

To: Bill Walsh FDOT District 5 Environmental Manager

From: Mike Drauer, Stantec Consulting Inc.

RE: I-4 Beyond the Ultimate Segment 3 Noise Study: Vera Luxury Apartments

The I-4 Beyond the Ultimate (BtU) PD&E Project received the Environmental Document and Record of Decision on August 24, 2017. Segment 3, (from East of SR 434 to East of SR 15–600/US 17-92) was one of the three segments that was included in the analysis that resulted in the approval of the Evaluation and Assessment of the I-4 Ultimate and Beyond the Ultimate 2002 FEIS and RODs (2002 and 2005). The noise study that was a part of the analysis for Segment 3 was completed prior to the Public Hearing which was held on November 14, 2016. The study did not include the Vera Luxury Apartments which had not begun construction at that time but did have approved permits prior to date the Environmental Document was approved. Since the permits were obtained prior to the date of public knowledge for the study, this apartment complex must be assessed for traffic noise impacts. This memo documents the review and analysis of the potential impacts related to traffic noise from the project on the Vera Luxury Apartments.

Background

If future design-year noise levels at noise-sensitive receptors approach, meet, or exceed the Noise Abatement Criteria established by FHWA in 23 CFR 772 or increase 15 dB(A) over existing noise levels as a direct result of the transportation improvement project, noise abatement must be considered. The Federal Highway Administration's (FHWA) Traffic Noise Modeling (TNM) Version 2.5 computer program was used to determine if noise impacts are predicted. If predicted noise levels approach or exceed Noise Abatement Criteria (NAC) or a substantial increase is to occur (greater than 15 dB(A)), noise abatement must be considered. The format and content of this analysis are based on the procedures and policy established in Part 2, Chapter 18 "Noise", of the FDOT PD&E Manual (revised June 2017) and on the regulatory material found in 23 Code of Federal Regulations (CFR), Part 772, and entitled "Procedures for Abatement of Highway Traffic Noise and Construction Noise", which are available from the FHWA and FDOT.

This study was conducted to analyze the Vera Luxury Apartment located at 4856 Veracity Point, Sanford, Florida for potential noise impacts related to the proposed I-4 BtU project.

FDOT is proposing to reconstruct and widen I-4 as part of the I-4 BtU concept. This involves the build-out of I-4 to its ultimate condition through Central Florida, including segments in Polk, Osceola, Orange, Seminole and Volusia Counties. The project limits for the segment analyzed in this study are within an approximate 10-mile segment of I-4

which extends from east of SR 434 (Milepost 4.050) to east of US 17-92 (Milepost 14.135) in Seminole County.

The concept design proposes the addition of two new express lanes in each direction, resulting in a total of ten dedicated lanes for the majority of the I-4 Segment 3 corridor [6 general use lanes (GUL) + 4 express lanes (EL)]. The section of I-4 from the begin project limits to just south of Lake Mary Boulevard will have three GUL and one auxiliary (aux) lane in each direction, resulting in a 12-lane section (6 GUL + 2 Aux + 4 EL) through this portion of the corridor. Although, the interstate is a designated east-west corridor, the alignment follows a southwest to northeast orientation through the limits of Segment 3. The study area in Segment 3 from east of SR 434 to east of US 17-92 includes the interchanges at Lake Mary Boulevard, CR 46A, SR 417 (Seminole Expressway)/SR 429 (future Wekiva Parkway), SR 46 and US 17-92.

Noise Analysis

The Vera Luxury Apartments consists of 3 large multi-story buildings that are some distance away from I-4, in addition to 8 two-story buildings that are located parallel to I-4. Each of the eight building contain units with balconies either on the first or second floor of the building. These balconies were used as the receptor point for each unit.

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

Roadway Segment	Level of Service "C" Volume	Cars	Medium Trucks	Heavy Trucks	Speed
Auxiliary Outside	6,009	1429	49	98	65
General Use Outside Middle		1429	49	97	65
General Use Inside Middle		1429	0	0	65
General Use Inside		1429	0	0	65
Express Outside	3,320	1660	0	0	65
Express Inside		1660	0	0	65

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

The receptors for this analysis are all Activity Category B (residential) under the Noise Abatement Criteria methodology meaning that the approach Activity Leq(h) is 66 dB(A).

Roadway engineering data was provided from the current design plans for I-4 BtU Segment 3 and incorporated into the TNM 2.5 Model. The plans indicate that the roadway curve located adjacent to the apartments will be constructed with super elevation, producing a condition where the nearest traffic lanes will be elevated significantly higher than the current conditions.

The TNM Model was run to and predicted noise impacts of greater than 66 dB(A) at 17 receptors within the Vera Luxury Apartments.

