Noise Study Report

City of Palm Bay
Brevard County, Florida

Malabar Road PD&E Study
From St. Johns Heritage Parkway to Minton Road
FM# 437210-1-28-01
ETDM# 14396

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Prepared by:
Environmental Transportation Planning, LLC
Ponte Vedra Beach, FL

In Coordination With
Kittelson & Associates, Inc.
Orlando, FL

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

EXECUTIVE SUMMARY

The Malabar Road Project Development and Environment (PD&E) Study evaluated capacity, safety, and multi-modal improvements on Malabar Road from St. Johns Heritage Parkway to Minton Road, a distance of approximately four miles, in the City of Palm Bay and Brevard County, Florida.

Malabar Road is a local road, and the City of Palm Bay is administering this PD&E study as a Local Agency Program (LAP) project. The City of Palm Bay follows the Florida Department of Transportation (FDOT) noise guidelines. This Noise Study Report summarizes the traffic noise impact analysis conducted for 354 noise-sensitive sites for the 2020 Existing Condition and the 2050 No-Build and Build Alternatives. Only one of these analyzed sites is currently experiencing noise levels that meet or exceed the FDOT Noise Abatement Criterion (NAC). Four receptor sites are predicted to meet or exceed the NAC under the No-Build Alternative. The proposed project increases noise levels throughout the corridor by an average of 3.2 dB(A). While none of the noise increases are considered substantial (i.e., 15 or more decibels over existing levels), project noise levels are predicted to meet or exceed the NAC at five receptors.

To mitigate these impacts, noise barriers were considered as an abatement measure. Two noise barriers were analyzed, one for the two impacted residences represented by receptor 7-9 and one for the benches represented by the 7-12 receptors. Despite both noise barriers meeting the FDOT-required 7.0 dB(A) noise reduction design goal (NRDG), neither barrier meets the cost-reasonableness criterion.

Statement Of Likelihood

Based on the noise analyses performed to date, there are no feasible solutions available to mitigate the noise impacts at the locations identified in **Figure 2** and **Figure 3**.

The City of Palm Bay is committed to analyzing traffic noise impacts at all nearby noise-sensitive land uses. All currently vacant lots with active building permits have been included in this analysis. 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.

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1.0 PROJECT DESCRIPTION

Initiated in November 2019, the Malabar Road Project Development and Environment (PD&E) Study evaluated capacity, safety, and multi-modal improvements on Malabar Road from St. Johns Heritage Parkway to Minton Road, a distance of approximately four miles in the City of Palm Bay and Brevard County, Florida. Malabar Road is an east-west regional roadway connecting western Brevard County/City of Palm Bay to US-1 in Malabar. The roadway's maintaining jurisdiction is Brevard County at its western edge before transitioning to the City of Palm Bay for several miles and becoming a state road (SR 514) between I-95 and US-1. Malabar Road has an existing diamond interchange with I-95. Within the study area, Malabar Road is an urban minor arterial. The study area is shown in **Figure 1**.

Malabar Road is a local road, and the City of Palm Bay is administering this PD&E study as a Local Agency Program (LAP) project.

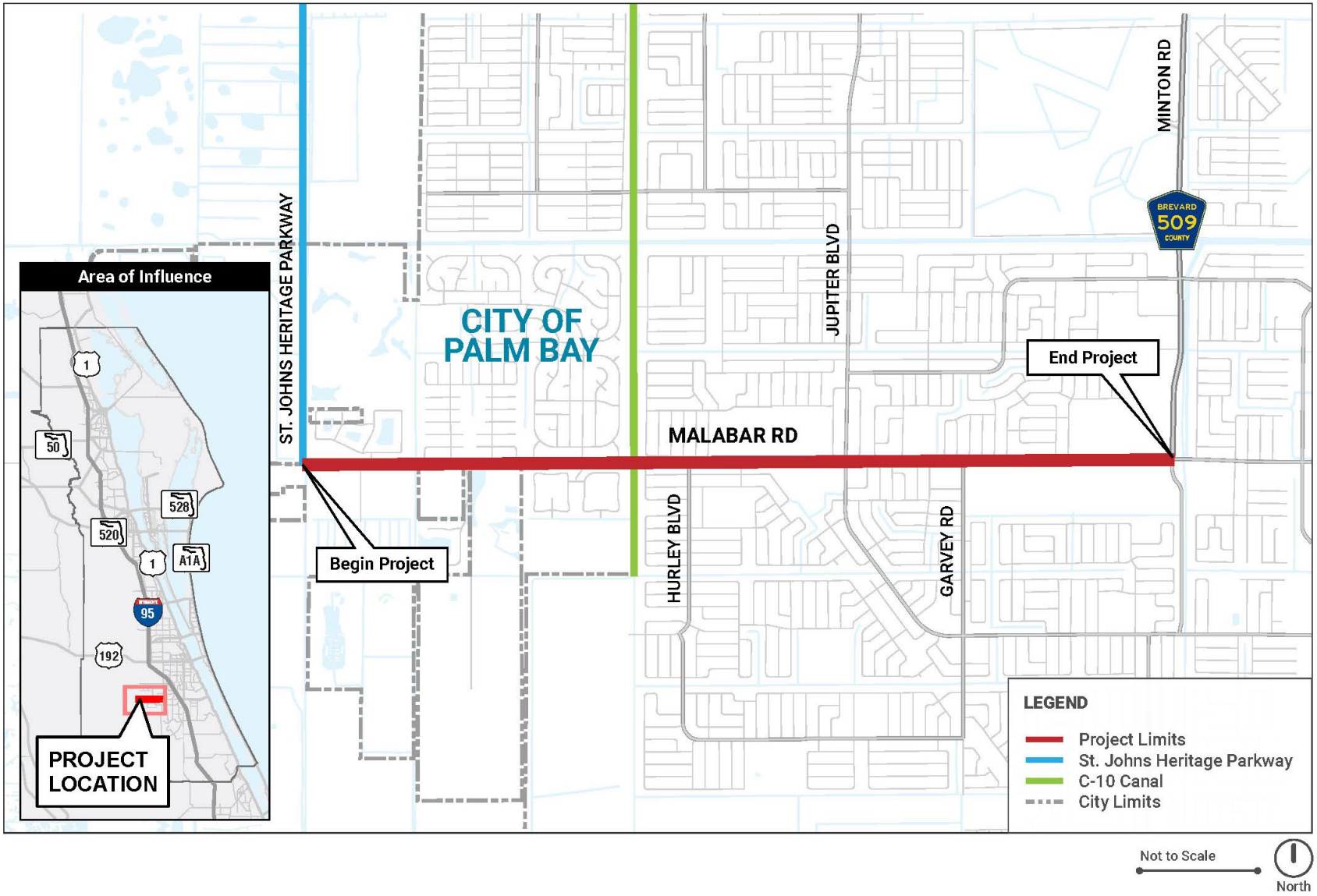
1.1 Proposed Improvements

The preferred Build Alternative consists of two 11-foot travel lanes in each direction; a 22-foot median, including Type E curb and gutter; a Type F curb and gutter outside of the travel lanes; a 10-foot shared-use path on the north side; an 8-foot sidewalk on the south side; and a 4-foot grass buffer between the back of the curb and the 8-foot south side sidewalk. Appendix A: Project Typical Sections illustrate the preferred Build Alternative typical sections**.** Additional detail on the key differences in typical section elements along the Malabar Road study corridor can be found in the Preliminary Engineering Report (PER).

Based on the project's intersection alternatives analysis, the following intersection control types are included:

- Traffic Signals –
    - Malabar Road & Jupiter Boulevard;
    - Malabar Road & Garvey Road;
    - Malabar Road & Plaza Shopping Center; and
    - Malabar Road & Minton Road.
- Roundabouts –
    - Malabar Road & St. Johns Heritage Parkway;
    - Malabar Road & Krassner Drive/Bending Branch Lane;
    - Malabar Road & Hurley Boulevard; and
    - Malabar Road & Maywood Avenue/Daffodil Drive.

Figure 1: Project Corridor



- Two-Way Stop Control –
    - Malabar Road & Snapdragon Drive;
    - Malabar Road & Championship Circle;
    - Malabar Road & Wisteria Avenue/Abilene Drive;
    - Malabar Road & Bavarian Avenue;
    - Malabar Road & Watoga Avenue/Avery Springs;
    - Malabar Road & Palm Bay Public Works Driveways;
    - Malabar Road & Post Office;
    - Malabar Road & Santa Rosa Avenue;
    - Malabar Road & Madalyn Landing; and
    - Malabar Road & Sutherland Drive.

1.2 No-Build Alternative

Consistent with FHWA guidelines, this analysis also considers an alternative that assesses what would happen to the environment in the future if this proposed improvement was not built. This alternative, called the No-Build Alternative, does not meet project needs but provides a baseline condition to compare and measure the proposed project's effects.

2.0 METHODOLOGY

This project's traffic noise analysis is consistent with Title 23, *Code of Federal Regulations* (CFR), § 772[1], Part II, Chapter 18 of the FDOT *Project Development and Environment Manual* [2], and Chapter 335, Section 335.17, *Florida Statutes*[3]. This assessment also adheres to the Federal Highway Administration (FHWA) traffic noise analysis guidelines in *FHWA-HEP-10-025*[4]. 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*[5]. Noise receptor coordinates used in the TNM are located in exterior areas where frequent human use may occur, usually at the edge of the residential structure closest to the project roadways, unless the analyst's professional judgment determines otherwise.

The MicroStation design files, georeferenced to the 2018 State Plane imagery for Brevard County[6], were used to determine the project's location for input into TNM. Elevation data for noise receptors and existing roadways represent 2-foot intervals for Brevard County.

2.1 Noise Metrics

Noise levels developed 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 noise levels. All reported noise levels are hourly equivalent noise levels [Leq(h)]. The Leq(h) is defined as the equivalent steady-state sound level that, in an hourly period, contains the same acoustic energy as the time-varying sound level for the same hourly period.

2.2 Traffic Data

Traffic characteristics that contribute to the design year's highest traffic noise levels were used in the impact modeling 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 PD&E

[1] Federal Highway Administration, *Code of Federal Regulations*, Title 23 Part 772, "Procedures for Abatement of Highway Traffic Noise and Construction Noise", (July 13, 2010)
[2] Florida Department of Transportation, *Project Development and Environment Manual,* Part 2, Chapter 18, (July 1, 2023)
[3] *Florida Statutes*, Chapter 335, § 335.17
[4] FHWA, *FHWA-HEP-10-025: Highway Traffic Noise: Analysis and Abatement Guidance, (*December 2011)
[5] FDOT, *Traffic Noise Modeling and Analysis Practitioners Handbook*, (December 31, 2018)
[6] https://fdotewp1.dot.state.fl.us/AerialPhotoLookUpSystem/

Manual. The traffic data used for this project consists of a mixture of LOS C and Demand volumes and are included in **Appendix B: Project Traffic Data.**

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 1**. For each activity category, the FDOT has established noise levels at which noise abatement must be considered. In Florida, noise levels that meet or exceed 66.0 dB(A) at Activity Category B and C land uses require noise abatement consideration. A 71.0 dB(A) noise level is required for an Activity Category E land use to be considered impacted by traffic noise. One additional criterion for determining project impacts that warrant abatement consideration occurs when project noise levels are below the NAC but show a substantial increase (15.0 dB(A) or more) over existing levels.

2.4 Noise Abatement Measures

Noise abatement must be considered when traffic noise impacts are identified as part of the traffic noise analysis. The potential abatement alternatives include traffic management techniques, 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. The proposed Build Alternative incorporates several traffic management techniques through the inclusion of roundabouts. Additional traffic management measures, such as reducing the speed limit, are not considered a viable noise abatement measure since they are inconsistent with the goal of improving safety and capacity within the corridor.

2.4.2 Alignment Modifications

The proposed project follows the same alignment as the existing facility to minimize the need for additional ROW within the project corridor. Consequently, an alternative roadway alignment is not a reasonable noise abatement measure.

Table 1: Noise Abatement Criteria

Hourly A-Weighted Sound Level-decibels (dB(A))				Description of Activity Category
Activity Category	Activity Leq(h)		Evaluation Location	
	FHWA	FDOT		
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[2]	67.0	66.0	Exterior	Residential.
C[2]	67.0	66.0	Exterior	Active sports areas, amphitheaters, 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[2]	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)

[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.

2.4.3 Buffer Zones

Noise buffer zones that separate the roadway and noise-sensitive land uses can minimize or eliminate noise impacts. 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 at this time. However, for any new development or redevelopment occurring in the future, local officials can use the noise contour information provided in **Section 5.1** of this Noise Study Report (NSR) to establish buffer zones, thereby minimizing or avoiding noise impacts at future sensitive land uses.

2.4.4 Noise Barriers

The most common type of noise abatement measure is constructing a noise barrier. Due to the limited ROW and proposed typical sections, noise barriers are the only measure considered for this project. The following feasibility and reasonableness factors must be evaluated when evaluating noise barriers.

2.4.4.1 Feasibility Factors

The FDOT PD&E Manual[7] stipulates that a noise barrier must meet the following acoustic and engineering criteria to be considered feasible.

1. 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 isolated and single impacted receptors.
2. Engineering feasibility: The engineering review identifies whether other factors must be evaluated for the barrier to be considered feasible.
    a. Safety: If a conflict between a noise barrier and safety exists, primary consideration must be given to safety. An example of such a conflict is losing a safe sight distance (line of sight) at an intersection or driveway resulting from a noise barrier placement.
    b. Accessibility to adjacent properties: On non-limited access roadways such as Malabar Road, the noise barrier placement cannot block ingress and egress. Other access issues to be considered include access to a local sidewalk or normal routes of travel.
    c. Right of way needs: Does the noise barrier require additional land, access rights, or easements for construction and maintenance?

[7] FDOT, *PD&E Manual*, Chapter 18.2.3

d. Maintenance: Maintenance crews must have reasonable access to both sides of the barrier for personnel and equipment using standard practices.
e. Drainage: Does the barrier have impacts on existing or planned drainage?
f. Utilities: Does the barrier impact existing utilities?

2.4.4.2 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.

1. 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.
2. Cost reasonableness: Using the current $30.00 per square foot statewide average, a cost of $42,000 per benefited receptor is looked upon as the upper limit for cost-reasonableness.
3. Benefited property owner and resident viewpoints: During project development, typically during the Final Design phase, the City of Palm Bay 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. If a majority consensus is not obtained in favor of the barrier, the noise barrier is not deemed reasonable.

3.0 TRAFFIC NOISE ANALYSIS

The traffic noise analysis includes noise model validation and prediction of noise levels for the 2020 Existing Condition and the 2050 No-Build and Build Alternatives. Existing noise-sensitive sites within the project limits were verified by a field review performed on August 6, 2021. Using **Table 1** as a guide, most noise-sensitive land uses within the study corridor fall under Activity Category B - Residential. The Activity Category C land uses within the project study corridor pertain to office and recreation areas within residential developments. Analysis of interior (Category D) noise levels is not required for this project as all Category C locations have areas of exterior use. The Activity Category E land uses include several commercial businesses with outdoor seating. There are no land uses in the study corridor that warrant an Activity Category A analysis. While Activity Category F land uses are in the project corridor, this is not considered a noise-sensitive activity and is not included in this analysis. The remainder of the corridor is Activity Category G undeveloped land.

A permit search of the project corridor was conducted on August 8, 2021, to identify any active building permits for noise-sensitive land uses. Two new residential subdivisions are being developed, as are several scattered residences throughout the corridor. All lots with active building permits have been included in this analysis. 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.

An illustration of typical exterior and interior noises and their corresponding decibel reading is presented in **Table 2**. This table provides the reader with a better understanding of the noise levels discussed herein. In Florida, noise levels reaching 66.0 dB(A) at Activity Category B and C land uses require consideration for noise abatement. A 71.0 dB(A) noise level is required for an Activity Category E land use to be considered impacted by traffic noise. 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.

Table 2: Comparative Noise Levels

Common Outdoor Activities	dB(A)	Common Inside Activities
Jet Flyover at 1,000 ft.	-110-	Rock Band
Gas Lawn Mower at 3 ft.	-100-	
Diesel Truck at 50 ft. (at 50 mph)	-90-	
		Food Blender at 3 ft.
Busy Urban Area Daytime	-80-	Garbage Disposal at 3 ft.
Gas 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
Quiet Suburban Nighttime		(Background)
Quiet Rural Nighttime	-30-	Library
	-20-	
	-10-	
Lowest Threshold of Human Hearing	-0-	Lowest Threshold of Human Hearing

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

3.1 Model Validation

Field measurements were taken within the project limits to verify the accuracy of the computer noise model (TNM 2.5). On August 6, 2021, noise monitoring was performed using an Extech Instruments Model 407780 Type 2 Integrating Sound Level Meter. The meter, calibrated 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 and speeds by type, and meteorological conditions, were recorded during the measurement session. The data collection effort also recorded the travel speed for each type of vehicle using a Bushnell Speedster handheld radar gun.

