alternatives were developed to support the US 41 at Bonita Beach Road purpose and need:

- Alternative A – Enhanced Traffic Signal
- Alternative B – Partial Displaced Left Turn

Both Alternatives were presented at the Alternatives Public Workshop conducted on Tuesday, April 4, 2023. Following the workshop, feedback was gathered from members of the public for both alternatives. The majority of public comments received expressed support for Alternative B, the partial displaced left turn (PDLT). Alternative B was favored as it does not widen US 41 further, was viewed as being more operationally efficient, and provided better pedestrian and bicyclist safety. These alternatives were also presented to the Lee County MPO on June 16, 2023, and the MPO Board was also supportive of the PDLT alternative.

FDOT District 1 determined that Alternative B best aligns with the purpose and need of the project and was selected as the Preferred Alternative.

#### 1.3.2.1 Preferred Alternative Features

The following highlights the key improvement elements within the US 41 at Bonita Beach Road intersection area for Alternative B:

#### US 41

The proposed roadway/intersection improvements evaluated as part of the alternatives analysis were brought forward as part of the preferred alternative design. Outside of the main US 41 and Bonita Beach Road intersection and “crossover” locations, additional intersection improvements are included as part of the preferred alternative:

- Signalization and turn lane improvements at the intersection of US 41 and Foley Road (Sta. 222+75).
- Modified “thru-cut” signalized intersection at US 41 and Center of Bonita Springs (Sta. 260+00):
  - A thru-cut intersection restricts through movements from the minor street typically due to operational and/or geometric conditions. In this case, the west leg is being widened from two lanes to five lanes (four eastbound approach lanes and one westbound receiving lane) and the east leg is being widened from two lanes to four lanes (two westbound approach lanes and two eastbound receiving lanes).
  - Dual southbound left turn lanes are also proposed in the new thru-cut configuration.



### Bonita Beach Road

The following roadway improvements are proposed along Bonita Beach Road as part of the preferred alternative:

- Three 11-foot travel lanes in each direction from the Center of Bonita Springs (Sta. 266+50) to Arroyal Road (Sta. 286+25). The third eastbound through lane drops at the Spanish Wells Boulevard signal.
- Widening the sidewalk to be a 12-foot shared-use path on both sides from the Center of Bonita Springs (Sta. 266+50) to Arroyal Road (Sta. 286+25).

At intersections along Bonita Beach Road, the following features are included are part of the preferred alternative:

- Bonita Beach Road at Center of Bonita Springs (Sta. 266+50):
  - Develop a third 11-foot eastbound travel lane departing intersection.
- Bonita Beach Road at Arroyal Road (Sta. 286+25):
  - One additional 11-foot eastbound through lane (will be a shared through/right configuration).
  - Develop a third 11-foot westbound travel lane departing intersection.
  - The southbound approach will be modified to include two southbound left turn lanes and one southbound shared through/right turn lane.

### Quadrant Roadway System

A new Northwest Quadrant Roadway from Bonita Beach Road at Windsor Road (Bonita Beach Road Sta. 260+00) to US 41 at the Center of Bonita Springs (US 41 Sta. 260+00) will be constructed by the City of Bonita Springs before the preferred alternative is planned to be constructed at the US 41 and Bonita Beach Road intersection. The following features describe the Northwest Quadrant Roadway improvements:

- Intersection of Bonita Beach Road and Windsor Road (Bonita Beach Road Sta. 260+00):
  - An eastbound displaced left turn to the Northwest Quadrant Roadway with a new crossover intersection just west of Windsor Road.
  - The southbound approach from Windsor Road will be widened to two lanes.
- Along Windsor Road:
  - Two southbound lanes and one northbound lane.
  - 6-foot sidewalk on the west side and 12-foot shared-use path on the east side of the roadway.

- Along New Roadway between Windsor Road and the Northwest Corner of the Center of Bonita Springs Shopping Plaza:
  - One 11-foot travel lane in each direction.
  - 4-foot paved shoulders in each direction.
  - 6-foot sidewalk on the west side and 12-foot shared-use path on the east side of the roadway.

The design concept for the City's Northwest Quadrant Roadway ties in at the existing US 41/Center of Bonita Springs intersection and is not making any improvements to this intersection. In the future condition, this intersection will not have enough capacity to accommodate the forecasted traffic demand, necessitating additional turn lane improvements on the intersection's west leg. As part of the preferred alternative, the Northwest Quadrant Roadway is being modified from the northwest corner of the Center of Bonita Springs Shopping Plaza to US 41. These changes are described below:

- Northwest Corner of the Center of Bonita Springs Shopping Plaza to US 41:
  - Roadway is widened to develop a center median with varying width.
  - One 11-foot travel lane in each direction.
  - 6-foot sidewalks on each side of the roadway.
  - 7-foot buffered bicycle lanes in each direction.
  - New 11-foot westbound left turn lane into Center of Bonita Springs behind the Old Time Pottery building.
- West Leg at US 41 Intersection:
  - One 11-foot eastbound right turn lane.
  - Three 11-foot eastbound left turn lanes.
  - One 11-foot westbound receiving lane.

Tying into the east leg of this intersection is a Northeast Quadrant Roadway proposed between US 41 and Arroyal Road, intersecting at Arroyal Road and Carolina Street. This will be a new three-lane roadway with two lanes eastbound and one lane westbound. The lane configuration at the US 41 intersection is discussed below:

- One 11-foot westbound left turn lane.
- One 11-foot westbound right turn lane.
- Two 11-foot eastbound receiving lanes.

Additional engineering detail can be found in the project's Preliminary Engineering Report (PER). The project's typical sections are shown in **Appendix E**.

## 2.0 Methodology

This project's traffic noise impact analysis is consistent with Title 23, *Code of Federal Regulations* (C.F.R.), § 772, Part II, Chapter 18 of the FDOT *Project Development and Environment Manual*, and Chapter 335, Section 335.17, *Florida Statutes*. This assessment also adheres to current Federal Highway Administration (FHWA) traffic noise analysis guidelines in *FHWA-HEP-10-025*. The FHWA Traffic Noise Model (TNM) - version 2.5 was used to predict traffic noise levels for this project, following guidelines outlined in the FDOT *Traffic Noise Modeling and Analysis Practitioners Handbook*. The analysis evaluated noise levels for the existing condition and the 2050 No-Build and Build Alternatives.

The project design files (State Plane West) were used to determine the location of the Build Alternative for input into TNM. Vertical elevations for the project roadways (existing and proposed) and analyzed receptors were obtained from the United States Geological Survey digital elevation models.

### 2.1 Noise Metrics

Sound levels for this analysis are expressed in decibels (dB) using an "A"-scale weighting expressed as dB(A). This scale most closely approximates the response characteristics of the human ear to typical traffic sound levels. All reported sound levels are hourly equivalent noise levels [ $L_{eq(h)}$ ]. The  $L_{eq(h)}$  is defined as the equivalent steady-state sound level that, in a given hourly period, contains the same acoustic energy as the time-varying sound level for the same hourly period.

### 2.2 Traffic Data

Traffic noise is heavily dependent on traffic volume and speed, with the amount of noise generated by traffic increasing as the vehicle speed and number of vehicles increase. Characteristics contributing to the 2050 Design Year's highest traffic noise levels were used to predict project noise levels. Worst-case noise conditions occur with the maximum traffic traveling at the posted speed and represent a Level of Service (LOS) C operating condition. However, if the traffic analysis indicates the roadway will operate below LOS C, the project's demand peak-hour directional traffic volumes are used per Chapter 18 of the FDOT PD&E Manual. Traffic volumes and speeds used in the analysis are included in **Appendix A**.

### 2.3 Noise Abatement Criteria

Land use plays an important role in traffic noise analyses. To determine which land uses are "noise sensitive," this noise impact analysis used the FHWA Noise Abatement Criteria (NAC) shown in **Table 2-1**. Noise sensitive sites are considered impacted when the future design year

Build alternative traffic noise level is predicted to approach, meet, or exceed the NAC for its respective category or experience a substantial increase in noise levels, defined as an increase of 15 dB(A) or more in the design year, over the existing noise levels. The FDOT defines "approach" as within one dB(A) of the applicable FHWA criterion. A substantial increase typically occurs in areas where traffic noise is a minor component of the existing noise environment but would become a major component after the project is constructed (e.g., a new alignment project).

Table 2-1 | Noise Abatement Criteria

Hourly A-Weighted Sound Level-decibels (dB(A))				Description of Activity Category
Activity	Activity Leq(h) <sup>1</sup>		Evaluation	
Category	FHWA	FDOT	Location	
A	57.0	56.0	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 <sup>2</sup>	67.0	66.0	Exterior	Residential.
C <sup>2</sup>	67.0	66.0	Exterior	Active sports areas, amphitheatres, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, golf courses, places of worship, playgrounds, public meeting rooms, public/nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52.0	51.0	Interior	Auditoriums, daycare centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public/nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E <sup>2</sup>	72.0	71.0	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.

(Based on Table 1 of 23 CFR Part 772)

<sup>1</sup> The Leq(h) Activity Criteria values are for impact determination only and are not design standards for noise abatement measures.

<sup>2</sup> Includes undeveloped lands permitted for this activity category.

For comparison purposes, typical noise levels for common indoor and outdoor activities are provided in **Table 2-2**.

Table 2-2 | Comparative Sound Levels

Common Outdoor Activities	dB(A)	Common Inside Activities
Jet Flyover at 1,000 ft. Gas Lawn Mower at 3 ft.	-110- -100-	Rock Band
Diesel Truck at 50 ft. (at 50 mph) Busy Urban Area Daytime	-90- -80-	Food Blender at 3 ft. Garbage Disposal at 3 ft.
Gas Mower at 100 ft. Commercial Area Heavy Traffic at 300 ft.	-70- -60-	Vacuum Cleaner at 10 ft. Normal Speech at 3 ft. Large Business Office
Quiet Urban Daytime Quiet Urban Nighttime Quiet Suburban Nighttime	-50- -40-	Dishwasher Next Room Theater, Large Conference Room (Background)
Quiet Rural Nighttime	-30- -20-	Library
Lowest Threshold of Human Hearing	-10- -0-	Lowest Threshold of Human Hearing
<i>Source: California Dept. of Transportation Technical Noise Supplement, Oct. 1998, Page 18.</i>		

## 2.4 Noise Abatement Measures

When noise impacts are identified as part of the traffic noise analysis, noise abatement must be considered. The potential abatement alternatives considered during the PD&E included traffic management, alternative roadway alignments, buffer zones, and noise barriers.

### 2.4.1 Traffic Management

Traffic management measures that limit motor vehicle speeds and reduce volumes can be effective as a noise mitigation option; however, these measures may also negate a project's ability to meet the need of the facility. For example, if the posted speed on US 41 and Bonita Beach Road were reduced, the capacity of the roadway to handle the forecasted motor vehicle

demand would also be reduced. Therefore, reducing traffic speeds and/or traffic volumes is inconsistent with the goal of improving the ability of the roadway to handle the forecasted volumes. As such, although feasible, traffic management measures are not considered a reasonable noise mitigation measure for the project.

#### 2.4.2 Alignment Modifications

Alignment modification involves orienting and/or siting the roadway at sufficient distances from noise sensitive sites to minimize traffic noise. Based on the noise contours developed for this project and shown in **Section 6** of this NSR, any alignment shift that would avoid traffic-related noise impacts of the proposed project would introduce noise impacts to other noise sensitive sites, and no net benefit would result. Therefore, alignment modifications are not considered a reasonable noise mitigation measure.

#### 2.4.3 Buffer Zones & Land Use Controls

Noise buffer zones that separate the roadway and noise sensitive land uses can minimize or eliminate noise impacts to areas of future development. This measure requires local land use planning not currently in place within the project corridor. Because the noise impact analysis applies to existing land uses, buffer zones are not an applicable abatement measure. However, for any new development or redevelopment occurring in the future, local officials can use the noise contour information provided in **Section 6** of this NSR to establish buffer zones, thereby minimizing or avoiding noise impacts on future sensitive land uses.

#### 2.4.4 Noise Barriers

The most common type of noise abatement measure is the construction of a noise barrier. Due to the land use density within the project corridor and proposed typical sections, noise barriers are the only measure being considered for this project. The following feasibility and reasonableness factors must be evaluated when considering noise barriers for abatement.

##### Feasibility Factors

The FDOT PD&E Manual stipulates that a noise barrier must meet acoustic and engineering criteria to be considered feasible, as summarized below:

- Acoustic feasibility: The barrier must provide a minimum of 5.0 dB(A) reduction in traffic noise for at least two impacted receptors. Consequently, noise barriers are not evaluated for residential areas with a single impacted receptor.
- Engineering feasibility: The engineering review identifies whether other factors must be evaluated for the barrier to be considered feasible.

- Safety: If a noise barrier and safety conflict exist, primary consideration must be given to safety. An example of such a conflict would be the loss of a safe sight distance (line of sight) at an intersection or driveway resulting from a noise barrier placement.
- Accessibility to adjacent properties: The noise barrier placement cannot block ingress and egress on non-limited access roadways. Other access issues to be considered include access to a local sidewalk or normal travel routes. Neither applies to noise barriers on limited-access roadways.
- Right-of-way needs: Does the noise barrier require additional land, access rights, or easements for construction and maintenance?
- Maintenance: Maintenance crews must have reasonable access to both sides of the barrier for personnel and equipment using standard practices.
- Drainage: Does the barrier impact existing or planned drainage?
- Utilities: Does the barrier impact existing utilities?

### Reasonableness Factors

If a noise barrier meets the feasibility criteria, the following reasonableness factors must collectively be achieved for the noise abatement measure to be deemed reasonable.

- Acoustic reasonableness: The barrier must attain the FDOT noise reduction design goal (NRDG) of 7.0 dB(A) for at least one benefited receptor. (Note: to be considered "benefited," the receptor must receive a minimum of 5.0 dB(A) in traffic noise reduction from the barrier.) Failure to achieve the NRDG results in the noise abatement measure being deemed not reasonable.
- Cost reasonableness: Using the current \$30.00 per square foot statewide average, a cost of \$42,000 per benefited receptor is the upper limit for cost-reasonableness.
- Benefited property owner and resident viewpoints: During project development, FDOT solicits the opinion of benefited owners and residents regarding noise abatement. Affected owners and residents are given the opportunity to provide input regarding their desires to have the proposed noise abatement measure constructed. This process aims to obtain a response for or against the noise barrier from a majority of respondents to the survey. The noise barrier is not deemed reasonable if a majority consensus is not obtained in favor of the barrier.

