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| To:   | File                                  | From: | Timothy W. A. Ogle, MS |
|       | FDOT District Six                     |       | Coral Gables, FL       |
| File: | GGIMTF Noise Study Report<br>Addendum | Date: | November 3, 2016       |

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The Florida Department of Transportation (FDOT) is in the process of designing improvements to the existing Golden Glades Multimodal Transportation Facility (GGMTF) at the Golden Glades Interchange (GGI) in North Miami. The GGMTF is located at the southwest quadrant of the GGI in northern Miami-Dade County. The project's study area is bordered to the north by the South Florida Rail Corridor (SFRC), State Road (SR) 9A(I-95) to the east and NW 159<sup>th</sup> Street/Block to the south (please see **Figure 1** – Project Location Map). Only the GGMTF is advancing to the construction phase at this time.

This Noise Study Report (NSR) Addendum presents the results of a Final Design Phase noise analysis for this project. The purpose of this Design Phase noise analysis is to update the results of the Project Development and Environment (PD&E) Phase noise analysis for the project, including design changes that have been implemented since the PD&E Phase, and for current conditions along the project corridor. This report presents a description of the methodologies used to perform the noise analysis, the predicted Design Year (2040) traffic noise levels, the noise barrier design concepts and the results of a noise barrier cost reasonableness analysis.

### **Existing Conditions**

The existing GGMTF is made up of two FDOT owned Park-and-Ride (PNR) lots, as well as adjacent roadways and ramps, including SR 9 and US 441/SR 7/ NW 7th Avenue. The two FDOT owned PNR lots consist of a 20 acre lot for the GGMTF on the west side and a 15 acre lot for the Truck Travel Center (GGTTC) on the east.

### **Project Background**

A PD&E Study was completed for the GGMTF in 2006. At the time, the preferred alternative included the construction of an 800-vehicle parking garage with transit and inter-city bus bays on the ground floor level. The facility included a covered 'Hub' Plaza with passenger waiting areas and amenities; areas for transit supportive joint development (e.g., retail); an enclosed pedestrian bridge to connect the SFRTA station with the garage, and office space within the terminal to accommodate administrative and operations staff as well as Intelligent Transportation Systems (ITS) equipment. In addition, the 2006 GGMTF included kiss & ride areas for passenger pick-ups and drop-offs and remote parking along the fringes of the property; pedestrian facilities; and, minor roadway improvements, mostly to SR 7, focusing on access/egress to the facility and correcting safety and operational deficiencies. The 2006 GGMTF PD&E preferred alternative also included incorporating joint development within the covered hub plaza; a traffic management center; a sheriff's station; and a chamber of commerce office.

### **Design with community in mind**

During the 2006 PD&E Phase noise analysis, it was determined that the only noise sensitive sites with potential to be impacted by the planned improvements were residences in the Centre Lake Apartments located along the SR 9/SR 7 connector roadway that borders the south side of the GGI PNR facility. Although the project was not moving the edge of pavement of the SR 9/SR 7 connector closer to the apartment complex, the planned improvements were expected to result in traffic noise impacts at approximately eight (8) nearby residences. However, the noise level with the planned improvements was only predicted to be 66.0 dB(A), which matches the FDOT Noise Abatement Criteria (NAC) for residences. Also, the predicted noise levels would be no more than 0.5 dB(A) greater than the existing levels and slightly lower than the design year no-build noise levels. Therefore, noise abatement was not considered to be reasonable for these impacted homes and none was recommended.

### **Design Changes**

The major design changes for the GGMTF PD&E Study Reevaluation are described below.

New items proposed for the GGMTF portion of the project being advanced at this time include: transit and Intercity bus platforms; a retail and transit hub facility; roadway improvements within the GGMTF; surface parking; a 4-story parking garage; and a pedestrian bridge between the proposed parking garage and the existing pedestrian Tri-Rail Bridge.