The FHWA requires that various noise abatement measures be considered for a proposed project when the predicted noise levels exceed noise abatement criteria, or, will increase substantially over existing levels. In order for a barrier to be feasible, it must provide a reduction of at least 5 dBA to an impacted receptor site. Additionally, in order for a noise barrier to be considered acoustically feasible, at least two impacted receptor sites must achieve a 5dBA reduction or greater. When a noise abatement measure such as a sound barrier is determined to be feasible, the reasonableness is then evaluated. This implies 'common sense' and 'good judgment' were applied in a decision related to noise abatement. Three reasonableness factors must be collectively achieved in order for the noise abatement measure to be deemed reasonable: the achievement of the noise reduction design goal (7dBA per FDOT criteria), the cost effectiveness of the noise abatement measure, and the consideration of the viewpoints of the benefited property owners and residents. When examining the cost reasonableness of a modeled noise barrier design for a residential area, the upper limit of \$42,000 per benefited receptor has been set by FDOT using the standard construction cost of \$30.00 per square foot where approximately 1,400 square feet of noise barrier is provided per benefited receptor. A benefited receptor is defined as a noise sensitive site that will obtain a minimum of 5 dBA of noise reduction as a result of a specific noise abatement measure whether or not they are predicted as having a noise impact. Only benefited receptor sites can be included in the calculation of a barrier being cost reasonable.

As noise barriers are the most suitable type of abatement in this situation, a Barrier Analysis was conducted using the TNM 2.5 Model. Two barrier scenarios were modeled: a ground mounted barrier near (within 10 feet) of the I-4 Right-of-Way, and a shoulder-mounted barrier located at the edge of the proposed shoulder of the roadway. The ground mounted barrier was modeled using heights ranging from 16 feet to 22 feet, while the shoulder mounted barrier was modeled at either 8 feet or 14 feet in height.

The results of the barrier analysis indicated that a 22 foot high ground mounted barrier would not provide the necessary abatement (at least 2 receptors having a noise reduction of at least 5 dB(A), with at least one receptor gaining 7 dB(A) or more) to meet the desired noise goal.

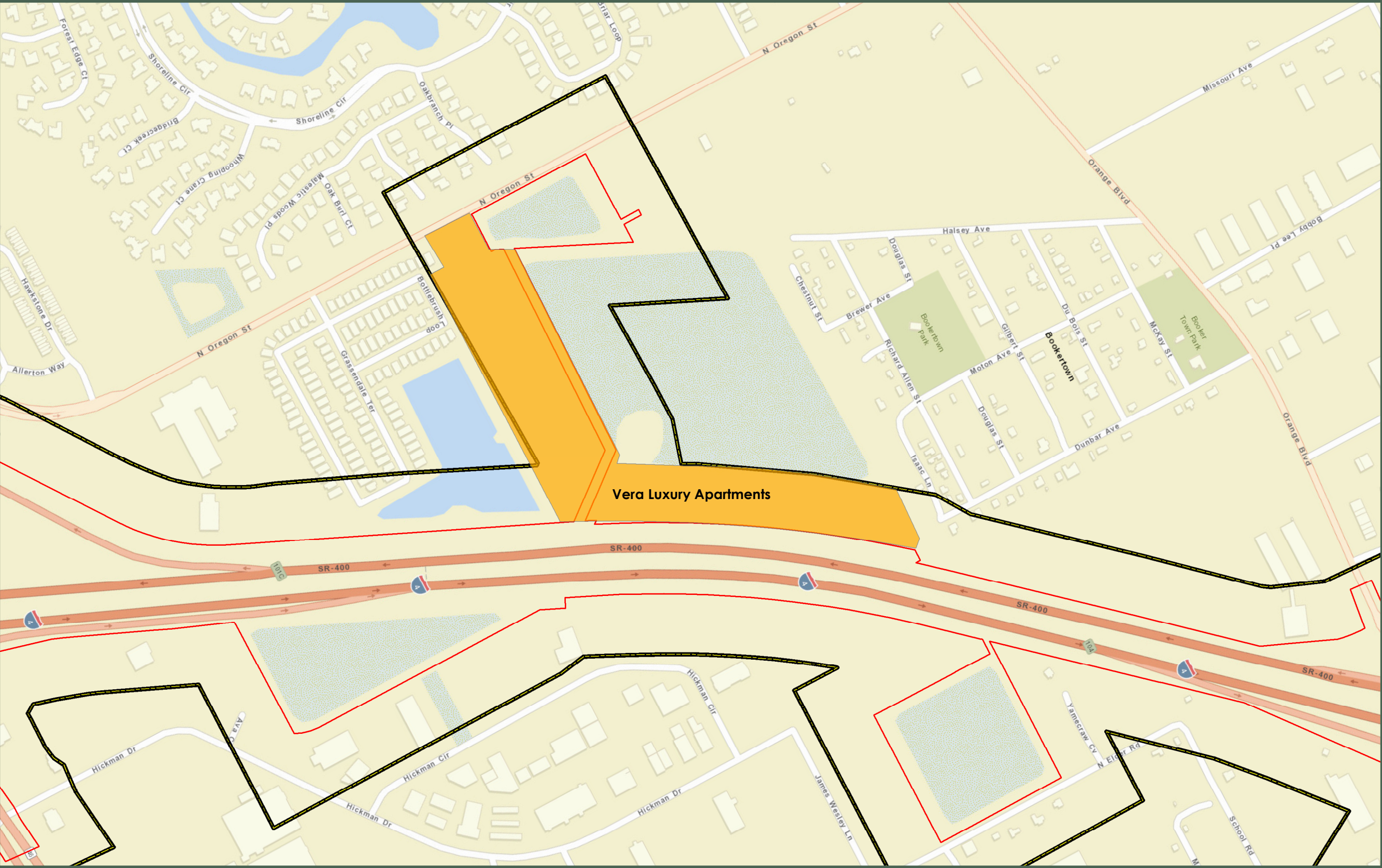
The 8 foot shoulder mounted barrier did not provide the necessary abatement either. However, a 14 foot shoulder mounted barrier provides a benefit to all 17 impacted receptors, and a benefit to an additional 60 receptors that are not predicted to be impacted. The 14 foot tall barrier modeled was 1,831 feet in length, with a total cost of \$769,101, for an average cost of \$9,988 per benefited receptor. This barrier configuration is both feasible and cost reasonable to provide abatement to the Vera Luxury Apartments and is recommended for further consideration and public input.