### **2.4.5 Special-Use Site Barrier Analysis**

The methodology used to evaluate noise barrier systems for impacted special land use (SLU) sites differs from those used for residential locations. The standard procedure for determining the feasibility and reasonableness of a noise barrier for an SLU site is documented in *A Method*



to Determine Reasonableness and Feasibility of Noise Abatement at Special-Use Locations (FDOT 2009). This special-use site analysis procedure starts with the established cost threshold for residential locations and converts it to a person-hours of use criteria that can be applied to non-residential sites using this equation from the above-referenced document. A noise barrier for an SLU site is considered cost-reasonable if the calculated "abatement cost factor" is below the \$995,935/person-hr/ft<sup>2</sup>.

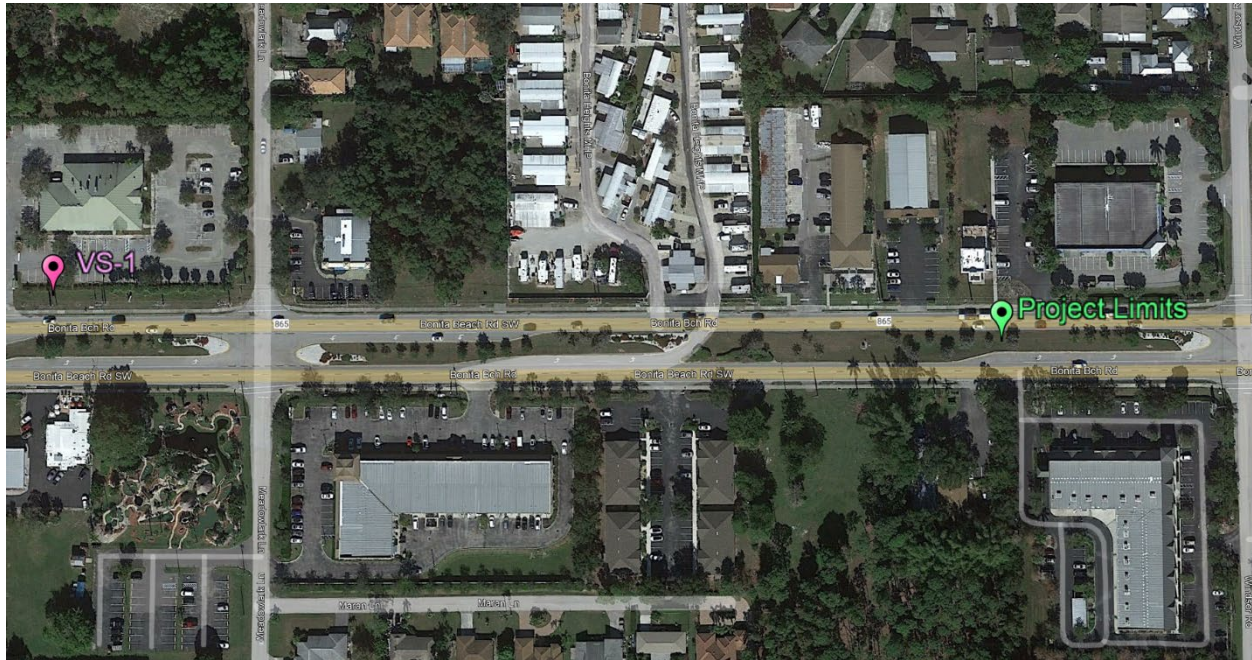
## 3.0 Traffic Noise Analysis and Abatement Evaluation

### 3.1 Model Validation

Existing noise levels are measured in the project corridor to confirm if traffic is the primary source of noise. These field measurements are also required to verify the accuracy of the TNM before it can be used to predict noise levels. Three 10-minute measurements were taken on September 6, 2023, using an Extech Instruments Model 407780 Type 2 Integrating Sound Level Meter. The sound level meter, calibrated at 114.0 dB(A) with an Extech Instruments Model 407766 calibrator, was adjusted to the A-weighted frequency scale, which approximates the frequency sensitivity of the human ear. Traffic data, including vehicle volumes, speeds by type, and meteorological conditions, were recorded during each measurement session. The data collection effort also recorded the travel speed for each type of vehicle using a Bushnell Speedster handheld radar gun.

Suitable validation measurement locations require a direct line of sight from the sound level meter to the roadway without visual obstructions like buildings. Additionally, the ability to measure the free flow of traffic is necessary. Numerous driveway openings and signalized intersections exist within the project's study limits. Thus, the validation measurements had to be collected outside the project study limits. **Figure 3-1** shows the site along Bonita Beach Road, approximately 1,500 feet from the western project limits. During the monitoring session, the atmospheric conditions were 91° under clear skies, with 49% humidity and mild west-northwest breezes ranging from 3 to 7 m.p.h.

Figure 3-1 | Validation Measurement Location



Validation of TNM occurs when the model-predicted noise levels are within three decibels of the field-measured levels. Table 3-1 shows that TNM predicted within the 3.0-decibel acceptance range for each 10-minute session. Consequently, the model is acceptable for predicting noise levels for this project.

Table 3-1 | TNM Validation Results Summary

Location	Validation Session	Field Measured (dB(A))	TNM Predicted (dB(A))	Variance (dB(A))
VS-1	Session 1	66.8	68.2	1.4
	Session 2	66.6	68.2	1.6
	Session 3	67.3	68.0	0.7

### 3.2 Noise Sensitive Receptors

Within the project limits, TNM receptor points representing residences are located in accordance with the FDOT PD&E Manual as follows:

- Residential receptor points are located in areas of frequent outdoor use or the corner of the residential building closest to the major traffic noise source.

- Where residences are clustered together, single receptor points are analyzed as representative of a group of residences with similar characteristics.
- Ground floor receptor points are assumed to be 5 feet above the ground elevation, and all receptors are assumed to be at ground level unless otherwise noted.
- Higher floor receptors are assumed to increase in elevation in 10-foot increments above the ground floor receptor.
- Non-residential receptor points are located at the edge of the outdoor use area closest to the major traffic noise source.

Using **Table 2-1** as a guide, noise sensitive land uses within the study corridor fall under NAC B, C, and E. The NAC C land uses within the study corridor pertain to exterior use areas associated with the Learning City Pre-School, Noah's Ark Academy, and the Angler's Paradise pool deck. The Shiknay's Bonita Funeral Home was considered an NAC D site because this type of site is similar to a church but does not have a readily defined area of frequent exterior use. The NAC E land uses include several commercial properties with outdoor uses ranging from open-air dining, benches, and a swimming pool.

The remainder of the corridor is NAC G undeveloped land. A permit search of these areas was conducted to identify active building permits for noise sensitive land use. As of September 11, 2023, no such permits were discovered adjacent to the corridor. If a future noise sensitive land use receives a building permit before the project's Date of Public Knowledge, they will be assessed for traffic noise impacts during the project's final design phase of development.

No land uses in the study corridor warrant an NAC A analysis. NAC F land uses are not considered a noise sensitive activity and are not included in the analysis.

### **3.3 Predicted Noise Levels and Abatement Analysis**

Noise levels were predicted for 57 noise sensitive sites representing 42 residences (NAC B), four SLU NAC C receptors, and eleven SLU NAC E receptors. Due to the number of receptors, the analysis divided the study corridor into Noise Study Areas (NSA). The reporting of project noise levels was further simplified by using receptors representing similar adjacent noise sensitive sites. The grouping within a representative receptor is referred to as a Common Noise Environment (CNE). There may be several CNEs within one NSA.

Receptor points are labeled according to the NSA within which they are located. NSAs are named as follows:

- The first two letters (i.e., SB, NB) describe on which side of the project roadway the NSA is located (e.g., "NB" indicates the receptor is in an NSA on the northbound side of the US

41 travel lanes; "EB" indicates the receptor is in an NSA on the eastbound side of Bonita Beach Road). NSAs adjacent to the future county road called "Quadrant Road" in this NSR, are referenced by NWQ (northwest Quadrant Road) and NEQ (northeast Quadrant Road).

- The number following the first two letters is a numeric sequencing number (e.g., NB2 is the 2<sup>nd</sup> NSA on the northbound side of US 41).
- Residential receptors are identified by "R"; Special land use receptors are identified by "SLU".
- The final two characters are the individual receptor number and is separated from the first string of characters with a dash (e.g., NB2-07 is the 7<sup>th</sup> receptor in the 2<sup>nd</sup> NSA on the northbound side of US 41).
- Where there are multi-family residential apartment complexes in the study corridor, the letter "a" represents ground-floor units, "b" represents 2<sup>nd</sup>-floor units, and "c" represents 3<sup>rd</sup>-floor units, etc. (e.g., NB2-07a).

The existing condition (2019), the 2050 No-Build Alternative, and the 2050 Build Alternative noise analysis results discussed in this section are also summarized in a noise impact comparison matrix provided in **Appendix B**. When discussing noise level increases, the general rule that applies to perception is:

- A 3 dB(A) increase is barely perceptible to most people.
- A 5 dB(A) increase is noticeable to most people.
- A 10 dB(A) increase is perceived as twice as loud and is considered a doubling of noise.

Overall, one SLU noise receptor currently experiences noise levels that approach or exceed NAC. Under the No-Build and Build Alternatives, the same receptor is predicted to exceed the NAC. None of the noise increases are considered substantial (defined as 15 dB(A) or higher).

### 3.3.1 Noise Study Area SB1

NSA SB1, shown on pages **C2 and C3** in the project aerials **Appendix C**, is located west of US 41 and spans from the project's beginning limits at Foley Road to Bonita Beach Road. Noise sensitive land uses in this NSA consist of SLU NAC D and two SLU NAC E sites. The Shikany's Bonita Funeral Home is represented by receptor SB1-SLU1-2 and was evaluated as an NAC D site due to the type of facility (similar to a church) and its lack of exterior use area. A permit search was conducted but did not yield any pertinent information relative to the type of construction. Thus, the funeral home was assumed to be masonry construction with single-glazed windows. The Mare Terra and Popeye's outdoor dining tables are represented by receptor SB1-SLU1-1 and SB1-SLU1-3, respectively.

Currently, no receptors experience noise levels that meet or exceed NAC. None of the SB1 receptors are predicted to meet or exceed the 51.0 dB(A) NAC D and 71.0 dB(A) NAC E criteria under the No-Build Alternative and Build Alternatives.

### 3.3.2 Noise Study Area SB2

NSA SB2, shown on pages **C3 through C5** in the project aerials **Appendix C**, is located west of US 41 and spans from Bonita Beach Road to the project ending limits, south of the Imperial River. Currently, there are no noise sensitive land uses within this NSA.

### 3.3.3 Noise Study Area NB1

NSA NB1, shown on pages **C2 and C3** in the project aerials **Appendix C**, is located east of US 41 and spans from the project Foley Road to Bonita Beach Road. Noise sensitive land uses in this NSA consist of one NAC C and two NAC E sites. The Learning City daycare playground (NAC C) is represented by NB1-SLU1-2. The outdoor dining tables for the Dunkin and Iguana Mia restaurants are represented by receptors NB1-SLU1-1 and NB1-SLU1-3, respectively.

Currently, no receptors experience noise levels that meet or exceed NAC. None of the NB1 receptors are predicted to meet or exceed the 66.0 dB(A) NAC C and 71.0 dB(A) NAC E criteria under the No-Build Alternative and Build Alternatives.

### 3.3.4 Noise Study Area NB2

NSA NB2, shown on pages **C3 through C5** in the project aerials **Appendix C**, is located east of US 41 and spans from Bonita Beach Road to the south of the Imperial River. Noise sensitive land uses in this NSA consist of two NAC E sites. The outdoor dining tables associated with the Aqua restaurant and the swimming pool associated with the Hampton Inn are represented by receptors NB2-SLU2-1 and NB2-SLU2-2, respectively.

Currently, no receptors experience noise levels that meet or exceed NAC. Neither receptor is predicted to meet or exceed the 71.0 dB(A) NAC under the No-Build Alternative and Build Alternatives.

### 3.3.5 Noise Study Area EB1

NSA EB1, shown on pages **C6 and C7** in the project aerials **Appendix C**, is located south of Bonita Beach Road and spans from the project's beginning limits at Windsor Road to US 41. Currently, there are no noise sensitive sites within this NSA.

### 3.3.6 Noise Study Area EB2

NSA EB2, shown on pages **C7 through C9** in the project aerials **Appendix C**, is located south of Bonita Beach Road and spans from US 41 to Spanish Wells Boulevard. Noise sensitive land uses in this NSA consist of three NAC E sites. The outdoor benches associated with the Bonita Dental



and Wellness Center are represented by receptor EB2-SLU2-1. The outdoor dining associated with the Jersey Mike's/Rosati's Pizza and Wingstop are represented by receptors EB2-SLU2-2 and EB2-SLU2-3, respectively.

Currently, no receptors experience noise levels that meet or exceed NAC. None of the receptors are predicted to meet or exceed the 71.0 dB(A) NAC under the No-Build Alternative and Build Alternatives.

### 3.3.7 Noise Study Area WB1

NSA WB1, shown on pages **C6 and C7** in the project aerials **Appendix C**, is located north of Bonita Beach Road and spans from Windsor Road to US 41. The NSA's only noise sensitive land use is the NAC E Komoon restaurant outdoor dining. This site is represented by receptor WB1-SLU1-1.

Currently, no receptors experience noise levels that meet or exceed NAC. Receptor WB1-SLU1-1 is not predicted to meet or exceed the 71.0 dB(A) NAC under the No-Build Alternative and Build Alternatives.

### 3.3.8 Noise Study Area WB2

NSA WB2, shown on pages **C7 through C9** in the project aerials **Appendix C**, is located north of Bonita Beach Road and spans from US 41 to Spanish Wells Boulevard. Noise sensitive land uses in this NSA consist of one NAC C and one NAC E site. The playground associated with Noah's Ark Academy is represented by receptor WB2-SLU2-1. The outdoor dining tables associated with the Bonita Beach Balloon Bar & Grill are represented by receptor WB2-SLU2-2.

Currently, the playground area affiliated with Noah's Ark Academy experiences noise levels that meet or exceed NAC. While the No Build and Build Alternatives are predicted to have nearly identical noise levels as the existing condition, the predicted project related noise level, 69.4 dB(A) for the Noah's Ark Academy playground, exceeds the NAC and requires abatement consideration.

Noise barrier WB1, as illustrated on page **D1** in **Appendix D**, was evaluated to abate the noise impact on the playground. The barrier was analyzed at the back of the sidewalk, approximately six feet inside the proposed westbound Bonita Beach Road ROW, following FDOT Special Land Use procedures outlined in **Section 2.4.5**. Several options were evaluated to determine which barrier configuration would yield the greatest noise reduction within special use cost-reasonableness guidelines. The six-foot-tall option failed to meet acoustic criteria; thus, it was removed from further evaluation.

As summarized in **Table 3-2**, an eight-foot-tall and 286-foot-long barrier meets all FDOT requirements and is a potentially feasible and reasonable method to abate traffic-related noise for 100% of the impacted playground area. A 10-foot-tall and 265-foot-long barrier option also meets acoustic criteria and abates 100% of the impacted playground.