One location within the study corridor was selected to undergo a series of three 10-minute measurements. The validation site, identified as V-1 and illustrated on page **D-2** in Appendix D, is west of the Canal #10 bridge perpendicular to the Malabar Road westbound (WB) lane. The predominant noise source is Malabar Road. During the monitoring session, the weather was 89° under clear skies, with 72% humidity, and winds out of the South at 3-7 mph. No unusual noise

events occurred during the three 10-minute sessions at this location. Validation of TNM occurs when the model-predicted noise levels are within three decibels of the field-measured levels. As shown in **Table 3**, TNM predicted within the 3.0-decibel acceptance range for each 10-minute session. Consequently, the model is acceptable for predicting noise levels on this project.

Table 3: Noise Model Validation

Validation Site: V-1 Date: 8/6/2021										
Run 1: Start-10:05 AM										
Malabar Rd	**Cars**		**Medium Trucks**		**Heavy Trucks**		**Buses**		**Motorcycles**	
	Vol. Count	**Avg. Speed**	**Vol. Count**	**Avg. Speed**	**Vol. Count**	**Avg. Speed**	**Vol. Count**	**Avg. Speed**	**Vol. Count**	**Avg. Speed**
EB	30	46	0	0	1	42	0	0	1	45
WB	36	46	3	42	2	42	0	0	0	0
Field Measurement (dB(A)):					61.6					
TNM Prediction (dB(A)):					61.7					
Variance (dB(A)):					0.1					
** No unusual occurrences.*										
Run 2: Start-10:16 AM										
Malabar Rd	**Cars**		**Medium Trucks**		**Heavy Trucks**		**Buses**		**Motorcycles**	
	Vol. Count	**Avg. Speed**	**Vol. Count**	**Avg. Speed**	**Vol. Count**	**Avg. Speed**	**Vol. Count**	**Avg. Speed**	**Vol. Count**	**Avg. Speed**
EB	40	47	1	40	1	44	0	0	0	0
WB	56	47	4	40	2	44	0	0	0	0
Field Measurement (dB(A)):					60.3					
TNM Prediction (dB(A)):					62.9					
Variance (dB(A)):					2.6					
** Unusual occurrences: Medium truck tail bang as vehicle crossed bridge EB approach. Car horn in distance.*										
Run 3: Start-10:29 AM										
Malabar Rd	**Cars**		**Medium Trucks**		**Heavy Trucks**		**Buses**		**Motorcycles**	
	Vol. Count	**Avg. Speed**	**Vol. Count**	**Avg. Speed**	**Vol. Count**	**Avg. Speed**	**Vol. Count**	**Avg. Speed**	**Vol. Count**	**Avg. Speed**
EB	29	47	5	43	3	44	0	0	0	0
WB	50	47	0	0	4	44	0	0	0	0
Field Measurement (dB(A)):					61.0					
TNM Prediction (dB(A)):					63.6					
Variance (dB(A)):					2.6					
** Unusual occurrences: Medium truck tail bang as vehicle crossed bridge EB approach.*										

3.2 PREDICTED NOISE LEVELS AND ABATEMENT ANALYSIS

For this project, a total of 354 noise sensitive sites were evaluated for project-related noise impacts. Due to the number of receptors, the analysis divided the study corridor into ten 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), defined as a group of receptors within the same Activity Category exposed to similar noise sources and levels; traffic volumes, traffic mix, and speed; and topographic features. There may be several CNEs within one NSA.

The 2020 Existing and 2050 No-Build and Build noise levels discussed in this section are also summarized in a noise impact comparison matrix, provided in **Appendix C.** Currently, only one analyzed receptor, a bench at the Madalyn Landing Apartments, experiences noise levels that meet or exceed the FDOT NAC. Under the No-Build Alternative, noise levels are predicted to meet or exceed the NAC at the same bench, plus three single-family residences. By comparison, predicted noise levels for the Build Alternative meet or exceed the NAC at two residential receptors and three benches at the Madalyn Landing Apartments, with an average 3.2 dB(A) increase in noise over the existing condition. The highest increase at a receptor not within the proposed ROW is 6.1 dB(A). This increase is not considered substantial (defined as 15 dB(A) or higher.

A discussion of each NSA and its corresponding impact and abatement analysis is provided in the following sections. A set of project aerials illustrating the NSAs, representative receptors, and the analyzed sites within each CNE, is included in **Appendix D**.

3.2.1 Noise Study Area 1

NSA 1 is located south of Malabar Road from St. Johns Heritage Parkway to the Melbourne-Tillman Drainage District (MTDD) Canal #8, as illustrated in Appendix D on page **D-1**. There are no noise-sensitive land uses in proximity to Malabar Road in this area.

3.2.2 Noise Study Area 2

NSA 2 is located north of Malabar Road from St. Johns Heritage Parkway to the MTDD Canal #8, as illustrated in Appendix D on page **D-1**. Noise sensitive land uses within this NSA are the 51 residences in the Parkside subdivision closest to Malabar Road, as represented in this report by receptors 2-1 through 2-13 and 2-15 through 2-21. Receptor 2-14 represents the neighborhood park complex. A six-foot-tall privacy wall runs along the southern property line of the subdivision.

Currently, the average noise level for these receptors is 49.9 dB(A) and is below the 66.0 dB(A) NAC for Activity Category B (residences) and Activity Category C (park) land uses. Noise levels predicted with the 2050 No-Build Alternative are also below the NAC average. Likewise, the Build Alternative noise levels are below the NAC with an average of 52.9 dB(A), overall increasing an average of 3.0 dB(A) over existing conditions. The noise increases are not considered substantial (15 or more dB(A) over existing levels). Neither these increases nor the project noise levels constitute a project impact on this subdivision.

3.2.3 Noise Study Area 3

NSA 3 is located south of Malabar Road from MTDD Canal #8 to Canal #10 and includes two subdivisions, Tillman Lakes and Brentwood Lakes. The Tillman Lakes subdivision is currently under construction, as illustrated in Appendix D on page **D-2**. Twenty-one constructed homes and lots with active building permits, as of 8/23/2021, are represented by receptors 3-1 through 3-10. The Brentwood Lakes subdivision (receptors 3-11 through 3-30) is adjacent to the proposed roundabout with Bending Branch Way, as illustrated in Appendix D on page **D-3**.

Currently, the average noise level in NSA 3 is 53.3 dB(A), which is below the NAC. Noise levels predicted with the No-Build Alternative are also below the NAC with an average of 55.9 dB(A). While the average noise level with the Build Alternative increases 3.0 dB(A) over existing conditions, the average project-related noise level is 56.3 dB(A). Neither these increases nor the project noise levels constitute project impacts.

3.2.4 Noise Study Area 4

NSA 4 is located north of Malabar Road from MTDD Canal #8 to Canal #10 as illustrated in Appendix D on pages **D-2** and **D-3**. Fifty-two residences, represented by receptors 4-1 through 4-22, were analyzed for project impacts. Currently, the average noise level in NSA 4 is 55.1 dB(A), which is below the NAC. Noise levels predicted with the No-Build Alternative are also below the NAC with an average of 56.8 dB(A). While the average noise level with the Build Alternative increases 3.6 dB(A) over existing conditions, the average project-related noise level is 58.7 dB(A). Neither these increases nor the project noise levels constitute project impacts.

3.2.5 Noise Study Area 5

NSA 5 is located south of Malabar Road from MTDD Canal #10 to Jupiter Boulevard, as illustrated in Appendix D on pages **D-4** and **D-5**. Through this NSA, the project includes a roundabout with

Hurley Boulevard and partial relocation of MTDD Canal C-20 to accommodate a wider Malabar Road while avoiding impacts on the US Postal Service property.

Noise-sensitive land uses in NSA 5 are 37 residences, represented by receptors 5-1 through 5-12, were analyzed for project impacts. Currently, the average noise level in NSA 5 is 56.9 dB(A), which is below the NAC. Noise levels predicted with the No-Build Alternative are also below the NAC with an average of 58.9 dB(A); however, one receptor (5-6) has a noise level of 66.2 dB(A) which exceeds the NAC. Receptor 5-6 is within the Build Alternative proposed ROW and will be acquired as part of the project; therefore it will not be impacted by project traffic noise. The average noise level under the Build Alternative increases 5.4 dB(A) over existing conditions; the average project-related noise level is 62.2 dB(A). Neither these increases nor the project noise levels constitute project impacts.

3.2.6 Noise Study Area 6

NSA 6 is located north of Malabar Road from MTDD Canal #10 to Jupiter Boulevard, as illustrated in Appendix D on pages **D-4** and **D-5**. The project includes a roundabout with Hurley Boulevard and partial relocation of MTDD Canal C-20 to accommodate a wider Malabar Road through this NSA. The project realigns several entrance roads, including Hoffer Avenue NW, Deedra St. SW, and Hillcrest Ave NW.

Thirty-three residences, represented by receptors 6-1 through 6-15, were analyzed for project impacts, including 13 homesites in the Avery Springs subdivision currently under construction or with active building permits (as of 8/23/2021). Currently, the average noise level in NSA 6 is 57.9 dB(A), which is below the NAC. Noise levels predicted with the No-Build Alternative are also below the NAC with an average of 59.9 dB(A). While the average noise level with the Build Alternative increases 2.2 dB(A) over existing conditions, the average project-related noise level is 60.0 dB(A). Neither these increases nor the project noise levels constitute project impacts.

3.2.7 Noise Study Area 7

NSA 7 is located south of Malabar Road from Jupiter Boulevard to Daffodil Drive SW, as illustrated in Appendix D on pages **D-5** through **D-7**. The project includes a roundabout with Daffodil Drive SW. Receptors 7-1 through 7-11 represent residences west of Garvey Road SW. Receptors 7-12 and 7-12.1 represent three benches facing Malabar Road in the Madalyn Landing Apartment complex. Receptor 7-12.2 represents the apartment complex dog walk. Each of the apartment receptors is an Activity Category C land use. Receptors 7-13 through 7-22 represent 23 residences in The Falls subdivision currently under construction or with active building permits (as of 8/23/2021).

Currently, the average noise level in NSA 7 is 57.9 dB(A); however, receptor 7-12, a bench, exceeds the 66.0 dB(A) NAC for Activity Category C land uses. Average noise levels predicted with the No-Build Alternative average of 58.0 dB(A) with the same receptor, 7-12, exceeding the NAC with 67.0 dB(A). The Build Alternative's average noise level increases 4.1 dB(A) over existing conditions with two residences, represented by receptor 7-9 and the three apartment benches, 7-12 and 7-12.1, exceeding the NAC. While the noise increases are not considered substantial, the project impacts to the two residences require abatement consideration, as summarized in **Section 3.2.7.1**. The abatement analysis for the three impacted Mandalyn Landing benches is summarized in **Section 3.2.7.2**.

3.2.7.1 Noise Abatement Consideration - Barrier 1

Abatement challenges to mitigate the two project impacts represented by receptor 7-9 involve the limited ROW and the required clear-recovery zone for noise barriers. Due to these constraints, the only feasible location for a noise barrier is between EB Malabar Road and the adjacent sidewalk. The noise barrier was analyzed approximately four feet from the face of the curb to maintain the clear zone/lateral offset. Ideally, standard methodology begins and ends a noise barrier at a point equal to four times the perpendicular distance between the last impacted receptor and the barrier. However, the two cross streets, Ware Avenue and Santa Rosa Avenue, require openings in the noise barrier to allow access to Malabar Road. Consequently, a multi-segmented barrier system was evaluated.

Several height combinations were analyzed to determine the dimensions where the greatest noise reduction is achieved within the $42,000 per benefited receptor reasonable cost requirement. To determine the noise barrier's effectiveness, receptor 7-9 was subdivided. As summarized in **Table 4**, the noise barrier achieves the required 7.0 dB(A) noise reduction design goal (NRDG) at heights above eight feet. However, none of the dimension options meet the cost-reasonableness requirement. **Figure 2** illustrates the least-costly option that meets the NRDG. Noise Barrier 1 does not meet the FDOT cost criterion; therefore, it is not considered reasonable.

Table 4: Noise Barrier 1

NSA 7: Single-Family Residential (Receptor 7-9) Evaluation Summary												
Evaluated Barrier Options			Number of Impacted Sites	Number of Impacted Sites Within a Noise Reduction Range			Number of Benefited Sites *1				Total Estimated Cost *4	Cost per Benefited Receptor *5
Option	Height (feet)	Length (feet)		5-5.9 dB(A)	6-6.9 dB(A)	≥ 7.0 dB(A) *2	Impacted	Other *3	Total	Avg. Noise Reduction dB(A)		
1	8	422	2	2	0	0	2	0	2	5.4	$101,280	$50,640
2 Illustrated	10	576	2	0	1	1	2	0	2	7.0	$172,800	$86,400
3	12	455	2	0	1	1	2	0	2	6.7	$163,800	$81,900
4	14	442	2	0	1	1	2	0	2	6.8	$185,640	$92,820

*1 = Minimum of 5.0 dB(A) required to be considered benefited by a noise barrier.

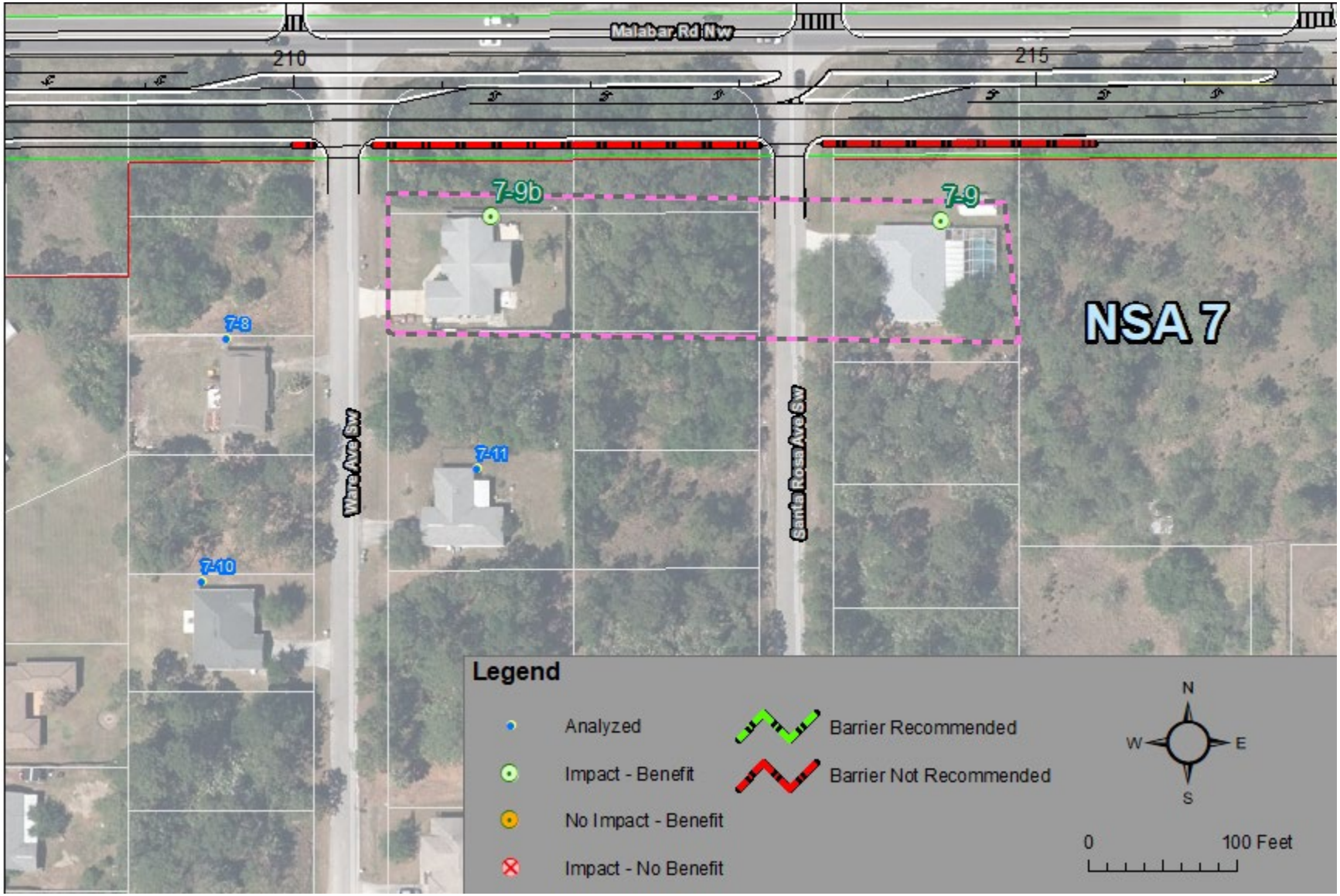
*2 = FDOT Noise Reduction Design Goal is 7.0 dB(A) at a minimum of 1 benefited receptor.