Planned improvements to SR 7 and SR 9 that were originally included in the 2006 PD&E Study in order to improve traffic circulation in and around the GGMTF will now be designed and built as a separate project (the Ultimate Configuration FM # 425637-4-52-01), which will be a design-bid-build project. The scope of this separate project includes improvements to the roadway system surrounding GGMTF; including, SR 7/US 441/NW 7th Avenue, the connector road between SR 9 and SR 7 along the south of the GGMTF (SR 9/SR 7 Connector Road) and a new signalized intersection at SR 9 and the SR 9/SR 7 Connector Road.

Finally, the separate GGTC project (FM# 423373-4-52-01) will include the following new items not found in the original PD&E: a maintenance facility with static scale; a truck wash with leaky load containment; an FHP emergency management area; a truck electrification system; vehicle and diesel fuel pump and also 144 parking spaces.

### **Methodology**

The currently proposed project design has been reevaluated for potential effects to noise levels, the impact status of nearby noise sensitive sites and to assess the reasonableness and feasibility of providing noise abatement. This noise analysis has been conducted in accordance with Title 23 of the Code of Federal Regulations Part 772 (23 CFR 772), *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (July 13, 2010) and Part 2 of the FDOT PD&E Manual, Chapter 17 – *Noise* (dated July 27, 2016). Both 23 CFR 772 and Chapter 17 have been revised since the PD&E phase noise analysis was completed; however, the revisions to these regulations and guidance materials do not affect the scope or the results of this noise analysis.

### **Design with community in mind**

The Federal Highway Administration's (FHWA) Traffic Noise Model (TNM) Version 2.5 (February 2004) was used to predict traffic noise levels and the effectiveness of various noise barrier design concepts. This model estimates the acoustic intensity at a noise sensitive site (the receptor) from a series of roadway segments (the source). Model-predicted noise levels are influenced by several factors, such as vehicle speed and distribution of vehicle types. Noise levels are also affected by characteristics of the source-to-receptor site path, including the effects of intervening barriers, obstructions (houses, trees, etc.), ground surface type (hard or soft) and topography.

The revised project geometry and updated traffic data were used for this analysis. Also, inputs from TNM files developed for the project during the PD&E phase were modified for the purposes of this analysis. Representative model receptor locations were used in the TNM model inputs to estimate noise levels associated with the planned improvements within the project study area. The representative sites were chosen based on noise sensitivity, roadway proximity, anticipated impacts from the proposed project, and homogeneity (i.e., the site is representative of other nearby sites). Traffic noise levels were predicted at the edge of the dwelling unit closest to the nearest primary roadway.

The developed properties along the project corridor were evaluated to identify the noise sensitive receptor sites that may be impacted by traffic noise associated with the proposed improvements. Under the existing 2016 conditions, the residences in the Centre Lake Apartments remain the only nearby noise sensitive sites with potential to be impacted by the planned improvements. The residences in the complex are found in single-story buildings that generally each contain eight to ten units. For residences such as these apartments, noise levels are evaluated for exterior areas where frequent exterior human use is likely to occur and where a lowered noise level would be of benefit. Noise levels were predicted for the 36 apartments located nearest to the planned improvements and that are the most likely to be affected by traffic noise.

Noise levels in this document represent the hourly equivalent sound level [Leq(h)]. The Leq(h) is the steady-state sound level, that contains the same amount of acoustic energy as the actual time-varying sound level over a one-hour period. The Leq(h) is measured in A-weighted decibels [dB(A)], which closely approximate the range of frequencies a human ear can hear.

The FHWA has established NAC for seven land use activity categories. The NAC have been updated slightly from the criteria used in the original PD&E Study. The most recent (July 2010) NAC levels are presented in **Table 1**. These criteria determine when an impact occurs and when consideration of noise abatement is required. Maximum noise level thresholds have been established for five of these activity categories. These maximum thresholds, or criteria levels, represent acceptable traffic noise level conditions. Noise abatement measures must be considered when predicted noise levels approach or exceed the NAC levels or when a substantial noise increase occurs. The FDOT defines "approach" as within one dB(A) of the FHWA criteria. A substantial noise increase is defined as when the existing noise level is predicted to be exceeded by 15 dB(A) or more as a result of the transportation improvement project.