The second step in the analysis determines if the barrier is cost-reasonable. The State of Florida Department of Children and Families (DCF) and Noah’s Ark Academy websites were queried for information used to conduct the cost reasonableness analysis. According to Florida DCF, the site has a maximum capacity of 105. The receptors website indicated that the school has five classrooms. For the calculations, it was assumed there was one teacher per classroom. These statistics formed the foundation for the cost analysis. The cost reasonable analysis for the 8-foot and 10-foot options are summarized in **Table 3-3** and **Table 3-4**.

Table 3-2 | Noise Barrier WB1 Evaluation (NSA WB2)

WB1-SLU2-1: Noah's Ark Academy playground NAC C						
Evaluated Barrier Options					Percentage of Impacted Area Benefited	Does the barrier satisfy the Noise Reduction Design Goal (-7 dB(A))
Option	Height* <sup>2</sup> (feet)	Length (feet)	Barrier Location	Total Cost* <sup>1</sup>		
1	6	306	Back of sidewalk	\$55,080	58%	No 6.6 dB(A)
2	8	286	Back of sidewalk	\$68,640	100%	Yes 9.0 dB(A)
3	10	265	Back of sidewalk	\$79,500	100%	Yes 10.3dB(A)

\*1 = Based on FDOT Statewide average of \$30 per square foot.

\*2 = 8-ft max on MSE/Bridge; 14-ft max on shoulder; 22-ft max at ROW or offset from shoulder.

\*3 = FDOT Reasonable Cost Guideline for Special Use Sites is \$995,935/person-hr/ft<sup>2</sup>.

Table 3-3 | Noise Barrier WB1 Evaluation (NSA WB2) – Option 2

NSA WB2: Noise Barrier WB1 - Special Use			
Item	Criteria	Input	Description
1	Enter length of proposed barrier	286 feet	ROW barrier length
2	Enter height of proposed barrier	8 feet	ROW barrier height
3	Multiply Item1 by Item 2	2288 sq. feet	
4	Avg. amount of time person stays per visit	1 hours	See Assumptions
5	Avg. number people visit site per day	111 people	
6	Multiply Item 4 by Item 5	111 person-hr	
7	Divide Item 3 by Item 6	20.61261261 sq. ft/person-hr	
8	Multiply \$42,000 by Item 7	\$ 865,730 \$/sq. ft/person-hr	
9	Does Item 8 exceed the "abatement cost factor" of \$995,935/person-hr/ft <sup>2</sup> ?	No	
10	If Item 9 is no, abatement is reasonable	<b>Reasonable</b>	
11	If Item 9 is yes, abatement is not reasonable	-	
<p>Assumptions:            Days open per week (5): Monday through Friday            Hours open per day: 6:00 am to 6:00 pm            Licensed capacity: 105            Number of classrooms: 5            Number of teaching staff: 6            Total number of people for potential use of playground area: 111</p> <p>Sources:            Florida Department of Children and Families : <a href="https://caressearch.myflfamilies.com/PublicSearch">https://caressearch.myflfamilies.com/PublicSearch</a>            Noah's Arc Academy : <a href="https://www.noahsarkbonita.com/">https://www.noahsarkbonita.com/</a></p>			



Table 3-4 | Noise Barrier WB1 Evaluation (NSA WB2) – Option 3

NSA WB2: Noise Barrier WB1 - Special Use				
Item	Criteria	Input		Description
1	Enter length of proposed barrier	265	feet	ROW barrier length
2	Enter height of proposed barrier	10	feet	ROW barrier height
3	Multiply Item1 by Item 2	2650	sq. feet	
4	Avg. amount of time person stays per visit	1	hours	See Assumptions
5	Avg. number people visit site per day	111	people	
6	Multiply Item 4 by Item 5	111	person-hr	
7	Divide Item 3 by Item 6	23.87387387	sq. ft/person-hr	
8	Multiply \$42,000 by Item 7	\$ 1,002,703	\$/sq. ft/person-hr	
9	Does Item 8 exceed the "abatement cost factor" of \$995,935/person-hr/ft <sup>2</sup> ?	Yes		
10	If Item 9 is no, abatement is reasonable	-		
11	If Item 9 is yes, abatement is not reasonable	<b>Not Reasonable</b>		
<p>Assumptions:            Days open per week (5): Monday through Friday            Hours open per day: 6:00 am to 6:00 pm            Licensed capacity: 105            Number of classrooms: 5            Number of teaching staff: 6            Total number of people for potential use of playground area: 111</p> <p>Sources:            Florida Department of Children and Families : <a href="https://caressearch.myflfamilies.com/PublicSearch">https://caressearch.myflfamilies.com/PublicSearch</a>            Noah's Arc Academy : <a href="https://www.noahsarkbonita.com/">https://www.noahsarkbonita.com/</a></p>				

The eight-foot-tall barrier option is recommended for further consideration during the final design. The final design evaluation may change this barrier's length, height, or viability.

### 3.3.9 Noise Study Area NWQR1

NSA NWQR1, shown on pages **C10** in the project aerials **Appendix C**, is located in the northwest quadrant of the US 41 and Bonita Beach Road intersection. The City of Bonita Springs plans to construct the two-lane roadway from Bonita Springs Road to US 41; thus, the initial construction of the quadrant road is not part of this PD&E study. This PD&E study is evaluating an expansion of the eastern section of the quadrant road's ROW to accommodate a triple-left turn lane to US 41. The quadrant road will remain as a two-lane roadway. The only noise sensitive land uses within the analysis limits are associated with the Angler's Paradise development, which is currently under construction. Twelve NAC B residential sites are represented by multi-story receptors NWQR1-01 through NWQR1-03. The NAC C pool deck is represented by receptor NWQR1-SLU1-1.

Currently, no receptors experience noise levels that meet or exceed NAC. None of the receptors are predicted to meet or exceed the 66.0 dB(A) NAC under the No-Build Alternative and Build Alternatives.

### 3.3.10 Noise Study Area NEQR1

NSA NEQR1, shown on page **C11** in the project aerials **Appendix C**, is located in the northeast quadrant of the US 41 and Bonita Beach Road intersection and specifically includes the noise sensitive land uses adjacent to the proposed quadrant road spanning from US 41 to Arroyal Road. The existing pond north of the quadrant road will be expanded as part of the FDOT project. The 25 NAC B residences south of the proposed road are represented by 13 receptors identified as NERQ1-01 through NERQ13.

Currently, no receptors experience noise levels that meet or exceed NAC. The five sites represented by receptors NEQR1-01 through NEQR1-03 are not predicted to meet or exceed NAC under the Build Alternative but are predicted to experience the greatest overall project-related noise increases, ranging from 5.0 dB(A) to 6.5 dB(A). These increases are not considered to be substantial.

### 3.3.11 Noise Study Area NEQR2

NSA NEQR2, shown on page **C11** in the project aerials **Appendix C**, is located in the northeast quadrant of the project study area and specifically includes the noise sensitive land uses east of Arroyal Road. Five NAC sites, four south of Carolina Street and one to the north, are represented by receptors NEQR2-01 and NEQR2-02, respectively.

Currently, no receptors experience noise levels that meet or exceed NAC. None of the receptors are predicted to meet or exceed the 66.0 dB(A) NAC under the No-Build Alternative and Build Alternatives.

## 4.0 Conclusions

Of the 57 analyzed sites, the noise level at one SLU site is predicted to approach or exceed the NAC for the design year 2050 Build Alternative. All other sites were predicted to not meet or exceed applicable NAC because of the project. Noise barriers were analyzed and considered to abate project-related impacts to the playground affiliated with the Noah's Ark Academy (WB2-SLU2-1). The PD&E special use barrier analysis results indicate that a barrier could potentially provide reasonable and feasible noise abatement for the impacted receptor WB2-SLU2-1.

### 4.1 Statement of Likelihood

The FDOT is committed to the construction of feasible and reasonable noise abatement measures. One potentially feasible and reasonable barrier has been identified for this project (see **Table 4-1** for more detail on the noise barriers and their locations in the maps in **Appendix D**), contingent upon the following conditions:

- Final recommendations on the construction of abatement measures are determined during the project's final design and through the public involvement process; and
- Detailed noise analyses during the final design process support the need, feasibility, and reasonableness of providing abatement; and
- Cost analysis indicates that the cost of the noise barrier(s) will not exceed the cost-reasonable criterion; and
- Community input supporting types, heights, and locations of the noise barrier(s) is provided to FDOT; and
- Safety and engineering aspects have been reviewed, and any conflicts or issues resolved.

The date that FDOT approves the Type 2 Categorical Exclusion will be the Date of Public Knowledge. During the design phase, a land use review will be performed to identify all noise sensitive sites that may have received a building permit between the time the PD&E noise study is finalized and prior to the project's Date of Public Knowledge. If the review identifies noise sensitive sites that have been permitted prior to the Date of Public Knowledge, then those sensitive sites will be evaluated for traffic noise impacts and abatement considerations.

Table 4-1 | Potentially Feasible and Reasonable Noise Barrier Evaluation Summary

Potentially Feasible and Reasonable Noise Barrier									
Evaluated Barrier Options					Percentage of Impacted Area Benefited	Does the barrier satisfy the Noise Reduction Design Goal (-7 dB(A))	Daily Person Usage Within Benefited Area	Possible for Person Hours of Daily Use Within Benefited Area to be met? <sup>*3</sup>	Recommended for further consideration in final design?
Barrier ID	Height* <sup>2</sup> (feet)	Length (feet)	Barrier Location	Total Cost* <sup>1</sup>					
WB1	8	286	Back of sidewalk	\$68,640	100%	Yes 9.0 dB(A)	111	Yes	Yes

\*1 = Based on FDOT Statewide average of \$30 per square foot.

\*2 = 8-ft max on MSE/Bridge; 14-ft max on shoulder; 22-ft max at ROW or offset from shoulder.

\*3 = FDOT Reasonable Cost Guideline for Special Use Sites is \$995,935/person-hr/ft<sup>2</sup>.

## 5.0 Construction Noise and Vibration

Based on the existing land use within the limits of this project, the construction of the proposed roadway improvements will have temporary noise and vibration impacts. Construction noise sensitive sites include all sites detailed in **Section 3.0** of this report. Vibration-sensitive sites on the project include residences and medical offices. Trucks, compaction equipment, earth-moving equipment, pumps, and generators are sources of construction noise and vibration. During the construction phase of the proposed project, short-term noise and vibration may be generated by stationary and mobile construction equipment. The construction noise and vibration will be temporary at any location and controlled by adherence to the most recent edition of the *FDOT Standard Specifications for Road and Bridge Construction*.

## 6.0 Public Coordination

Coordination with the public and local agencies and officials will be accomplished during the PD&E study. Local and community officials will be offered the opportunity to comment on the proposed project at the planned public meetings.

A public alternatives meeting was held on April 4, 2023 at the Bonita Springs Recreation Center. Two noise-related comments were received and are documented under separate cover.

### 6.1 Noise Impact Contours

To promote compatibility between land development planning and the roadways under study, the distance between the edge of the outside travel lane and the point where the roadway-related noise is predicted to reach the NAC for each activity category was estimated. These estimates are referred to as noise contours and are shown in **Table 6-1**. These estimates provide the general distance at which the traffic noise meets or exceeds the FDOT NAC for each activity type. These contours represent the approximate distance from the nearest edge of the pavement to the limits of the area predicted to meet or exceed the NAC in the 2050 Design Year. These contours do not consider any shielding of noise provided by structures or vegetation between the receptor site and the proposed travel lanes.

Table 6-1 | Project Noise Contours

<b>NAC Impact Distance</b>		
<b>Activity Category <sup>*1</sup></b>	<b>Corresponding Noise Abatement Criterion</b>	<b>Approximate Distance to EOP <sup>*2</sup></b>
Category A	56 dB(A)	525 ft
Category B and C	66 dB(A)	125 ft
Category E	71 dB(A)	50 ft

<sup>\*1</sup> Activity Categories as defined in 23 CFR 772.  
<sup>\*2</sup> EOP = Edge of Pavement; SR 45 (US 41) / Bonita Beach Road; does not account for variation caused by topography, local roads, intervening structures, etc.

## 7.0 References

1. 23 CFR Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise Federal Register, Vol. 75, No. 133, July 2010.
2. *Project Development and Environment Manual*; FDOT. July 1, 2023.
3. Section 335.17, *Florida Statutes. State Highway Construction; Means Of Noise Abatement*. 2012.
4. *Highway Traffic Noise: Analysis and Abatement Guidance, FHWA-HEP-10-025*; FHWA. December 2011.
5. *Traffic Noise Modeling and Analysis Practitioners Handbook*; FDOT. December 2018.
6. *A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special-Use Locations*; FDOT. 2009.
7. *Noise Measurement Handbook*; FHWA. June 2018.
8. *Standard Specifications for Road and Bridge Construction*; FDOT. 2023.

**Appendix A      Project Noise Traffic Data**



**TRAFFIC DATA FOR NOISE STUDIES - SUMMARY OUTPUT**  
**FDOT DISTRICT 1**

Federal Aid Number(s):	TBD
FPID Number(s):	444321-1-22-01
State/Federal Route No.:	0
Road Name:	US 41 at Bonita Beach Road
Project Description:	PD&E Study
Segment Description:	US 41 from Foley Road to Bonita Beach Road
Section Number:	12010000
Mile Post To/From:	0.562 to 0.990

<b>Existing Facility:</b>		D =	<b>60.00%</b>	%
Year:		T24 =	<b>3.20%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>1.60%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>1.00%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>0.60%</b>	% of Design Hour Volume
		B =	<b>0.00%</b>	% of Design Hour Volume
		MC =	<b>0.20%</b>	% of Design Hour Volume

<b>No Build Alternative (Design Year):</b>		D =	<b>60.00%</b>	%
Year:		T24 =	<b>3.20%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>1.60%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>1.00%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>0.60%</b>	% of Design Hour Volume
		B =	<b>0.00%</b>	% of Design Hour Volume
		MC =	<b>0.20%</b>	% of Design Hour Volume

<b>Build Alternative (Design Year):</b>		D =	<b>60.00%</b>	%
Year:		T24 =	<b>3.20%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>1.60%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>1.00%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>0.60%</b>	% of Design Hour Volume
		B =	<b>0.00%</b>	% of Design Hour Volume
		MC =	<b>0.20%</b>	% of Design Hour Volume

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Adam Burghdoff, PE      Adam M Burghdoff      Date: 1/22/2024  
 Print Name      Signature

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis.