*3 = Refers to non-impacted noise-sensitive sites.

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

*5 = FDOT Reasonable Cost Guideline is $42,000.

Figure 2: Analyzed Noise Barrier 1



3.2.7.2 Noise Abatement Consideration - Barrier 2

The limited ROW and the clear-recovery zone requirement are also abatement challenges to mitigating project impacts to the three Madalyn Landing benches, represented by receptors 7-12 and 7-12.1. Due to these constraints, the only feasible location for a noise barrier is between EB Malabar Road and the adjacent sidewalk. The noise barrier was analyzed approximately four feet from the face of the curb to maintain the clear zone/lateral offset. Ideally, standard methodology begins and ends a noise barrier at a point equal to four times the perpendicular distance between the last impacted receptor and the barrier. However, Garvey Road and the apartment entrance roads require openings in the noise barrier to allow access to Malabar Road.

As Activity Category C land uses, the benches are considered "Special-Use" sites that require a multi-phased approach to the abatement analyses. The first step in the analysis determines the most effective barrier dimensions that achieve the required 7.0 dB(A) NRDG. If the barrier meets this requirement, a separate cost-reasonable analysis is conducted. Note that receptor 7-12.1 is subdivided to determine the noise barrier's effectiveness better.

Several height combinations were analyzed to determine the dimensions where the greatest noise reduction is achieved. As shown in **Table 5**, the barrier meets the NRDG under all three height dimensions and provides effective noise abatement for two of the three impacted benches. The western-most bench, represented by receptor 7-12, cannot be benefited from a noise wall due to the Garvey Road access. Adding a segment to the barrier west of Garvey Road has no beneficial effect on this receptor.

Table 5: Noise Barrier 2 Feasibility Analysis

NSA 7: Madalyn Landing Apartments					
	Barrier Segment 1: Height (ft):		**8**	**10**	**12**
	Length (ft):		**631**	**631**	**631**
Receptor (Impacted)	**Represents**	**Noise Level Without Barrier**	**Noise Reduction With Barrier (dB(A))**		
7-12	Western bench	69.6	1.8	1.9	2.0
7-12.1	Middle bench	70.8	9.0	10.8	11.8
7-12.1b	Eastern bench	71.6	7.1	8.1	8.6
7-12.2	Dog Walk	65.2	0.6	0.7	0.7
	Avg. Noise Reduction (dB(A))		8.1	9.5	10.2
Feasible. Carry forward to Reasonableness Analysis					

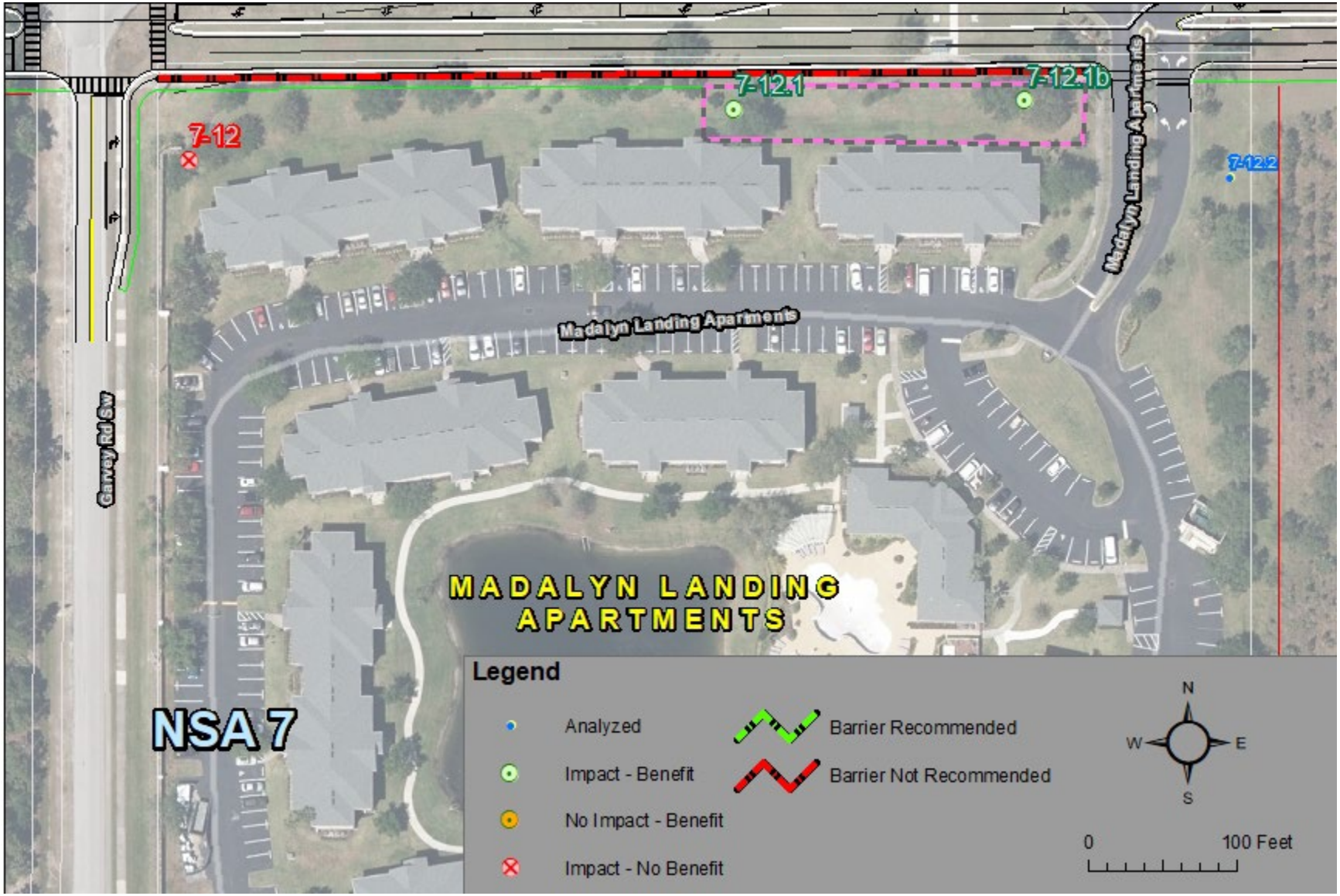
The second step in the analysis determines if the barrier is cost-reasonable using the FDOT's matrix for special use locations, as summarized in **Table 6**. For a barrier at this location to be cost-reasonable, a minimum of 213 people must utilize the two benches (7-12.1 and 7-12.1b) for one hour every day of the year. This is an unrealistic expectation; therefore, the barrier is considered not reasonable.

Table 6: Noise Barrier 2 Cost-Reasonableness Analysis

NSA 7: Madalyn Landing Apartments				
Avg. Noise Reduction for Barrier 2 = 8.1 dB(A)				
Item	**Criteria**	**Input**		**Description**
1	Enter length of proposed barrier	8	feet	
2	Enter height of proposed barrier	631	feet	
3	Multiply Item1 by Item 2	5048	sq. feet	
4	Avg. amount of time person stays per visit	1	hours	See Assumptions
5	Avg. number people visit site per day	212	people	
6	Multiply Item 4 by Item 5	212	person-hr.	
7	Divide Item 3 by Item 6	23.81132075	sq. ft/person-hr.	
8	Multiply $42,000 by Item 7	$ 1,000,075	$/sq. ft/person-hr.	
9	Does Item 8 exceed the "abatement cost factor" of $995,935/person-hr./ft2?	Yes		
10	If Item 9 is no, abatement is reasonable	-		
11	If Item 9 is yes, abatement is not reasonable	**Not Reasonable**		
Assumptions				
* * To meet the cost-reasonableness criterion, it takes 213 people, staying one hour each day on the three benches. This is an unrealistic expectation.				

Figure 3 illustrates the least-costly height option. Noise Barrier 2 does not meet the FDOT cost criterion; therefore, it is not considered reasonable.

Figure 3: Analyzed Noise Barrier 2



3.2.8 Noise Study Area 8

NSA 8 is located north of Malabar Road from Jupiter Boulevard to Maywood Avenue NW, as illustrated in Appendix D on pages **D-5** through **D-7**. The project includes a roundabout with Maywood Avenue. Fifty-six residences, represented by receptors 8-1 through 8-8 and 8-10 through 8-20, were analyzed for project impacts. Also included in the analysis is the office building, receptor 8-9. Currently, the average noise level in NSA 8 is 59.2 dB(A), which is below the NAC. Noise levels predicted with the No-Build Alternative are also below the NAC with an average of 59.3 dB(A). While the average noise level with the Build Alternative increases 2.4 dB(A) over existing conditions, the average project-related noise level is 61.6 dB(A). Neither these increases nor the project noise levels constitute project impacts.

3.2.9 Noise Study Area 9

NSA 9 is located south of Malabar Road from Daffodil Drive SW to the project end limit at Minton Road, as illustrated in Appendix D on pages **D-7** and Land use in this NSA There are no noise-sensitive land uses near Malabar Road in this area.

3.2.10 Noise Study Area 10

NSA 10 is located north of Malabar Road from Maywood Avenue NW to the project end limit at Minton Road, as illustrated in Appendix D on pages **D-7** and The analysis includes one residence, represented by receptor 10-1, and the outside tables at the Fired Up Coal Oven Pizza restaurant, receptor 10-2. Currently, the average noise level in NSA 10 is 60.9 dB(A), which is below the 66.0 dB(A) NAC for the Activity Category B residence and below the 71.0 dB(A) NAC for the Activity Category E restaurant. Noise levels predicted with the No-Build Alternative are also below the NAC with an average of 60.9 dB(A). While the average noise level with the Build Alternative increases 1.4 dB(A) over existing conditions, the average project-related noise level is 62.2 dB(A). Neither these increases nor the project noise levels constitute project impacts.

4.0 CONCLUSIONS

A total of 354 noise-sensitive sites were analyzed for project noise impacts. The analysis determined that the Build Alternative increases traffic noise levels throughout the project corridor by an average of 3.2 dB(A). While none of the noise increases are considered substantial (i.e., 15 or more decibels over existing levels), project noise levels are predicted to meet or exceed the NAC at five receptors.

To mitigate these impacts, two noise barriers were considered as an abatement measure. One barrier was analyzed for the two impacted residences represented by receptor 7-9 and one for the three benches represented by the 7-12 receptors. Neither barrier meets the cost-reasonableness criterion.

4.1 STATEMENT OF LIKELIHOOD

Based on the noise analyses performed to date, there are no feasible solutions available to mitigate the noise impacts at the locations identified in **Figure 2** and **Figure 3**.

The City of Palm Bay is committed to analyzing traffic noise impacts at all nearby noise-sensitive land uses. All currently vacant lots with active building permits have been included in this analysis. 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.

5.0 CONSTRUCTION NOISE AND VIBRATION

Based on the existing land use within the limits of this project, construction of the proposed roadway improvements may have noise or vibration impacts. If noise-sensitive land uses develop adjacent to the roadway prior to construction, additional impacts could result. It is anticipated that applying the *FDOT Standard Specifications for Road and Bridge Construction*[8] will minimize or eliminate most of the potential construction noise and vibration impacts. However, should unanticipated noise or vibration issues arise during the construction process, the City Project Manager and the Contractor will investigate additional methods of controlling these impacts.

5.1 COMMUNITY COORDINATION

5.1.1 NOISE IMPACT CONTOURS

Generalized future noise impact contours have been developed for NAC Acitivy Categories A, B, C, and E. These contours represent the approximate distance from the nearest edge of 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.

Within the project corridor, the distance between the proposed edge of the pavement and the noise impact contour line at various locations is presented in **Table 7**. Noise-sensitive land uses should be located beyond these distances to minimize the potential for incompatible land use.

This Noise Study Report provides information that can be used to protect future land development from becoming incompatible with anticipated traffic noise levels. A copy of the NSR will be provided to local and state officials to promote land use compatibility.

[8] FDOT, *Standard Specifications for Road and Bridge Construction*, January 2023.

Table 7: Critical Distance Impact Contours

Activity Category *1	Corresponding NAC	Malabar Project Segment *2			
		St. Johns Heritage Pkwy to Bending Branch	Bending Branch to Hurley Blvd	Hurley Blvd to Jupiter Blvd	Jupiter Blvd to Minton Rd
Category A	56 dB(A)	160 feet	300 feet	300 feet	340 feet
Category B and C	66 dB(A)	30 feet	60 feet	65 feet	65 feet
Category E	71 dB(A)	Within ROW	Within ROW	Within ROW	Within ROW
*1 = Activity Categories as defined in 23 CFR 772. *2 = Distance refers to nearest project roadway proposed edge of pavement					

5.2 PUBLIC MEETINGS

Coordination with the public and local agencies and officials has been accomplished during the PD&E study. The Alternatives Public Meeting was a virtual public meeting held on Thursday, September 24, 2020, at 5:30 p.m. using GoToWebinar. Three days before the virtual public meeting, the public meeting displays and handout were posted in City Hall's Community Meeting Room A and on the project website for public review. Attendees were invited to register for the virtual public meeting using the registration link on the project website. The Alternatives Public Meeting has two primary objectives: (1) informing the public on the alternatives being considered; and (2) obtaining input from the public, elected and appointed officials, property and business owners, and other interested parties.