**Table1 Noise Abatement Criteria  
[Hourly A-Weighted Sound Level-Decibels (dB(A))]**

| ACTIVITY CATEGORY | ACTIVITY Leq(h) <sup>1</sup> |      | EVALUATION LOCATION | DESCRIPTION OF ACTIVITY CATEGORY  |
|-------------------|------------------------------|------|---------------------|---|
|                   | FHWA                         | FDOT |                     |   |
| A                 | 57                           | 56   | Exterior            | Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.   |
| B <sup>2</sup>    | 67                           | 66   | Exterior            | Residential   |
| C <sup>2</sup>    | 67                           | 66   | Exterior            | Active sports areas, amphitheatres, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails and trail crossings. |
| D                 | 52                           | 51   | Interior            | Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools and television studios.   |
| E <sup>2</sup>    | 72                           | 71   | Exterior            | Hotels, motels, offices, restaurants/bars and other developed lands, properties or activities not included in A-D or F.   |
| F                 | -                            | -    | -                   | Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical) and warehousing.   |
| G                 | -                            | -    | -                   | Undeveloped lands that are not permitted.   |

*(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 a design standard for noise abatement measures.  
<sup>2</sup> Includes undeveloped lands permitted for this activity category.  
*Note:* FDOT defines that a substantial noise increase occurs when the existing noise level is predicted to be exceeded by 15 decibels or more as a result of the transportation improvement project. When this occurs, the requirement for abatement consideration will be followed.

**Predicted Noise Levels**

The predicted Design Year (2040) traffic noise levels with the revised project improvements and updated traffic data are presented in **Table 2**. The predicted traffic noise levels are expected to range from 59.1 dB(A) at second-row apartments to 67.0 dB(A) at apartment units nearest the project. Exterior areas at 11 apartments are now predicted to be impacted by the planned improvements. Given the predicted traffic noise impacts with the revised improvements planned with this project, noise abatement was reconsidered for the Centre Lakes Apartments.

**Table 2 Predicted Traffic Noise Levels**

| REPRESENTATIVE MODEL RECEPTOR | NUMBER OF NOISE SENSITIVE SITES | LOCATION (Station) | DISTANCE TO NEAREST TRAFFIC LANE* | PREDICTED TRAFFIC NOISE LEVEL [Leq(h), dB(A)] |
|-------------------------------|---------------------------------|--------------------|-----------------------------------|---|
| CL-1(FR)                      | 1                               | 98+70              | 35                                | <b>67.0</b>                                   |
| CL-2(FR)                      | 1                               | 99+20              | 40                                | <b>66.3</b>                                   |
| CL-3(FR)                      | 2                               | 100+50             | 30                                | <b>66.6</b>                                   |
| CL-4(FR)                      | 2                               | 101+50             | 25                                | <b>66.7</b>                                   |
| CL-5(FR)                      | 2                               | 102+40             | 25                                | <b>66.6</b>                                   |
| CL-6(FR)                      | 2                               | 103+30             | 20                                | <b>66.6</b>                                   |
| CL-7(FR)                      | 1                               | 104+50             | 20                                | 65.3  |
| CL-8(FR)                      | 1                               | 105+20             | 20                                | <b>66.0</b>                                   |
| CL-9(SR)                      | 2                               | 98+70              | 70                                | 62.1  |
| CL-10(SR)                     | 2                               | 99+20              | 70                                | 61.8  |
| CL-11(SR)                     | 2                               | 100+20             | 70                                | 60.2  |
| CL-12(SR)                     | 4                               | 100+90             | 70                                | 59.3  |
| CL-13(SR)                     | 4                               | 101+90             | 65                                | 60.4  |
| CL-14(SR)                     | 4                               | 102+90             | 60                                | 61.0  |
| CL-15(SR)                     | 2                               | 103+70             | 60                                | 61.8  |
| CL-16(SR)                     | 2                               | 104+50             | 60                                | 59.1  |
| CL-17(SR)                     | 2                               | 105+20             | 65                                | 63.6  |