FDOT Reviewer: \_\_\_\_\_ Date: \_\_\_\_\_  
 Print Name      Signature

**TRAFFIC DATA FOR NOISE STUDIES - SUMMARY OUTPUT**  
**FDOT DISTRICT 1**

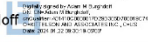
Federal Aid Number(s):	TBD
FPID Number(s):	444321-1-22-01
State/Federal Route No.:	0
Road Name:	US 41 at Bonita Beach Road
Project Description:	PD&E Study
Segment Description:	US 41 from Bonita Beach Road to Quadrant Road
Section Number:	12010000
Mile Post To/From:	0.990 to 1.250

<b>Existing Facility:</b>		D =	<b>57.00%</b>	%
Year:		T24 =	<b>2.60%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>1.30%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>1.00%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>0.60%</b>	% of Design Hour Volume
		B =	<b>0.00%</b>	% of Design Hour Volume
		MC =	<b>0.20%</b>	% of Design Hour Volume

<b>No Build Alternative (Design Year):</b>		D =	<b>57.00%</b>	%
Year:		T24 =	<b>2.60%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>1.30%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>1.00%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>0.60%</b>	% of Design Hour Volume
		B =	<b>0.00%</b>	% of Design Hour Volume
		MC =	<b>0.20%</b>	% of Design Hour Volume

<b>Build Alternative (Design Year):</b>		D =	<b>57.00%</b>	%
Year:		T24 =	<b>2.60%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>1.30%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>1.00%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>0.60%</b>	% of Design Hour Volume
		B =	<b>0.00%</b>	% of Design Hour Volume
		MC =	<b>0.20%</b>	% of Design Hour Volume

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Adam Burghdoff, PE      Adam M Burghdoff       Date: 1/22/2024  
 Print Name      Signature

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis.

FDOT Reviewer: \_\_\_\_\_      Date: \_\_\_\_\_  
 Print Name      Signature

**TRAFFIC DATA FOR NOISE STUDIES - SUMMARY OUTPUT**  
**FDOT DISTRICT 1**

Federal Aid Number(s):	TBD
FPID Number(s):	444321-1-22-01
State/Federal Route No.:	0
Road Name:	US 41 at Bonita Beach Road
Project Description:	PD&E Study
Segment Description:	US 41 from Quadrant Road to North of River
Section Number:	12010000
Mile Post To/From:	1.250 to 1.723

<b>Existing Facility:</b>		D =	<b>57.00%</b>	%
Year:		T24 =	<b>2.60%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>1.30%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>1.00%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>0.60%</b>	% of Design Hour Volume
		B =	<b>0.00%</b>	% of Design Hour Volume
		MC =	<b>0.20%</b>	% of Design Hour Volume

<b>No Build Alternative (Design Year):</b>		D =	<b>57.00%</b>	%
Year:		T24 =	<b>2.60%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>1.30%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>1.00%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>0.60%</b>	% of Design Hour Volume
		B =	<b>0.00%</b>	% of Design Hour Volume
		MC =	<b>0.20%</b>	% of Design Hour Volume

<b>Build Alternative (Design Year):</b>		D =	<b>57.00%</b>	%
Year:		T24 =	<b>2.60%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>1.30%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>1.00%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>0.60%</b>	% of Design Hour Volume
		B =	<b>0.00%</b>	% of Design Hour Volume
		MC =	<b>0.20%</b>	% of Design Hour Volume

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Adam Burghdoff, PE Adam M Burghdoff Date: 1/22/2024  
Print Name Signature

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis.

FDOT Reviewer: \_\_\_\_\_ Date: \_\_\_\_\_  
Print Name Signature

**TRAFFIC DATA FOR NOISE STUDIES - SUMMARY OUTPUT  
 FDOT DISTRICT 1**

Federal Aid Number(s):	TBD
FPID Number(s):	444321-1-22-01
State/Federal Route No.:	0
Road Name:	US 41 at Bonita Beach Road
Project Description:	PD&E Study
Segment Description:	onita Beach Road from Vanderbilt Drive to Shopping Center Entranc
Section Number:	0
Mile Post To/From:	0

Existing Facility:		D =	<b>54.00%</b>	%
Year:	<b>2019</b>	T24 =	<b>6.00%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:	<b>1368</b>	Tpeak =	<b>3.00%</b>	% of Design Hour Volume
Demand Peak Hour Volume:	<b>1782</b>	MT =	<b>1.30%</b>	% of Design Hour Volume
Posted Speed:	<b>45</b>	HT =	<b>1.60%</b>	% of Design Hour Volume
		B =	<b>0.10%</b>	% of Design Hour Volume
		MC =	<b>0.30%</b>	% of Design Hour Volume

No Build Alternative (Design Year):		D =	<b>54.00%</b>	%
Year:	<b>2050</b>	T24 =	<b>6.00%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:	<b>1368</b>	Tpeak =	<b>3.00%</b>	% of Design Hour Volume
Demand Peak Hour Volume:	<b>2317</b>	MT =	<b>1.30%</b>	% of Design Hour Volume
Posted Speed:	<b>45</b>	HT =	<b>1.60%</b>	% of Design Hour Volume
		B =	<b>0.10%</b>	% of Design Hour Volume
		MC =	<b>0.30%</b>	% of Design Hour Volume

Build Alternative (Design Year):		D =	<b>54.00%</b>	%
Year:	<b>2050</b>	T24 =	<b>6.00%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:	<b>1368</b>	Tpeak =	<b>3.00%</b>	% of Design Hour Volume
Demand Peak Hour Volume:	<b>2317</b>	MT =	<b>1.30%</b>	% of Design Hour Volume
Posted Speed:	<b>45</b>	HT =	<b>1.60%</b>	% of Design Hour Volume
		B =	<b>0.10%</b>	% of Design Hour Volume
		MC =	<b>0.30%</b>	% of Design Hour Volume

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Adam Burghdoff, PE Adam M Burghdoff Date: 1/22/2024  
Print Name Signature

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis.

FDOT Reviewer: \_\_\_\_\_ Date: \_\_\_\_\_  
Print Name Signature

**TRAFFIC DATA FOR NOISE STUDIES - SUMMARY OUTPUT**  
**FDOT DISTRICT 1**

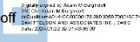
Federal Aid Number(s):	TBD
FPID Number(s):	444321-1-22-01
State/Federal Route No.:	0
Road Name:	US 41 at Bonita Beach Road
Project Description:	PD&E Study
Segment Description:	Bonita Beach Road from Shopping Center Entrance to US 41
Section Number:	0
Mile Post To/From:	0

<b>Existing Facility:</b>		D =	<b>54.00%</b>	%
Year:	<b>2019</b>	T24 =	<b>6.00%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:	<b>1368</b>	Tpeak =	<b>3.00%</b>	% of Design Hour Volume
Demand Peak Hour Volume:	<b>1782</b>	MT =	<b>1.30%</b>	% of Design Hour Volume
Posted Speed:	<b>45</b>	HT =	<b>1.60%</b>	% of Design Hour Volume
		B =	<b>0.10%</b>	% of Design Hour Volume
		MC =	<b>0.30%</b>	% of Design Hour Volume

<b>No Build Alternative (Design Year):</b>		D =	<b>54.00%</b>	%
Year:	<b>2050</b>	T24 =	<b>6.00%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:	<b>1368</b>	Tpeak =	<b>3.00%</b>	% of Design Hour Volume
Demand Peak Hour Volume:	<b>1960</b>	MT =	<b>1.30%</b>	% of Design Hour Volume
Posted Speed:	<b>45</b>	HT =	<b>1.60%</b>	% of Design Hour Volume
		B =	<b>0.10%</b>	% of Design Hour Volume
		MC =	<b>0.30%</b>	% of Design Hour Volume

<b>Build Alternative (Design Year):</b>		D =	<b>54.00%</b>	%
Year:	<b>2050</b>	T24 =	<b>6.00%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:	<b>2124</b>	Tpeak =	<b>3.00%</b>	% of Design Hour Volume
Demand Peak Hour Volume:	<b>1960</b>	MT =	<b>1.30%</b>	% of Design Hour Volume
Posted Speed:	<b>45</b>	HT =	<b>1.60%</b>	% of Design Hour Volume
		B =	<b>0.10%</b>	% of Design Hour Volume
		MC =	<b>0.30%</b>	% of Design Hour Volume

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Adam Burghdoff, PE      Adam M Burghdoff       Date: 1/22/2024  
 Print Name      Signature

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis.

FDOT Reviewer: \_\_\_\_\_      Date: \_\_\_\_\_  
 Print Name      Signature

**TRAFFIC DATA FOR NOISE STUDIES - SUMMARY OUTPUT**  
**FDOT DISTRICT 1**

Federal Aid Number(s):	TBD
FPID Number(s):	444321-1-22-01
State/Federal Route No.:	0
Road Name:	US 41 at Bonita Beach Road
Project Description:	PD&E Study
Segment Description:	Bonita Beach Road from US 41 to Arroyal Road
Section Number:	0
Mile Post To/From:	0

Existing Facility:		D =	<b>60.00%</b>	%
		T24 =	<b>3.60%</b>	% of 24 Hour Volume
Year:	<b>2019</b>	Tpeak =	<b>1.80%</b>	% of Design Hour Volume
		MT =	<b>0.80%</b>	% of Design Hour Volume
LOS C Peak Hour Directional Volume:	<b>1368</b>	HT =	<b>1.00%</b>	% of Design Hour Volume
Demand Peak Hour Volume:	<b>1980</b>	B =	<b>0.10%</b>	% of Design Hour Volume
Posted Speed:	<b>45</b>	MC =	<b>0.30%</b>	% of Design Hour Volume

No Build Alternative (Design Year):		D =	<b>60.00%</b>	%
		T24 =	<b>3.60%</b>	% of 24 Hour Volume
Year:	<b>2050</b>	Tpeak =	<b>1.80%</b>	% of Design Hour Volume
		MT =	<b>0.80%</b>	% of Design Hour Volume
LOS C Peak Hour Directional Volume:	<b>1368</b>	HT =	<b>1.00%</b>	% of Design Hour Volume
Demand Peak Hour Volume:	<b>2574</b>	B =	<b>0.10%</b>	% of Design Hour Volume
Posted Speed:	<b>45</b>	MC =	<b>0.30%</b>	% of Design Hour Volume

Build Alternative (Design Year):		D =	<b>60.00%</b>	%
		T24 =	<b>3.60%</b>	% of 24 Hour Volume
Year:	<b>2050</b>	Tpeak =	<b>1.80%</b>	% of Design Hour Volume
		MT =	<b>0.80%</b>	% of Design Hour Volume
LOS C Peak Hour Directional Volume:	<b>2124</b>	HT =	<b>1.00%</b>	% of Design Hour Volume
Demand Peak Hour Volume:	<b>2132</b>	B =	<b>0.10%</b>	% of Design Hour Volume
Posted Speed:	<b>45</b>	MC =	<b>0.30%</b>	% of Design Hour Volume

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Adam Burghdoff, PE Adam M Burghdoff Date: 1/22/2024  
Print Name Signature

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis.

FDOT Reviewer: \_\_\_\_\_ Date: \_\_\_\_\_  
Print Name Signature

**TRAFFIC DATA FOR NOISE STUDIES - SUMMARY OUTPUT**  
**FDOT DISTRICT 1**

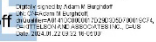
Federal Aid Number(s):	TBD
FPID Number(s):	444321-1-22-01
State/Federal Route No.:	0
Road Name:	US 41 at Bonita Beach Road
Project Description:	PD&E Study
Segment Description:	Bonita Beach Road from Arroyal Road to Spanish Wells Boulevard
Section Number:	0
Mile Post To/From:	0

<b>Existing Facility:</b>		D =	<b>60.00%</b>	%
Year:		T24 =	<b>3.60%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>1.80%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>0.80%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>1.00%</b>	% of Design Hour Volume
		B =	<b>0.10%</b>	% of Design Hour Volume
		MC =	<b>0.30%</b>	% of Design Hour Volume

<b>No Build Alternative (Design Year):</b>		D =	<b>60.00%</b>	%
Year:		T24 =	<b>3.60%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>1.80%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>0.80%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>1.00%</b>	% of Design Hour Volume
		B =	<b>0.10%</b>	% of Design Hour Volume
		MC =	<b>0.30%</b>	% of Design Hour Volume

<b>Build Alternative (Design Year):</b>		D =	<b>60.00%</b>	%
Year:		T24 =	<b>3.60%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>1.80%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>0.80%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>1.00%</b>	% of Design Hour Volume
		B =	<b>0.10%</b>	% of Design Hour Volume
		MC =	<b>0.30%</b>	% of Design Hour Volume

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Adam Burghdoff, PE      Adam M Burghdoff       Date: 1/22/2024  
 Print Name      Signature

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis.

FDOT Reviewer: \_\_\_\_\_      Date: \_\_\_\_\_  
 Print Name      Signature



**TRAFFIC DATA FOR NOISE STUDIES - SUMMARY OUTPUT**  
**FDOT DISTRICT 1**

Federal Aid Number(s):	TBD
FPID Number(s):	444321-1-22-01
State/Federal Route No.:	0
Road Name:	US 41 at Bonita Beach Road
Project Description:	PD&E Study
Segment Description:	NW Quadrant Roadway from Bonita Beach Road to US 41
Section Number:	0
Mile Post To/From:	0

Existing Facility:		D =	<b>54.00%</b>	%
Year:	<b>2019</b>	T24 =	<b>6.80%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:	<b>0</b>	Tpeak =	<b>3.40%</b>	% of Design Hour Volume
Demand Peak Hour Volume:	<b>1</b>	MT =	<b>2.30%</b>	% of Design Hour Volume
Posted Speed:	<b>0</b>	HT =	<b>0.30%</b>	% of Design Hour Volume
		B =	<b>0.70%</b>	% of Design Hour Volume
		MC =	<b>0.80%</b>	% of Design Hour Volume

No Build Alternative (Design Year):		D =	<b>54.00%</b>	%
Year:	<b>2050</b>	T24 =	<b>6.80%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:	<b>0</b>	Tpeak =	<b>3.40%</b>	% of Design Hour Volume
Demand Peak Hour Volume:	<b>292</b>	MT =	<b>2.30%</b>	% of Design Hour Volume
Posted Speed:	<b>0</b>	HT =	<b>0.30%</b>	% of Design Hour Volume
		B =	<b>0.70%</b>	% of Design Hour Volume
		MC =	<b>0.80%</b>	% of Design Hour Volume

Build Alternative (Design Year):		D =	<b>54.00%</b>	%
Year:	<b>2050</b>	T24 =	<b>6.80%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:	<b>547</b>	Tpeak =	<b>3.40%</b>	% of Design Hour Volume
Demand Peak Hour Volume:	<b>292</b>	MT =	<b>2.30%</b>	% of Design Hour Volume
Posted Speed:	<b>30</b>	HT =	<b>0.30%</b>	% of Design Hour Volume
		B =	<b>0.70%</b>	% of Design Hour Volume
		MC =	<b>0.80%</b>	% of Design Hour Volume

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Adam Burghdoff, PE      Adam M Burghdoff      Date: 1/22/2024  
Print Name      Signature

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis.