6.0 REFERENCES

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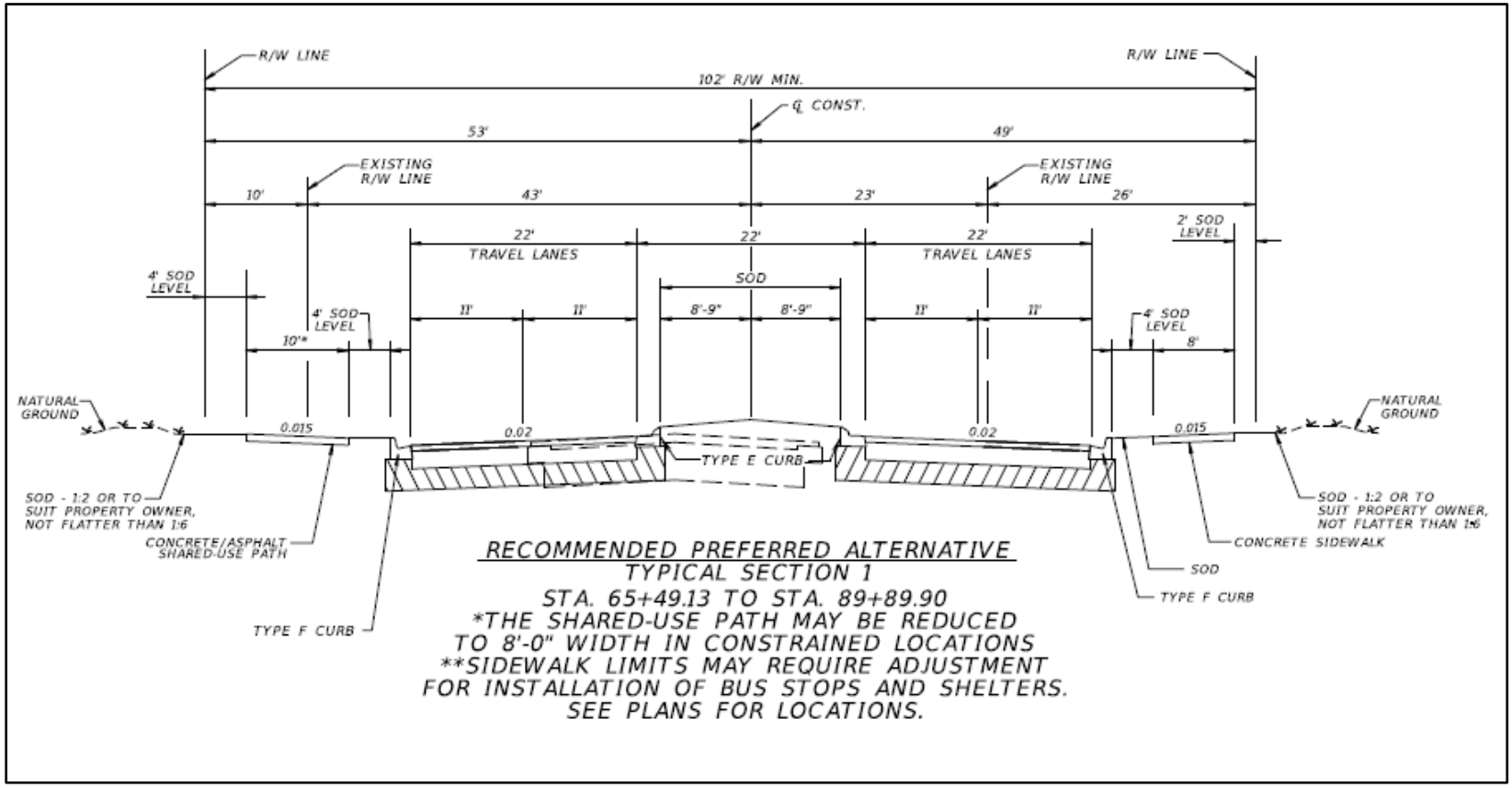
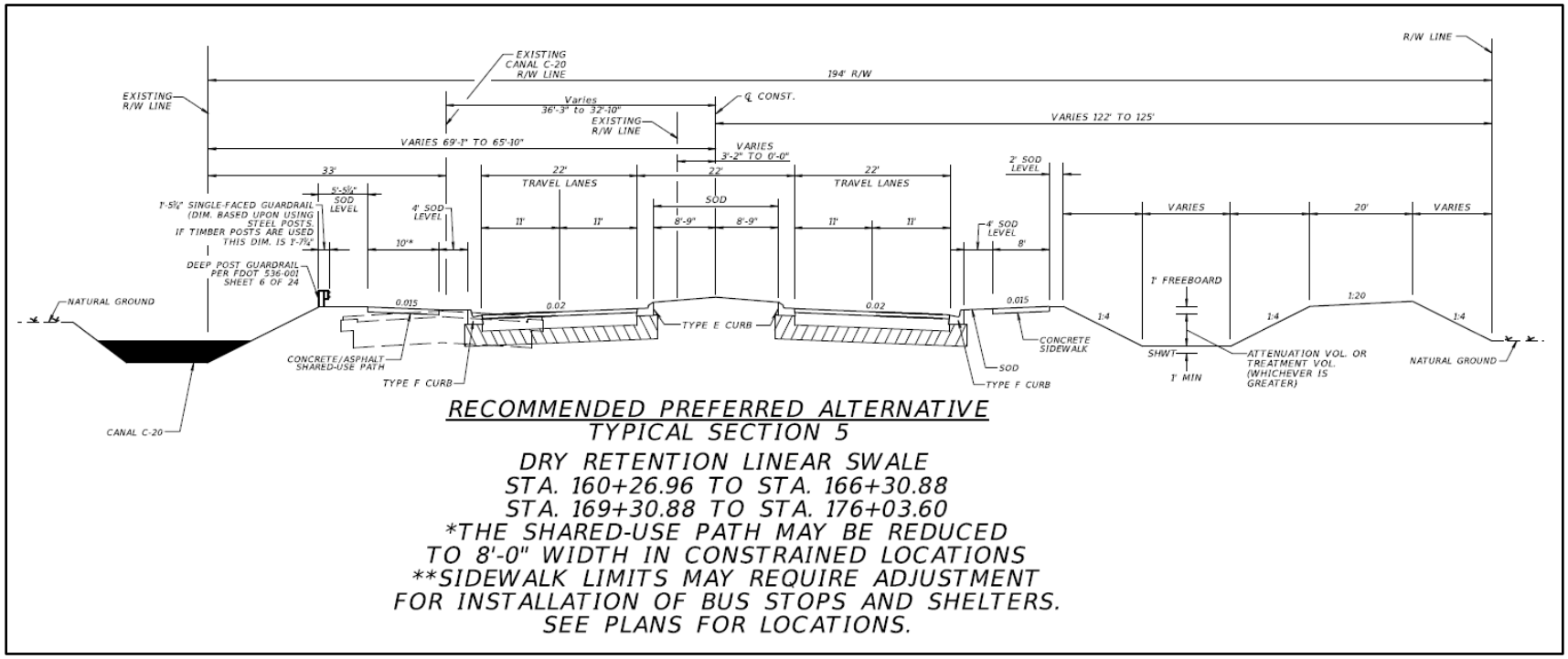
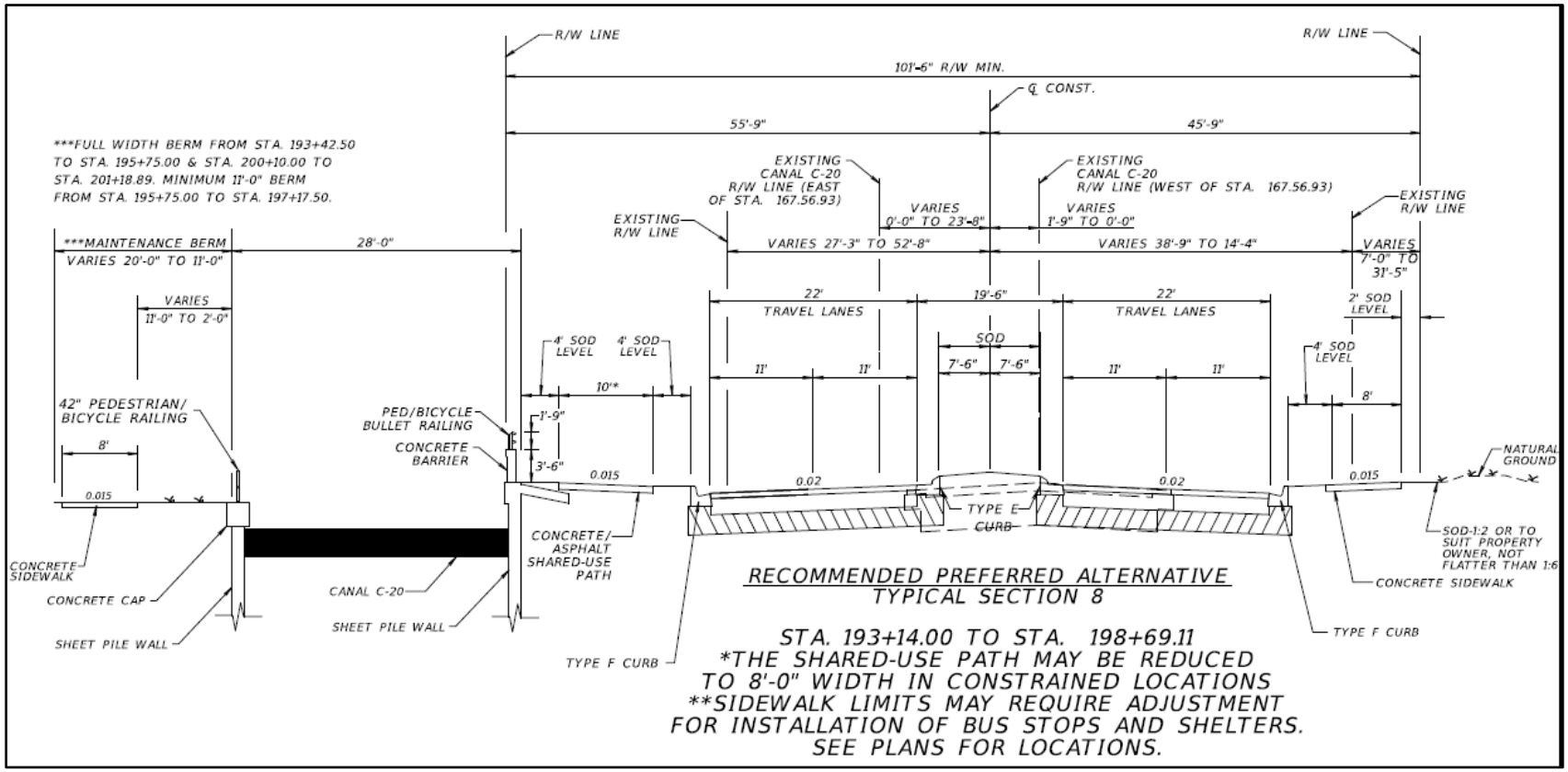
University of Florida, Florida Geographic Data Library.
https://www.fgdl.org/metadataexplorer/about.html

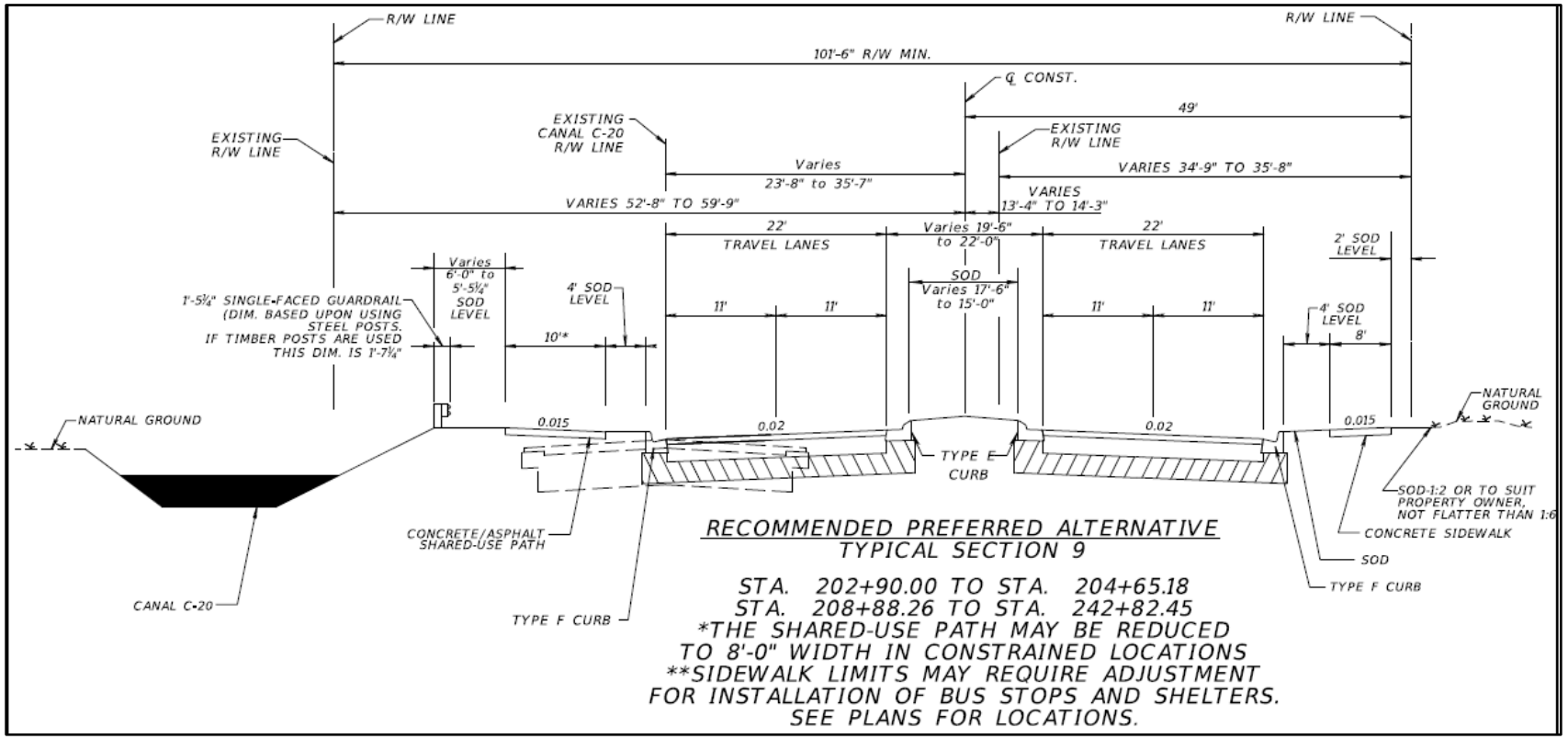
APPENDIX A: PROJECT TYPICAL SECTIONS

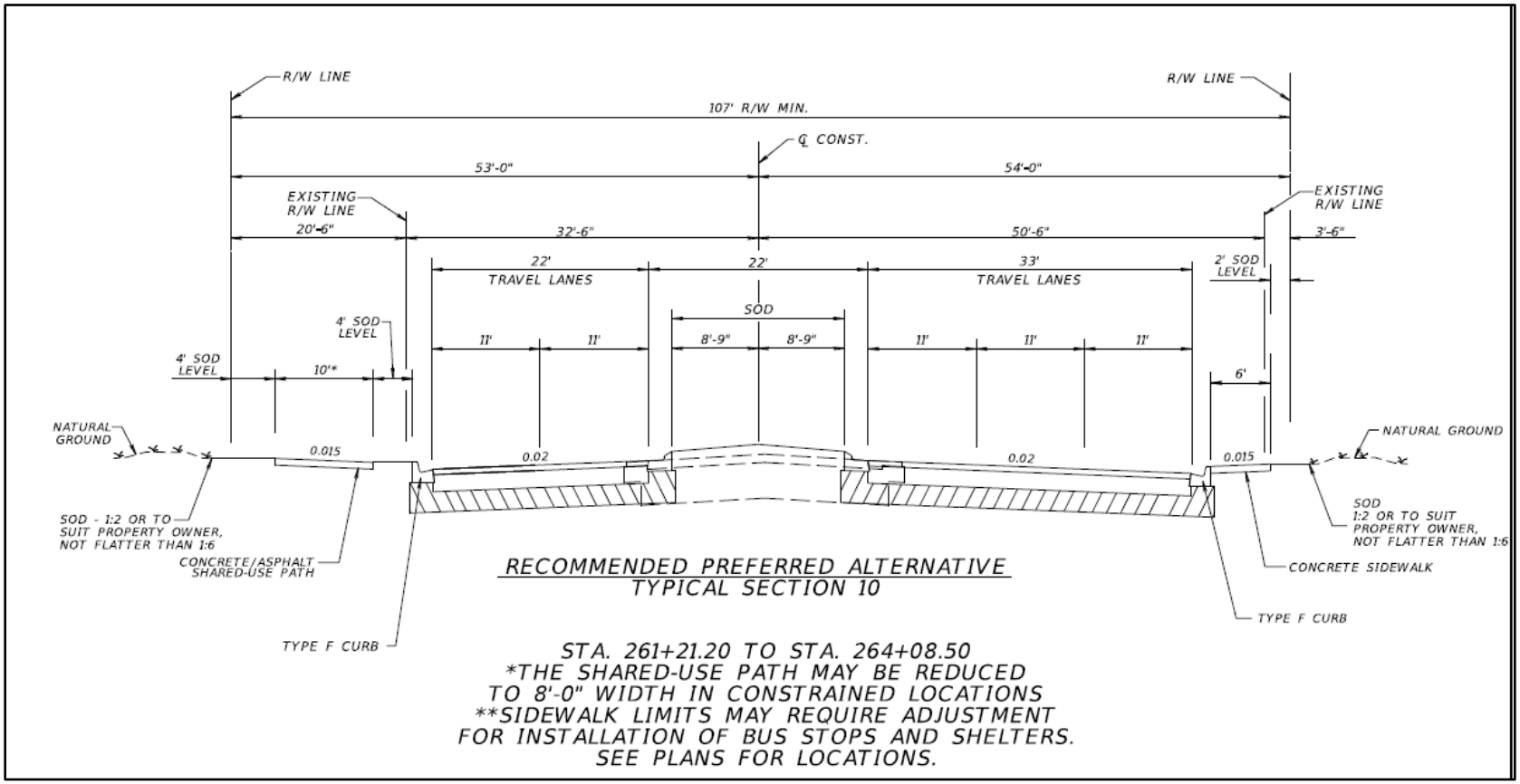

R/W LINE
R/W LINE
102' R/W MIN.
℄ CONST.
53'
49'
EXISTING R/W LINE
EXISTING R/W LINE
10'
43'
23'
26'
22' TRAVEL LANES
22'
22' TRAVEL LANES
2' SOD LEVEL
4' SOD LEVEL
SOD
11'
11'
8'-9"
8'-9"
11'
11'
4' SOD LEVEL
4' SOD LEVEL
10'*
8'
NATURAL GROUND
NATURAL GROUND
0.015
0.02
0.02
0.015
TYPE E CURB
SOD - 1:2 OR TO SUIT PROPERTY OWNER, NOT FLATTER THAN 1:6
CONCRETE/ASPHALT SHARED-USE PATH
SOD - 1:2 OR TO SUIT PROPERTY OWNER, NOT FLATTER THAN 1:6
CONCRETE SIDEWALK
SOD
TYPE F CURB
TYPE F CURB
RECOMMENDED PREFERRED ALTERNATIVE
TYPICAL SECTION 1
STA. 65+49.13 TO STA. 89+89.90
*THE SHARED-USE PATH MAY BE REDUCED TO 8'-0" WIDTH IN CONSTRAINED LOCATIONS
**SIDEWALK LIMITS MAY REQUIRE ADJUSTMENT FOR INSTALLATION OF BUS STOPS AND SHELTERS. SEE PLANS FOR LOCATIONS.