**Notes:** Bolded numbers indicate noise levels approaching or exceeding the FHWA NAC. \*=Distance in nearest 5 foot increment

**Noise Abatement Analysis**

The FDOT requires that the reasonableness and feasibility of noise abatement be considered when the NAC is approached or exceeded. The most common and effective noise abatement measure for an apartment complex such as Centre Lakes Apartments is construction of a noise barrier along the limited-access ROW line or along the roadway shoulder. Noise barriers reduce noise by blocking the sound path between a roadway and a noise sensitive area. To be effective, noise barriers must be long, continuous, and have sufficient height to block the path between the noise source and the receptor site.

A wide range of factors are used to evaluate the feasibility and reasonableness of noise abatement measures. Feasibility primarily concerns engineering considerations such as access, drainage, utilities, safety or maintenance, and the ability to construct a noise barrier using standard construction methods and techniques while reducing noise levels by at least 5 dB(A) to the impacted receptor sites.

Reasonableness implies that common sense and good judgment were applied in a decision related to noise abatement. A reasonableness analysis includes consideration of the cost of abatement, the amount of noise abatement benefit, and the consideration of the viewpoints of the impacted and benefited property owners and residents. To be deemed reasonable, a noise barrier must, at a minimum, meet two important FDOT criteria:

- The estimated construction cost cannot exceed the FDOT’s reasonable cost criteria of \$42,000 per benefited receptor site; and,
- According to the FDOT’s noise reduction reasonableness criteria, the noise barrier must reduce noise levels by at least 7 dB(A) at one or more impacted receptor sites.

The location of the noise barrier evaluated for the Centre Lake Apartments is shown in **Figure 2**. The following discussion provides the details of the feasibility and reasonableness analysis for noise barriers considered for each of the impacted sites.

**Centre Lake Apartments Noise Barrier**

The SR 9/SR 7 connector is located at-grade; however, the nearby PNR access ramps for I-95 increase in elevation west to east in order to cross over SR 7 and I-95. Various conceptual noise barrier designs were evaluated to determine the most effective location, length and height that will achieve the desired noise level reduction at reasonable cost. The results of the noise barrier analysis are summarized in **Table 3**.

**Table 3 Center Lake Noise Barrier Design Concepts**

| DESIGN CONCEPT | HEIGHT (feet) | LENGTH* (feet) | NUMBER OF IMPACTED RECEPTORS | NOISE REDUCTION FOR IMPACTED RECEPTORS [AVERAGE (Maximum)] | NUMBER OF BENEFITED RECEPTORS IMPACTED (Total) | NOISE REDUCTION FOR ALL BENEFITED RECEPTORS [AVERAGE (Maximum)] | ESTIMATED COST† (Per Benefited Site) |
|----------------|---------------|----------------|------------------------------|--|--|---|--------------------------------------|
| CL-CD1         | 10            | 1,115          | 11                           | 6.4 (6.7)  | 10 (15)  | 6.2 (7.2)   | \$334,500 (\$22,300)                 |
| CL-CD2         | 11            | 1,015          | 11                           | 8.8 (9.2)  | 10 (17)  | 7.9 (9.2)   | \$365,400 (\$21,494)                 |
| CL-CD3         | 12            | 925            | 11                           | 8.5 (9.0)  | 10 (15)  | 7.9 (9.0)   | \$333,000 (\$22,200)                 |
| CL-CD4         | 13            | 965            | 11                           | 9.1 (9.7)  | 10 (31)  | 7.3 (9.7)   | \$376,350 (\$12,140)                 |
| <b>CL-CD5</b>  | <b>14</b>     | <b>925</b>     | <b>11</b>                    | <b>9.4 (10.2)</b>  | <b>10 (31)</b>                                 | <b>7.7 (10.2)</b>   | <b>\$388,500 (\$12,532)</b>          |

Notes: \* - Rounded to nearest five-foot increment, † - Based on \$30/Square-Foot, CL-CD5 is the recommended noise barrier alternative.