FDOT Reviewer: \_\_\_\_\_ Date: \_\_\_\_\_  
Print Name      Signature



**TRAFFIC DATA FOR NOISE STUDIES - SUMMARY OUTPUT**  
**FDOT DISTRICT 1**

Federal Aid Number(s):	TBD
FPID Number(s):	444321-1-22-01
State/Federal Route No.:	0
Road Name:	US 41 at Bonita Beach Road
Project Description:	PD&E Study
Segment Description:	NE Quadrant Roadway from US 41 to Arroyal Road
Section Number:	0
Mile Post To/From:	0

<b>Existing Facility:</b>		D =	<b>60.00%</b>	%
Year:		T24 =	<b>6.80%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>3.40%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>2.30%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>0.30%</b>	% of Design Hour Volume
	<b>2019</b>	B =	<b>0.70%</b>	% of Design Hour Volume
	<b>0</b>	MC =	<b>0.80%</b>	% of Design Hour Volume
	<b>1</b>			
	<b>0</b>			

<b>No Build Alternative (Design Year):</b>		D =	<b>60.00%</b>	%
Year:		T24 =	<b>6.80%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>3.40%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>2.30%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>0.30%</b>	% of Design Hour Volume
	<b>2050</b>	B =	<b>0.70%</b>	% of Design Hour Volume
	<b>0</b>	MC =	<b>0.80%</b>	% of Design Hour Volume
	<b>1</b>			
	<b>0</b>			

<b>Build Alternative (Design Year):</b>		D =	<b>60.00%</b>	%
Year:		T24 =	<b>6.80%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>3.40%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>2.30%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>0.30%</b>	% of Design Hour Volume
	<b>2050</b>	B =	<b>0.70%</b>	% of Design Hour Volume
	<b>547</b>	MC =	<b>0.80%</b>	% of Design Hour Volume
	<b>362</b>			
	<b>30</b>			

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Adam Burghdoff, PE      Adam M Burghdoff      Date: 1/22/2024  
Engineered by Adam M. Burghdoff, PE, State of Florida, License No. 12563. Registered Professional Engineer, State of Florida, License No. 12563. Registered Professional Engineer, State of Florida, License No. 12563.  
 Print Name      Signature

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis.

FDOT Reviewer: \_\_\_\_\_ Date: \_\_\_\_\_  
 Print Name      Signature

**TRAFFIC DATA FOR NOISE STUDIES - SUMMARY OUTPUT**  
**FDOT DISTRICT 1**

Federal Aid Number(s):	TBD
FPID Number(s):	444321-1-22-01
State/Federal Route No.:	0
Road Name:	US 41 at Bonita Beach Road
Project Description:	PD&E Study
Segment Description:	Arroyal Road
Section Number:	0
Mile Post To/From:	0

<b>Existing Facility:</b>		D =	<b>60.00%</b>	%
Year:		T24 =	<b>6.80%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>3.40%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>2.30%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>0.30%</b>	% of Design Hour Volume
	<b>2019</b>	B =	<b>0.70%</b>	% of Design Hour Volume
	<b>547</b>	MC =	<b>0.80%</b>	% of Design Hour Volume
	<b>335</b>			
	<b>30</b>			

<b>No Build Alternative (Design Year):</b>		D =	<b>60.00%</b>	%
Year:		T24 =	<b>6.80%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>3.40%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>2.30%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>0.30%</b>	% of Design Hour Volume
	<b>2050</b>	B =	<b>0.70%</b>	% of Design Hour Volume
	<b>547</b>	MC =	<b>0.80%</b>	% of Design Hour Volume
	<b>335</b>			
	<b>30</b>			

<b>Build Alternative (Design Year):</b>		D =	<b>60.00%</b>	%
Year:		T24 =	<b>6.80%</b>	% of 24 Hour Volume
LOS C Peak Hour Directional Volume:		Tpeak =	<b>3.40%</b>	% of Design Hour Volume
Demand Peak Hour Volume:		MT =	<b>2.30%</b>	% of Design Hour Volume
Posted Speed:		HT =	<b>0.30%</b>	% of Design Hour Volume
	<b>2050</b>	B =	<b>0.70%</b>	% of Design Hour Volume
	<b>547</b>	MC =	<b>0.80%</b>	% of Design Hour Volume
	<b>697</b>			
	<b>30</b>			

I certify that the above information is accurate and appropriate for use with the traffic noise analysis.

Prepared By: Adam Burghdoff, PE      Adam M Burghdoff      Date: 1/22/2024  
 Print Name      Signature

I have reviewed and concur that the above information is appropriate for use with the traffic noise analysis.

FDOT Reviewer: \_\_\_\_\_ Date: \_\_\_\_\_  
 Print Name      Signature

**Appendix B      Noise Impact Comparison Matrix**

### Noise Impact Comparison Matrix

Noise Sensitive Sites			Predicted Noise Levels (dB(A)) <i>Red = Noise Level above NAC</i>				
Receptor ID	# Sites Represented	Impact Criterion (dB(A))	2019 Existing	2050 No Build	2050 Build	Change From Existing	Consider Abatement
<b>NSA SB1: West of US 41 - Foley Rd to Bonita Beach Rd - Pages C2 and C3 - Appendix C</b>							
SB1-SLU1-1 NAC E	1	71.0	63.5	63.5	63.1	-0.4	-
SB1-SLU1-2 NAC D	1	51.0	41.8	41.8	41.6	-0.2	-
SB1-SLU1-3 NAC E	1	71.0	66.5	66.5	66.7	0.2	-
<b>NSA Summary</b>	<b>3</b>		<b>57.3</b>	<b>57.3</b>	<b>57.1</b>	<b>-0.1</b>	
<b>NSA SB2: West of US 41 - Bonita Beach Road to Imperial River - Pages C3 through C5 - Appendix C</b>							
No noise sensitive sites							
<b>NSA NB1: East of US 41 - Foley Rd to Bonita Beach Rd - Pages C2 and C3 - Appendix C</b>							
NB1-SLU1-1 NAC E	1	71.0	66.8	66.8	66.2	-0.6	-
NB1-SLU1-2 NAC C	1	66.0	62.4	62.4	61.2	-1.2	-
NB1-SLU1-3 NAC E	1	71.0	67.5	67.5	66.7	-0.8	-
<b>NSA Summary</b>	<b>3</b>		<b>65.6</b>	<b>65.6</b>	<b>64.7</b>	<b>-0.9</b>	
<b>NSA NB2: East of US 41 - Bonita Beach Rd to Imperial River- Pages C3 through C5 - Appendix C</b>							
NB2-SLU2-1 NAC E	1	71.0	66.4	66.4	65.6	-0.8	-

### Noise Impact Comparison Matrix

Noise Sensitive Sites			Predicted Noise Levels (dB(A)) <i>Red = Noise Level above NAC</i>				
Receptor ID	# Sites Represented	Impact Criterion (dB(A))	2019 Existing	2050 No Build	2050 Build	Change From Existing	Consider Abatement
NB2-SLU2-2 NAC E	1	71.0	61.2	61.2	60.6	-0.6	-
<b>NSA Summary</b>	<b>2</b>		<b>63.8</b>	<b>63.8</b>	<b>63.1</b>	<b>-0.7</b>	
<b>NSA EB1: South of Bonita Beach Rd - Windsor Rd to US 41 - Pages C6 and C7 - Appendix C</b>							
No noise sensitive sites							
<b>NSA EB2: South of Bonita Beach Rd - US 41 to Spanish Wells Blvd - Pages C7 through C9 - Appendix C</b>							
EB2-SLU2-1 NAC E	1	71.0	65.0	65.0	64.8	-0.2	-
EB2-SLU2-2 NAC E	1	71.0	64.3	64.4	64.4	0.1	-
EB2-SLU2-3 NAC E	1	71.0	64.0	64.0	64.2	0.2	-
<b>NSA Summary</b>	<b>3</b>		<b>64.4</b>	<b>64.5</b>	<b>64.5</b>	<b>0.0</b>	
<b>NSA WB1: North of Bonita Beach Rd - Windsor Rd to US 41 - Pages C6 and C7 - Appendix C</b>							
WB1-SLU1-1 NAC E	1	71.0	65.9	65.9	64.7	-1.2	-
<b>NSA Summary</b>	<b>1</b>		<b>65.9</b>	<b>65.9</b>	<b>64.7</b>	<b>-1.2</b>	
<b>NSA WB2: North of Bonita Beach Rd - US 41 to Spanish Wells Blvd - Pages C7 through C9 - Appendix C</b>							
WB2-SLU2-1 NAC C	1	66.0	69.5	69.5	69.4	-0.1	Yes

### Noise Impact Comparison Matrix

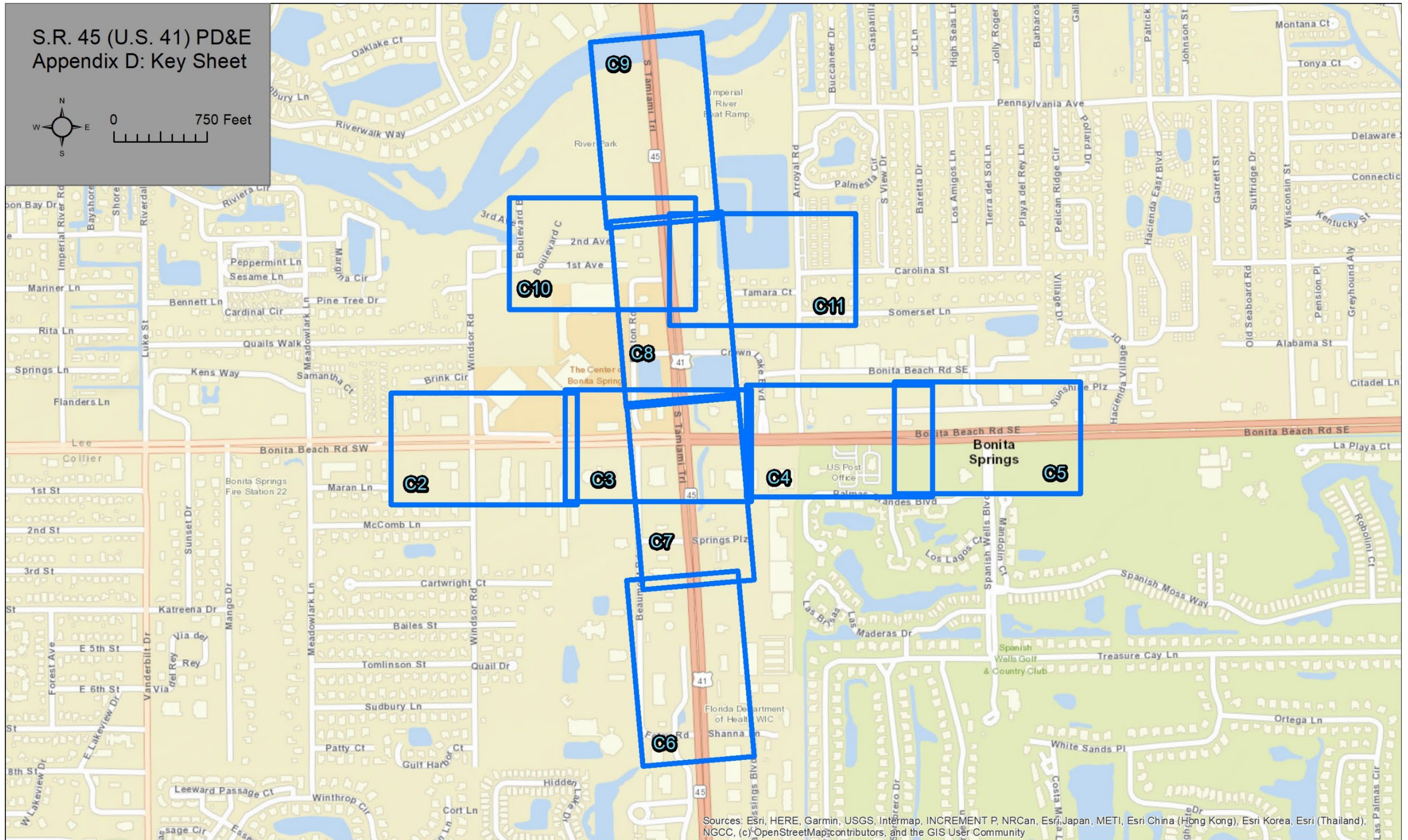
Noise Sensitive Sites			Predicted Noise Levels (dB(A)) <i>Red = Noise Level above NAC</i>				
Receptor ID	# Sites Represented	Impact Criterion (dB(A))	2019 Existing	2050 No Build	2050 Build	Change From Existing	Consider Abatement
WB2-SLU2-2 NAC E	1		71.0	66.9	66.9	66.6	-0.3
<b>NSA Summary</b>	<b>2</b>		<b>68.2</b>	<b>68.2</b>	<b>68.0</b>	<b>-0.2</b>	
<b>NSA NWQR1: North of NW Quad Rd - Page C10 - Appendix C</b>							
NWQR1-01.1A	1	66.0	57.2	58.6	59.0	1.8	-
NWQR1-01.2A	3	66.0	56.9	57.9	58.1	1.2	-
NWQR1-01.2B	3	66.0	61.1	61.7	62.1	1.0	-
NWQR1-01.3A	1	66.0	56.8	57.4	57.5	0.7	-
NWQR1-01.3B	1	66.0	61.1	61.4	61.8	0.7	-
NWQR1-02.1A	1	66.0	53.3	55.9	56.4	3.1	-
NWQR1-03.1A	1	66.0	52.6	55.4	55.7	3.1	-
NWQR1-03.1B	1	66.0	56.1	58.5	58.9	2.8	-
NWQR1-SLU1-1 NAC C	1	66.0	55.2	55.7	56.0	0.8	-
<b>NSA Summary</b>	<b>13</b>		<b>56.7</b>	<b>58.1</b>	<b>58.4</b>	<b>1.7</b>	
<b>NSA NEQR1: South of NE Quad Rd - Page C11 - Appendix C</b>							
NEQR1-01	1	66.0	55.3	55.5	60.8	5.5	-
NEQR1-02	2	66.0	54.2	54.5	60.7	6.5	-
NEQR1-03	2	66.0	53.9	54.3	58.9	5.0	-
NEQR1-04	2	66.0	53.9	54.5	59.2	5.3	-
NEQR1-05	2	66.0	58.0	59.5	61.2	3.2	-
NEQR1-06	2	66.0	55.2	55.3	58.6	3.4	-
NEQR1-07	2	66.0	56.1	56.2	57.2	1.1	-
NEQR1-08	2	66.0	56.4	56.5	56.8	0.4	-
NEQR1-09	2	66.0	55.2	55.4	55.9	0.7	-
NEQR1-10	2	66.0	54.5	54.8	55.6	1.1	-