RECOMMENDED PREFERRED ALTERNATIVE
TYPICAL SECTION 5
DRY RETENTION LINEAR SWALE
STA. 160+26.96 TO STA. 166+30.88
STA. 169+30.88 TO STA. 176+03.60
*THE SHARED-USE PATH MAY BE REDUCED TO 8'-0" WIDTH IN CONSTRAINED LOCATIONS
**SIDEWALK LIMITS MAY REQUIRE ADJUSTMENT FOR INSTALLATION OF BUS STOPS AND SHELTERS. SEE PLANS FOR LOCATIONS.


R/W LINE
R/W LINE
101'-6" R/W MIN.
℄ CONST.
55'-9"
45'-9"
***FULL WIDTH BERM FROM STA. 193+42.50 TO STA. 195+75.00 & STA. 200+10.00 TO STA. 201+18.89. MINIMUM 11'-0" BERM FROM STA. 195+75.00 TO STA. 197+17.50.
EXISTING CANAL C-20 R/W LINE (EAST OF STA. 167.56.93)
EXISTING CANAL C-20 R/W LINE (WEST OF STA. 167.56.93)
EXISTING R/W LINE
EXISTING R/W LINE
VARIES 0'-0" TO 23'-8"
VARIES 1'-9" TO 0'-0"
VARIES 27'-3" TO 52'-8"
VARIES 38'-9" TO 14'-4"
VARIES 7'-0" TO 31'-5"
***MAINTENANCE BERM VARIES 20'-0" TO 11'-0"
28'-0"
VARIES 11'-0" TO 2'-0"
22' TRAVEL LANES
19'-6"
22' TRAVEL LANES
2' SOD LEVEL
4' SOD LEVEL
4' SOD LEVEL
SOD
4' SOD LEVEL
11'
11'
7'-6"
7'-6"
11'
11'
10'*
8'
42" PEDESTRIAN/ BICYCLE RAILING
PED/BICYCLE BULLET RAILING
CONCRETE BARRIER
1'-9"
3'-6"
8'
0.015
0.015
0.02
0.02
0.015
NATURAL GROUND
TYPE E CURB
CONCRETE SIDEWALK
CONCRETE CAP
SHEET PILE WALL
CANAL C-20
SHEET PILE WALL
CONCRETE/ ASPHALT SHARED-USE PATH
TYPE F CURB
TYPE F CURB
SOD-1:2 OR TO SUIT PROPERTY OWNER, NOT FLATTER THAN 1:6
RECOMMENDED PREFERRED ALTERNATIVE
TYPICAL SECTION 8
STA. 193+14.00 TO STA. 198+69.11
*THE SHARED-USE PATH MAY BE REDUCED TO 8'-0" WIDTH IN CONSTRAINED LOCATIONS
**SIDEWALK LIMITS MAY REQUIRE ADJUSTMENT FOR INSTALLATION OF BUS STOPS AND SHELTERS. SEE PLANS FOR LOCATIONS.


R/W LINE
R/W LINE
101'-6" R/W MIN.
℄ CONST.
49'
EXISTING R/W LINE
EXISTING CANAL C-20 R/W LINE
EXISTING R/W LINE
Varies 23'-8" to 35'-7"
VARIES 34'-9" TO 35'-8"
VARIES 52'-8" TO 59'-9"
VARIES 13'-4" TO 14'-3"
22' TRAVEL LANES
Varies 19'-6" to 22'-0"
22' TRAVEL LANES
2' SOD LEVEL
Varies 6'-0" to 5'-5¼" SOD LEVEL
4' SOD LEVEL
SOD Varies 17'-6" to 15'-0"
4' SOD LEVEL
1'-5¼" SINGLE-FACED GUARDRAIL (DIM. BASED UPON USING STEEL POSTS. IF TIMBER POSTS ARE USED THIS DIM. IS 1'-7¼"
10'*
11'
11'
11'
11'
8'
NATURAL GROUND
NATURAL GROUND
0.015
0.02
0.02
0.015
TYPE F CURB
SOD-1:2 OR TO SUIT PROPERTY OWNER, NOT FLATTER THAN 1:6
CONCRETE SIDEWALK
SOD
TYPE F CURB
CONCRETE/ASPHALT SHARED-USE PATH
CANAL C-20
TYPE F CURB
RECOMMENDED PREFERRED ALTERNATIVE
TYPICAL SECTION 9
STA. 202+90.00 TO STA. 204+65.18
STA. 208+88.26 TO STA. 242+82.45
*THE SHARED-USE PATH MAY BE REDUCED TO 8'-0" WIDTH IN CONSTRAINED LOCATIONS
**SIDEWALK LIMITS MAY REQUIRE ADJUSTMENT FOR INSTALLATION OF BUS STOPS AND SHELTERS. SEE PLANS FOR LOCATIONS.


R/W LINE
R/W LINE
107' R/W MIN.
℄ CONST.
53'-0"
54'-0"
EXISTING R/W LINE
EXISTING R/W LINE
20'-6"
32'-6"
50'-6"
3'-6"
22'
TRAVEL LANES
22'
33'
TRAVEL LANES
2' SOD LEVEL
SOD
4' SOD LEVEL
4' SOD LEVEL
11'
11'
8'-9"
8'-9"
11'
11'
11'
10'*
6'
NATURAL GROUND
NATURAL GROUND
0.015
0.02
0.02
0.015
SOD - 1:2 OR TO SUIT PROPERTY OWNER, NOT FLATTER THAN 1:6
CONCRETE/ASPHALT SHARED-USE PATH
TYPE F CURB
SOD 1:2 OR TO SUIT PROPERTY OWNER, NOT FLATTER THAN 1:6
CONCRETE SIDEWALK
TYPE F CURB
RECOMMENDED PREFERRED ALTERNATIVE
TYPICAL SECTION 10
STA. 261+21.20 TO STA. 264+08.50
*THE SHARED-USE PATH MAY BE REDUCED TO 8'-0" WIDTH IN CONSTRAINED LOCATIONS
**SIDEWALK LIMITS MAY REQUIRE ADJUSTMENT FOR INSTALLATION OF BUS STOPS AND SHELTERS. SEE PLANS FOR LOCATIONS.

APPENDIX B: PROJECT TRAFFIC DATA

Noise Analysis Traffic Data - Malabar Road PD&E from St. Johns Heritage Parkway to Minton Road
Existing (2020) Conditions

Malabar Road

Mainline Traffic Segment	Number of Lanes	AADT	LOS C AADT	Peak Hour Peak Direction	Off Peak Hour Peak Direction	LOS C Peak Hour Peak Direction	Design Hr. % T	Design Hr. % MT	Design Hr. % HT	Design Hr. % Buses	Design Hr. % Motorcycles	Standard K-factor	D-factor	Posted Speed (mph)
Malabar Road, West of St. Johns Heritage Parkway	2	3,500	7,300	190	130	370	6.62%	2.71%	2.50%	1.40%	1.21%	9.0%	60.0%	35
Malabar Road from St. Johns Heritage Parkway to Wisteria Avenue/Abilene Drive	2	7,200	7,700	440	290	390	4.54%	1.86%	1.72%	0.96%	0.83%	9.0%	60.0%	35/45
Malabar Road from Wisteria Avenue/Abilene Drive to Krassner Drive/Bending Branch Lane	2	7,200	17,600	440	290	870	4.54%	1.86%	1.72%	0.96%	0.83%	9.0%	60.0%	45
Malabar Road from Krassner Drive/Bending Branch Lane to Hurley Boulevard	2	11,000	16,800	550	450	830	4.54%	1.86%	1.72%	0.96%	0.83%	9.0%	60.0%	45
Malabar Road from Hurley Boulevard to Jupiter Boulevard	2	11,000	16,800	550	450	830	5.64%	3.00%	1.68%	0.96%	1.44%	9.0%	55.0%	45
Malabar Road from Jupiter Boulevard to Garvey Road	2	16,000	16,800	830	680	830	2.47%	1.40%	0.74%	0.33%	1.64%	9.0%	55.0%	45
Malabar Road from Garvey Road to Maywood Avenue/Daffodil Drive	2	16,000	16,800	830	680	830	2.47%	1.40%	0.74%	0.33%	1.64%	9.0%	55.0%	45
Malabar Road from Maywood Avenue/Daffodil Drive to Plaza Entrance	2	16,000	16,800	830	680	830	2.47%	1.40%	0.74%	0.33%	1.64%	9.0%	55.0%	35/45
Malabar Road from Plaza Entrance to Malabar Road	4	16,000	15,200	830	680	770	2.47%	1.40%	0.74%	0.33%	1.64%	9.0%	55.0%	35
Malabar Road, East of Minton Road	4	23,000	39,800	1,100	900	2,000	2.01%	1.14%	0.60%	0.26%	1.33%	9.0%	55.0%	45

Intersecting Roadways

Arterial Traffic Segment	Number of Lanes	AADT	LOS C AADT	Peak Hour Peak Direction	Off Peak Hour Peak Direction	LOS C Peak Hour Peak Direction	Design Hr. % T	Design Hr. % MT	Design Hr. % HT	Design Hr. % Buses	Design Hr. % Motorcycles	K-factor	D-factor	Posted Speed (mph)
St. Johns Heritage Parkway														
St. Johns Heritage Parkway - North of Malabar Road	2	5,200	17,600	280	190	870	7.04%	2.89%	2.66%	1.49%	1.29%	9.0%	60.0%	45
Jupiter Boulevard														
Jupiter Boulevard - South of Malabar Road	2	7,100	7,700	360	290	390	3.69%	2.03%	1.10%	0.56%	1.69%	9.0%	55.0%	35
Jupiter Boulevard - North of Malabar Road	2	10,000	16,800	460	440	830	3.71%	2.04%	1.11%	0.56%	1.70%	9.0%	51.0%	40
Garvey Road														
Garvey Road - South of Malabar Road	2	2,700	5,800	140	90	300	8.24%	4.68%	2.46%	1.09%	5.47%	9.0%	60.0%	35
Minton Road														
Minton Road - South of Malabar Road	2	13,000	8,000	740	430	390	0.57%	0.32%	0.17%	0.08%	0.38%	9.0%	63.0%	35
Minton Road - North of Malabar Road	4	22,000	39,800	1,100	900	2,000	2.91%	1.65%	0.87%	0.38%	1.93%	9.0%	55.0%	45

Notes

(1) Posted speed data are obtained by field observation.
(2) Arterial design hour LOS C maximum service volumes are obtained from *FDOT 2020 Generalized Service Volume Tables*.
(3) Arterial K and D factors are obtained from the Project Traffic Analysis Report.
(4) Number of lanes are obtained by field observation.
(5) Classification counts were only collected on Malabar Road between St. Johns Heritage Parkway and Minton Road. Classification counts were not collected on side streets, so sidestreet specific vehicle classification data were not available.
(6) Truck percentages by category on side streets were estimated by using the peak hour intersection sidestreet approach heavy vehicle percentages. The breakdown of heavy vehicle types were assumed to be proportional to that of Malabar Road.

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

Prepared By: _____ Date: _____
Print Name *Signature*

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

City of Palm Bay Reviewer: _____ Date: _____
Print Name *Signature*

Noise Analysis Traffic Data - Malabar Road PD&E from St. Johns Heritage Parkway to Minton Road
No Build (2050) Conditions

Malabar Road														
Mainline Traffic Segment	**Number of Lanes**	**AADT**	**LOS C AADT**	**Peak Hour Peak Direction**	**Off Peak Hour Peak Direction**	**LOS C Peak Hour Peak Direction**	**Design Hr. % T**	**Design Hr. % MT**	**Design Hr. % HT**	**Design Hr. % Buses**	**Design Hr. % Motorcycles**	**Standard K-factor**	**D-factor**	**Posted Speed (mph)**
Malabar Road, West of St. Johns Heritage Parkway	2	10,000	7,300	540	360	370	6.62%	2.71%	2.50%	1.40%	1.21%	9.0%	60.0%	35
Malabar Road from St. Johns Heritage Parkway to Wisteria Avenue/Abilene Drive	2	16,000	7,700	860	570	390	4.54%	1.86%	1.72%	0.96%	0.83%	9.0%	60.0%	35/45
Malabar Road from Wisteria Avenue/Abilene Drive to Krassner Drive/Bending Branch La	2	16,000	17,600	860	570	870	4.54%	1.86%	1.72%	0.96%	0.83%	9.0%	60.0%	45
Malabar Road from Krassner Drive/Bending Branch Lane to Hurley Boulevard	2	16,000	16,800	1,000	820	830	4.54%	1.86%	1.72%	0.96%	0.83%	9.0%	60.0%	45
Malabar Road from Hurley Bouelvard to Jupiter Boulevard	2	21,000	16,800	1,000	820	830	5.64%	3.00%	1.68%	0.96%	1.44%	9.0%	55.0%	45
Malabar Road from Jupiter Boulevard to Garvey Road	2	28,000	16,800	1,400	1,100	830	2.47%	1.40%	0.74%	0.33%	1.64%	9.0%	55.0%	45
Malabar Road from Garvey Road to Maywood Avenue/Daffodil Drive	2	28,000	16,800	1,400	1,100	830	2.47%	1.40%	0.74%	0.33%	1.64%	9.0%	55.0%	45
Malabar Road from Maywood Avenue/Daffodil Drive to Plaza Entrance	2	28,000	16,800	1,400	1,100	830	2.47%	1.40%	0.74%	0.33%	1.64%	9.0%	55.0%	35/45
Malabar Road from Plaza Entrance to Malabar Road	4	28,000	15,200	1,400	1,100	770	2.47%	1.40%	0.74%	0.33%	1.64%	9.0%	55.0%	35
Malabar Road, East of Minton Road	4	23,000	39,800	1,100	900	2,000	2.01%	1.14%	0.60%	0.26%	1.33%	9.0%	55.0%	45
Intersecting Roadways														
Arterial Traffic Segment	**Number of Lanes**	**AADT**	**LOS C AADT**	**Peak Hour Peak Direction**	**Off Peak Hour Peak Direction**	**LOS C Peak Hour Peak Direction**	**Design Hr. % T**	**Design Hr. % MT**	**Design Hr. % HT**	**Design Hr. % Buses**	**Design Hr. % Motorcycles**	**K-factor**	**D-factor**	**Posted Speed (mph)**
St. Johns Heritage Parkway														
St. Johns Heritage Parkway - South of Malabar Road	2	10,000	13,400	540	360	300	0.00%	0.00%	0.00%	0.00%	0.00%	9.0%	60.0%	45
St. Johns Heritage Parkway - North of Malabar Road	2	20,000	17,600	1,100	730	900	7.04%	2.89%	2.66%	1.49%	1.29%	9.0%	60.0%	45
Jupiter Boulevard														
Jupiter Boulevard - South of Malabar Road	2	9,000	7,700	450	370	390	3.69%	2.03%	1.10%	0.56%	1.69%	9.0%	55.0%	35
Jupiter Boulevard - North of Malabar Road	2	12,000	16,800	550	530	830	3.71%	2.04%	1.11%	0.56%	1.70%	9.0%	51.0%	40
Garvey Road														
Garvey Road - South of Malabar Road	2	7,200	5,800	390	260	300	8.24%	4.68%	2.46%	1.09%	5.47%	9.0%	60.0%	35
Minton Road														
Minton Road - South of Malabar Road	2	13,000	8,000	740	430	390	0.57%	0.32%	0.17%	0.08%	0.38%	9.0%	63.0%	35
Minton Road - North of Malabar Road	4	26,000	39,800	1,300	1,100	2,000	2.91%	1.65%	0.87%	0.38%	1.93%	9.0%	55.0%	45

Notes

(1) Posted speed data are obtained by field observation.
(2) Arterial design hour LOS C maximum service volumes are obtained from *FDOT 2020 Generalized Service Volume Tables*.
(3) Arterial K and D factors are obtained from the Project Traffic Analysis Report.
(4) Number of lanes are obtained by field observation.
(5) Classification counts were only collected on Malabar Road between St. Johns Heritage Parkway and Minton Road. Classification counts were not collected on side streets, so sidestreet specific vehicle classification data were not available.
(6) Truck percentages by category on side streets were estimated by using the peak hour intersection sidestreet approach heavy vehicle percentages. The breakdown of heavy vehicle types were assumed to be proportional to that of Malabar Road.