A 14-foot tall, 925-foot long noise barrier located along the shoulder of the SR 9/SR 7 connector was determined to be the most feasible noise abatement alternative for these apartments. This noise barrier design concept, referred to as CL-CD5, provides the greatest balance of noise level reduction, benefit to impacted residences, reasonable cost and minimized visual impact, while also providing the most effective blocking of the line-of-sight between the traffic on the nearby connector roadway and the apartments.

This noise barrier concept is predicted to reduce noise levels at the benefited sites by an average of 7.7 dB(A) and a maximum of 10.2 dB(A). This noise barrier design concept is expected to benefit 10 of the nearby impacted residences and 21 non-impacted residences (incidentally). It was not

possible to benefit the one remaining impacted site. The estimated cost of this noise barrier design concept, based on FDOT's standard noise barrier unit cost estimate of \$30 per square-foot, is \$388,500 overall and \$12,532 for each benefitted site.

Of all of the noise barrier design concepts assessed, this concept provides the most reasonable combination of noise abatement performance and cost. This noise barrier design concept attains the FDOT's noise reduction design criteria of at least a 7 dB(A) reduction for at least one impacted receptor site. At this time, it appears that the noise barrier can be constructed using standard construction methods and there are no known utilities or drainage conflicts that would affect its construction feasibility. Based on these results, noise barrier design concept CL-CD5 is recommended for further consideration and public input.

### **Conclusion and Recommendations**

The Design Phase traffic noise analysis has been conducted for an FDOT project to improve the existing Golden Glades Multimodal Transportation Facility at the Golden Glades Interchange in North Miami. The purpose of this analysis was to update the results of the project's 2006 PD&E Phase noise analysis, including an evaluation of design changes implemented since completion of the PD&E Phase. Exterior areas associated with residences at the Centre Lakes Apartments are the only nearby noise sensitive site with the potential to be impacted by traffic noise due to the planned improvements.

The predicted Design Year (2040) traffic noise levels are expected to range from 59.1 to 67.0 dB(A). Exterior areas at 11 apartments are now predicted to be impacted by the planned improvements. Given the predicted traffic noise impacts with the revised improvements planned with this project, noise abatement was reconsidered for the Centre Lakes Apartments. A 14-foot tall, 925-foot long noise barrier located along the shoulder of the SR 9/SR 7 connector was determined to be the most feasible noise abatement alternative for these apartments. This noise barrier design is recommended for construction as a part of the overall project.

### **Public Involvement**

In accordance with FDOT policy, the FDOT will survey the benefitted property owners and residents prior to project construction to determine their viewpoints regarding the proposed noise barrier. Also, FDOT's policy is to weigh the opinions of property owners at 90%; whereas those of the residents renting apartments are weighted at 10%. Furthermore, primary emphasis will be given to the benefitted property owners and residents immediately adjacent to the proposed noise barrier. An initial meeting was held with a representative of the owners of the Centre Lake Apartments. Further coordination with the property owners as well as with the tenants will occur as the project progresses towards construction.

### **Construction Noise**

During construction of the project, there is the potential for noise impacts to be substantially greater than those resulting from normal traffic operations due to the heavy equipment typically used to build roadways. In addition, construction activities may also result in increased vibration

levels. The project area includes residences that should be considered sensitive to noise and vibration associated with construction activities. Construction noise and vibration impacts will be minimized by adherence to the controls listed in the latest edition of the FDOT's *Standard Specifications for Road and Bridge Construction*.

According to Section 335.02 of the Florida Statutes, the FDOT is exempt from compliance with local ordinances. However, it is the FDOT's policy to follow the requirements of local ordinances to the extent that is considered reasonable. Also, the contractor will be instructed to coordinate with the project engineer and the District Six Noise Specialist, should unanticipated noise or vibration issues arise during project construction.