**Noise Impact Comparison Matrix**

Noise Sensitive Sites			Predicted Noise Levels (dB(A)) <i>Red = Noise Level above NAC</i>				
Receptor ID	# Sites Represented	Impact Criterion (dB(A))	2019 Existing	2050 No Build	2050 Build	Change From Existing	Consider Abatement
NEQR1-11	2	66.0	53.8	54.4	55.3	1.5	-
NEQR1-12	2	66.0	54.3	55.3	55.8	1.5	-
NEQR1-13	2	66.0	56.6	58.3	58.3	1.7	-
<b>NSA Summary</b>	<b>25</b>		<b>55.3</b>	<b>56.0</b>	<b>58.0</b>	<b>2.6</b>	
<b>NSA NEQR2: East of Arroyal Rd - Page C11 - Appendix C</b>							
NEQR2-01	4	66.0	62.2	62.6	61.9	-0.3	-
NEQR2-02	1	66.0	56.6	57.4	59.2	2.6	-
<b>NSA Summary</b>	<b>5</b>		<b>59.4</b>	<b>60.0</b>	<b>60.6</b>	<b>1.2</b>	

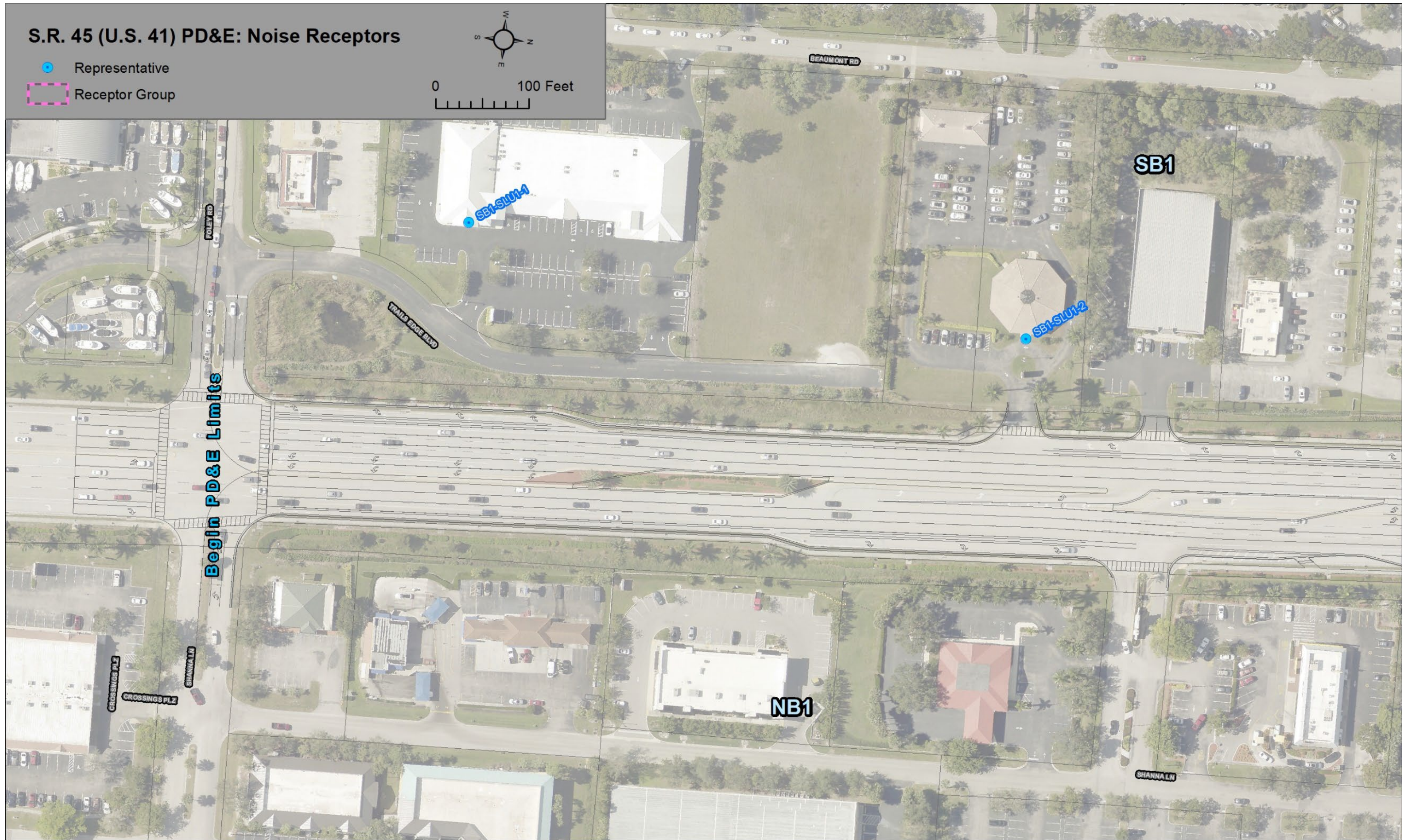
**Appendix C      Project Aerials**



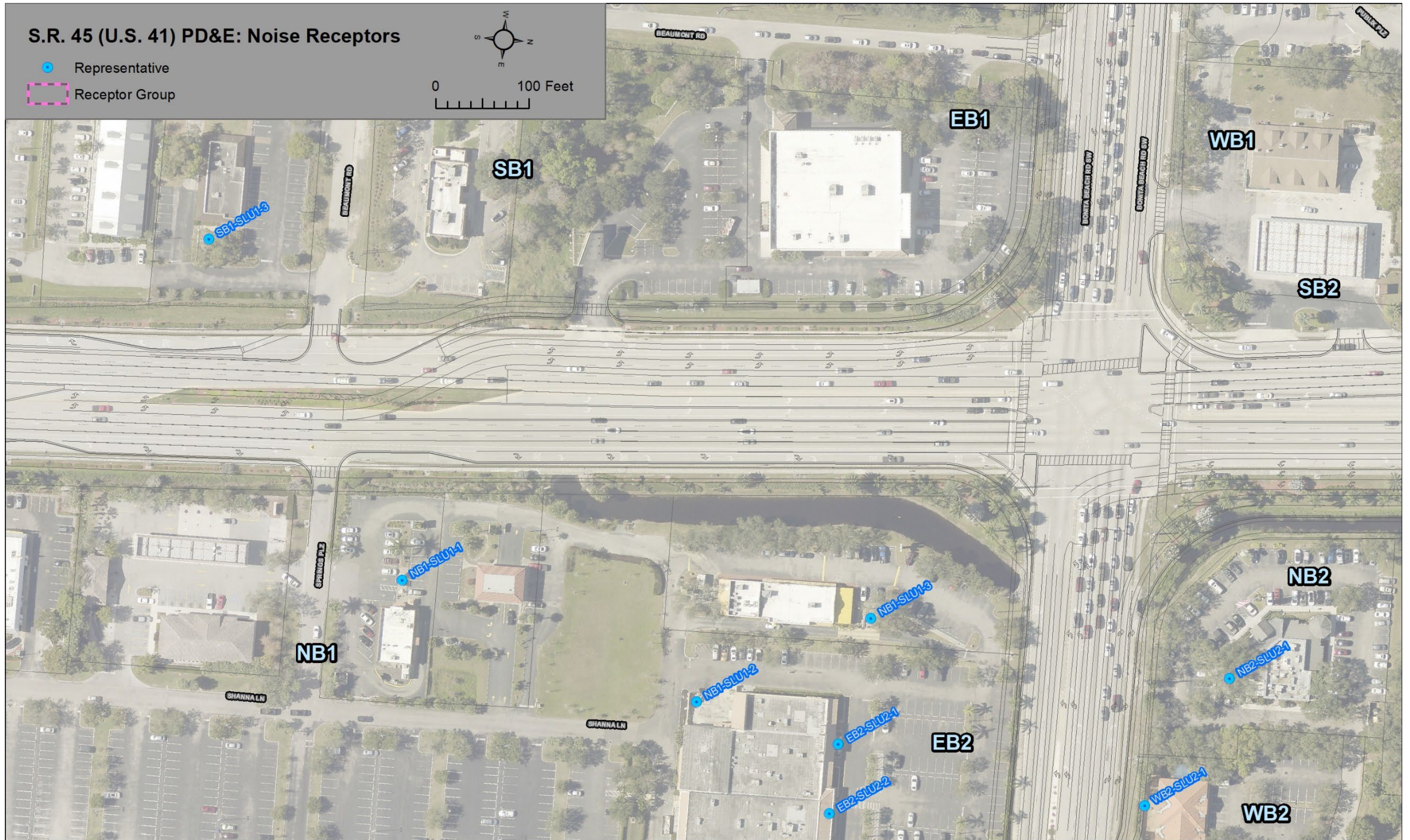


Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)OpenStreetMap contributors, and the GIS User Community