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

Prepared By: _____ Date: _____
Print Name *Signature*

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

City of Palm Bay Reviewer: _____ Date: _____
Print Name *Signature*

Noise Analysis Traffic Data - Malabar Road PD&E from St. Johns Heritage Parkway to Minton Road
Build (2050) Conditions

Malabar Road														
Mainline Traffic Segment	**Number of Lanes**	**AADT**	**LOS C AADT**	**Peak Hour Peak Direction**	**Off Peak Hour Peak Direction**	**LOS C Peak Hour Peak Direction**	**Design Hr. % T**	**Design Hr. % MT**	**Design Hr. % HT**	**Design Hr. % Buses**	**Design Hr. % Motorcycles**	**Standard K-factor**	**D-factor**	**Target Speed (mph)**
Malabar Road, West of St. Johns Heritage Parkway	4	10,000	7,700	540	360	390	6.62%	2.71%	2.50%	1.40%	1.21%	9.0%	60.0%	35
Malabar Road from St. Johns Heritage Parkway to Wisteria Avenue/Abilene Drive	4	16,000	39,800	860	570	2,000	4.54%	1.86%	1.72%	0.96%	0.83%	9.0%	60.0%	45
Malabar Road from Wisteria Avenue/Abilene Drive to Krassner Drive/Bending Branch La	4	16,000	37,900	860	570	1,900	4.54%	1.86%	1.72%	0.96%	0.83%	9.0%	60.0%	45
Malabar Road from Krassner Drive/Bending Branch Lane to Hurley Boulevard	4	21,000	37,900	1,000	820	1,900	4.54%	1.86%	1.72%	0.96%	0.83%	9.0%	60.0%	45
Malabar Road from Hurley Bouelvard to Jupiter Boulevard	4	21,000	37,900	1,000	820	1,900	5.64%	3.00%	1.68%	0.96%	1.44%	9.0%	55.0%	45
Malabar Road from Jupiter Boulevard to Garvey Road	4	28,000	37,900	1,400	1,100	1,900	2.47%	1.40%	0.74%	0.33%	1.64%	9.0%	55.0%	45
Malabar Road from Garvey Road to Maywood Avenue/Daffodil Drive	4	28,000	37,900	1,400	1,100	1,900	2.47%	1.40%	0.74%	0.33%	1.64%	9.0%	55.0%	45
Malabar Road from Maywood Avenue/Daffodil Drive to Plaza Entrance	4	28,000	37,900	1,400	1,100	1,900	2.47%	1.40%	0.74%	0.33%	1.64%	9.0%	55.0%	35/45
Malabar Road from Plaza Entrance to Malabar Road	4	28,000	15,200	1,400	1,100	770	2.47%	1.40%	0.74%	0.33%	1.64%	9.0%	55.0%	35
Malabar Road, East of Minton Road	4	23,000	39,800	1,100	900	2,000	2.01%	1.14%	0.60%	0.26%	1.33%	9.0%	55.0%	45
Intersecting Roadways														
Arterial Traffic Segment	**Number of Lanes**	**AADT**	**LOS C AADT**	**Peak Hour Peak Direction**	**Off Peak Hour Peak Direction**	**LOS C Peak Hour Peak Direction**	**Design Hr. % T**	**Design Hr. % MT**	**Design Hr. % HT**	**Design Hr. % Buses**	**Design Hr. % Motorcycles**	**K-factor**	**D-factor**	**Posted Speed (mph)**
St. Johns Heritage Parkway														
St. Johns Heritage Parkway - South of Malabar Road	2	10,000	17,600	540	360	870	0.00%	0.00%	0.00%	0.00%	0.00%	9.0%	60.0%	45
St. Johns Heritage Parkway - North of Malabar Road	2	20,000	17,600	1,100	730	870	7.04%	2.89%	2.66%	1.49%	1.29%	9.0%	60.0%	45
Jupiter Boulevard														
Jupiter Boulevard - South of Malabar Road	2	9,000	7,700	450	370	390	3.69%	2.03%	1.10%	0.56%	1.69%	9.0%	55.0%	35
Jupiter Boulevard - North of Malabar Road	2	12,000	16,800	550	530	830	3.71%	2.04%	1.11%	0.56%	1.70%	9.0%	51.0%	40
Garvey Road														
Garvey Road - South of Malabar Road	2	7,200	7,700	390	260	390	8.24%	4.68%	2.46%	1.09%	5.47%	9.0%	60.0%	35
Minton Road														
Minton Road - South of Malabar Road	2	13,000	8,000	740	430	410	0.57%	0.32%	0.17%	0.08%	0.38%	9.0%	63.0%	35
Minton Road - North of Malabar Road	4	26,000	39,800	1,300	1,100	2,000	2.91%	1.65%	0.87%	0.38%	1.93%	9.0%	55.0%	45

Notes
(1) Target speed determined as part of build alternative. Posted speed data are obtained by field observation.
(2) Arterial design hour LOS C maximum service volumes are obtained from *FDOT 2020 Generalized Service Volume Tables*.
(3) Arterial K and D factors are obtained from the Project Traffic Analysis Report.
(4) Number of lanes are obtained by field observation.

APPENDIX C: PREDICTED NOISE LEVELS

NOISE-SENSITIVE SITES				PREDICTED NOISE LEVELS DB(A)				
Receptor ID (Impacted)	# Sites Represented	Activity Category	NAC Impact Criterion (dB(A))	2020 Existing Noise Level	2050 No-Build Noise Level	2050 Project Design Year		
						Build Noise Level	Change From Existing	Consider Abatement
NSA 1: S. of Malabar Rd from St. Johns Heritage Pkwy to MTDD Canal #8 - Illustrated on Appendix D page D-1								
There are no noise-sensitive sites in this NSA.								
NSA 1 Summary (Totals/Averages)	**0**			**0**	**0**	**0**	**0**	**0**
NSA 2: N. of Malabar Rd from St. Johns Heritage Pkwy to MTDD Canal #8 - Illustrated on Appendix D page D-1								
2-1	1	B	66.0	52.3	57.2	55.9	3.6	
2-2	7	B	66.0	50.5	54.5	53.8	3.3	
2-3	2	B	66.0	48.5	51.1	51.5	3.0	
2-4	2	B	66.0	48.3	50.6	51.4	3.1	
2-5	2	B	66.0	48.5	50.4	51.5	3.0	
2-6	2	B	66.0	48.8	50.3	51.7	2.9	
2-7	2	B	66.0	49.2	50.4	52.0	2.8	
2-8	2	B	66.0	50.1	50.9	52.9	2.8	
2-9	2	B	66.0	51.6	52.1	54.4	2.8	
2-10	2	B	66.0	52.1	52.5	55.3	3.2	
2-11	1	B	66.0	52.4	52.8	55.2	2.8	
2-12	1	B	66.0	53.1	53.4	56.4	3.3	
2-13	2	B	66.0	47.6	48.4	50.6	3.0	
2-14	1	C	66.0	47.6	48.3	50.7	3.1	
2-15	1	B	66.0	52.6	52.8	55.6	3.0	
2-16	1	B	66.0	52.2	52.5	55.1	2.9	
2-17	9	B	66.0	52.4	52.6	55.2	2.8	
2-18	1	B	66.0	49.9	50.1	52.9	3.0	
2-19	1	B	66.0	47.8	48.1	50.9	3.1	
2-20	9	B	66.0	46.8	47.5	49.5	2.7	
2-21	1	B	66.0	45.5	46.1	48.7	3.2	
NSA 2 Summary (Totals/Averages)	**52**			**49.9**	**51.1**	**52.9**	**3.0**	**0**
NSA 3: S. of Malabar Rd from MTDD Canal #8 to MTDD Canal #10 - Illustrated on Appendix D pages D-2 thru D-4								
3-1	1	B	66.0	48.9	50.8	53.0	4.1	
3-2	1	B	66.0	57.3	60.0	60.5	3.2	
3-3	8	B	66.0	57.8	60.6	61.1	3.3	
3-4	1	B	66.0	57.4	60.2	60.7	3.3	
3-5	1	B	66.0	55.5	58.3	59.1	3.6	
3-6	1	B	66.0	52.7	55.6	56.1	3.4	
3-7	5	B	66.0	48.2	50.7	51.4	3.2	
3-8	1	B	66.0	46.8	49.3	49.5	2.7	
3-9	1	B	66.0	50.3	53.1	53.5	3.2	

NOISE-SENSITIVE SITES				PREDICTED NOISE LEVELS DB(A)				
Receptor ID (Impacted)	# Sites Represented	Activity Category	NAC Impact Criterion (dB(A))	2020 Existing Noise Level	2050 No-Build Noise Level	2050 Project Design Year		
						Build Noise Level	Change From Existing	Consider Abatement
3-10	1	B	66.0	48.8	51.6	51.8	3.0	
3-11	1	B	66.0	48.6	51.4	51.7	3.1	
3-12	1	B	66.0	49.7	52.5	52.8	3.1	
3-13	1	B	66.0	51.4	54.3	54.9	3.5	
3-14	1	B	66.0	55.2	58.1	58.6	3.4	
3-15	17	B	66.0	60.0	62.9	59.7	-0.3	
3-16	11	B	66.0	49.9	52.8	52.3	2.4	
3-17	1	C	66.0	50.3	53.0	52.3	2.0	
3-18	1	B	66.0	56.5	59.3	56.6	0.1	
3-19	1	B	66.0	52.2	54.8	53.6	1.4	
3-20	1	B	66.0	50.2	52.8	52.3	2.1	
3-21	1	B	66.0	52.4	54.9	54.7	2.3	
3-22	1	B	66.0	55.3	57.7	57.2	1.9	
3-23	1	B	66.0	58.3	60.6	60.3	2.0	
3-24	1	B	66.0	60.0	62.2	62.6	2.6	
3-25	9	B	66.0	60.7	62.8	65.2	4.5	
3-26	1	B	66.0	57.6	59.7	62.6	5.0	
3-27	1	C	66.0	50.5	52.8	53.9	3.4	
3-28	7	B	66.0	52.1	54.3	55.9	3.8	
3-29	1	B	66.0	54.2	56.3	58.9	4.7	
3-30	1	B	66.0	51.2	53.4	55.8	4.6	
NSA 3 Summary (Totals/Averages)	**81**			**53.3**	**55.9**	**56.3**	**3.0**	**0**
NSA 4: N. of Malabar Rd from MTDD Canal #8 to MTDD Canal #10 - Illustrated on Appendix D pages D-2 thru D-4								
4-1	1	B	66.0	60.8	60.8	65.2	4.4	
4-2	1	B	66.0	53.8	53.9	59.2	5.4	
4-3	1	B	66.0	48.2	48.5	53.2	5.0	
4-4	1	B	66.0	55.3	55.4	60.2	4.9	
4-5	4	B	66.0	49.3	49.6	54.8	5.5	
4-6	1	B	66.0	56.1	56.2	60.5	4.4	
4-7	3	B	66.0	56.0	56.4	60.5	4.5	
4-8	3	B	66.0	56.7	58.3	60.7	4.0	
4-9	1	B	66.0	56.7	59.6	60.0	3.3	
4-10	5	B	66.0	51.2	53.5	55.5	4.3	
4-11	1	B	66.0	50.7	53.4	54.1	3.4	
4-12	1	B	66.0	62.7	65.5	65.4	2.7	
4-13	1	B	66.0	49.1	51.9	53.0	3.9	
4-14	8	B	66.0	59.2	62.1	60.9	1.7	
4-15	1	B	66.0	60.0	62.6	61.6	1.6	
4-16	1	B	66.0	48.6	51.4	52.4	3.8	

NOISE-SENSITIVE SITES				PREDICTED NOISE LEVELS DB(A)				
Receptor ID (Impacted)	# Sites Represented	Activity Category	NAC Impact Criterion (dB(A))	2020 Existing Noise Level	2050 No-Build Noise Level	2050 Project Design Year		
						Build Noise Level	Change From Existing	Consider Abatement
4-17	6	B	66.0	52.8	55.5	54.9	2.1	
4-18	4	B	66.0	59.9	62.0	62.7	2.8	
4-19	5	B	66.0	55.1	57.2	57.7	2.6	
4-20	1	B	66.0	59.8	61.9	62.3	2.5	
4-21	1	B	66.0	56.6	58.7	59.5	2.9	
4-22	1	B	66.0	53.8	55.9	56.8	3.0	
NSA 4 Summary (Totals/Averages)	**52**			**55.1**	**56.8**	**58.7**	**3.6**	**0**
5-1	1	B	66.0	52.9	55.0	57.2	4.3	
5-2	1	B	66.0	57.9	60.0	62.5	4.6	
5-3	7	B	66.0	57.1	59.1	61.6	4.5	
5-4	1	B	66.0	57.0	59.0	61.8	4.8	
5-5	4	B	66.0	51.1	53.2	55.8	4.7	
5-6	3	B	66.0	64.1	**66.2**	76.4	12.3	**In ROW**
5-7	7	B	66.0	58.3	60.3	63.9	5.6	
5-8	7	B	66.0	52.2	54.2	57.0	4.8	
5-9	1	B	66.0	61.3	63.3	66.5	5.2	**In ROW**
5-10	1	B	66.0	57.3	59.3	62.6	5.3	
5-11	3	B	66.0	57.0	59.0	61.2	4.2	
5-12	1	B	66.0	56.2	58.2	60.4	4.2	
NSA 5 Summary (Totals/Averages)	**37**			**56.9**	**58.9**	**62.2**	**5.4**	**0**
NSA 6: N. of Malabar Rd from MTDD Canal #10 to Jupiter Blvd - Illustrated on Appendix D pages D-5 thru D-6								
6-1	1	B	66.0	57.9	60.0	59.7	1.8	
6-2	7	B	66.0	59.2	61.2	61.0	1.8	
6-3	1	B	66.0	59.7	61.7	61.1	1.4	
6-4	3	B	66.0	52.4	54.5	55.7	3.3	
6-5	3	B	66.0	53.9	56.0	56.4	2.5	
6-6	1	B	66.0	59.3	61.4	60.4	1.1	
6-7	1	B	66.0	58.9	60.9	60.3	1.4	
6-8	1	B	66.0	56.1	58.1	58.0	1.9	
6-9	5	B	66.0	61.0	63.1	62.5	1.5	
6-10	1	B	66.0	61.0	63.1	62.6	1.6	
6-11	4	B	66.0	53.3	55.4	56.5	3.2	
6-12	1	B	66.0	54.0	56.1	57.4	3.4	
6-13	1	B	66.0	58.5	60.6	61.1	2.6	
6-14	1	B	66.0	61.3	63.2	63.9	2.6	
6-15	2	B	66.0	61.3	62.5	63.7	2.4	