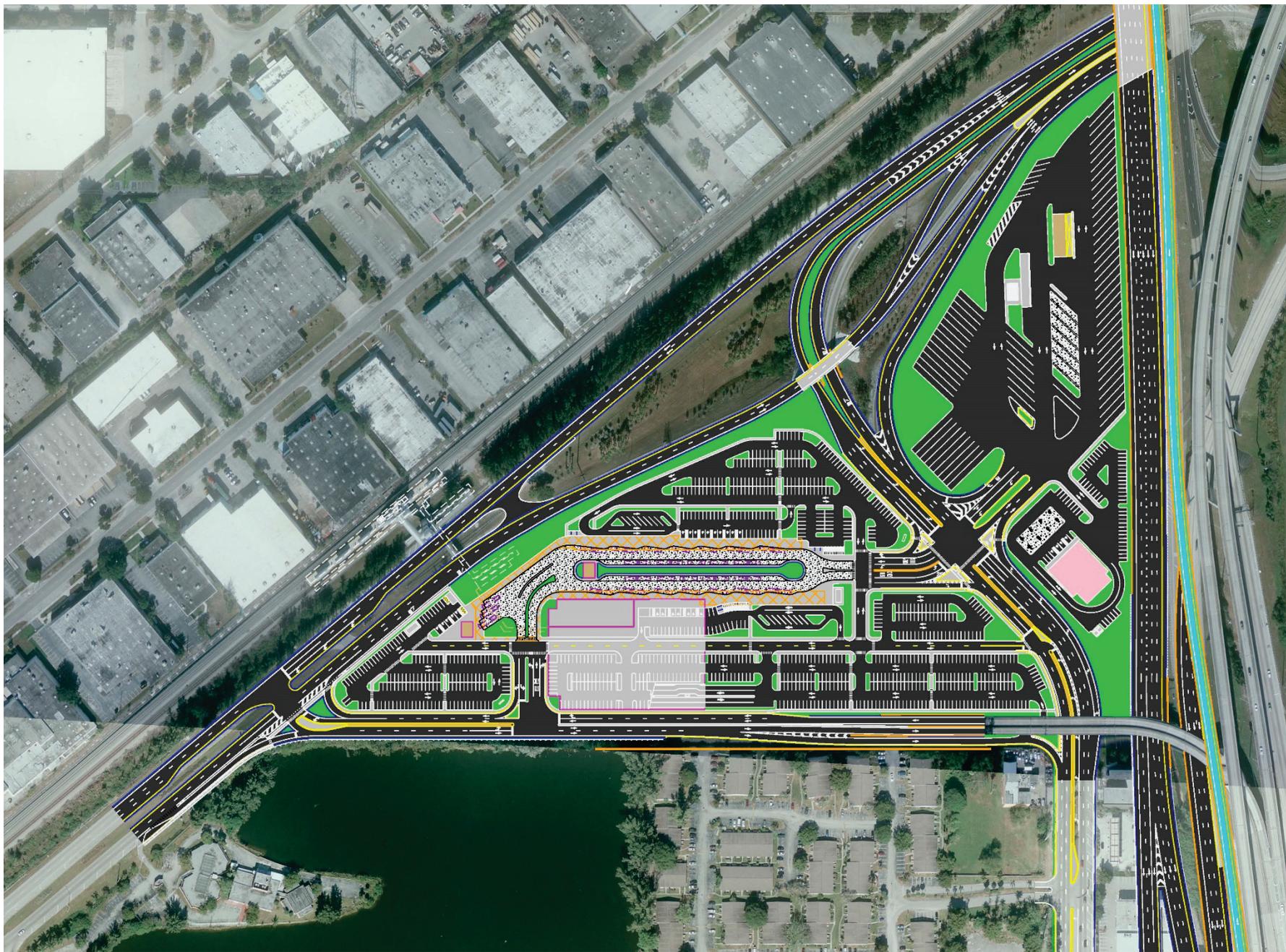


Figure 1 - Project Location Map