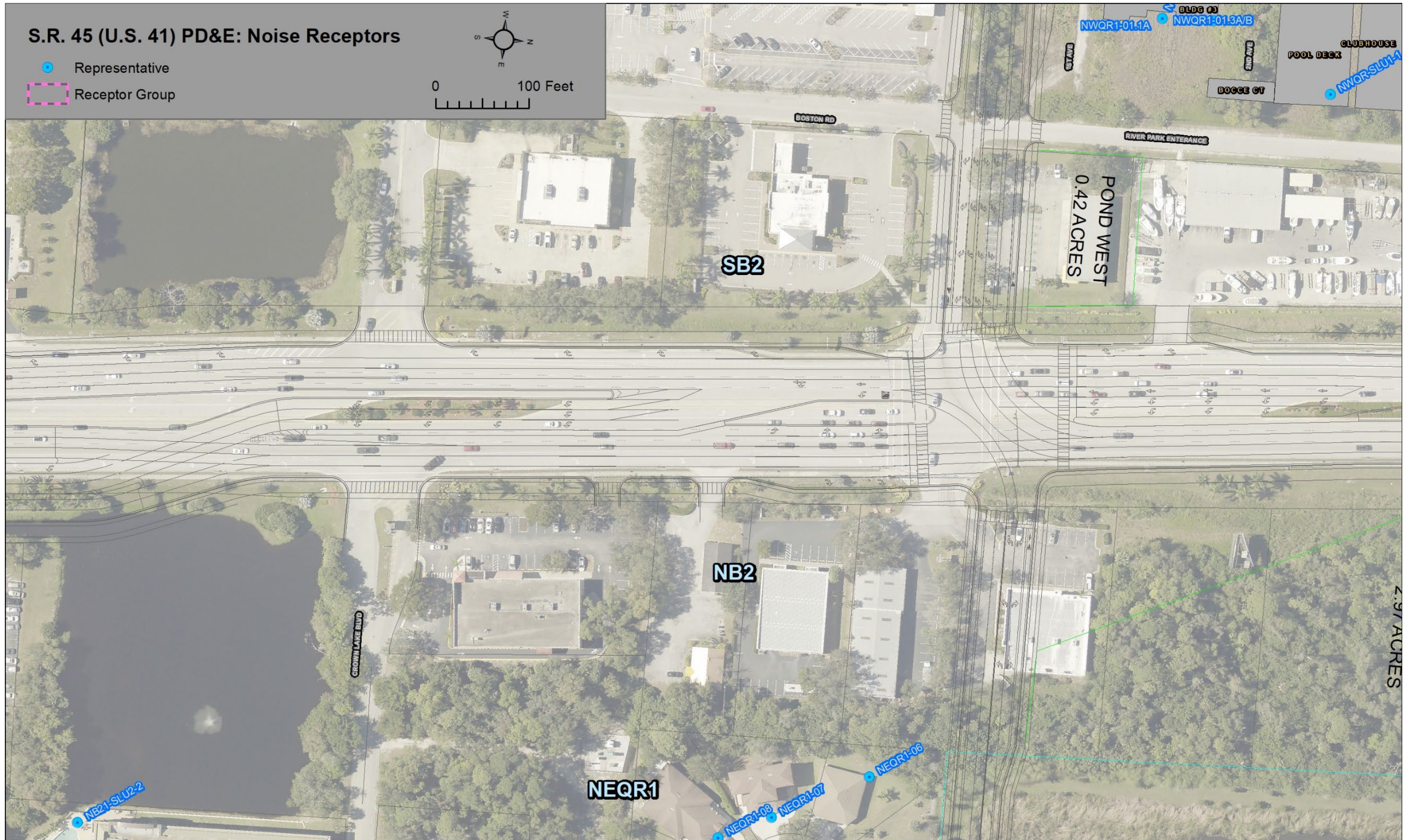




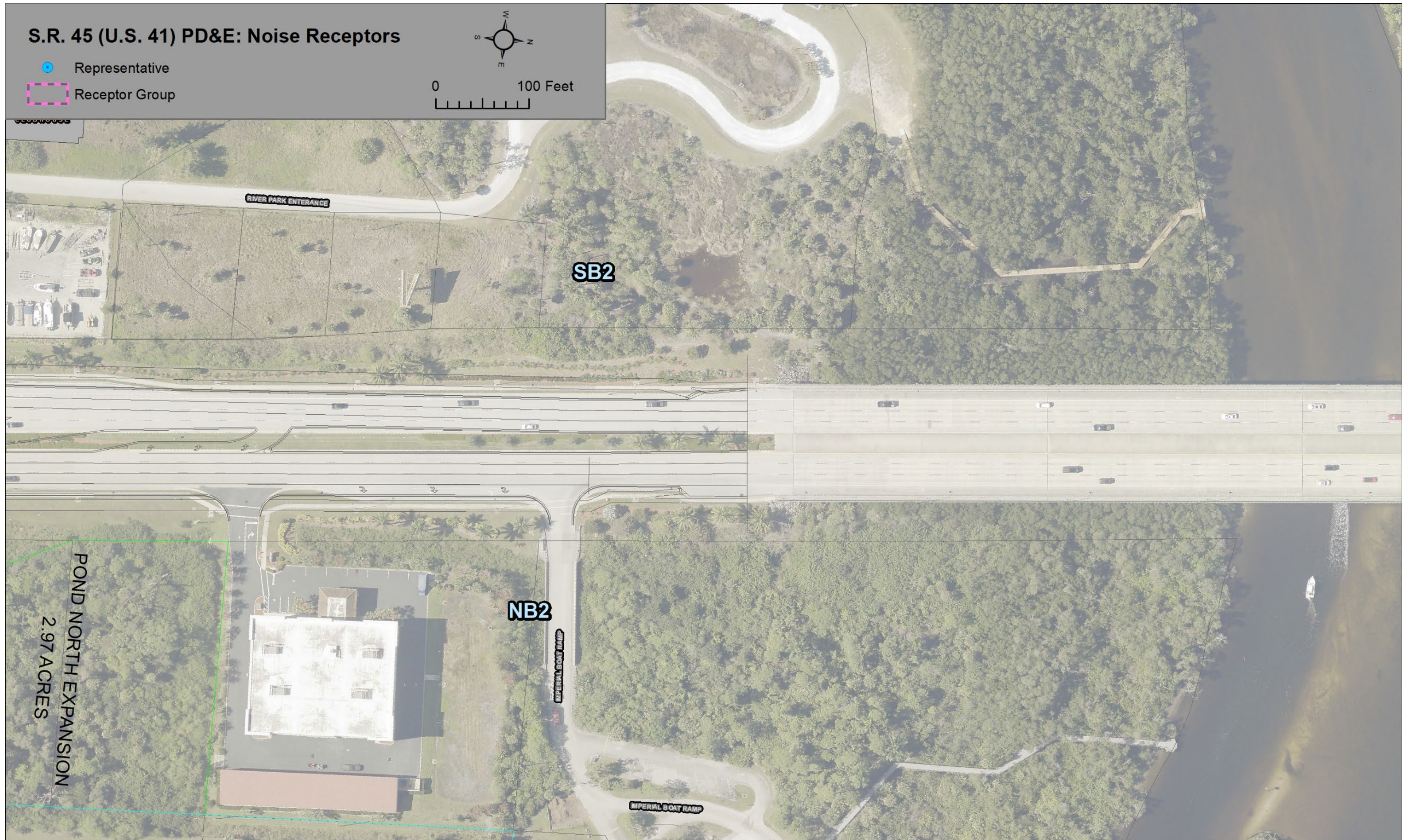








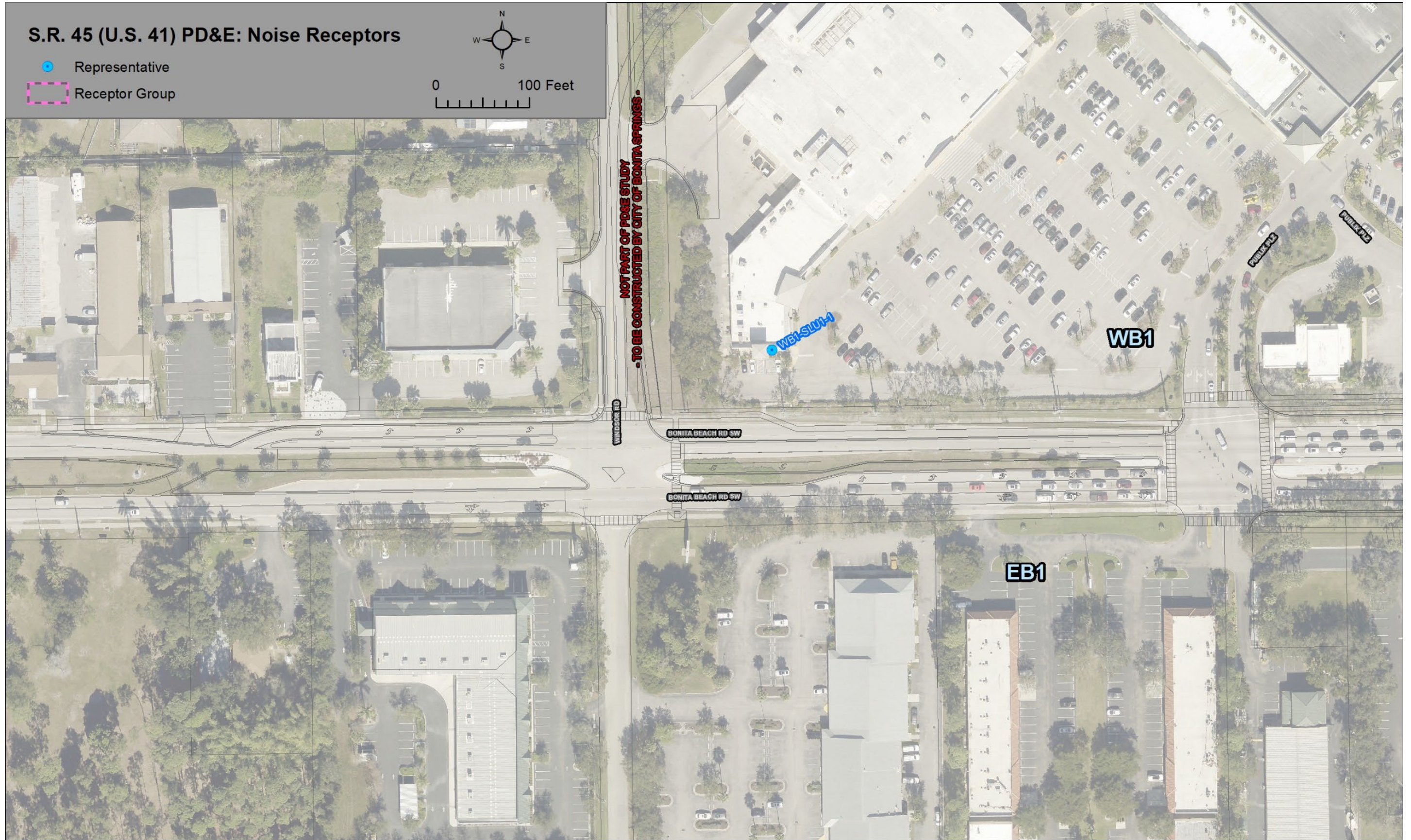
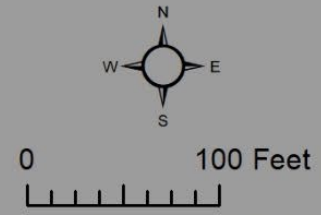




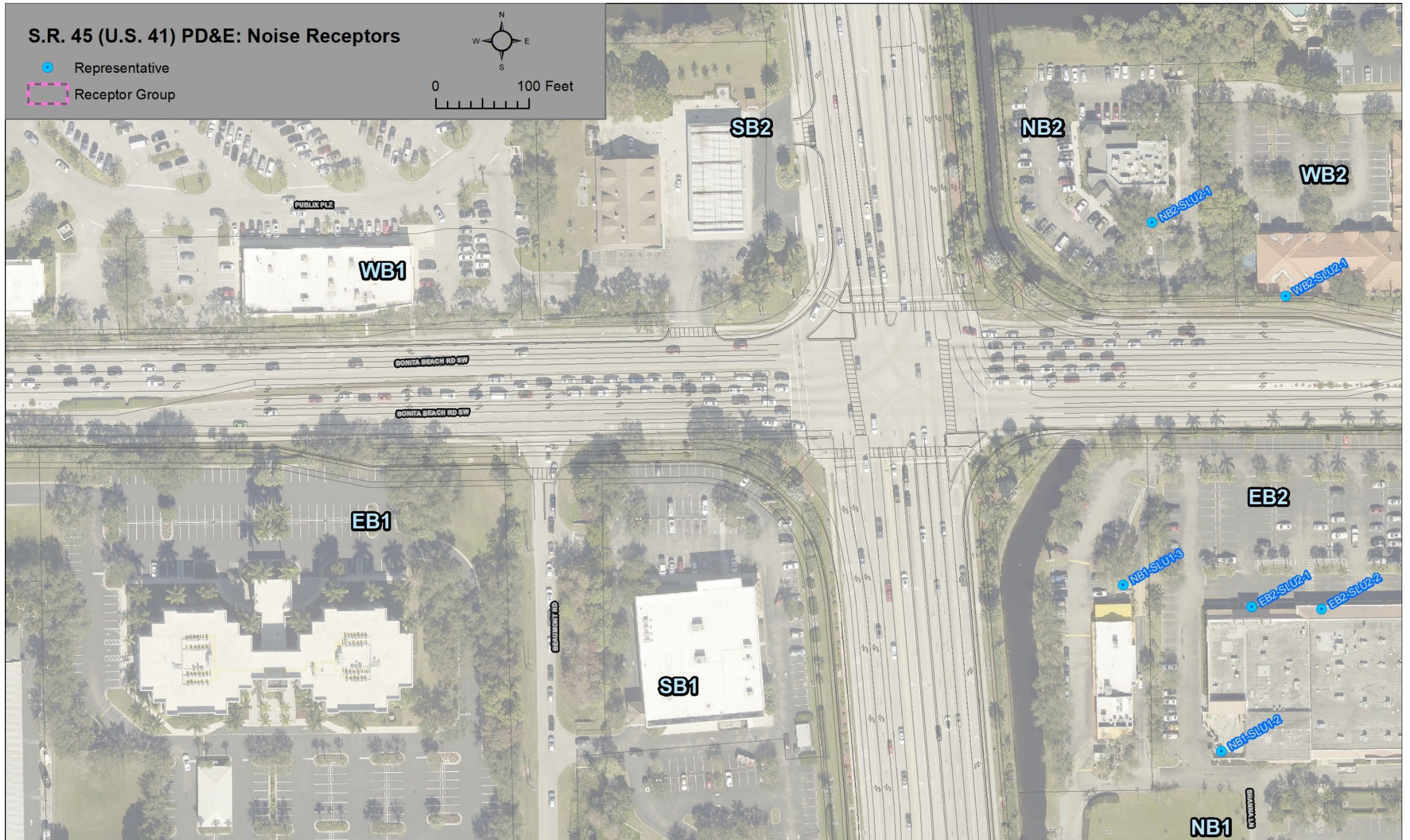


### S.R. 45 (U.S. 41) PD&E: Noise Receptors

- Representative
- ▭ Receptor Group



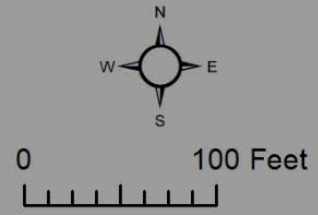








### S.R. 45 (U.S. 41) PD&E: Noise Receptors

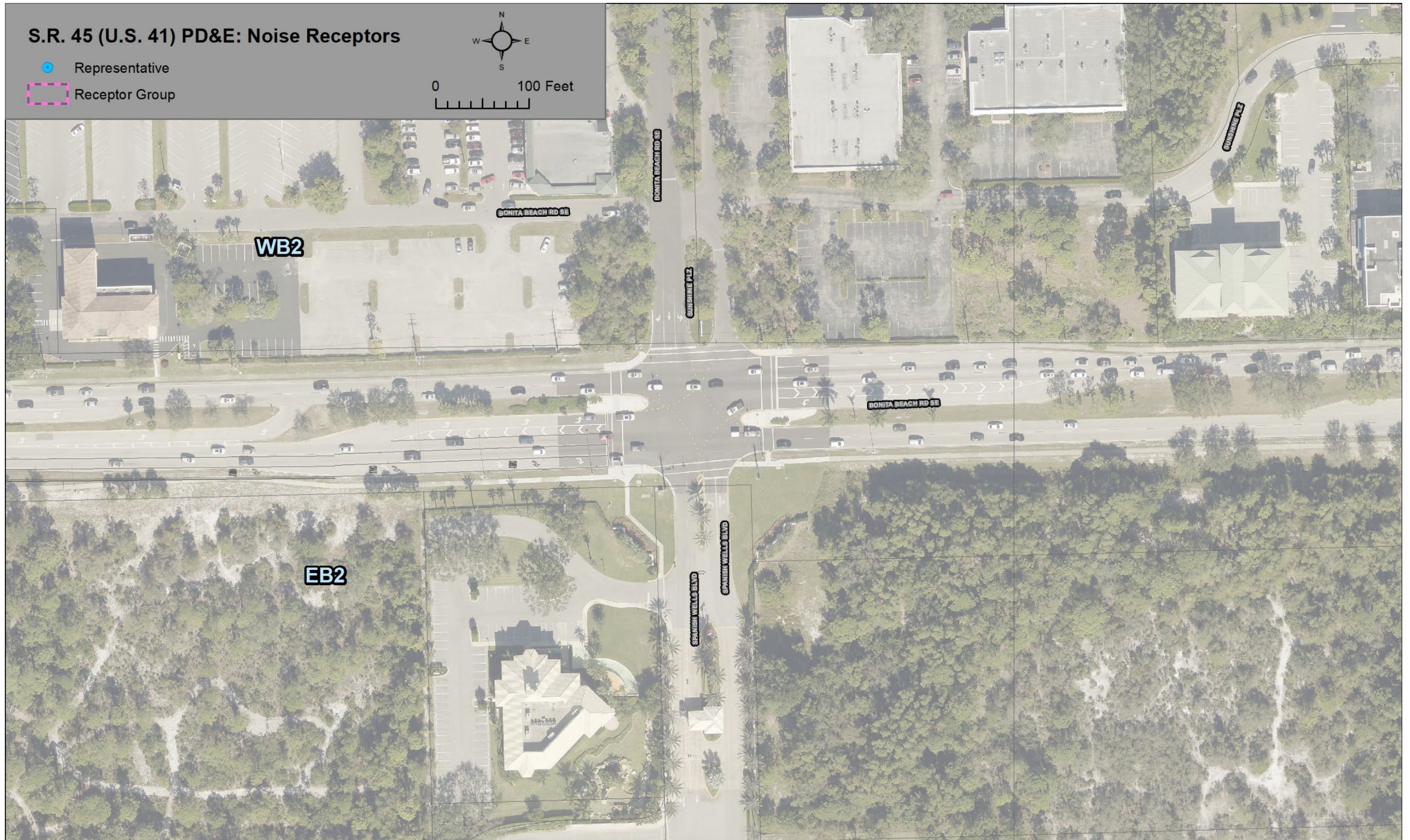
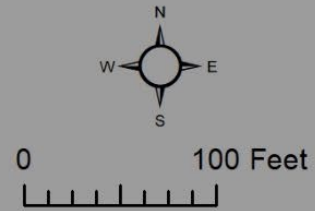
- Representative
- ▭ Receptor Group