NOISE-SENSITIVE SITES				PREDICTED NOISE LEVELS DB(A)				
Receptor ID (Impacted)	# Sites Represented	Activity Category	NAC Impact Criterion (dB(A))	2020 Existing Noise Level	2050 No-Build Noise Level	2050 Project Design Year		
						Build Noise Level	Change From Existing	Consider Abatement
NSA 6 Summary (Totals/Averages)	**33**			**57.9**	**59.9**	**60.0**	**2.2**	**0**
NSA 7: S. of Malabar Rd from Jupiter Blvd to Maywood/Daffodil - Illustrated on Appendix D pages D-6 thru D-9								
7-1	1	B	66.0	61.0	61.1	65.3	4.3	
7-2	1	B	66.0	56.4	56.6	59.6	3.2	
7-3	1	B	66.0	57.1	57.2	61.1	4.0	
7-4	2	B	66.0	57.6	57.7	61.9	4.3	
7-5	1	B	66.0	60.4	60.5	65.3	4.9	
7-6	1	B	66.0	58.6	58.6	63.3	4.7	
7-7	1	B	66.0	56.9	56.9	60.9	4.0	
7-8	1	B	66.0	58.4	58.4	63.5	5.1	
7-9	2	B	66.0	61.5	61.5	**67.6**	6.1	**Yes**
7-10	1	B	66.0	53.3	53.3	57.5	4.2	
7-11	1	B	66.0	55.4	55.5	59.8	4.4	
7-12	1	C	66.0	**66.0**	**67.0**	**69.6**	3.6	**Yes**
7-12.1	2	C	66.0	65.3	65.3	**70.8**	5.5	**Yes**
7-12.2	1	C	66.0	62.4	62.4	65.2	2.8	
7-13	1	B	66.0	61.6	61.6	64.8	3.2	
7-14	7	B	66.0	58.3	58.3	61.5	3.2	
7-15	1	B	66.0	56.6	56.6	59.1	2.5	
7-16	1	B	66.0	54.4	54.5	57.3	2.9	
7-17	8	B	66.0	53.5	53.5	57.2	3.7	
7-18	1	B	66.0	53.6	53.6	57.9	4.3	
7-19	1	B	66.0	59.1	59.1	63.3	4.2	
7-20	1	B	66.0	56.2	56.2	60.3	4.1	
7-21	1	B	66.0	54.0	54.0	58.3	4.3	
7-22	1	B	66.0	52.5	52.5	56.8	4.3	
NSA 7 Summary (Totals/Averages)	**40**			**57.9**	**58.0**	**62.0**	**4.1**	**5**
NSA 8: N. of Malabar Rd from Jupiter Blvd to Maywood/Daffodil - Illustrated on Appendix D pages D-4 thru D-7								
8-1	2	B	66.0	61.8	62.2	64.8	3.0	
8-2	1	B	66.0	58.1	58.5	60.4	2.3	
8-3	1	B	66.0	58.5	58.6	62.5	4.0	
8-4	1	B	66.0	63.3	63.4	65.9	2.6	
8-5	4	B	66.0	59.6	59.6	63.2	3.6	
8-6	1	B	66.0	59.6	59.7	63.1	3.5	
8-7	1	B	66.0	62.8	62.8	64.6	1.8	
8-8	1	B	66.0	58.9	59.0	62.3	3.4	

NOISE-SENSITIVE SITES				PREDICTED NOISE LEVELS DB(A)				
Receptor ID (Impacted)	# Sites Represented	Activity Category	NAC Impact Criterion (dB(A))	2020 Existing Noise Level	2050 No-Build Noise Level	2050 Project Design Year		
						Build Noise Level	Change From Existing	Consider Abatement
8-9	1	C	66.0	59.2	59.2	62.3	3.1	
8-10	1	B	66.0	63.3	63.3	64.9	1.6	
8-11	1	B	66.0	59.1	59.2	62.0	2.9	
8-12	1	B	66.0	57.0	57.0	59.4	2.4	
8-13	1	B	66.0	59.9	60.0	62.1	2.2	
8-14	1	B	66.0	54.6	54.7	57.1	2.5	
8-15	7	B	66.0	61.3	61.4	62.2	0.9	
8-16	7	B	66.0	56.7	56.7	57.7	1.0	
8-17	12	B	66.0	60.5	60.6	61.1	0.6	
8-18	11	B	66.0	54.8	54.9	56.9	2.1	
8-19	1	B	66.0	59.4	59.4	61.7	2.3	
8-20	1	B	66.0	55.2	55.2	57.0	1.8	
NSA 8 Summary (Totals/Averages)	**57**			**59.2**	**59.3**	**61.6**	**2.4**	**0**
NSA 9: S. of Malabar Rd from Maywood/Daffodil to Minton Rd - Illustrated on Appendix D pages D-x thru D-x								
There are no noise-sensitive sites in this NSA.								
NSA 9 Summary (Totals/Averages)	**0**			**0**	**0**	**0**	**0**	**0**
NSA 10: N. of Malabar Rd from Maywood/Daffodil to Minton Rd - Illustrated on Appendix D pages D-x thru D-x								
10-1	1	B	66.0	59.7	59.7	60.0	0.3	
10-2	1	E	71.0	62.0	62.0	64.4	2.4	
NSA 10 Summary (Totals/Averages)	**2**			**60.9**	**60.9**	**62.2**	**1.4**	**0**

APPENDIX D: PROJECT AERIALS

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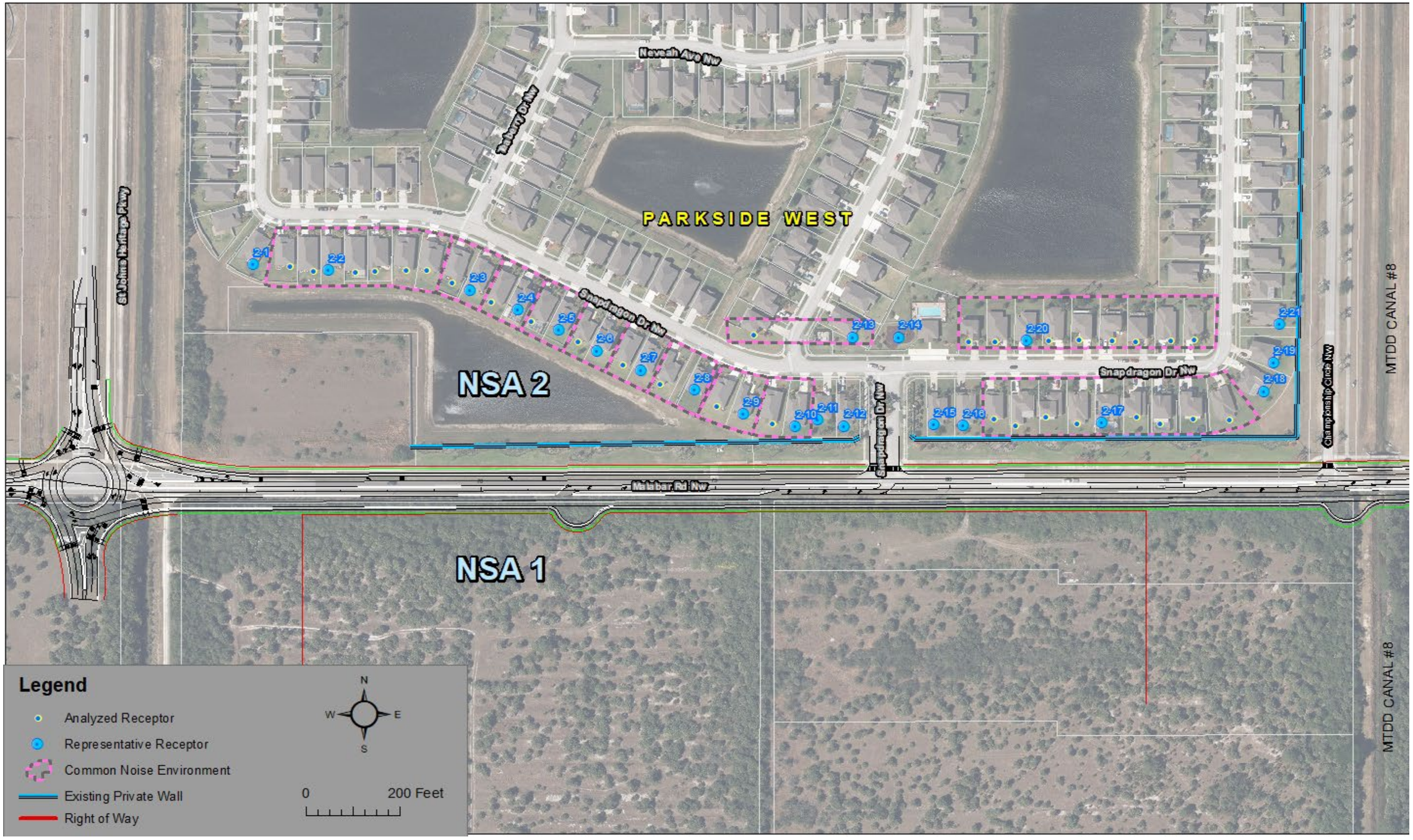

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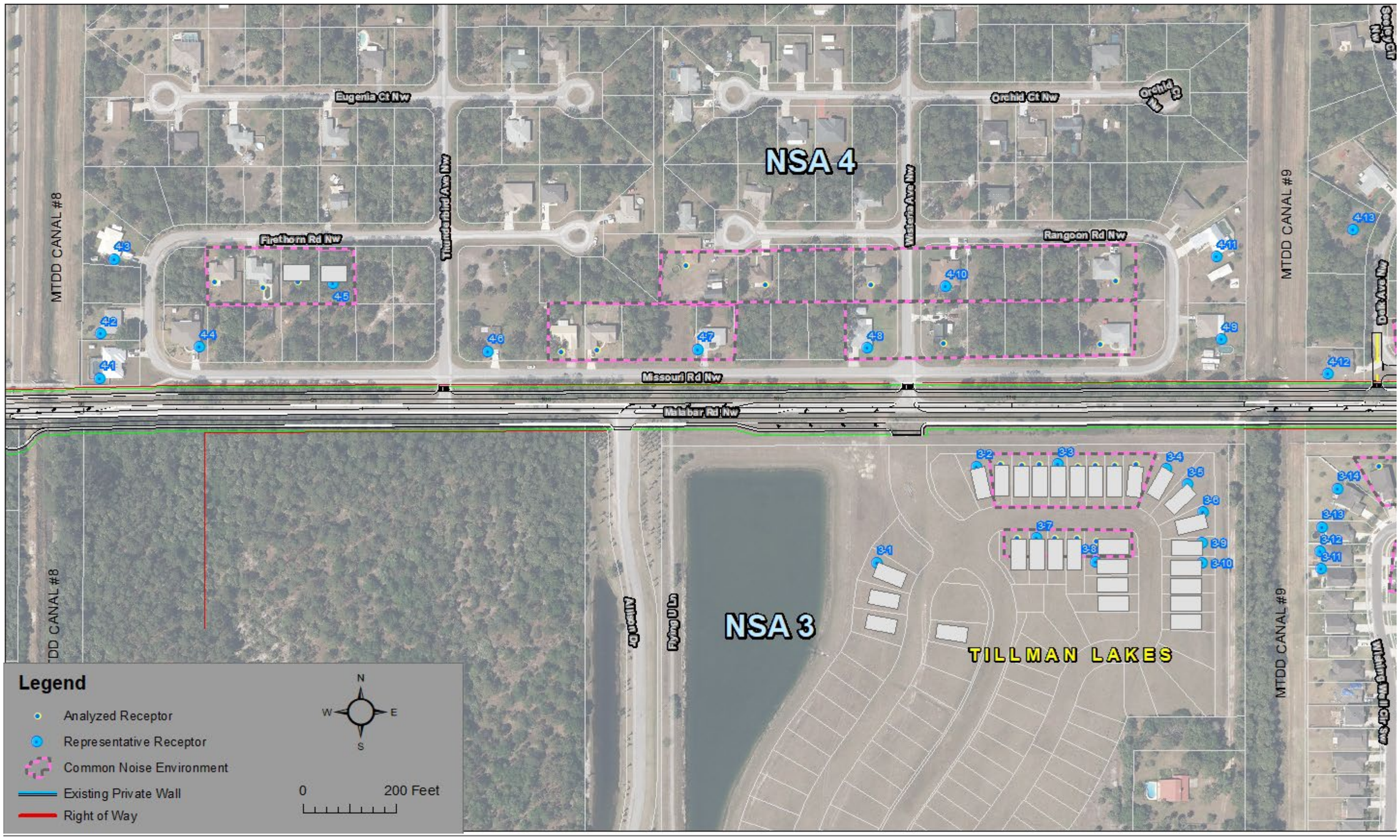
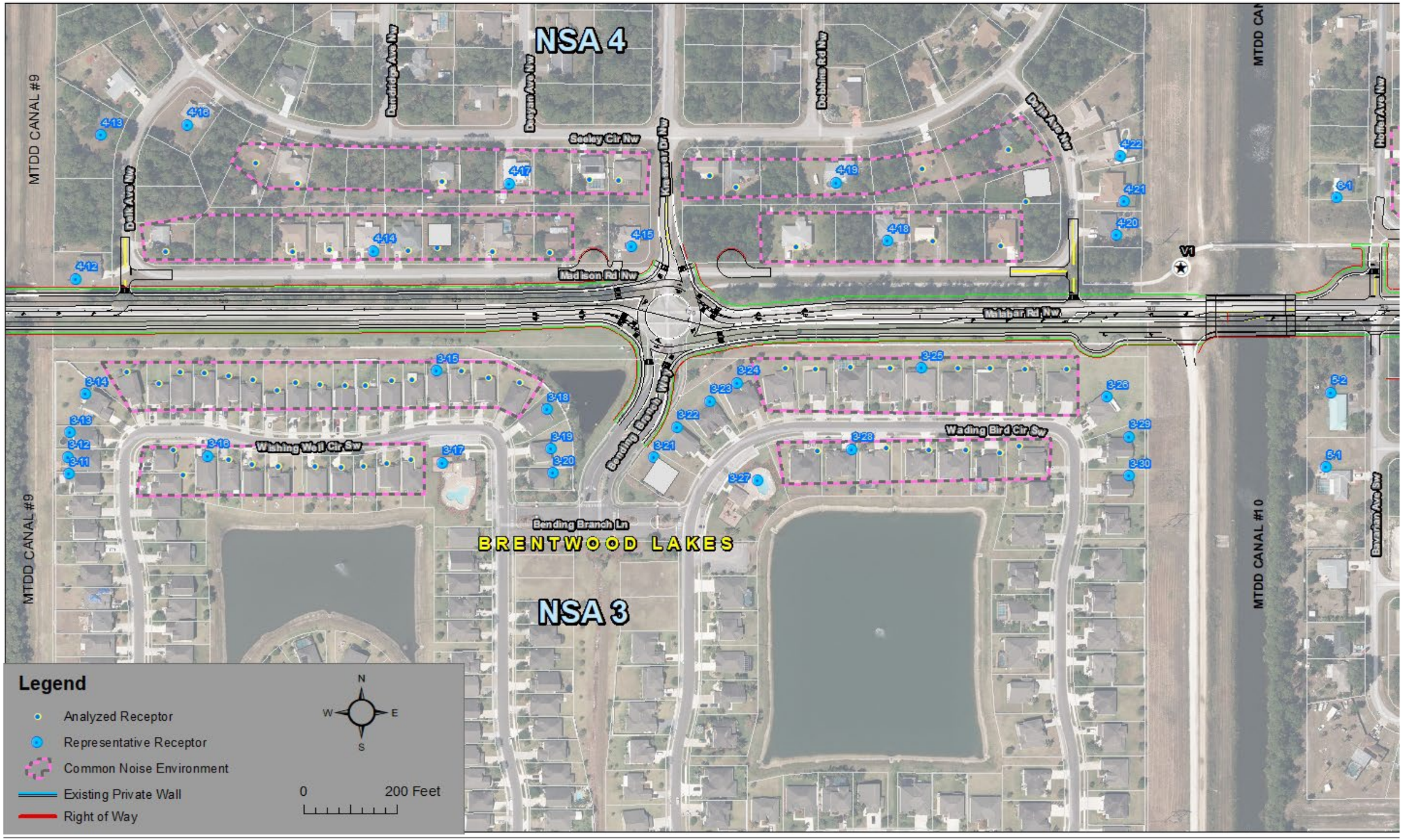
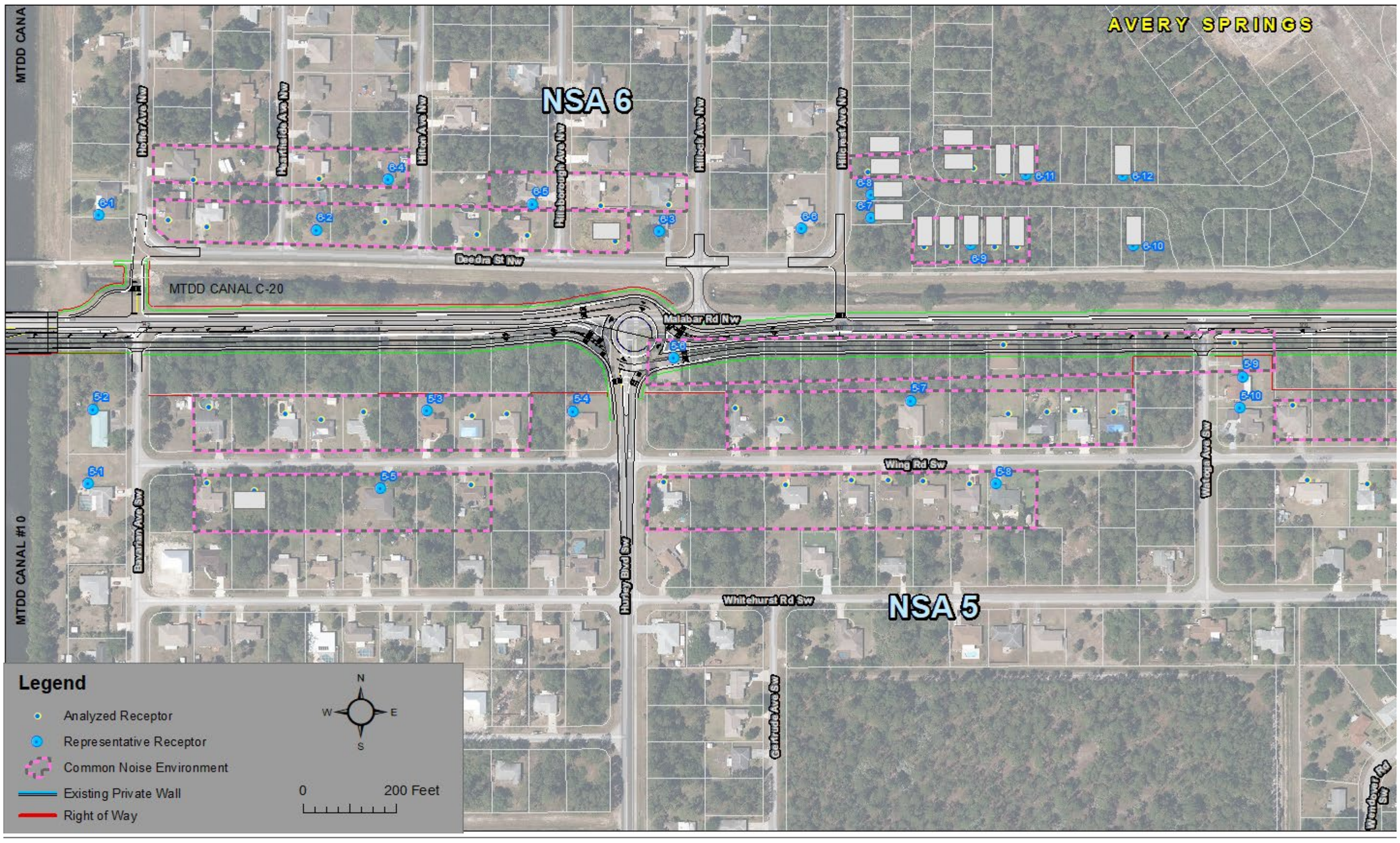
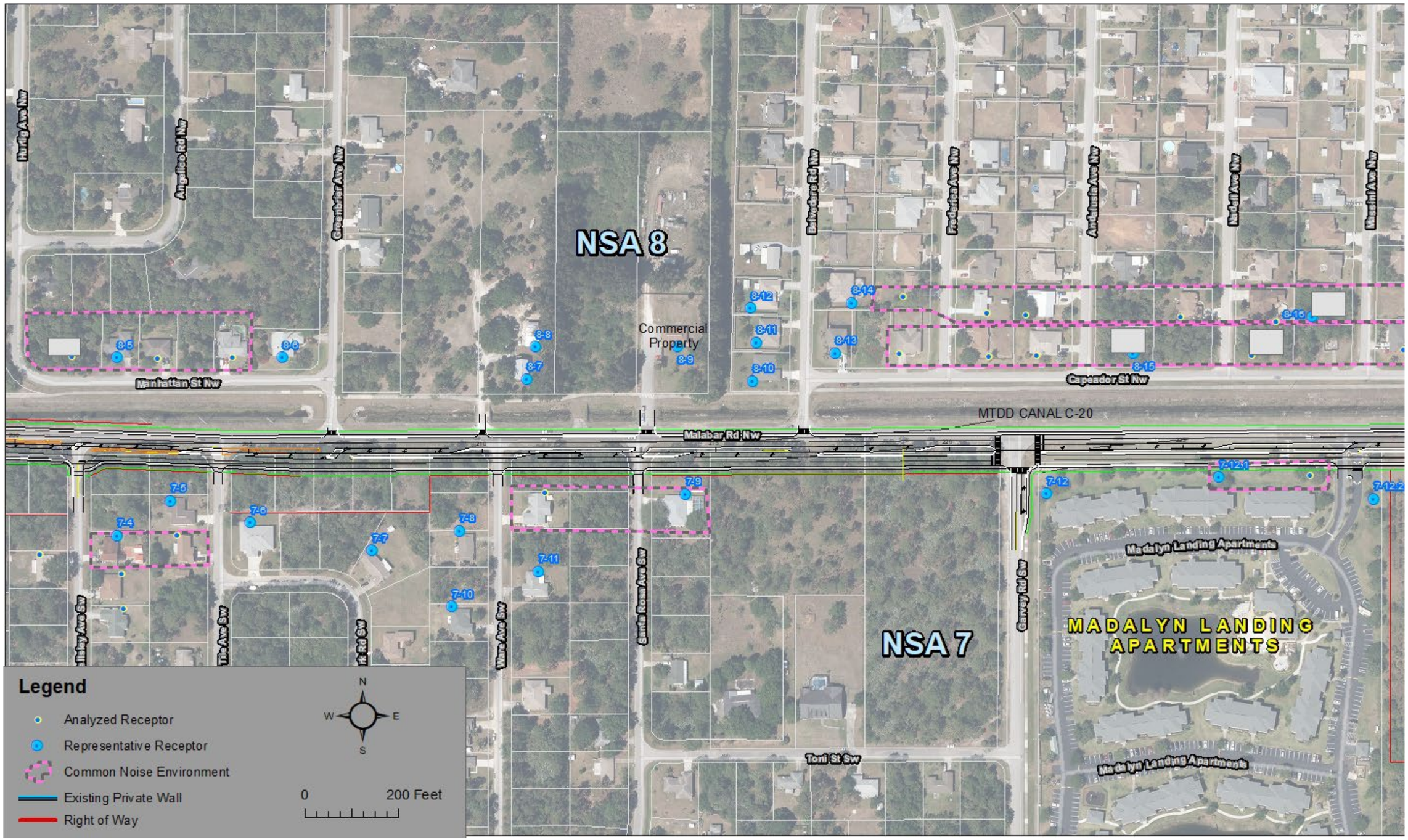