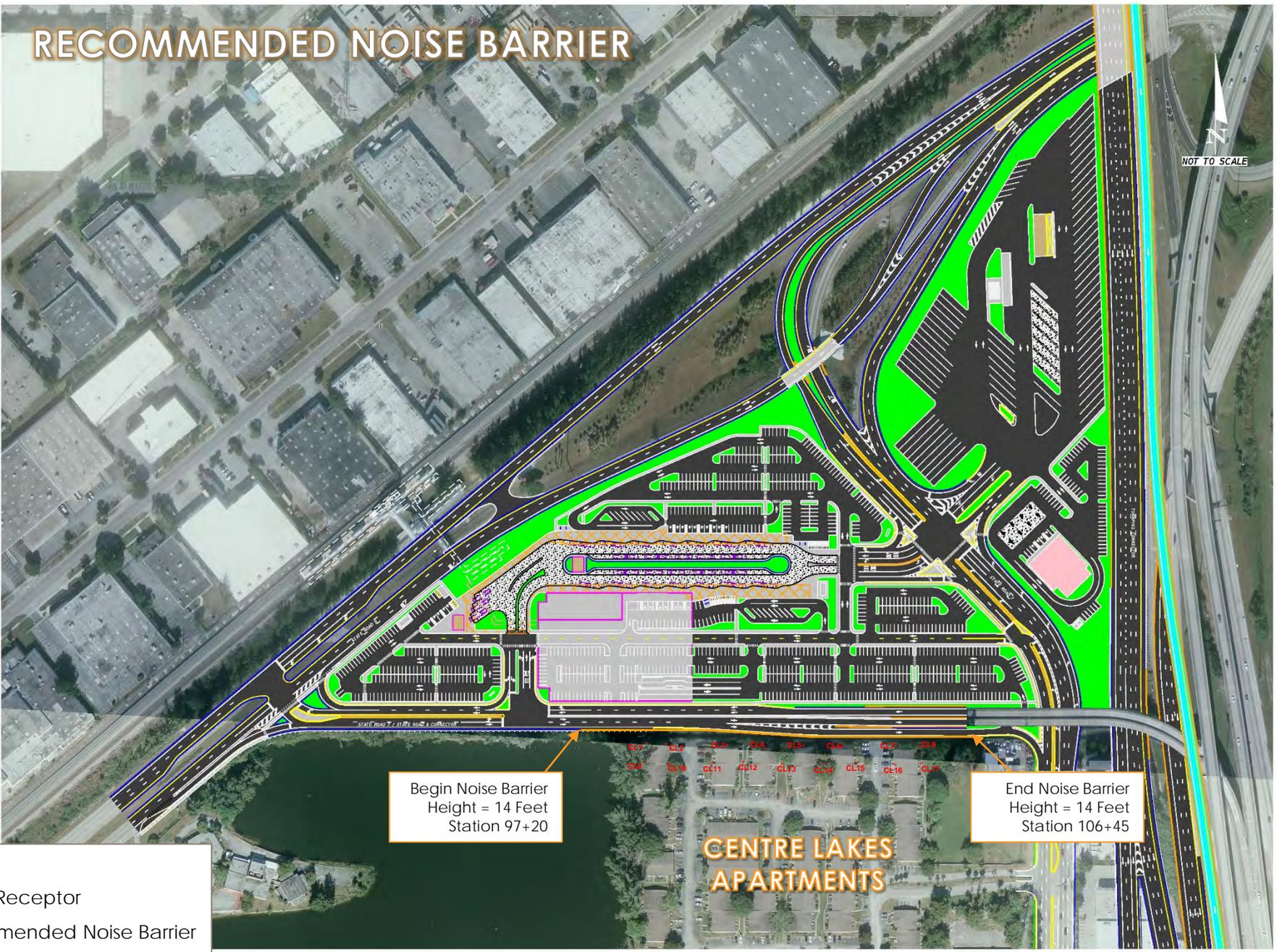


Figure 2 - Recommended Noise Barrier