Barrier Analysis Table

Barrier Type	Height (feet)	Length (feet)	# of Impacted Receptor	# of Impacted Benefited Receptor	# of Non-Impacted Benefited Receptor	Total # of Benefited Receptors	Avg. Noise Reduction (dBA)	Cost (\$30.00 per square foot)	Average Cost per Benefited Receiver	Comment
Ground	22	1808	17	2	13	15	5.1	\$1,193,197	\$79,546	Not cost reasonable, no receptor 7dB or greater
Shoulder	14	1831	17	17	60	77	7.1	\$769,101	\$9,988	Cost Reasonable, meets Noise design Goal
Shoulder	8	1831	17	0	0	0	n/a	\$439,486		Does not achieve benefited receivers or meet noise design goal

Conclusion

A 14 foot-tall, 1,831 foot long shoulder mounted barrier provides at least a 5 d(B)A reduction to 77 receptors, at a cost of \$9,988 per benefited receptor. This barrier configuration is recommended for further consideration and public input for the next phase of the I-4 BtU project.



Map Key

- SR 400 (I-4) PD&E- Segment 3 Limits**
- SR 400 Beyond the Ultimate-Segment 3 Study Area
- SR 400 Segment 3 R/W (12/11/2015)
- Vera Luxury Apartments (Parcel Limits)

Supplemental Noise Analysis Memo: Vera Luxury Apartments

Client/Project:
 Florida Department of Transportation- D5
 SR 400 (I-4) Beyond the Ultimate PD&E Study
 Segment 3: SR 400/Interstate 4 (I-4) from One Mile East of SR 434 to East of SR 15-600/US 17-92

Project Location:
 77160 Seminole County 79110 Valusia County
 Begin: STA 2043+71.32 - MP 4.05 STA 2578+48.33 - MP 0.0
 End: STA 2578.48.33 - MP 14.135 STA 2583+0.00 - MP 0.086

Prepared by: mLeonard 12/12/2018
 Technical Review by: mDrauer 12/12/2018
 Independent Review by: jMoore 12/12/2018

Coordinate System: NAD 1983 StatePlane Florida East FIPS 0901 Feet

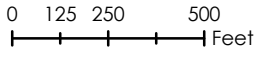


Figure A - Vera Luxury Apartments Location Map



Map Key

- SR 400 (I-4) PD&E - Segment 3 Limits
- SR 400 Beyond the Ultimate - Segment 3 Study Area
- SR 400 Segment 3 R/W (12/11/2015)
- Proposed Wall (Cost Reasonable)
- Noise Sensitive Receptors (NSR)
 - Benefited Receptor (5 dB(A) or more)
 - Not Benefited

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 Independent Review by: Moore 12/6/2018

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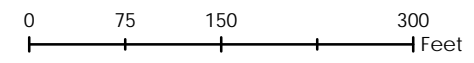


Figure B - Vera Luxury Apartments Noise Barrier Analysis Map