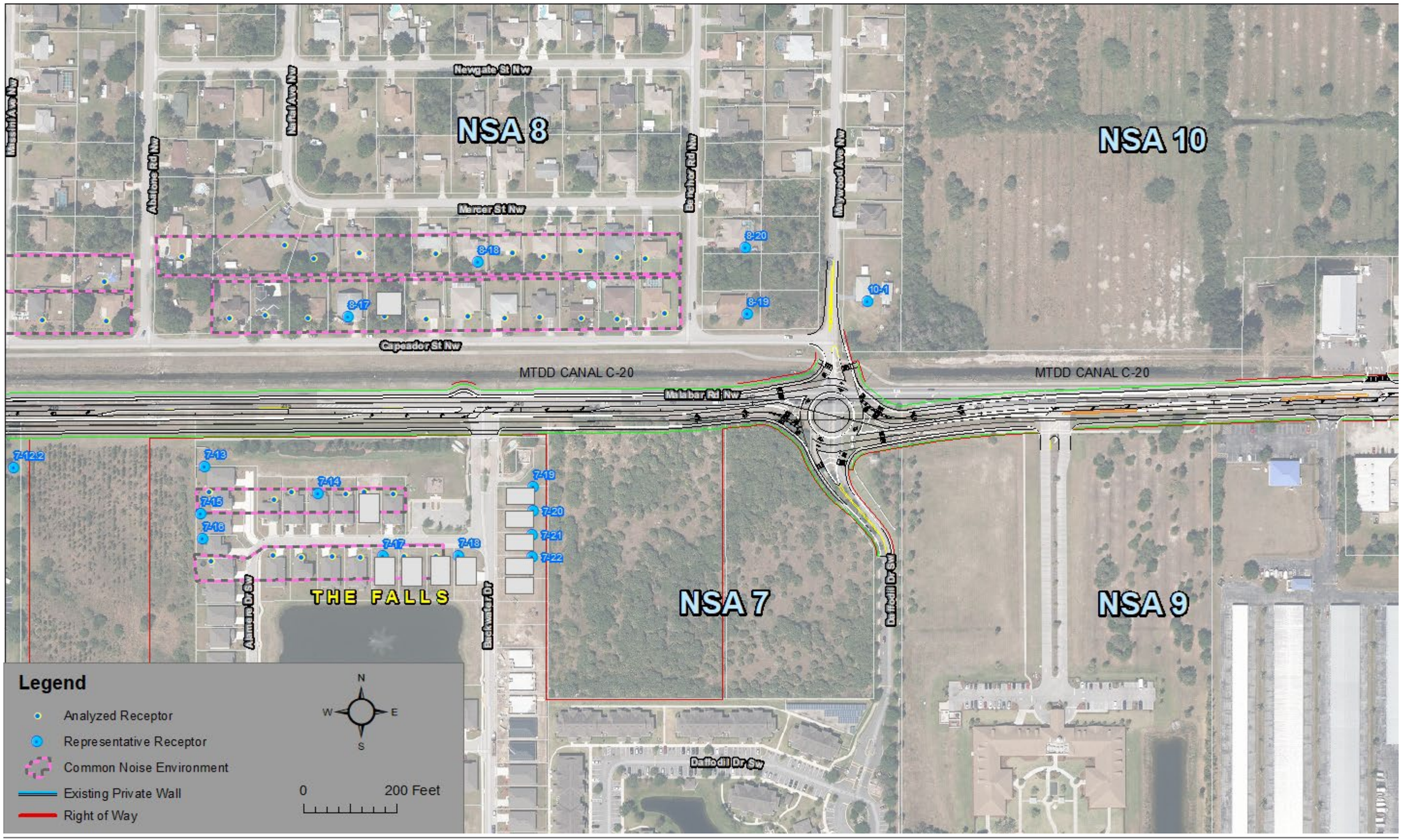

NSA 4
NSA 3
MTDD CANAL #9
MTDD CANAL #10
MTDD CAN
Dell Ave Nw
Dandridge Ave Nw
Bryan Ave Nw
Sedley Cir Nw
Kansas St Nw
Dobbins Rd Nw
Dolle Ave Nw
Hefner Ave Nw
Madison Rd Nw
Malabar Rd Nw
Wishing Well Cir Sw
Bending Branch Ln
Wading Bird Cir Sw
Bryan Ave Sw
BRENTWOOD LAKES
V1
4-12
4-13
4-14
4-15
4-16
4-17
4-18
4-19
4-20
4-21
4-22
3-11
3-12
3-13
3-14
3-15
3-16
3-17
3-18
3-19
3-20
3-21
3-22
3-23
3-24
3-25
3-26
3-27
3-28
3-29
3-30
5-1
5-2
6-1
Legend
Analyzed Receptor
Representative Receptor
Common Noise Environment
Existing Private Wall
Right of Way
N
W
E
S
0
200 Feet

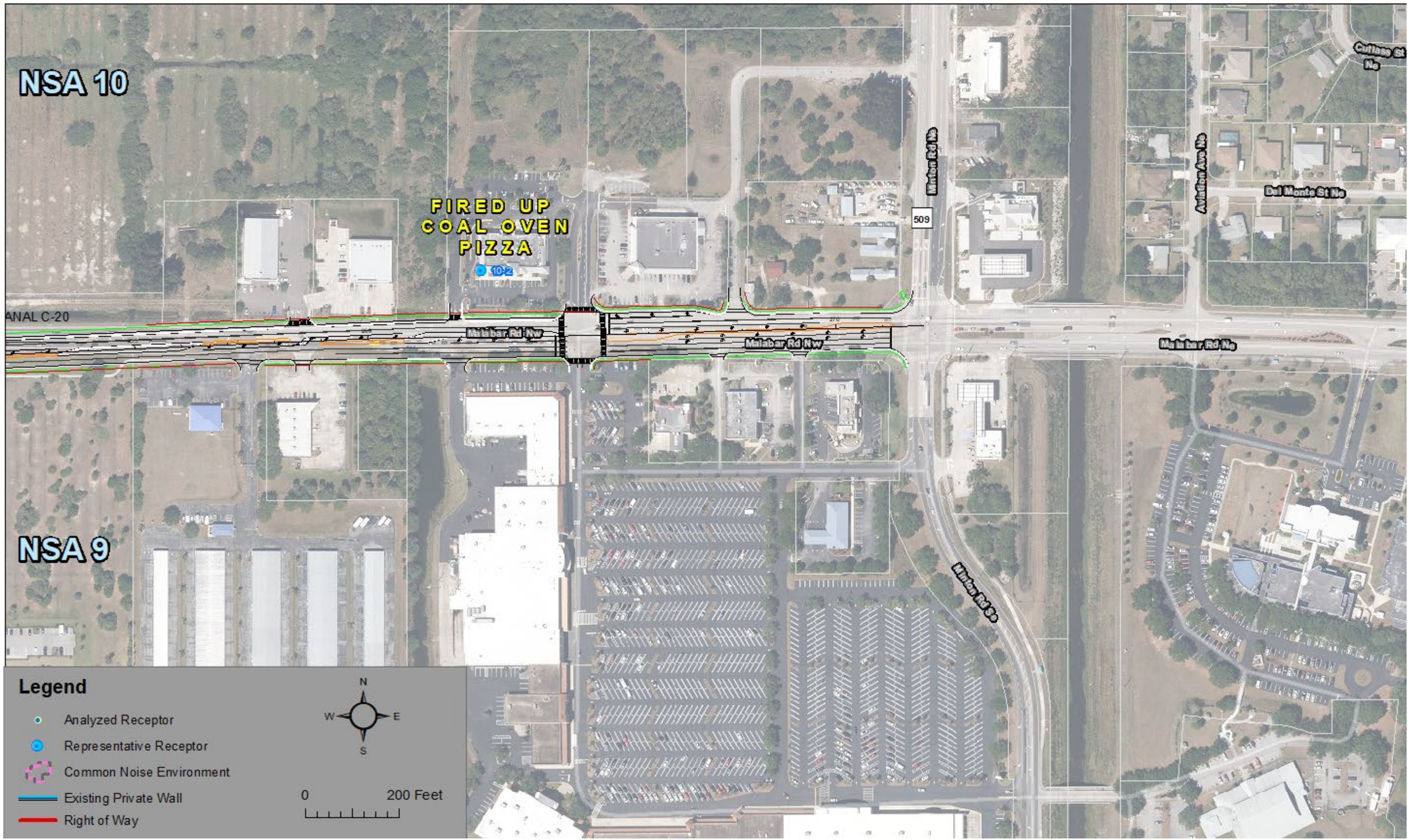

AVERY SPRINGS
NSA 6
NSA 5
MTDD CANAL C-20
MTDD CANAL #10
Deedra St Nw
Malabar Rd Nw
Wing Rd Sw
Whitehurst Rd Sw
Hillcrest Ave Nw
Hillcrest Ave Sw
Hillcrest Rd Sw
Bayham Ave Sw
Gertrude Ave Sw
Legend
Analyzed Receptor
Representative Receptor
Common Noise Environment
Existing Private Wall
Right of Way
N
W
E
S
0
200 Feet


NSA 6
NSA 8
NSA 5
NSA 7
MTDD CANAL C-20
Malabar Rd Nw
Jupiter Blvd Nw
Jupiter Blvd Sw
Sanford St Sw
6-11
6-12
6-13
6-14
6-15
8-1
8-2
8-3
8-4
7-1
7-2
7-3
Legend
Analyzed Receptor
Representative Receptor
Common Noise Environment
Existing Private Wall
Right of Way
N
W
E
S
0
200 Feet

APPENDIX D: PROJECT AERIALS




NSA 8
NSA 10
NSA 7
NSA 9
THE FALLS
Newgate St Nw
Mercer St Nw
Capeador St Nw
MTDD CANAL C-20
MTDD CANAL C-20
Malabar Rd Nw
Daffodil Dr Sw
Backwater Dr
Alamanda Dr Sw
Legend
Analyzed Receptor
Representative Receptor
Common Noise Environment
Existing Private Wall
Right of Way
N
W
E
S
0
200 Feet


NSA 10
NSA 9
FIRED UP
COAL OVEN
PIZZA
10-2
ANAL C-20
Malabar Rd NW
Malabar Rd NW
Malabar Rd NE
Minton Rd NE
Minton Rd SE
Aviation Ave NE
Del Monte St NE
Cutlass St NE
509
Legend
Analyzed Receptor
Representative Receptor
Common Noise Environment
Existing Private Wall
Right of Way
N
W
E
S
0
200 Feet