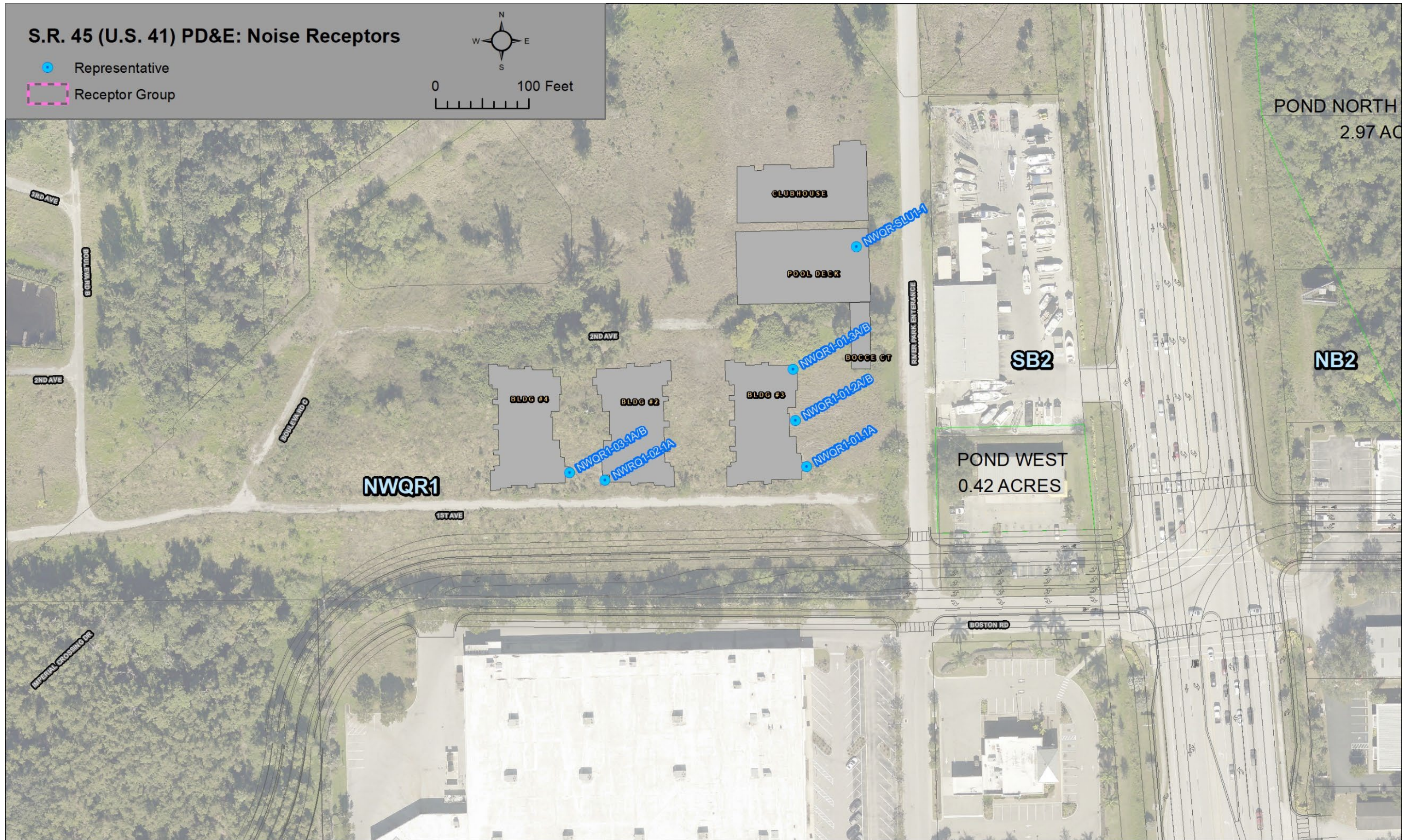


### S.R. 45 (U.S. 41) PD&E: Noise Receptors

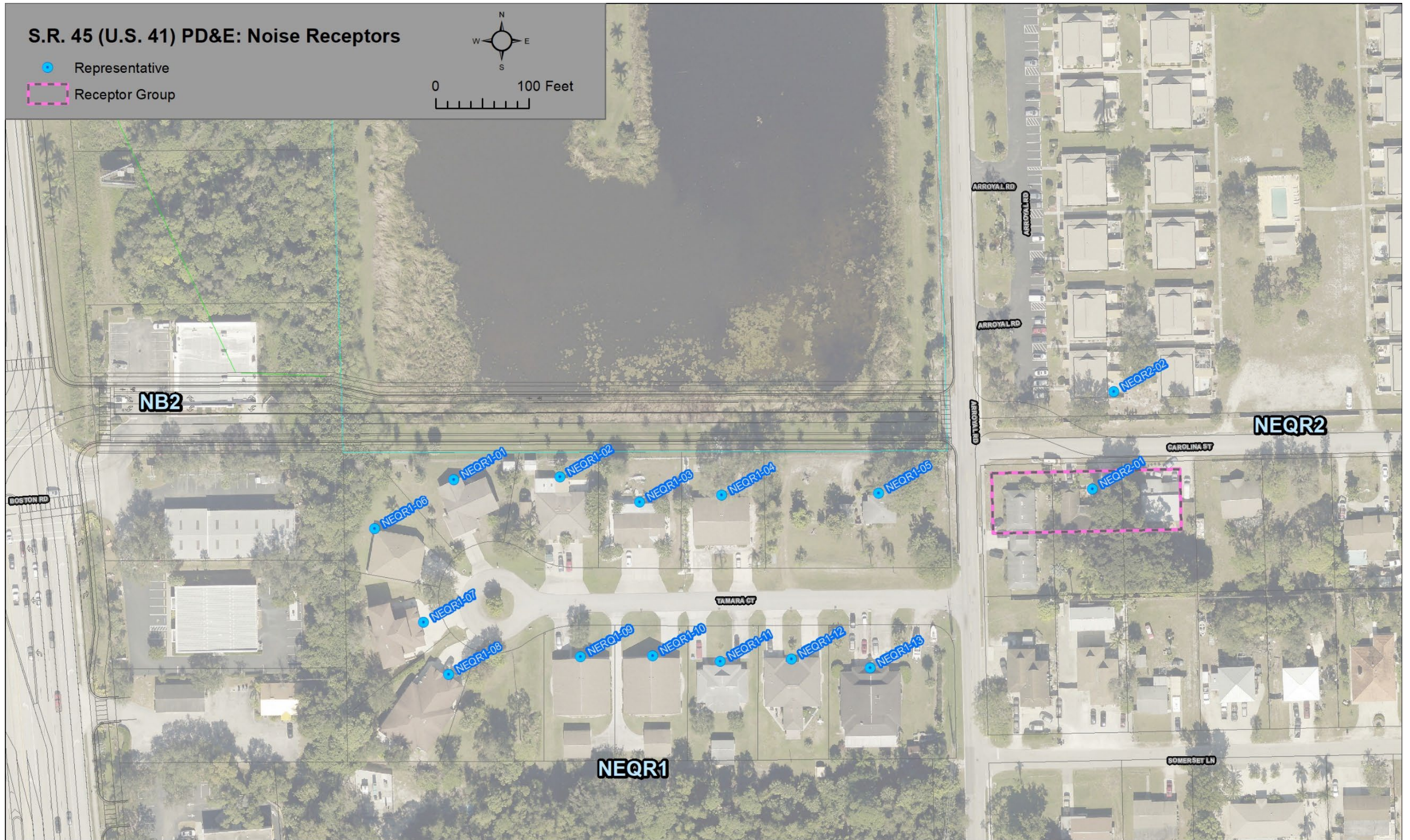
-  Representative
-  Receptor Group













**Appendix D      Noise Barrier Location Maps**

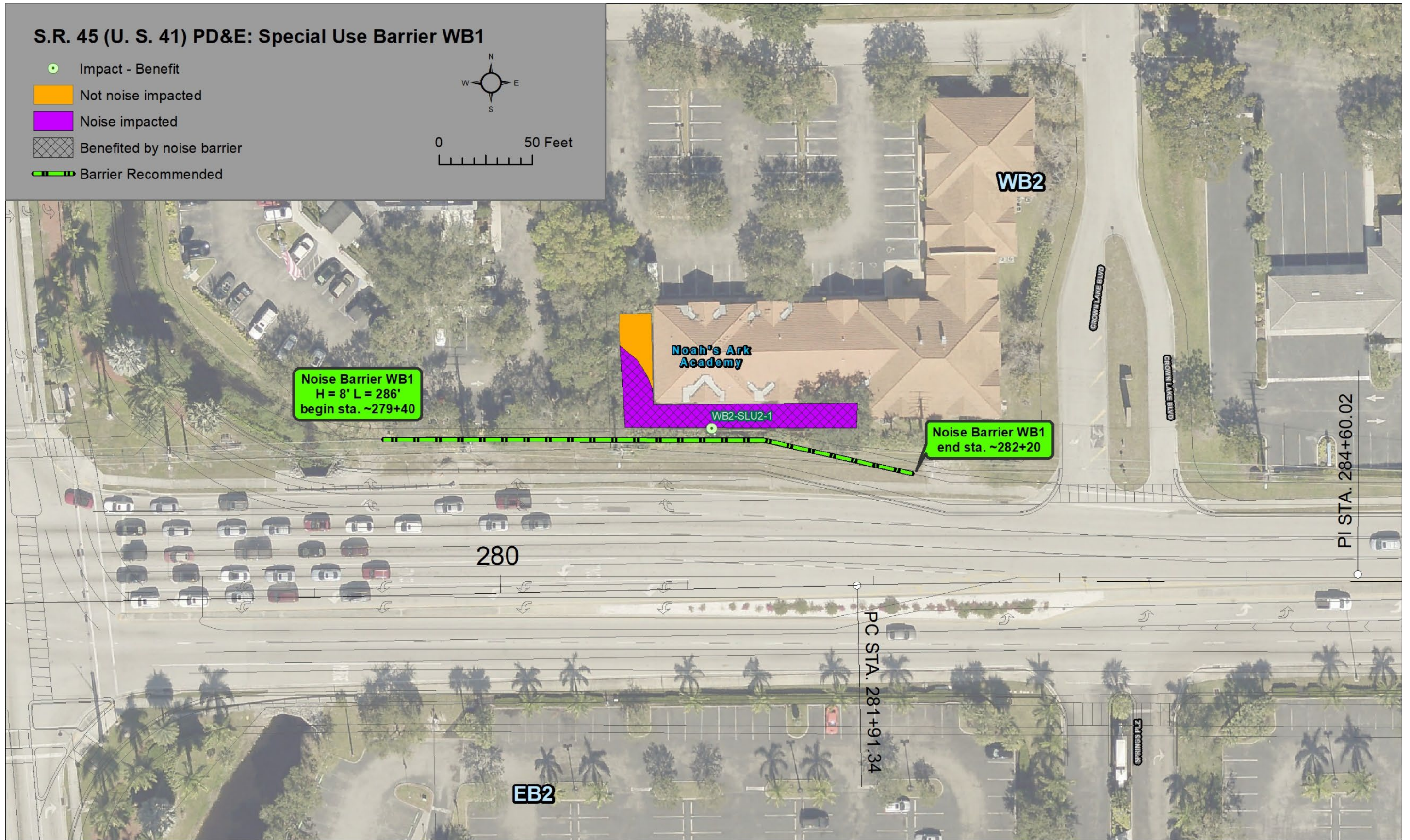


### S.R. 45 (U. S. 41) PD&E: Special Use Barrier WB1

- Impact - Benefit
- Not noise impacted
- Noise impacted
- Benefited by noise barrier
- Barrier Recommended



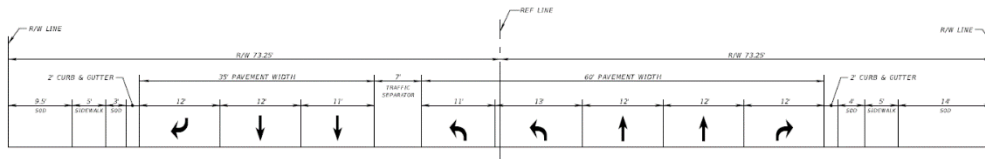
0 50 Feet



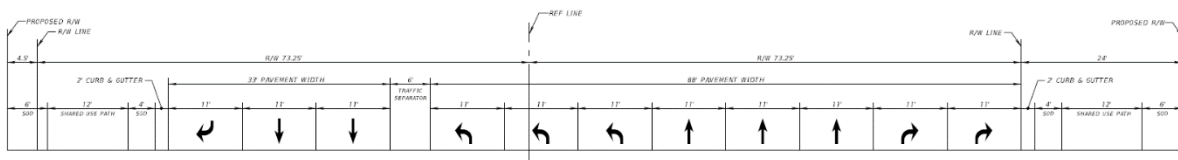


**Appendix E      Typical Sections**

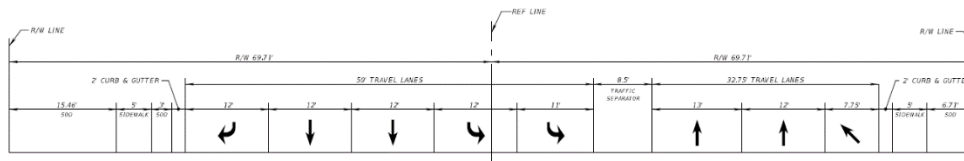
US 41 & BONITA BEACH ROAD (WEST LEG) - EXISTING



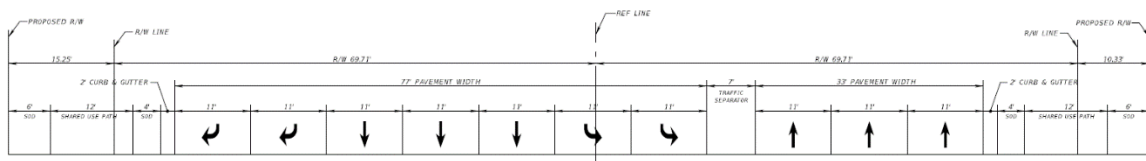
US 41 & BONITA BEACH ROAD (WEST LEG) - PROPOSED



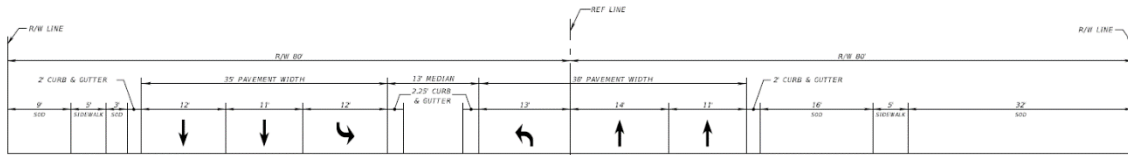
US 41 & BONITA BEACH ROAD (EAST LEG) - EXISTING



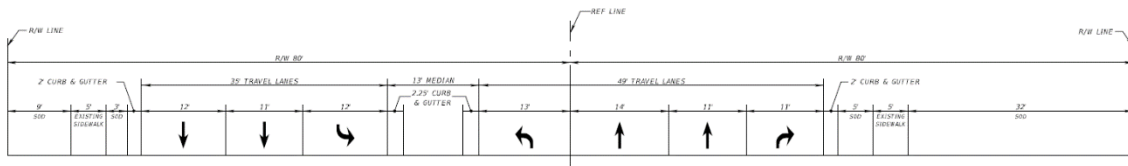
US 41 & BONITA BEACH ROAD (EAST LEG) - PROPOSED



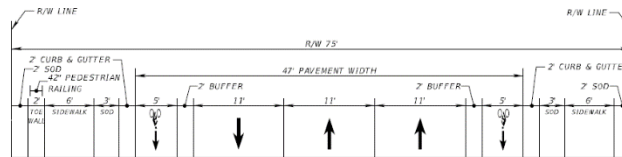
*BONITA BEACH ROAD EAST - EXISTING*



*BONITA BEACH ROAD EAST - PROPOSED*



*PROPOSED ROADWAY BETWEEN US 41 AND ARROYAL ROAD*





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**Orlando, FL**